Glass Half Full or Half Empty? Activists, Short Sellers, and Disagreement[*]

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Abstract

We study events in which activist hedge funds and short sellers target the same stock, using European data on activism and mandatory disclosures of large short positions. The likelihood of activist targeting and the probability of a successful campaign are higher in the presence of large short sellers, with an even larger effect when investor disagreement is high. Hedge fund activism is associated with a reduction in short interest but it does not affect the likelihood of a large short position. Finally, we show that hedge fund activism generates higher abnormal returns when large short sellers are present, especially when activists achieve their stated goals.

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

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

1 Introduction

Activist hedge funds have recently become an important force in corporate decision-making (e.g., 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" (Edmans (2009)). Another group of sophisticated investors, short sellers, also target struggling firms with underperformance. However, they hold the opposite view to activists, believing that shares are overvalued and expecting prices to decrease further (e.g., Jones and Lamont (2002), Asquith et al. (2005), and Cohen et al. (2007)). Short sellers are able to forecast price decreases as a result of private information acquisition (Karpoff and Lou (2010)) or better interpretation of public information (Engelberg et al. (2012) and Porras Prado et al. (2016)), therefore generating positive abnormal returns.

Short sellers and activist hedge funds often "agree to disagree" by targeting the same company, as evidenced by the dispute between activist Carl Icahn and short seller William Ackman over Herbalife Ltd., a nutritional supplements company.[1] The literature on investor disagreement emphasizes differences of opinion and the role of unsophisticated investors (see, e.g., Hong and Stein (2007) for a survey).[2] Given the prominent role of activist hedge funds and short sellers in stock markets, how do these sophisticated investors react to each other's presence? Do investment decisions change? Is their profitability affected?

We provide the first analysis of events where activist hedge funds and large short sellers simultaneously target the same company. Our study builds on a comprehensive sample covering 648 activist campaigns in Europe between January 2010 and December 2019, merged with hand-collected data on 14,646 large short positions. The data on large short selling positions

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[1]The fight between activist Bruce Berkowitz and short seller David Einhorn over St. Joe Company is another notable event. The "long-short battle" involving GameStop in January 2021 can also be seen in a similar light, although many of the activists targeting GameStop were retail investors active on Reddit.

[2]Varian (1985) and Morris (1995) adopt a heterogeneous priors approach, in which agents are endowed with different beliefs and do not rationally update their beliefs after observing each other's trading decisions. Harris and Raviv (1993) and Kandel and Pearson (1995) assume that agents observe the same information but interpret it using different models. In the latter setting, beliefs can diverge more when more information becomes available.

come from the European Union ("EU") requirement that any short positions exceeding 0.5% of shares outstanding must be disclosed to the public across all EU members after November 2012.[3]

Following the EU's regulatory change, short sellers must publicly disclose their positions in a stock if the holdings are above a certain threshold, allowing other market participants to learn from short sellers' trading decisions more quickly. In turn, such announcements may attract activist hedge funds, who typically rely on public information to identify potential targets (Brav et al. (2019)). Like short sellers, activists often invest in struggling companies, such as those with poor management supported by a complacent board (Brav et al. (2008)). If the activist holds the belief that her intended corporate actions, such as a change in board composition or management, are not properly reflected in the firm's stock price, she has an incentive to target the firm. Furthermore, stocks with high short selling demand typically underperform the market (Asquith and Meulbroek (1995) and Drechsler and Drechsler (2014)), which helps lower activists' initial costs of accumulating a sizable position (Gantchev and Jotikasthira (2018)).

We therefore hypothesize that activist hedge funds are more likely to launch campaigns in firms involving large short sellers. We show that the presence of large short sellers has a positive effect on the likelihood of activist targeting, controlling for aggregate short selling and firm characteristics. The probability of an activist campaign is 0.12% percentage points higher when a large short seller is involved in the previous quarter, equivalent to a marginal increase of 24.5%. Aggregate short selling activity also positively predicts an activist intervention, but its marginal effect is smaller relative to large short sellers' stakes. This suggests that activist hedge funds pay attention to and learn from large short sellers' disclosures.

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[3]France, Spain, and the United Kingdom, already had disclosure rules in place before the EU-wide regulation was implemented (Jones et al. (2016)). The United Kingdom required short sellers of financial-sector stocks to disclose positions exceeding 0.25% since January 2009. In France, since February 2011, all short positions larger than 0.5% had to be disclosed on 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.

Next, we examine whether activists tend to target firms with large short positions when overall investor disagreement is high. Hong and Stein (2007) attribute high trading volume to investor disagreement. Therefore, for stocks with a high level of disagreement the presence of investors with a pessimistic view (i.e., large short sellers) is more likely to attract investors with the opposite belief, including activist hedge funds. Following Diether et al. (2002) and Boehme et al. (2006), we proxy for investor disagreement using the dispersion of analysts' earnings forecasts. Each quarter, we assign stocks into five quintiles based on the dispersion measure from the previous quarter. We find that relative to firms in a given quintile, firms in the next quintile are 0.17 percentage points more likely to be targeted by activists when large short sellers are present in the previous quarter, which translates into a marginal increase of 29.8% in targeting probability. This result is consistent with Cookson et al. (2021), who find that disagreement among retail investors is associated with more activist trading.

We find no evidence that the presence of activist hedge funds predicts subsequent new large short positions or increases in existing ones. Activists' holdings are typically much larger than individual short sellers' stakes (9.0% vs. 2.1% of outstanding shares in our sample) and activists also tend to form "wolf packs" to coordinate their strategy with smaller followers in engaging target management (Brav et al. (2019)). This increases the risk of a "short squeeze" that forces short sellers to cover their positions at unfavorable prices (e.g., the Herbalife and Gamestop episodes), potentially making short selling less desirable.

One potential concern about our analysis is that an activist's decision to target a particular company might be related to firm characteristics that are also used by short sellers when deciding to short the stock. Using propensity score matching, we create a randomized sample based on observed covariates and repeat our analysis, obtaining similar results in the matched-sample. It is even more critical to ensure that our results are not driven by endogeneity concerns due to unobserved variables or reverse causality. To this end, we use the EU's harmonization of short selling disclosure rules in November 2012. This provides a plausible exogenous shock to estimate how activism is affected by the availability of information about the presence of large short sellers. Prior to the regulatory harmonization being implemented, several EU countries

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— France, Spain, and the United Kingdom — already had alternative short selling disclosure regimes in place (Jones et al. (2016)). We find that after November 2012, firms in EU countries without prior disclosure requirements had a higher likelihood of activist campaigns relative to firms in countries 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 also more likely to have individual large short sellers but they were unknown to the market before the regulatory harmonization took place.

We then examine if the presence of large short sellers affects the probability that an activist campaign is successful and the returns to such actions. When a stock is targeted by both large short sellers and activist hedge funds, we expect that corporate managers are more likely to accept activists' demands and implement their proposals. This increases the probability of success as managers try to mitigate the negative effects of short selling on share price, which can affect managerial compensation (De Angelis et al. (2017)) and the ability of the firm to invest (Goldstein and Guembel (2008) and Campello et al. (2018)). Consistent with prior studies (Brav et al. (2008) and Becht et al. (2017)), we find that an activist campaign announcement is followed by an average positive abnormal return of 5.28% during the period between 10 days before and 10 days after the announcement. Consistent with our hypothesis, the cumulative abnormal returns are higher for stocks with at least one large short seller (6.90%) than for those without a large short position (4.79%).

Finally, to analyze the effect of the presence of large short sellers on the profitability of hedge fund activism, we employ a calendar-time portfolio approach. We calculate the abnormal returns of portfolios that buy all stocks with an unresolved activist campaign on a given day based on Carhart (1997)'s four-factor model, using several sample splits. The portfolio that buys all target stocks *with* the presence of large short sellers in the previous quarter has a value-weighted abnormal return equal to 15.8% per year. In contrast, the portfolio that buys target stocks *without* any large short position generates an annualized return of only 4.5%, and this estimate is not statistically insignificant. In summary, the presence of large short sellers is associated with positive abnormal returns. 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 higher abnormal returns when large short sellers also target the stock.

