



Corporate control and shareholder activism in Germany: An empirical analysis of hedge fund strategies

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ABSTRACT

Government-initiated reforms of the German financial system two decades ago shifted corporate control activities from universal banks to capital markets. Hedge funds took advantage of these changes by acquiring stakes in weakly governed firms. For 653 hedge fund interventions between 2000 and 2020, this study analyzes the changes in financial and operating performance and firm characteristics before and after the event. We also assess the probabilities that a firm becomes a target and that an attack creates shareholder value. On average, hedge funds increased returns, with the magnitude depending on the period, level of aggressiveness, institutional ownership, and industry. Crisis and non-crisis results differ, as hedge funds strategies are mostly successful in a rising stock market environment. Typically, hedge funds targeted smaller and more visible firms with higher sales growth, lower leverage, and higher institutional ownership. After the attack, firm profitability and cash holdings decreased, leverage increased, while investments in M&A and capex declined. This research offers new empirical evidence on the success of hedge fund strategies in Germany and on the performance of targeted firms.

1. Introduction

Shareholder activism has become an integral part of modern capital market-oriented corporate control and corporate governance systems. In this study, we investigate the consequences resulting from changes in the German financial and corporate governance system two decades ago. This government-initiated reforms shifted corporate control activities swiftly from universal banks to capital markets. Incentivized by large tax-advantages, banks sold their equity holdings and abandoned proxy voting for their clients, diminishing the banks' influence substantially. As domestic equity mutual funds were primarily subsidiaries of banks, which provided the majority of corporate debt financing, fund managers did not actively engage in corporate control activities, revealing substantial conflicts of interest. The banks' sudden retreat caused a vacuum in the control structures of German firms, which foreign hedge funds immediately took advantage of by attacking smaller and weakly governed firms. Later on, foreign institutional investors increased their equity holdings in larger German firms. Nowadays, foreign institutional investors own about 62.1% of the shares from constituents of the DAX stock index (IHS Markit & DIRK, 2021). Consequently, these government-initiated regulatory changes started a

transition from a bank-controlled to a capital market-oriented and international investor dominated corporate governance system in Germany.

Shareholder and hedge fund activism have been important corporate governance themes for many decades resulting in a vast literature and empirical evidence. Most studies for the U.S. report positive short-term stock returns around the disclosure of an activists' engagements (Becht, Franks, Grant, & Wagner, 2017; Brav, Jian, Partnoy, & Thomas, 2008; Clifford, 2008; deHaan, Larcker, & McClure, 2019; Greenwood & Schor, 2009; Klein & Zur, 2009), whereas the long-term impact is less conclusive with evidence for positive (Bebchuk, Brav, & Jiang, 2015) and neutral valuation effects (Cremers, Giambona, Sepe, & Wang, 2021; deHaan et al., 2019). Nevertheless, most research for the U.S. advocates a positive corporate governance role of activist investors. However, the potential measures and actions that increase shareholder value are still ambiguous, with some previous studies relating share price increases to higher dividends and share buybacks, surges in leverage as well as declines in cash holdings and investments (M&As and capex) subsequent to hedge fund interventions (Boyson & Mooradian, 2011; Brav, Jiang, & Kim, 2015b; Brav, Jiang, Ma, & Tian, 2018; Gantchev, Sevilir, & Shivdasani, 2020). Other studies report an increase in operating

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performance (Bebchuk et al., 2015). However, how hedge funds influence a firms' strategy and operations is less understood. In Germany, hedge funds activism started only after major government-initiated reforms ended the dominance of banks and corporations ('Deutschland AG'). Despite this critical event, only a few studies on hedge fund activism exist for Germany so far (Achleitner, Betzer, & Gider, 2010; Bessler, Drobetz, & Holler, 2015; Weber & Zimmermann, 2013), mostly covering the period before the 2007/2008 global financial crisis.

This study contributes to the literature by investigating whether hedge fund attacks resulted in improved corporate governance and higher shareholder values for German firms over an extended period. Our sample consists of 653 activism events that occurred during the last two decades (2000–2020). We separate the sample into three sub-periods, before (2000–2006), during (2007–2008), and subsequent (2009–2020) to the global financial crisis and differentiate between industries, firms with low and high institutional ownership as well as between aggressive and less aggressive hedge fund strategies. Moreover, we investigate the changes in financing, investment and payout policies as well as corporate strategy and operating performance, before and subsequent to the event and finally test for the differences between targeted and non-targeted firms. The reporting threshold for the mandatory disclosure of voting rights (3% or 5%) is used as the event for which we calculate short- and long-term valuation effects, employ cross-sectional regressions and analyze the determinants that influence the size of the stock price reactions. The performance analysis is extended by using calendar-time portfolio returns and the Fama-French-Carhart four-factor model. Firm characteristics and other variables that affect the probability of a firm to become a hedge fund target are analyzed in logistic regressions. Moreover, we estimate ordinary least squares regressions with dummies for each of the five years prior to and the five years after the event to examine changes in firm characteristics. This offers additional insights into the real effects of shareholder activism on target firms.

Our empirical findings indicate that activist interventions, on average, increased shareholder value of targeted firms. The magnitude of the performance depends on the period, industry, level of aggressiveness and magnitude of institutional ownership. Moreover, crisis and non-crisis period results differ, as most hedge fund strategies are only value creating in a rising stock market environment with favorable economic conditions. Hedge funds were more likely to target smaller and more visible firms with higher sales growth, lower leverage and higher institutional ownership. Subsequent to the activism, firms' profitability and cash holdings decreased, payouts and leverage increased, while investments (M&As and capex) declined. In a series of robustness tests, we provide supporting evidence for our results.

Overall, we document that shareholder activism has become an important force in the corporate governance system in Germany during the last two decades, as hedge fund interventions often find support by active and passive institutional investors and proxy advisory firms. Even smaller stakes are sufficient to force management to initiate dramatic changes such as the sale of subsidiaries, spin-offs and divestments at conglomerate firms or the termination of pending acquisitions. Still, the typical demands of hedge funds are higher dividends, share-buybacks and leverage increases. Relative new issues on the activists' agenda are environmental concerns (Naaraayanan, Sachdeva, & Sharma, 2021). In the future, management may face additional demands from environmental activist groups to refocus the firm's strategy.

We structure the rest of the paper as follows. In the next section, we provide a review of the literature and develop our hypotheses. Section 3 contains a description of the data and the methodology. In Section 4, we present our empirical results on the determinants and consequences of activist interventions and perform additional robustness checks in Section 5. Section 6 concludes our analysis of hedge fund activism in Germany.

2. Literature review and hypotheses development

In this section, we discuss the changes of the corporate governance system in Germany and the rise of hedge fund activism (2.1) as well as the role of hedge funds in corporate governance (2.2). Finally, we develop our hypotheses (2.3).

2.1. Corporate governance in Germany

Traditionally, the German corporate governance system has been viewed as an archetype of an insider-dominated and stakeholder-oriented system (Franks & Mayer, 2001), with high ownership concentration and large shareholders controlling publicly listed firms (Faccio & Lang, 2002; La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2000). In addition, the large banking groups exerted substantial influence and control over German firms through large equity holdings (Allen & Gale, 2001), proxy voting for their clients, and high representation on supervisory boards (Andres, Betzer, & van Bongard, 2011; Dittmann, Maug, & Schneider, 2010). Consequently, German firms were entrenched in a network of cross-holdings (Adams, 1999) and directors on companies' boards (Andres et al., 2011), with banks being in a pivotal position ('Deutschland AG'). This resulted in a weak market for corporate control with very few hostile takeovers (Franks & Mayer, 2001), as domestic mutual funds or pension funds rarely engaged in shareholder activism due to conflicts of interest arising from their bank affiliation. Overall, capital markets performed a limited role for financing and corporate governance at that time in Germany.

2.1.1. Regulatory reforms and the emergence of hedge fund activism

Recent developments in the financing structures of German firms and regulatory reforms positioned the German corporate governance system closer to the Anglo-Saxon model (Bessler & Drobetz, 2015; Rapp & Strenger, 2015). To strengthen the monitoring role of investors and capital markets, reforms were implemented in the areas of disclosure standards, takeover law, and accounting rules (IFRS) to improve investor protection, while corporate tax reforms incentivized banks to divest their holdings (Weber, 2009). These government actions reduced the banks' influence, but also changed the ownership structure of publicly traded firms in Germany, resulting in higher free float of shares and lower participation in shareholder meetings. This resulted in a control vacuum in German firms, which attracted foreign hedge funds eager to exploit this opportunity.

2.2. The impact of hedge funds on corporate governance

Shareholder activism in general and hedge fund interventions in particular have become essential external corporate governance mechanisms during the past two decades. Activist investors usually acquire minority positions in target firms and demand significant changes in corporate strategy, business operations, financing or governance. Firms that become targets often operate inefficiently and fail to maximize shareholder value. Consequently, activist hedge funds fulfill an important monitoring function in capital markets.

2.2.1. Hedge funds incentives for active monitoring and involvement

Active monitoring by institutional investors usually creates a free-rider problem, as these investors bear the entire cost but benefit only partially (Grossman & Hart, 1980). Therefore, investors have little incentives to monitor management ("rational apathy"), unless they obtain a sufficiently large ownership position to justify the cost (Shleifer & Vishny, 1986). Hedge funds usually possess a comparative advantage due to their organizational design and specific tactics, which let them exercise influence (Brav et al., 2008). The performance-related fee structure, less diversification restrictions, lock-in effects of larger positions and lower risk of early capital withdrawals, all create strong incentives to restructure the target firm for unlocking firm value. Overall,

hedge funds are in a unique position to take a long-term perspective and initiate a restructuring or other change.