We also form double-sorted portfolios, conditional on campaign outcome and the presence of large short positions. While this is not an implementable strategy, we expect 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.

Our study contributes to several strands of literature. First, the paper contributes to a growing body of work on hedge fund activism that examines short-term 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 (Appel et al. (2018), Kedia et al. (2017), Gantchev and Jotikasthira (2018), 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 profitability.

Second, our work also relates to a large literature on the negative relationship 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 highlights that investment decisions are affected by investor disagreement (e.g., Miller (1977), Morris (1995), Chen et al. (2001), and Diether et al. (2002)), especially

among informed investors with opposing views about the firm value. Our result that activists tend to target firms with large short positions when overall investor disagreement increases is also consistent with Cookson et al. (2021), who find that disagreement among retail investors predicts more activist trading.

2 Hypothesis Development

This section develops our empirical hypotheses about the interaction between short selling and hedge fund activism.

Hypothesis 1a: *The likelihood of being targeted by an activist campaign is higher for stocks with large disclosed short positions.*

Hypothesis 1b: *Activist hedge funds are more likely to target stocks with disclosed short positions when investor disagreement is high.*

If activists disagree with short sellers about the expected value of the firm (e.g., Harris and Raviv (1993), Kandel and Pearson (1995), and Hong and Stein (2007)), the presence of large short sellers may change an activist's decision to include a firm in the set of potential targets. For example, this happens when the activist believes that the result of a campaign — such as a change in board composition or the replacement of a CEO — is not properly reflected in the stock price.

Activist hedge funds often target struggling companies, using public information to identify targets and acquire shares, and hope to increase equity value through their engagement with the firms' management (Brav et al. (2019)). Gantchev and Jotikasthira (2018) view activist targeting as a multi-step screening process, the first steps of which are based on the firm's fundamental characteristics and corporate policies. After identifying an initial set of firms that may benefit from activism, activists prefer firms with affordable prices (e.g., relatively low valuation multiples) given their investment constraints.

Short sellers' aggregate activity forecasts negative abnormal returns by exploiting private information (Asquith and Meulbroek (1995) and Drechsler and Drechsler (2014)). The possession of detailed shorting information enables other market participants to learn about a stock's future performance. For example, after the harmonization of disclosure requirements by the EU in November 2012, Jank and Smajlbegovic (2015) find that stocks exhibit lower abnormal risk-adjusted performance following disclosures of large short positions. This effect is present even after controlling for the aggregate level of short selling. As a consequence, an activist investor also has an incentive to use the presence of large short positions when selecting stocks as potential targets for activism.

Prior work has described the relationship between disagreement and trading volume (Karpoff (1986) and Hong and Stein (2007)). Investors trade more often when there is more disagreement about the firm value, with a larger number of optimistic and pessimistic investors willing to commit capital. This leads us to hypothesize that the effect of large short sellers on the likelihood of hedge fund activism is greater for stocks with a high level of disagreement.

Hypothesis 2: *The likelihood of short sellers initiating a new position or increasing an existing position is unrelated to the presence of an activist hedge fund.*

In a similar fashion, the arguments for the previous hypothesis can also be used to motivate why the decision by large short sellers to target stocks may be affected by the presence of an unresolved activist campaign. However, the effect of activism on short sellers' decisions is less clear. The increase in stock prices observed after an activist campaign announcement would make the stock more overvalued from a short seller's perspective, leading to an increase in the probability of a large short sale position. However, short sellers may be reluctant to initiate a new position, or increase an existing one, after one or more activist hedge funds have targeted a company. Activist hedge funds' holdings are typically much higher than an individual short seller's stake (9.0% vs. 2.1% of the outstanding stock in our sample). As pointed out by Brav et al. (2019) activists also tend to 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. Therefore, the sign of the effect depends on the relative strength of each factor.

If activist hedge funds change their investment decisions in response to knowledge about the presence of large short sellers, a natural extension is to investigate activism success and the returns to activism. This motivates our last hypotheses:

Hypothesis 3a: *Activists are more likely to achieve their stated goals (or success) when large short sellers are present.*

Hypothesis 3b: *The returns to hedge fund activism are higher for stocks with large short positions, especially when activists achieve their stated goals.*

Hypothesis 3a is motivated by how the underperformance of stocks following an increase in short selling activity has negative consequences for the share prices (Jones and Lamont (2002)). These prompt 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)) or to lower managerial compensation due to lower share prices. This is 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 shocks of trading decisions.

When a stock is targeted by both large short sellers and activist hedge funds, we expect that corporate managers are more likely to settle with the activist and implement her proposals, mitigating the negative effects of short selling and increasing the probability of campaign success. As activism is found to lead to higher returns (Brav et al. (2008)), we also expect

to observe higher returns for campaigns with large short positions. If short sellers exit or cover their positions, returns to activism improve, especially in stocks with successful activist interventions where the activists achieve their stated goals.

3   Data

3.1   Hedge Fund Activism

As there is no 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 activist campaigns in Europe between 2010 and 2019 from Activist Insight, which specializes in activist investing.[4] The data are collected from company disclosures through their investor relations' webpages and/or stock exchanges in the EU.[5] This step leads to a preliminary list of 971 activist campaigns involving 524 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, 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 305 additional campaigns that are not covered by Activist Insight.

In the final step, for each of the 1,276 events, if it exists in more than one database we compare the disclosure dates, outcome dates, and activist ownership. When there are discrepancies, we

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[4]When we purchased the data, Activist Insight collected only a limited number of activist campaigns for 2018 and 2019. Data for these two years are being updated.

[5]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%.

read the original company disclosures and conduct news searches in Factiva using the activist and target company names as key words if the company disclosures are not available. Overall, our sample focus on the 843 events that are launched by 501 unique hedge funds.[6] In the Appendix, we repeat our main analysis using the remaining 433 events launched by individual investors, corporations, and other entities, and compare the results with our main results.

To the best of our knowledge, our sample of 843 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.

3.2 European Short Selling Disclosures

During the 2008 financial crisis, regulators across the world 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.

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

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."[7] The disclosure 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)).

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).[8] 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 stock being shorted. We develop country-specific Python algorithms to retrieve all relevant large short selling position data for these markets to create a comprehensive dataset of European short selling disclosures.

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

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

3.3 Equity Lending and Aggregate Short Selling

The data used to measure aggregate short selling activity is 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) and Porras Prado et al. (2016)). 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 the 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. *On Loan*, defined as the end-of-quarter quantity of shares borrowed as a percentage of shares outstanding, is our proxy for aggregate short selling activity in a given stock.

3.4 Other Data Sources

We merge data from several other sources with our sample. Financial accounting and stock return information are from Compustat Global. Institutional ownership data are from Thomson Eikon. Analysts' earnings estimates are from I/B/E/S. Our final sample includes 6,603 firms with available stock prices and accounting measures for our sample period from January 2010 to December 2019. Of these 6,603 unique firms, 6.1% are targeted by activist hedge funds at least once and 24.5% involve at least one large short seller.

4 Descriptive Statistics

4.1 Activist campaigns

In Table 1, we present summary statistics for activist campaigns in Europe. In Panel A, we report statistics on activist campaigns, broken down by target country, and a number

of country-level metrics related to activism. First, the 648 activist campaigns are unevenly distributed across countries, with 68.1% concentrated in just three countries: the United Kingdom, Germany, and Italy. Second, about 70% of all the campaigns are launched by European activists. However, in 60.8% of the campaigns the activist is a foreign hedge fund (either based in other European countries or on other continents), often a U.S. one (27.8% of the cases). For instance, all campaigns in Italy are launched by foreign hedge funds. In contrast, only 38.0% of events in the United Kingdom involve foreign funds, with most of them coming from the U.S. Third, success rates exhibit large differences across countries, even among countries with the largest number of events (e.g., 72.7% for Italy and only 59.3% for the United Kingdom). We also find similarities across countries. Although there is some dispersion in activist ownership, it is smaller 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, (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, over 55.2% of all campaigns are related to corporate governance, with the sale of firm or assets ranking the second (21.1%). Outcomes are available for 94.3% of the campaigns, approximately 61.4% of which are successful in which activists achieve at least one

of their stated goals. The overall success rate is close to that found for campaigns taking place in the U.S. (Brav et al. (2008) and He and Li (2018)).

In untabulated analysis, we find that the average dollar investment is \$303.47 million, substantially greater than the median dollar investment of \$34.79 million, while the difference between the average (9.01%) and median (5.42%) percent ownership is less dramatic. This suggests that the distribution of target size is skewed. The level of ownership is comparable to that reported in the U.S. sample (Brav et al. (2008) and Gantchev (2013)).

4.2   Large short positions and aggregate short interest

Table 2, Panel A shows summary statistics on large short selling positions across European markets. Of the 6,603 stocks in our sample, 1,648 stocks are shorted by 1,237 unique large short sellers between January 2010 and December 2019. Among all countries, the United Kingdom has the largest number of large short selling positions, where 581 stocks are shorted by 468 unique short sellers. For 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, Panel B reports aggregate short interest for our sample firms, including both firms with and without large short positions. The average short interest is 0.87% while the median is 0.08%. Firms in larger markets generally involve a higher short interest, such as those in Netherlands and United Kingdom, while smaller markets, such as Greece and Hungry, see little short activity.

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Table 2 About Here

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4.3   Target company characteristics

In Table 3, we present statistics for the target companies. Columns (1)-(3) report the average, median, and standard deviation for major firm characteristics, and columns (4)-(7) show the differences with two alternative sets of matched firms. In columns (4)-(5), each firm targeted

by an activist is matched to other firms in the same 6-digit GICS industry and year. In columns (6)-(7), the matched firm is the one with the closest market capitalization in the same 6-digit GICS industry and year as the target.

Relative to industry-year matched companies, firms targeted by activist hedge funds are more likely to involve large short positions. 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. Interestingly, target companies are larger than non-targets in Europe, consistent with Becht et al. (2017). Compared with peers in the U.S., 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, implying that one major goal of activists is to reduce undervaluation of target firms. 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 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 other firm characteristics' differences have lower statistical significance.

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TABLE 3 ABOUT HERE

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5 Short-Selling Disclosures and Hedge Fund Activism

5.1 Activism following short-selling disclosures

We start our analysis by testing Hypothesis 1a, which states that the likelihood of hedge fund activist campaigns increases with short selling disclosures. Our regression specification has the

following form:

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

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 4. We also include a proxy for end-of-quarter aggregate short interest (*On Loan*), which controls for the effect of aggregate short interest on activist targeting decisions. Country-fixed effects are captured by the parameter ψ_c and time-fixed effects by θ_t. Standard errors are clustered at the firm level.

In Table 4, Panel A we report the estimation results. Columns (1) and (3) report the probit coefficients and their associated marginal probabilities. Columns (2) and (4) report coefficients from a linear probability model with country and time fixed effects. Since the results between the probit and linear probability models are qualitatively similar, for brevity we focus our discussion on the probit model.

<center>TABLE 4 ABOUT HERE</center>

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 0.12 percentage points higher when a short seller is involved in the previous quarter (significant at the 5% level), which amounts to 24.5% of the unconditional probability of targeting. Similarly, a one standard deviation increase in large short interest is associated with a 0.04 percentage-point increase in hedge fund activism. Relative to the

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unconditional probability of activism of 0.49%, 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 comparing 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]

The effects of the other firm controls largely confirm our univariate results 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, and dividend yields. This suggests that activists aim to reduce underperformance and seek higher payouts. Importantly, activists are more likely to target firms with more institutional holders, whose support is crucial for them to achieve their goals (Jiang et al. (2018) and Brav et al. (2010)).

5.2 Investor disagreement, Shorting, and Activism

To test whether activists are more likely to target firms with large short positions when investor disagreement is high (Hypothesis 1b), we extend Equation (1) by adding an interaction term of last quarter's *D(Large Short)* and proxies for differences of opinion among investors. Following Diether et al. (2002) and Boehme et al. (2006), we proxy for disagreement using analyst forecast dispersion, defined as the standard deviation of one-year ahead earnings forecasts scaled by the absolute value of the mean earnings forecast.[10] We also use an alternative forecast dispersion measure, which equals the standard deviation of one-year ahead earnings forecasts scaled by

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[9]A one standard deviation increase in aggregate short interest is associated with a 0.03 percentage-point increase in hedge fund activism. This amounts to 6.34% of the unconditional probability of targeting.

[10]Each stock must be covered by two or more analysts during a quarter otherwise analyst forecast dispersion is undefined. Many stocks are also not covered by I/B/E/S. Similar to La Porta (1996), we find no evidence that the performance of stocks in the I/B/E/S sample is different from those in Compustat Global.

the absolute value of the actual earnings figure.[11]

Each quarter, we assign stocks into five quintiles based on analyst forecast dispersion in the previous quarter. Stocks in the first quintile have the lowest dispersion, while the fifth quintile includes stocks with the highest dispersion. For ease of interpretation, we scale the quintile numbers 1 to 5 by 100 before running regressions. As shown in Table 5, compared to firms in a given quintile, firms in the next quintile are 0.17-0.18 percentage points more likely to be targeted by activists if a large short seller is present in the previous quarter. This amounts to 29.8-31.6% of the unconditional probability (0.57%) of targeting and is significant at the 5% level. In sum, as predicted by Hypothesis 1b, we find that the effect of large short sellers on the likelihood of being targeted by an activist campaign increases with differences of opinion.

5.3   Changes in Short Positions following Activism

Next, we examine if the likelihood of short sellers establishing a new position or increasing an existing short position is related to the presence of an activist hedge fund. Our specification takes the following form:

$$
\begin{aligned}
D(\Delta(\textit{Large Short})> 0)_{i,c,t} \;\; = \;\; & \alpha + \beta D(\textit{Activist Targeting})_{i,c,t-1} \\
& + \gamma' \mathbf{X}_{i,c,t-1} + \psi_c + \theta_t + \epsilon_{i,c,t},
\end{aligned}
\tag{2}
$$

in which $D(\Delta(\text{Large Short}) > 0)$ is a dummy variable equal to one if a short seller enters a new position or increases an existing short position in firm i in country c in quarter t; zero otherwise. $D(\textit{Activist Targeting})$ 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

---

[11]We obtain qualitatively similar results when replacing one-year ahead earnings forecasts with two-year ahead earnings forecasts to calculate analyst forecast dispersion measures.

Equation (1). As shown in Table 6, the results from both the probit and linear probability models suggest that the presence of an activist does not affect subsequent shorting decisions. If anything, the effect is slightly negative, although it is not statistically significant at the 10% level. As expected, we also find that more aggregate short selling is positively related to the likelihood of observing a large short position in a stock. Using estimates in column (1c), we calculate that a one standard deviation increase in *On Loan* is associated with a 9.8 percentage-point increase in the marginal probability of having a large short seller, equivalent to the unconditional probability of being targeted by a large short seller.

TABLE 6 ABOUT HERE

While hedge fund activism is not associated with the subsequent presence of large short sellers, it may change the aggregate supply of 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 shown in Table 7, activism negatively predicts aggregate short selling in the quarter following an activist campaign announcement. Using the estimates in column (1c), we find that the presence of activists is associated with a 4.7 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) finds that lending supply is lower following the disclosure of a 13D filing by activists targeting U.S. firms. Table 8 shows that European activist campaigns are also associated with a lower probability of higher lendable supply, with the marginal probability being 7.7 percentage points.