2.2.2. Strategies and tactics of hedge fund interventions

Activist investors usually follow a two-stage approach to intervene and to exert control. Typically, they first communicate directly and quietly with management in private meetings to present their restructuring proposals or to claim a board seat (Becht, Franks, & Wagner, 2021). If the target firm does not intend to cooperate, activist hedge funds escalate to more hostile and confrontational approaches to initiate public pressure on management (media campaigns, open letters, lawsuits, or takeover bids). To succeed, hedge funds need support from a sufficient number of shareholders that believe in their value-creating ideas. Often, they form an alliance with other institutional shareholders or hedge funds (wolf packs) to coordinate their intervention and influence (Brav, Dasgupta, & Mathews, 2021; Doidge, Dyck, Mahmudi, & Virani, 2019; González & Calluzzo, 2019; Wong, 2020). Finally, the success of the specific activist tactics may depend on the national corporate governance system, culture and other distinctive features. Next, we examine the empirical evidence of hedge fund activism and develop our hypotheses on the determinants and consequences of activist interventions.

2.3. Hypotheses development

We now discuss the reasons why activist hedge funds attack specific target firms (2.3.1) and analyze the consequences from their interventions (2.3.2).¹ Based on the previous empirical evidence, we formulate different testable hypotheses.

2.3.1. Characteristics of target firms

The empirical evidence for the U.S. reveals that four aspects typically attract hedge funds attention. *First*, certain fundamental characteristics determine the likelihood of activist engagement. Often smaller firms with lower valuations are more attractive as activist need to invest a smaller amount of capital to obtain a significant stake for exercising control (Becht et al., 2017; Brav et al., 2008). In Germany, hedge funds tend to target also larger high-valued conglomerates, at least in the earlier period (Bessler et al., 2015). Moreover, undervalued but highly profitable firms with higher sales growth increase the success of activist investors' engagement to create shareholder value (Boyson & Mooradian, 2011; Klein & Zur, 2009). From this evidence, we specify our first hypothesis (*firm valuation and performance*) as follows:

Hypothesis 1. Firms targeted by hedge fund activists relative to non-targeted firms have a) a lower firm valuation, b) a lower market-to-book ratio, c) higher sales growth, and d) a higher operating performance and profitability.

Second, activist hedge funds often focus on a firm's capital structure and payout policy. Firms with high cash holdings, low leverage, relatively low dividends and share repurchases become more likely targets (Achleitner et al., 2010; Aslan & Kumar, 2016; Autore, Clarke, & Liu, 2019). Hedge funds are able to address the potential agency problems of free cash flows with relatively modest measures that are highly appreciated by other investors. This leads to our second hypothesis (*financing and payouts*):

Hypothesis 2. Firms targeted by hedge fund activists relative to non-targeted firms have a) higher cash holdings, b) lower dividends and repurchase less shares, and c) lower leverage.

Third, poor management decisions that destroy shareholder value

¹ For excellent reviews of the theoretical and empirical literature on hedge fund activism, see Brav, Jiang, and Kim (2015a), Aguilera, Federo, and Ponomareva (2021), and Brav et al. (2022).

encourage hedge funds to intervene. This includes corporate restructuring, refocusing firms on its core business (divestments), stopping pending M&A transactions, or the sale of the target firm (Boyson, Gantchev, & Shivdasani, 2017; Gantchev et al., 2020; Greenwood & Schor, 2009; Wu & Chung, 2022). Hedge funds also engage in firms with high R&D and capital expenditures (Brav et al., 2018; Klein & Zur, 2009), and higher level of diversification (Brav, Jiang, & Li, 2022). This leads to our third hypothesis (*corporate strategy*):

Hypothesis 3. Firms targeted by hedge fund activists relative to non-targeted firms invest a) more in research and development, b) have higher capital expenditures, and c) and a higher degree of diversification (conglomerate).

Fourth, activist investors target firms due to their governance and ownership structure. Usually activist investors face resistance from firms with high ownership concentration and from controlling shareholders (Kastiel, 2016). In contrast, hedge funds benefit when firms have a high level of institutional ownership, as other institutional investors often support their campaigns (Becht et al., 2017; Kedia, Starks, & Wang, 2021). Therefore, we postulate our fourth hypothesis (*corporate governance*):

Hypothesis 4. Firms targeted by hedge fund activists relative to non-targeted firms have a) a lower ownership concentration, and b) a higher institutional ownership.