TABLES 7 AND 8 ABOUT HERE

Overall, there results suggest that while aggregate short selling activity is negatively related to the presence of hedge fund activists, large short sellers do not reduce their positions. While both large and small short sellers observe the same public signal (i.e., the activist campaign announcement), they appear to react differently. This is consistent with differences of opinion models in which investors "agree to disagree (e.g., Harris and Raviv (1993) and Kandel and Pearson (1995)).

5.4   Propensity Score Matching

One potential issue with the methodology used in the previous section is that firms targeted by activists (i.e., the "treated" groups) 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 a hedge fund activist. 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-neighbour method without replacement and obtained 2,254 observations with different weights. In the first stage, we adopt 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 employ the same control variables used in Table 4, namely, firm size (*Size*), *M/B*, *ROA*, *Leverage*, the cumulative stock return in the previous 12 months (*Return*), the dividend yield, and Amihud's (2002) *ILLIQ* measure. We also constrain matched observations to be in the same country and year.

In the full sample, we can see that the treated and control groups have very different characteristics. Firms targeted by activists tend to be larger in size, more leveraged, with higher

returns in the past 12 months, and less liquid. After matching, we have a propensity score of 0.006 for the treated and 0.004 for the control firms. The p-value of the difference is equal to 0.640, rejecting the hypothesis that the joint distribution of covariates of the treated and the control groups is different. This suggests that the matching algorithm correctly identifies non-target firms that have a similar propensity to be targeted by activists as those that are actually targeted.

In Table 9, 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. We observe that, after matching, treated and control firms still exhibit statistically significant differences in short selling measures. However, all differences in the control variables are no longer statistically significant at the 5% level. We also perform the propensity score matching algorithm to the likelihood of being targeted by a large short seller, showing the results in Appendix Table A.

<u>TABLE 9 ABOUT HERE</u>

In Table 10, we use the matched sample to re-estimate the regressions discussed in Subsections 5.1 and 5.3. Our main findings remain unchanged, i.e., firms shorted by large short sellers are more likely to be targeted by activist hedge funds. We also find that stocks with higher aggregate short selling intensity are more likely to be targeted by activist hedge funds. Like found in the unmatched sample, the presence of activists is not related to the likelihood that large investors will short sell the stock, as shown in Table 11.

<u>TABLES 10 AND 11 ABOUT HERE</u>

Overall, the evidence presented in subsections 5.1 to 5.4 supports our hypotheses that activist hedge funds are more likely to target a firm when large short sellers are present, especially when overall investor disagreement is high. However, the reverse is not true: short-selling decisions are unaffected by an activist campaign. Based on these results, in the remainder of this paper

we focus our attention on how short sellers affect hedge fund activism and the returns of firms targeted by activists.

5.5   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 to short the stock. This raises concerns about reverse causality and simultaneity, which cannot be addressed by matching estimators and potentially bias our estimates. In this subsection, we employ the harmonization of short selling regulation across the European Union as our identification strategy to mitigate these concerns.

The European Union's harmonized short selling disclosure requirements became effective on November 1st, 2012 for all member countries. Before this date a few countries —- France, Spain, and the United Kingdom — had already implemented alternative large short selling disclosure regimes (Jones et al. (2016)). 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. Relative to stocks in countries that already had disclosure requirements in place (i.e., France, Spain, and the United Kingdom), stocks in countries 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. The reform is likely to affect activists' targeting decisions because it allows hedge fund activists to have better knowledge about the composition of short sellers. For example, a stock with only 0.25% of its outstanding shares being lent out would not have any large short positions that require disclosure after November 2012. Furthermore, firms with a higher *aggregate* short interest before November 2012 are also more likely to have large *individual* short positions. In turn, this makes treated firms with large ex-ante aggregate shorting positions to be even 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 estimate the following linear probability model:

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

We use quarterly data in the two years before and after November 2012, with a total of 38,494 stock-year-quarter observations. The indicator variable $Post$ equals one for periods after November 2012, when the disclosure rule is in effect, and zero otherwise. $Treat$ equals one if a stock is traded in EU countries other than France, Spain and the United Kingdom and zero otherwise. $On\ Loan$ proxies for end-of-quarter aggregate short selling (SS).

The main parameter of interest is captured by δ_1. A positive δ_1 indicates that stocks in the treatment group (i.e., $Treat=1$) are more likely to be targeted by activists after the large short selling disclosure requirement was implemented (i.e., $Post=1$). Certain specifications include country fixed effects (ψ_c) and year-quarter fixed effects (θ_t). We note that adding these fixed effects make time-invariant variable $Post$ and country-invariant variable $Treat$ redundant, eliminating them from the estimation output.

We present the estimated coefficients in Table 12. The estimates under column (1) show that the cross-product ($Post \times Treat$) is positive and statistically significant at the 5% level. This implies that firms in countries without prior short selling disclosure requirements become more likely to be targeted by activists *after* November 2012, when regulation was harmonized across

---

[12]We find that 25.2% of stock-quarter observations in the top quintile of $On\ Loan$ (i.e., aggregate short interest) have a large short position disclosed, but only 0.2% for those in the bottom quintile of $On\ Loan$. The correlation between aggregate short selling and an indicator for large short positions is 0.6 in our sample.

EU countries.[13] The estimated coefficient represents an marginal increase of 0.3% in targeting probability, an economically significant effect given the unconditional sample targeting probability is 0.31%.

<div align="center">

TABLE 12 ABOUT HERE

</div>

In column (2), we include aggregate short interest and the triple interaction terms 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. The estimated coefficient is statistically significant at the 5% level. The results are robust to the inclusion of time-fixed effects and country-fixed effects in columns (3) and (4). 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 higher for firms with a higher ex-ante short interest.

6 Short Positions, Activists' Success, and Profitability

6.1 Short positions and Activist Success

In the previous section we establish that the presence of large short sellers increases the likelihood that a hedge activist targets the firm. We turn to investigating if activists are more likely to be successful in their campaigns and to generate abnormal returns following the campaign.

To examine whether the presence of large short sellers affects the success of activist campaigns, we replace the dependent variable in Equation (1) with *D(Activist Success)*. This is an indicator variable equal to one if an activist achieves at least one stated goal of the campaign;

---

[13]In unreported results, we find evidence that the parallel trends assumption is not violated. In other words, the difference in activist targeting probability between the two groups in the pre-treatment period (*Post*=0) is not significantly different from zero.

zero otherwise. The sample includes all activist interventions with available covariates in our sample.

As shown in column (1) of Table 13, the presence of large short sellers is associated with a 19.2 percentage-point increase in activists' success probability, with the coefficient estimate being significant at the 1% level. Similarly, in column (3) we find that a one standard deviation increase in the quantity shorted by large short sellers is associated with a 9.1 percentage-point in success likelihood. These results rationalize activists' targeting decisions: not only they are attracted to stocks targeted by large short sellers, but they are more likely to be successful in achieving their campaign objectives.

<div align="center">
Table 13 About Here
</div>

6.2 Short positions and Activist Profitability

We now examine the profitability of activist campaigns and how it is affected by the presence of large short sellers. To motivate our formal test, in Figure 2 we plot the cumulative buy-and-hold abnormal returns, defined as the buy-and-hold return of the company in excess of the MSCI Europe index return, using a window from 10 days before an activist campaign announcement to 20 days after the announcement. Approximately five days prior to the announcement date, the difference between the cumulative abnormal returns (red line) of firms with at least one large short position in the previous quarter becomes larger than that of companies without any large short position (blue line).

<div align="center">
Figure 2 About Here
</div>

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 and annualized by multiplying the daily estimated alpha by 252. 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).[14] Standard errors are based on the Newey-West HAC estimator with seven lags (Newey and West (1987)).

In Table 14, 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 (1)-(4), we report 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 with large short sellers and to be successful in the campaign. The annualized alpha in column (1) for campaigns initiated with large short positions is 15.8% and statistically significant, while in column (3) we find that campaigns without the presence of large short sellers exhibit a lower abnormal return of 4.5%, which is not significant at the 10% level. In columns (5)-(8) 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 14 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 (1)-(4) show that the presence of large short sellers is associated with positive abnormal performance regardless whether the campaign is successful ($B + S$) or not ($B + U$), with the average return being higher for successful ones. These results are consistent with Hypothesis 2.