2.3.2. Consequences for target firms

The pivotal question is whether hedge fund interventions generate shareholder value. Previous studies document a short-term increase in abnormal stock returns for target firms around the disclosure of the attack in the U.S. (Boyson & Mooradian, 2011; Brav et al., 2008; Clifford, 2008; Klein & Zur, 2009) and in non-U.S. countries (Becht et al., 2017; Bessler et al., 2015; Weber & Zimmermann, 2013). In contrast, long-term abnormal stock returns related to activism events are inconclusive. For activist hedge funds, the returns are usually positive (Bebchuk et al., 2015; Bessler et al., 2015), with at best neutral effects for other shareholders (deHaan et al., 2019). Consequently, target firms outperform control firms, on average, as activist have some short-term stock-picking skills but do not create long-term shareholder value (Cremers et al., 2021). For the operating performance, hedge fund activism is associated with positive effects (Bebchuk et al., 2015; Brav et al., 2015b). This leads to our fifth hypothesis (*firm valuation and performance*):

Hypothesis 5. Subsequent to the hedge fund intervention, target firms experience a) positive short-term valuation effects, b) long-term valuation effects that depends on the activist tactics, and c) higher operative performance and profitability.

Hedge fund activism often increase the short-term performance as firms increase payouts, reduce cash holdings and increase leverage (Autore et al., 2019; Brav et al., 2008). This results in our sixth hypothesis (*financing and payout*):

Hypothesis 6. Subsequent to the hedge fund intervention, target firms a) increase dividend and repurchase more shares, b) decrease cash holdings, and c) increase leverage.

Shareholder activism also leads to less future acquisitions, more divestitures, or firms becoming an attractive takeover target themselves, which functions as an exit strategy for hedge funds (Boyson et al., 2017; Gantchev et al., 2020; Swidler, Trinh, & Yost, 2019; Wu & Chung, 2022). Although hedge fund interventions are associated with lower R&D expenditures, the innovation efficiency seems to increase as measured by a higher count and citation of patents (Brav et al., 2018; Tang, 2020). From this, we formulate our seventh hypothesis (*corporate strategy*):

Hypothesis 7. Subsequent to the hedge fund intervention, target firms a) engage in less acquisitions, b) decrease research and

development, and c) decrease capital expenditures.

Since hedge funds usually acquire only a minority stake in target firms, they rely on the support of other institutional investors backing the success and value creation of activist campaigns (Becht et al., 2017; Kedia et al., 2021). Consequently, a high level of institutional ownership complements the hedge fund attack. This results in our eighth hypothesis (*corporate governance*):

Hypothesis 8. Subsequent to the hedge fund intervention, target firms with high institutional ownership have higher positive long-term valuation effects.

3. Data and methodology

3.1. Construction of the dataset

Our hand-collected dataset of hedge fund activism events covering the period 2000–2020 is based on different information sources: *First*, we compile ownership information for all constituents of the CDAX, a composite stock index of all German firms listed in the *Prime* and *General Standard* market segments of Deutsche Börse. We gather the complete history of shareholdings above the 3% or 5% disclosure threshold² from Refinitiv Eikon and match the data with a list of activist hedge funds that we collected from academic research, press articles, and shareholder activism reports. *Second*, we screen the LexisNexis database for news article to obtain information on the form (private/public) and nature (friendly/hostile) of the intervention. *Third*, we merge our identified events with the disclosure date of voting rights, which is obtained from the publication of regulatory filings pursuant to §40 WpHG provided by DGAP ('Deutsche Gesellschaft für Ad-hoc Publizität'). Finally, we use the date of the first notification of reaching the reporting threshold as the event date in this study.

We exclude target firms with less than 140 trading days to remove any distortion effects associated with IPOs (e.g. underwriter support and lock-up periods). We also eliminate merger arbitrage strategy events and when the intention is to obtain a majority stake or full control by acquiring more than 30% of target shares,³ as our focus is on corporate governance issues. Our final sample consists of 653 hedge fund activism events in Germany between 2000 and 2020.

3.2. Distribution of hedge fund activism events

In Fig. 1 and Table 1, Panels A, we present respectively the quarterly and yearly number of hedge fund activism events from 2000 to 2020. After the government-implemented corporate governance changes in Germany, activist interventions increased from 5 to 73 events per year over the 2000–2006 period. In 2007, immediately before the financial crisis, the activities reached a maximum of 147 events. This first wave of shareholder activism ended with a sharp drop to 40 events in 2008, and further declined to the range between 6 and 17 events per

² On 1 February 2007, the minimum threshold for a mandatory disclosure of total voting rights according to the *German Securities Trading Act* (§33 Wertpapierhandelsgesetz, WpHG) has changed from 5% to 3%. Thus, in the years prior to 2007, we were only able to collect ownership information for shareholders exceeding the 5% threshold. The investor must notify the issuer and financial regulator (BaFin) when this threshold is reached within 4 trading days. In the U.S., investors have 10 days, within which they have to disclose their positions exceeding 5%. Currently, the SEC considers to shorten this window to 5 days (SEC, 2022), while academics already expressed their concerns in previous public consultations (Bebchuk, Brav, Jackson Jr., & Jiang, 2013).

³ Pursuant to the *German Stock Acquisition and Takeover Act*, any person who acquires control of a target firm, which is legally defined as holding at least 30% of the outstanding shares, is subject to a mandatory takeover bid (§§ 29, 35 Wertpapiererwerbs- und Übernahmegesetz, WpÜG).

year until 2014. However, the number of hedge fund events has increased since 2015, with 21 to 38 events per year.

Panels B of Fig. 1 and Table 1 contain the distribution of events based on the stock market segment at Deutsche Börse, consisting of the highest ranked and most regulated *Prime Standard* and lower regulated *General Standard*. Since both segments were introduced in 2003, we consider all earlier events as a separate group. Segment affiliation reveals the visibility, foreign ownership and shareholder structure of the target firms. Most hedge fund activism events occurred in the *Prime Standard* (84.1%), with 10% in the *General Standard* and 5.9% in other market segments. This suggests that most target firms meet high disclosure standards, have higher liquidity, more analyst coverage and cater more to international investors. For instance, mandatory quarterly financial reporting, analyst conferences and reporting all in English makes them attractive for foreign institutional investors. Especially in the 2009–2020 period, the majority of target firms were listed in the *Prime Standard*. Given the large number of transfers from the *Prime* to the *General Standard*, especially since the global financial crisis (Bessler, Beyenbach, Rapp, & Vendrasco, 2021, 2022), this raises the question whether firms try to escape hedge fund activism by down-listing and going dark. In addition, Panels C of Fig. 1 and Table 1 reveal that most target firms were members of the stock index for small caps (15.6%, SDAX) and mid-caps (26.8%, MDAX). Interestingly, only 12.9% of target firms were included in the blue-chip index DAX, while the remaining 6.8% and 37.9% were from the TecDAX and CDAX, respectively.

In Panel D of Table 1, we present the number of events that occurred in each industry over the sample period (2000–2020), providing further insights into the target selection strategies of hedge funds. The industries are sorted by relative frequency of events over the full period. We observe an industry clustering with close to 70% (95%) of all events concentrated in four (eight) industries, indicating some sector-specific hedge fund attractiveness (Boyson, Ma, & Mooradian, 2022). Panel E contains the industry distribution of targets, its relative share and performance (BHAR). For the full period, the two most frequently targeted industries (Industrials and Technology) have the highest out-performance (14.10% and 11.12%, respectively). We observe some substantial sub-period performance variation with Industrials declining from 37.94% to 10.70%. Technology increased from –7.61% to 24.52% from the first to the last sub-period. Real Estate and Telecommunication experienced some extreme negative performance for the full and two sub-periods. Consequently, some industries seem to be more attractive than others for hedge funds at different points in time.⁴

3.3. Methodology

3.3.1. Stock returns

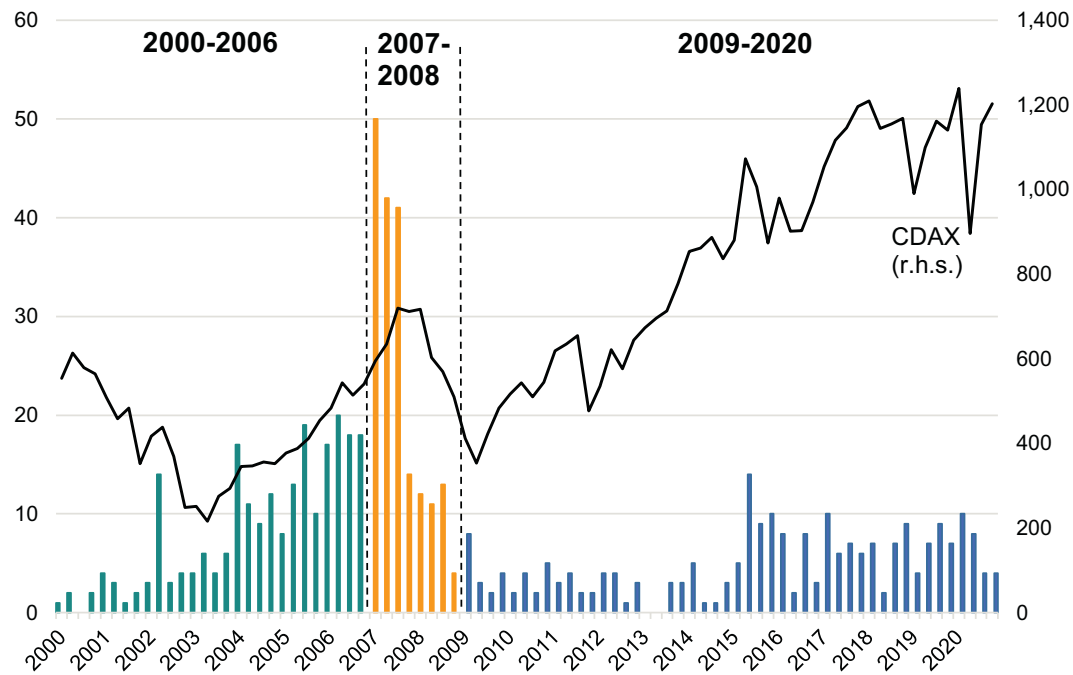
To examine the impact of hedge fund activism on stock returns, we employ the event study methodology and calculate cumulative abnormal returns (CAR) over the period τ to T :