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

In addition, the results from columns (5)-(8) 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.

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 and the probability that a campaign is successful. In contrast, the presence of activist hedge funds does not predict subsequent shorting decisions, potentially attributable to heightened short-squeeze risk. Furthermore, we show that activists tend to target firms with large short positions when overall investor disagreement is high.

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, firms in EU countries without prior disclosure requirements exhibit an increase in the likelihood of activist campaigns relative to those that had existing disclosure rules (i.e., France, Spain, and the United Kingdom). Furthermore, this effect is more pronounced for stocks with larger aggregate short selling intensity.

Lastly, we find that activists' campaigns are more likely to be successful in the presence of large short sellers and earn higher abnormal returns. A calendar-time portfolio approach shows that hedge fund activism generates higher abnormal returns when large short sellers are present, especially when activists achieve their stated goals. This rationalizes activists' decisions to launch campaigns more frequently in stocks targeted by large short sellers.

Our results 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. Our conclusions are also relevant for the regulatory discussion on the disclosure requirements for short sellers.

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Figure 1.

This figure plots the annual number of activism campaigns (left axis) in Europe from 2010 to 2017 and the associated success rate (right axis). A campaign is deemed as successful if the activist achieved their stated goals, and it is a partial success if the activist reached at least one stated goal.
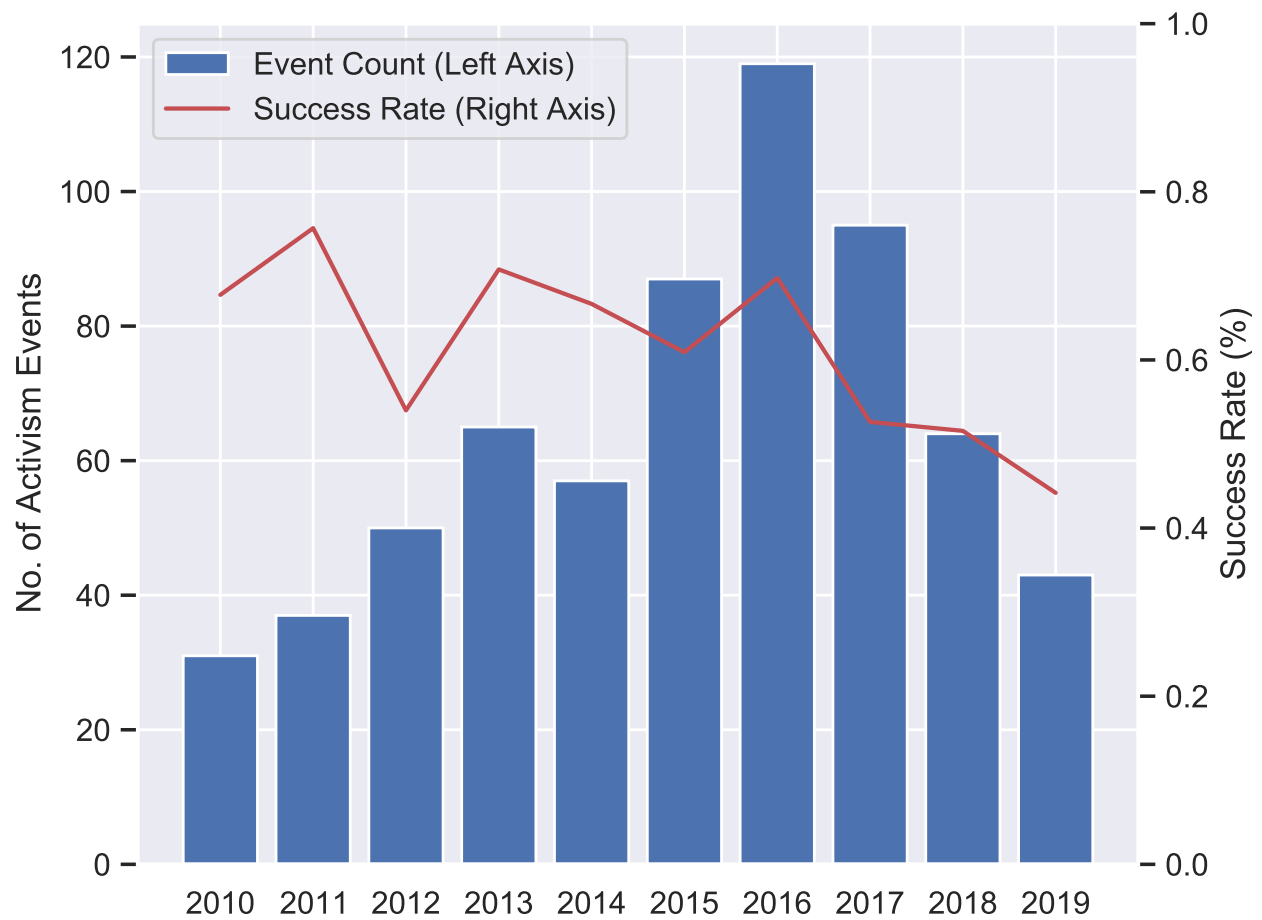
Figure 2. Buy-and-Hold Abnormal Returns around Activist Announcements
This figure plots cumulative buy-and-hold abnormal returns from 10 days before to 20 days after the activist campaign announcement. Abnormal return is defined as the buy-and-hold return of the firm in excess of the buy-and-hold return of the MSCI Europe index. The yellow line represents the average cumulative return for firms with at least one large short position in the previous quarter before the activist announcement. The blue line represents the average cumulative return for firms without any large short position.
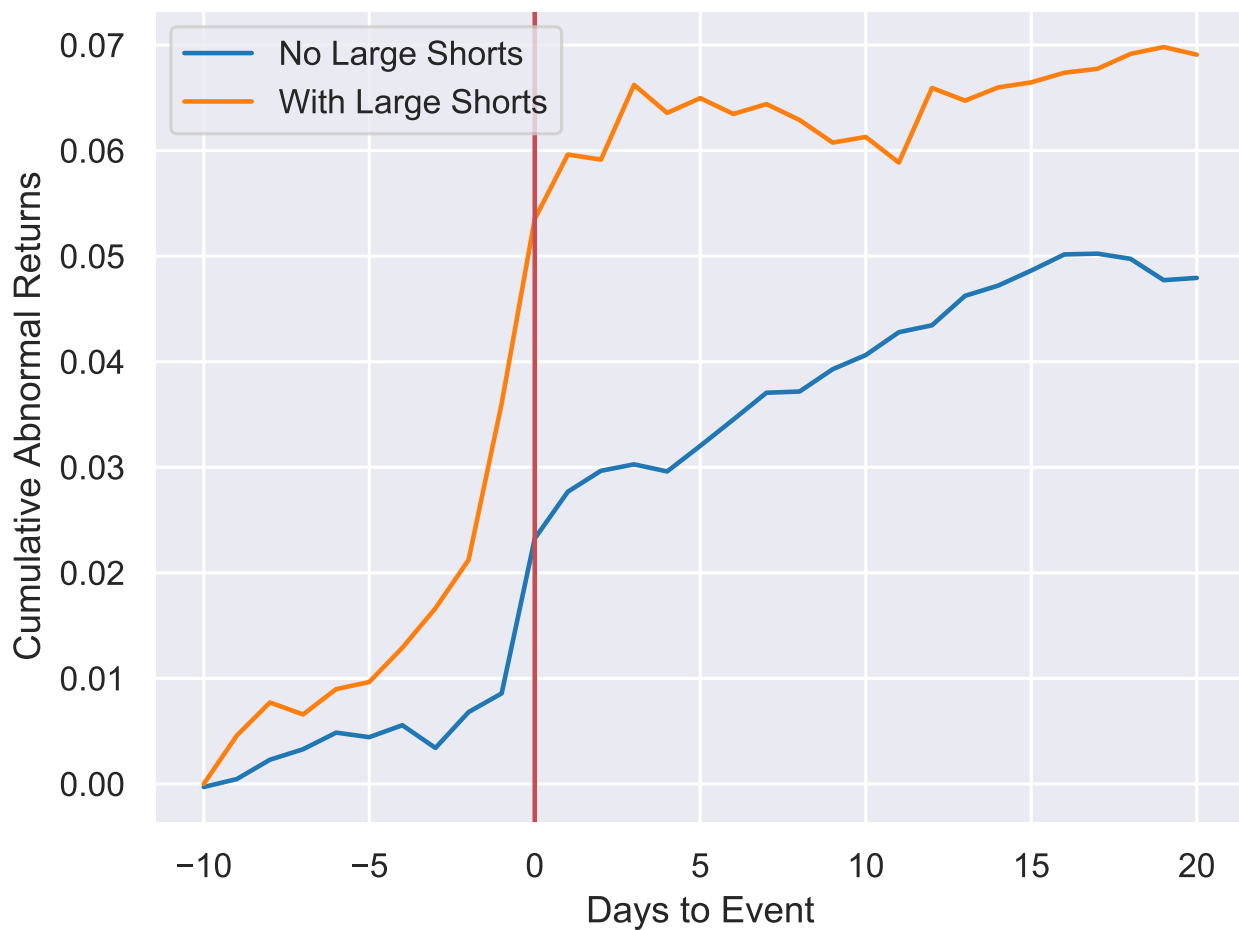
Table 1