$$CAR_T = \sum_{\tau=1}^T dAR_{\tau} \quad (1)$$

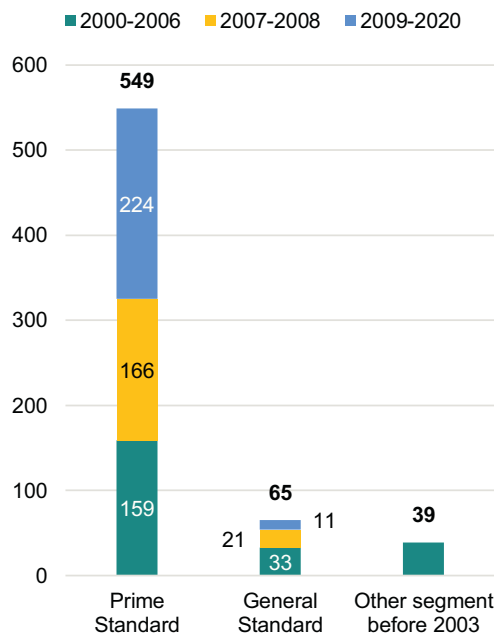
with

⁴ See the *Internet Appendix* (Part I) for more distributions of the events. In Figure IA.1, Panel A, we classified all target firms into five categories based on market capitalization (in Euros) and observe that most activist investors attacked micro-cap (21.6%, 50–250 mn.) and small-cap stocks (37.5%, 250 mn. - 10bn.), while large cap stocks belonged to the smallest group (8.9%, larger than 10 bn.). Panel B presents the number of events differentiated by industry and reveals that the four most targeted industries are Industrials (21.9%), Consumer Discretionary (19.3%), Technology (16.4%), and Financials (10.9%).

Panel A: Event Month, Sub-Periods and CDAX Performance



Panel B: Stock Exchange Segment



Panel C: Stock Index

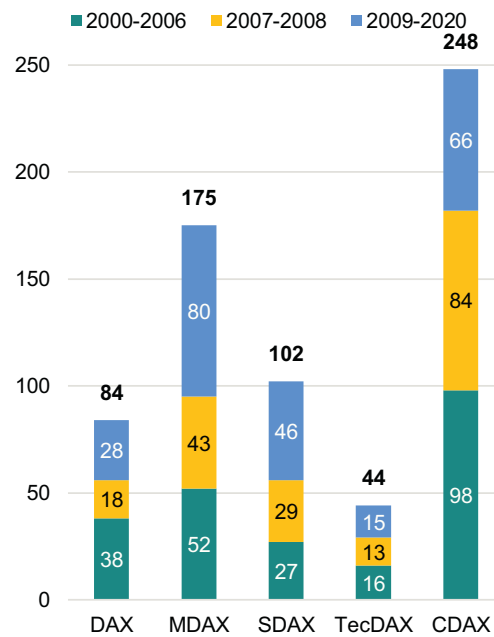


Fig. 1. Sample Distribution.

Notes: This figure presents the distribution of events in Germany over the period from 2000 to 2020. Panel A reports the quarterly distribution of events and the CDAX performance, Panel B contains the distribution sorted by stock market segment and Panel C by stock index of the target firm. Differentiation is based on sub-periods. The sample includes 653 hedge fund activism events.

$$dAR_{\tau} = \frac{1}{n} \sum_{i=1}^N AR_{i,\tau} \tag{2}$$

and

$$AR_{i,\tau} = R_{i,\tau} - (\alpha_i + \beta_i \times R_{M,\tau}) \tag{3}$$

where dAR_{τ} is the average abnormal return of an equally weighted

portfolio of target firms on event day τ , $AR_{i,\tau}$ is the abnormal return of stock i on day τ , with $R_{i,\tau}$ as the stock return and $R_{M,\tau}$ as the market return for the same day. For the estimation of the market model parameters α_i and β_i , we use 60 daily stock returns of the target firm over the pre-event window from $t = -140$ to $t = -81$, excluding the price run-up prior to the event. Following Schwert (1996), we set α_i to zero to avoid that the abnormal returns from the estimation window bias the

Table 1
Sample distributions.