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 as 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	No. of events	Percent by foreign activists	Percent by U.S. activists	Activist ownership	Success rate
Austria	12	100.0%	0.0%	10.4%	58.3%
Belgium	3	100.0%	0.0%	-	0.0%
Cyprus	2	100.0%	0.0%	44.6%	50.0%
Denmark	5	100.0%	40.0%	3.0%	80.0%
Finland	13	76.9%	7.7%	10.8%	92.3%
France	38	73.7%	39.5%	3.7%	34.2%
Germany	81	72.8%	29.6%	10.8%	56.8%
Greece	2	50.0%	0.0%	37.6%	50.0%
Ireland	17	94.1%	23.5%	6.9%	58.8%
Italy	55	100.0%	18.2%	4.0%	72.7%
Luxembourg	6	100.0%	16.7%	10.7%	50.0%
Netherlands	24	95.8%	66.7%	4.8%	58.3%
Norway	14	85.7%	35.7%	6.3%	64.3%
Poland	30	56.7%	16.7%	8.2%	90.0%
Portugal	1	0.0%	0.0%	-	100.0%
Spain	14	92.9%	21.4%	8.1%	78.6%
Sweden	24	62.5%	41.7%	13.5%	75.0%
United Kingdom	305	38.0%	27.5%	10.1%	59.3%
Rest of the EU	2	50.0%	0.0%	0.5%	0.0%
The EU	648	60.8%	27.8%	9.0%	61.4%

Panel B: Types of activist demands

Type	No. of events	Percent of all events	Success rate
Business strategy	70	10.8%	61.4%
Capital structure	73	11.3%	58.9%
Corporate governance	358	55.2%	68.2%
Oppose merger	94	14.5%	51.1%
Sale of firm or assets	137	21.1%	61.3%
General undervaluation	22	3.4%	54.5%

Table 2
Short Selling in Europe
In Panel A, we report country-level statistics on large short selling positions between November 2012 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	350	151	2.05%	0.54%	1.10%	2.37%	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	1,237	1,648	2.06%	0.59%	1.18%	2.57%	2.28%

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%	0.11%	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	1.17%	0.00%	0.08%	1.10%	2.43%
France	11,005	589	0.94%	0.00%	0.11%	0.94%	2.00%
Germany	10,142	561	1.29%	0.00%	0.18%	1.34%	2.71%
Greece	1,109	60	0.08%	0.00%	0.00%	0.01%	0.36%
Hungary	213	16	0.00%	0.00%	0.00%	0.00%	0.01%
Ireland	1,298	69	0.54%	0.00%	0.12%	0.54%	2.46%
Italy	7,195	423	0.99%	0.01%	0.14%	0.84%	2.19%
Luxembourg	747	51	1.01%	0.01%	0.19%	0.94%	2.04%
Netherlands	2,802	153	1.74%	0.02%	0.50%	1.77%	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%	0.06%	0.18%
Portugal	799	42	0.93%	0.01%	0.12%	0.81%	2.21%
Spain	3,481	172	1.21%	0.02%	0.30%	1.33%	2.44%
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%	0.64%	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 6-digit GICS Industry, and the difference with firms in the same year, same 6-digit GICS Industry and the closest market capitalization. *Large short interest* is the number of shares shorted by large short sellers divided by shares outstanding. *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 activist 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 $1000\sqrt{|\text{Stock return}|/(\text{Dollar Trading Volume})}$. 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. *Prior 12-month return* and *Amihud illiquidity* are measured at the day immediately 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	
	Mean	Median	Std. Dev.	Avg. diff.	*t*-stat.	Avg. diff.	*t*-stat.
Large short interest	0.004	0.000	0.008	0.003***	18.64	0.001***	2.97
D(Large Short)	0.249	0.000	0.433	0.195***	20.26	0.100***	4.12
On loan	0.021	0.006	0.044	0.012***	11.25	0.006**	2.01
Size ($ billion)	5.027	0.961	9.806	3.430***	14.92	0.332	0.60
M/B	2.136	1.223	4.204	-0.422*	-1.71	-1.035***	-3.07
q	1.505	1.144	1.510	-0.303***	-2.78	-0.507***	-3.56
ROA	0.012	0.020	0.087	-0.065	-0.10	-0.000	-0.06
Leverage	0.381	0.329	0.353	-0.500	-0.15	-0.113	-0.86
Prior 12-month return	0.064	0.028	0.479	-0.097	-0.78	-0.107**	-2.48
Dividend yield	0.011	0.000	0.137	0.004	0.69	0.006	0.96
Amihud illiquidity	5.646	0.894	12.748	-27.209***	-5.14	-3.156**	-2.47
Institutional ownership	0.267	0.255	0.166	0.101***	12.49	0.055***	4.69

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			Linear Probability Model		Probit Model			Linear Probability Model	
	Coefficient (1a)	t-stat. (1b)	Marg. Prob. (1c)	Coefficient (2a)	t-stat. (2b)	Coefficient (3a)	t-stat. (3b)	Marg. Prob. (3c)	Coefficient (4a)	t-stat. (4b)
D(Large short)	0.121**	2.20	0.124	0.002*	1.71					
Large short interest						11.752**	2.44	12.026	0.202**	1.96
On loan	2.398**	2.51	2.458	0.066**	2.47	1.639	1.45	1.677	0.052*	1.80
Size (log $)	0.057***	4.33	0.058	0.001***	3.41	0.058***	4.46	0.059	0.001***	3.49
M/B	-0.019**	-2.46	-0.020	-0.000***	-3.67	-0.019**	-2.47	-0.020	-0.000***	-3.69
ROA	-0.432**	-2.24	-0.443	-0.006**	-2.09	-0.435**	-2.26	-0.445	-0.006**	-2.12
Leverage	0.132*	1.73	0.135	0.002*	1.78	0.133*	1.75	0.136	0.002*	1.78
Prior 12-month return	-0.148***	-2.70	-0.152	-0.002***	-2.96	-0.150***	-2.74	-0.154	-0.002***	-3.00
Dividend yield	-4.703**	-2.32	-4.820	-0.055***	-2.82	-4.684**	-2.31	-4.793	-0.055***	-2.80
Illiquidity	0.000	0.42	0.000	0.000	0.82	0.000	0.40	0.000	0.000	0.81
Year-quarter dummies	Y			Y		Y			Y	
Country dummies	Y			Y		Y			Y	
Observations	86038			86377		86038			86377	
Pseudo R-squared	0.058					0.058				
Adj. R-squared				0.003					0.003	
% (Dep variable = 1)	0.49%			0.49%		0.49%			0.49%	

Table 5
Investor Disagreement, Shorting, and Activism
In this table, we report results on whether investor disagreement, proxied by analyst forecast dispersion, affects the relationship between large short positions and hedge fund activism. The dependent variable is an indicator equal to one if a firm is targeted by an activist in quarter t and zero otherwise. *Dispersion quintile (mean)* is the quintile (1 to 5) for the standard deviation of one-year ahead earnings forecasts in quarter t-1 scaled by the absolute value of the mean earnings forecast. *Dispersion quintile (actual)* is the quintile (1 to 5) for the standard deviation of one-year ahead earnings forecasts in quarter t-1 scaled by the actual earnings figure. 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. 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)	(1)	(2)	(3)	(4)
D(Large Short) × Dispersion quintile (mean)	0.170**	0.160**		
	(2.17)	(2.05)		
D(Large Short) × Dispersion quintile (actual)			0.175**	0.160**
			(2.36)	(2.18)
Dispersion quintile (mean)	0.063**	0.063**		
	(2.23)	(2.23)		
Dispersion quintile (actual)			0.062**	0.062**
			(2.17)	(2.15)
D(Large short)	-0.002	-0.003	-0.003	-0.004*
	(-1.02)	(-1.53)	(-1.28)	(-1.66)
On loan		0.054*		0.051*
		(1.79)		(1.68)
Year-quarter dummies	Y	Y	Y	Y
Country dummies	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y
Observations	50,583	50,583	49,539	49,539
Adj. R-squared	0.003	0.003	0.003	0.003
% (Dep variable = 1)	0.57%	0.57%	0.56%	0.56%

Table 6
Changes in Short Positions Following Activism
In this table, we report results on the effect of hedge fund activism on the occurrence of new or increased large short positions. The sample period runs from November 2012 to December 2019. The dependent variable is an indicator equal to one if a large short seller enters a new position or increases an existing large short position 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(Δ(Large Short)> 0)	Probit Model			Linear Probability Model	
	Coefficient (1a)	t-stat. (1b)	Marg. Prob. (1c)	Coefficient (2a)	t-stat. (2b)
D(Activist targeting)	-0.081	-0.82	-0.993	-0.012	-0.61
On loan	18.206***	41.05	222.648	5.096***	45.36
Size (log $)	0.185***	27.45	2.261	0.021***	20.44
M/B	0.010***	4.70	0.117	0.002***	4.22
ROA	-0.285**	-2.38	-3.486	-0.037***	-3.26
Leverage	0.182***	4.14	2.231	0.028***	4.93
Prior 12-month return	-0.067***	-2.66	-0.818	-0.011***	-3.63
Dividend yield	-1.568***	-2.59	-19.179	-0.192**	-2.23
Year-quarter dummies	Y			Y	
Country dummies	Y			Y	
Observations	87537			87619	
Pseudo R-squared	0.205				
Adj. R-squared				0.163	
% (Dep variable = 1)	9.83%			9.82%	

Table 7

Changes in Aggregate Short Selling Following Activism

In this table, we report results on the effect of hedge fund activism on aggregate short interest. The sample period runs from November 2012 to December 2019. The dependent variable is an indicator equal to one if on loan increases 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 variable: D(Δ(On Loan) > 0)	Probit Model			Linear Probability Model	
	Coefficient (1a)	*t*-stat. (1b)	Marg. Prob. (1c)	Coefficient (2a)	*t*-stat. (2b)
D(Activist targeting)	-0.121*	-1.73	-4.674	-0.045*	-1.73
Size (log $)	0.111***	32.45	4.276	0.041***	34.54
M/B	0.003**	2.35	0.107	0.001**	2.43
ROA	0.155**	1.98	5.993	0.045*	1.72
Leverage	-0.006	-0.28	-0.237	-0.001	-0.19
Prior 12-month return	0.127***	10.93	4.909	0.047***	10.77
Dividend yield	-7.096***	-15.37	-273.784	-2.583***	-16.44
Year-quarter dummies	Y			Y	
Country dummies	Y			Y	
Observations	85,758			85,780	
Pseudo R-squared	0.043				
Adj. R-squared				0.055	
% (Dep variable = 1)	40.26			40.25	

Table 8

Changes in Lendable Supply Following Activism

In this table, we report results on the effect of hedge fund activism on the lendable supply of shares for shorting. The sample period runs from November 2012 to December 2019. The dependent variable is an indicator equal to one if lendable supply as a percentage of outstanding shares increases 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 variable: D(Δ(Lendable) > 0)	Probit Model			Linear Probability Model	
	Coefficient (1a)	t-stat. (1b)	Marg. Prob. (1c)	Coefficient (2a)	t-stat. (2b)
D(Activist targeting)	-0.193***	-2.70	-7.718	-0.070***	-2.71
Size (log $)	0.017***	6.96	0.679	0.007***	7.43
M/B	-0.008***	-7.12	-0.319	-0.003***	-7.28
ROA	-0.075	-1.17	-2.982	-0.025	-1.08
Leverage	0.007	0.40	0.273	0.002	0.34
Prior 12-month return	0.534***	38.60	21.305	0.194***	43.50
Dividend yield	-3.410***	-9.22	-136.052	-1.252***	-9.31
Year-quarter dummies	Y			Y	
Country dummies	Y			Y	
Observations	85,780			85,780	
Pseudo R-squared	0.072				
Adj. R-squared				0.094	
% (Dep variable = 1)	49.98			49.98	

Table 9
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
Size (log $)	Unmatched	20.876	19.952	44.4	8.79	0.000
	Matched	20.876	20.896	-0.9	-0.13	0.900
M/B	Unmatched	2.030	2.773	-19.6	-3.26	0.001
	Matched	2.030	2.031	-0.0	-0.00	0.997
ROA	Unmatched	0.018	0.018	-0.2	-0.04	0.970
	Matched	0.018	0.014	5.3	0.67	0.503
Leverage	Unmatched	0.388	0.334	18.4	3.67	0.000
	Matched	0.388	0.369	6.3	0.83	0.409
Prior 12-month return	Unmatched	0.038	0.124	-19.9	-3.61	0.000
	Matched	0.038	0.048	-2.4	-0.37	0.713
Dividend yield	Unmatched	0.004	0.006	-10.9	-2.01	0.045
	Matched	0.004	0.004	-0.8	-0.12	0.904
Amihud illiquidity	Unmatched	4.254	6.822	-16.7	-2.72	0.007
	Matched	4.254	4.167	0.6	0.09	0.927

Table 10

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			Linear Probability Model		Probit Model			Linear Probability Model	
	Coefficient (1a)	t-stat. (1b)	Marg. Prob. (1c)	Coefficient (2a)	t-stat. (2b)	Coefficient (3a)	t-stat. (3b)	Marg. Prob. (3c)	Coefficient (4a)	t-stat. (4b)
D(Large short)	0.229**	2.17	9.118	0.091**	2.15					
Large short interest						22.652***	2.58	903.681	8.909***	2.58
On loan	4.076**	2.22	162.614	1.584**	2.23	2.578	1.21	102.860	0.998	1.20
Size (log $)	-0.032	-1.28	-1.291	-0.013	-1.26	-0.030	-1.19	-1.189	-0.012	-1.16
M/B	0.004	0.27	0.167	0.002	0.27	0.004	0.28	0.176	0.002	0.29
ROA	0.364	0.79	14.534	0.141	0.80	0.357	0.78	14.259	0.139	0.78
Leverage	0.110	0.75	4.369	0.043	0.74	0.114	0.78	4.563	0.045	0.77
Prior 12-month return	0.036	0.32	1.446	0.014	0.32	0.030	0.27	1.210	0.012	0.26
Dividend yield	-0.495	-0.13	-19.755	-0.198	-0.12	-0.558	-0.14	-22.275	-0.226	-0.14
Illiquidity	0.001	0.31	0.042	0.000	0.31	0.001	0.31	0.041	0.000	0.30
Year-quarter dummies	Y			Y		Y			Y	
Country dummies	Y			Y		Y			Y	
Observations	2254			2254		2254			2254	
Pseudo R-squared	0.014					0.016				
Adj. R-squared				-0.004					-0.003	
% (Dep variable = 1)	50.00%			50.00%		50.00%			50.00%	

Table 11
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 occurrence of new large short positions, 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 large short seller enters a new position 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.