Panel A: Event Year and Sub-Periods																					
Pre-Crisis Period						Crisis Period						Post-Crisis Period									
Year	Events					Year	Events					Year	Events								
2000	5					2007	147					2009	17								
2001	10					2008	40					2010	13								
2002	24											2011	11								
2003	20											2012	12								
2004	49											2013	6								
2005	50											2014	10								
2006	73											2015	38								
											2016	21									
											2017	29									
											2018	25									
											2019	27									
											2020	26									
Total	231					Total	187					Total	235								

Panel B: Stock Exchange Segment					
Market Segment	2000–2006	2007–2008	2009–2020	Full Period	%
Prime Standard	159	166	224	549	84.1
General Standard	33	21	11	65	10.0
Other segment before 2003	39	0	0	39	5.9
Total	231	187	235	653	100

Panel C: Stock Index					
	2000–2006	2007–2008	2009–2020	Full Period	%
DAX	38	18	28	84	12.9
MDAX	52	43	80	175	26.8
SDAX	27	29	46	102	15.6
TecDAX	16	13	15	44	6.7
CDAX	98	84	66	248	38.0
Total	231	187	235	653	100

Panel D: Industries by Year																						
		Before the Crisis						Crisis		After the Crisis												
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Industrials	143	1	3	5	6	10	11	11	32	10	2	4	6	5	1	2	11	5	4	5	3	6
Consumer Discret.	126	0	3	4	6	9	11	15	26	10	2	3	1	2	1	3	10	2	3	4	4	7
Technology	107	0	0	6	4	10	6	11	22	8	4	1	1	2	0	2	2	5	7	4	10	2
Financials	71	1	0	1	1	9	10	11	16	0	2	3	1	1	1	0	1	3	3	1	1	5
Sub-total	447	2	6	16	17	38	38	48	96	28	10	11	9	10	3	7	24	15	17	14	18	20
	Σ	165						124				158										

Health Care	57	1	0	2	1	3	4	5	12	3	6	1	0	1	0	2	2	1	2	3	4	4
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(continued on next page)

Table 1 (continued)

Panel D: Industries by Year																						
		Before the Crisis						Crisis		After the Crisis												
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real Estate	42	0	0	1	1	1	2	9	8	3	0	0	0	1	0	1	6	0	3	5	1	0
Basic Materials	40	0	1	2	1	4	2	3	9	4	0	0	1	0	1	0	2	3	3	1	3	0
Telecomm.	34	0	1	1	0	2	2	4	11	1	0	1	1	0	1	0	3	2	2	0	1	1
Sub-total	173	1	2	6	3	10	10	21	40	11	6	2	2	2	2	3	13	6	10	9	9	5
	Σ				53				51								69					
Energy	11	0	0	0	0	0	1	3	4	0	1	0	0	0	0	0	1	0	1	0	0	0
Consumer Staples	9	2	2	1	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	1
Other	8	0	0	1	0	1	1	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Utilities	5	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	2	0	0
Sub-total	33	2	2	2	0	1	2	4	11	1	1	0	0	0	1	0	0	0	2	2	0	1
	Σ				13				12								8					
Total	653	5	10	24	20	49	50	73	147	40	17	13	11	12	6	10	38	21	29	25	27	26
	Σ				231				187								235					

Panel E: Industries and BHAR Performance

	Rel. Sh.	Full Period		2000–2006		2007–2008		2009–2020	
		n	BHAR	n	BHAR	n	BHAR	n	BHAR
Industrials	0.22	143	14.10%	47	37.94%	42	−8.18%	54	10.79%
Cons. Discret.	0.19	126	0.56%	48	13.86%	36	−14.25%	42	−2.06%
Technology	0.16	107	11.12%	37	−7.61%	30	15.20%	40	24.52%
Financials	0.11	71	−4.09%	33	−0.96%	16	−14.14%	22	−0.73%
Health Care	0.09	57	0.01%	16	4.68%	15	−2.62%	26	−1.49%
Real Estate	0.06	42	−17.96%	14	−31.18%	11	−42.64%	17	6.63%
Basic Materials	0.06	40	6.16%	13	21.11%	13	1.41%	14	0.10%
Telecomm.	0.05	34	−14.49%	10	−5.07%	12	−42.27%	12	18.28%
Energy	0.02	11	17.65%	4	75.80%	4	−25.13%	3	−11.99%
Cons. Staples	0.01	9	16.51%	5	34.43%	2	−59.19%	2	38.45%
Other	0.01	8	−19.56%	4	−13.14%	4	−25.99%	0	6.66%
Utilities	0.01	5	16.63%	0	0.29%	2	14.15%	3	5.17%
	1.00	653	3.37%	231	10.19%	187	−9.49%	235	7.54%

Notes: This table presents the distribution of hedge fund activism events in Germany over the period from 2000 to 2020. The sample includes 653 hedge fund activism events. Panel A reports the yearly distribution of events, Panel B contains the distribution by stock market segment of the target firm, Panel C reports the distribution by stock index, Panel D shows the industry distribution by year and Panel E presents the industry performance, all separated by sub-periods. The industries are classified based on the Industry Classification Benchmark (ICB) and sorted by the relative share of the events in the full period. The mean buy-and-hold abnormal returns (BHARs) are calculated for the 40 days before to 250 days after the event day 0.

abnormal returns during the event window. As a proxy, we employ the CDAX stock index to calculate the market returns $R_{M,t}$.