Dep variable: D(Δ(Large Short)> 0)	Probit Model			Linear Probability Model	
	Coefficient (1a)	t-stat. (1b)	Marg. Prob. (1c)	Coefficient (2a)	t-stat. (2b)
D(Activist targeting)	-0.294	-1.08	-11.401	-0.112	-1.06
On loan	-4.909***	-6.27	-190.358	-1.910***	-6.36
Size (log $)	-0.029***	-5.04	-1.130	-0.011***	-4.98
M/B	0.005**	2.18	0.207	0.002**	2.15
ROA	-1.412***	-5.62	-54.748	-0.459***	-6.12
Leverage	0.014	0.22	0.552	0.006	0.24
Prior 12-month return	-0.042	-1.14	-1.611	-0.015	-1.11
Dividend yield	0.276	0.22	10.690	0.097	0.21
Year-quarter dummies	Y			Y	
Country dummies	Y			Y	
Observations	9812			9817	
Pseudo R-squared	0.020				
Adj. R-squared				0.021	
% (Dep variable = 1)	59.21%			59.20%	

Table 12
Heterogeneous Short-Selling Disclosure Requirements
In this table, we report results on the heterogeneous effects of short-selling disclosure requirements in the EU. Our sample is based on data for the two years 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 one if a stock is traded in EU countries other than France, Spain and the United Kingdom 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. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent var: D(Activist targeting)	(1)	(2)	(3)	(4)
Post	0.000	0.001		
	(0.63)	(1.07)		
Treat	-0.001*	-0.001		
	(-1.88)	(-1.29)		
Post × Treat	0.003**	0.001	0.003**	0.001
	(2.41)	(0.93)	(2.41)	(0.91)
Post × Treat × On Loan		0.218**		0.218**
		(2.14)		(2.13)
On loan		0.044		0.045
		(1.06)		(1.08)
Post × On Loan		-0.030		-0.030
		(-0.72)		(-0.71)
Treat × On Loan		-0.049		-0.051
		(-1.10)		(-1.14)
Firm controls	Y	Y	Y	Y
Year-quarter dummies	N	N	Y	Y
Country dummies	N	N	Y	Y
Observations	38494	38494	38494	38494
Adj. R-squared	0.002	0.002	0.002	0.003
% (Dep variable = 1)	0.31%	0.31%	0.31%	0.31%

Table 13
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. 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 success)	Probit Model			Linear Probability Model		Probit Model			Linear Probability Model	
	Coefficient (1a)	*t*-stat. (1b)	Marg. Prob. (1c)	Coefficient (2a)	*t*-stat. (2b)	Coefficient (3a)	*t*-stat. (3b)	Marg. Prob. (3c)	Coefficient (4a)	*t*-stat. (4b)
D(Large short)	0.485***	2.97	19.179	0.165***	2.90					
Large short interest						35.646***	2.72	1410.471	11.539**	2.54
On loan	-2.701	-0.99	-106.869	-0.980	-0.97	-3.983	-1.33	-157.583	-1.329	-1.21
Size (log $)	0.005	0.16	0.214	-0.000	-0.03	0.010	0.28	0.389	0.001	0.12
M/B	0.017	0.83	0.670	0.005	0.69	0.018	0.91	0.725	0.006	0.78
ROA	-1.376	-1.36	-54.434	-0.423	-1.15	-1.382	-1.36	-54.697	-0.429	-1.16
Leverage	-0.396**	-2.01	-15.688	-0.131*	-1.95	-0.386*	-1.96	-15.276	-0.126*	-1.88
Prior 12-month return	-0.102	-0.57	-4.040	-0.027	-0.43	-0.098	-0.55	-3.874	-0.026	-0.41
Dividend yield	-0.550	-0.09	-21.748	-0.212	-0.11	-1.321	-0.22	-52.278	-0.432	-0.22
Illiquidity	0.007	1.20	0.279	0.002	1.21	0.007	1.12	0.260	0.002	1.14
Year-quarter dummies	Y			Y		Y			Y	
Country dummies	Y			Y		Y			Y	
Observations	570			583		570			583	
Pseudo R-squared	0.149					0.147				
Adj. R-squared				0.118					0.114	
% (Dep variable = 1)	54.04%			54.72%		54.04%			54.72%	

Table 14
Short Positions and Activists' Profitability
In this table, we report abnormal returns of activism 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* are annualized by multiplying daily alphas by 252. *t*-statistics are shown in parentheses and are calculated using the Newey-West standard errors with seven lags. *, **, 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)	
	Coefficient (1a)	*t*-stat. (1b)	Coefficient (2a)	*t*-stat. (2b)	Coefficient (3a)	*t*-stat. (3b)	Coefficient (4a)	*t*-stat. (4b)
Alpha	0.158**	2.18	0.045	0.66	0.129**	2.40	0.027	0.39
MKT	0.333***	8.01	0.254***	5.70	0.311***	8.56	0.224***	5.11
SMB	-1.073***	-11.36	-0.938***	-10.01	-1.186***	-17.01	-0.928***	-9.19
HML	-0.288**	-2.45	-0.286**	-2.37	-0.044	-0.53	-0.447***	-3.72
UMD	-0.016	-0.14	0.100	0.97	0.069	0.77	-0.038	-0.39
Days	1637		1637		1637		1637	
R-Squared	0.214		0.177		0.373		0.153	

Table 14 – Continued

Panel B:	Double Sorted Portfolios							
	L + S		L + U		N + S		N + U	
	Coefficient (1a)	t-stat. (1b)	Coefficient (2a)	t-stat. (2b)	Coefficient (3a)	t-stat. (3b)	Coefficient (4a)	t-stat. (4b)
Alpha	0.179**	2.28	-0.060	-0.41	0.125**	2.07	0.029	0.40
MKT	0.335***	8.19	0.235***	4.04	0.310***	7.63	0.238***	5.28
SMB	-1.046***	-10.49	-0.696***	-6.01	-1.139***	-13.94	-0.941***	-8.89
HML	-0.201	-1.64	-0.320	-1.39	0.020	0.21	-0.365***	-2.90
UMD	0.073	0.62	-0.011	-0.06	0.045	0.42	-0.028	-0.28
Days	1637		1637		1637		1637	
R-Squared	0.183		0.038		0.315		0.149	

Appendix

Table A
Propensity Score Matching: Balancing Test
In this table, we report balancing test outcomes comparing firms with new 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
Size (log $)	Unmatched	21.127	18.605	115.6	46.30	0.000
	Matched	21.127	21.148	-1.0	-0.40	0.688
M/B	Unmatched	3.590	2.497	21.4	10.72	0.000
	Matched	3.590	3.300	5.7	1.76	0.079
ROA	Unmatched	0.023	0.002	21.1	8.32	0.000
	Matched	0.023	0.026	-3.2	-1.44	0.150
Leverage	Unmatched	0.373	0.323	16.9	7.40	0.000
	Matched	0.373	0.363	3.3	1.19	0.234
Prior 12-month return	Unmatched	0.172	0.098	14.0	6.62	0.000
	Matched	0.172	0.172	-0.1	-0.04	0.965
Dividend yield	Unmatched	0.007	0.004	16.0	7.80	0.000
	Matched	0.007	0.006	0.8	0.25	0.804