For the long-run performance, we calculate buy-and-hold abnormal returns (BHAR) for each stock i relative to the benchmark index M on a daily basis:

$$BHAR = \frac{1}{n} \sum_{i=1}^N \left(\prod_{t=1}^T (1 + R_{i,t}) \right) - \left(\prod_{t=1}^T (1 + R_{M,t}) \right) \quad (4)$$

To obtain further insights into the long-term valuation effects of hedge fund activism, we also use the calendar-time portfolio approach and calculate the monthly stock returns of an equally weighted portfolio for holding periods of 12, 24, 36, 48 and 60 months as follows:

$$R_{CalTime,t} = \frac{1}{N_t} \sum_{i=1}^N z_{i,t} \times R_{i,t} \quad (5)$$

where N_t denotes the total number of stocks in the portfolio at time t and $z_{i,t}$ is an indicator variable that takes the value of one when the firm i had an event and zero otherwise. We add the stock to the portfolio two months before the event, which gives us the perspective of the hedge fund that starts increasing their position already before the regulatory filing. In addition, we also take the perspective of the investor who is trying to benefit from the activist intervention and invests in the stock in the event month. If multiple hedge funds attack the target firm during the holding period, we include a stock only at the time of the initial investment and extend the holding period relative to the last investment to avoid adding a stock to the portfolio multiple times.

To determine whether the hedge fund activism creates abnormal returns, we control for the impact of common risk factors and employ the Fama-French-Carhart four-factor model by estimating the following regression model:

$$(R_{CalTime,t} - R_{f,t}) = \alpha_i + \beta_M(R_{M,t} - R_{f,t}) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{MOM}MOM_t + \varepsilon_t \quad (6)$$

where the monthly excess return of the calendar-time portfolio is the dependent variable, $(R_{M,t} - R_{f,t})$ is the excess return on the market (CDAX), SMB_t (small minus big stocks), HML_t (high minus low book-to-market stocks), and MOM_t (high minus low momentum stocks) are the estimates of portfolio loadings on the Fama and French (1993) size and value factors, and the Carhart (1997) momentum factor. The construction of the factors includes all firms listed in the ‘‘Regulated Market’’ segments at Deutsche B rse. We use the 3-month Euribor as risk-free rate R_f . Due to availability of factor data, this part of our analysis is restricted to all events between January 2000 and June 2016. We obtained the risk-free rates and factor returns from Refinitiv and Br ckner, Lehmann, Schmidt, and Stehle (2015), respectively.

3.3.2. Abnormal trading volume

Hedge funds usually try to acquire shares of the target firm quietly up to the legal reporting threshold (5% or 3%), before making the public announcement to minimize their initial investment costs. To identify when hedge funds started buying shares, we also examine the trading activity before the official hedge fund activism event and calculate the abnormal trading volume ($AV_{i,t}$) based on the approach by Brav and Gompers (2003):

$$AV_{i,t} = \frac{V_{i,t}}{\frac{1}{60} \sum_{\tau=-81}^{\tau=-140} V_{i,\tau}} - 1 \quad (7)$$

where $V_{i,t}$ denotes the trading volume of a stock i on a given day t , which is divided by the average trading volume of the stock during the 60-day estimation period prior to the event from $t = -140$ to $t = -81$, minus one. The objective of this analysis is to determine whether hedge funds were ‘‘legally’’ front running the abnormal price increases (run-up and mark-up) before the event, which they usually determine on their

own.

4. Empirical results

4.1. Characteristics of target firms

4.1.1. Summary statistics

First, we are interested in the firm characteristics associated with a firm becoming a hedge fund target and whether these firms are significantly different from other firms that are not targeted (Table 3). Activist shareholders may choose target firms not arbitrarily, but rather screen for specific features that indicate a high potential for value creation through their intervention. We summarize all variables in Table 2.

Table 2
Variable definitions.

Variable	Description and Construction Principles
<i>Target Firm Characteristics</i>	
Closely held shares	Proportion of shares in a firm held by officers, directors and other blockholders with at least 5% of the share (in %).
Bank, Corporation, Government, Individual/Family	Dummy variable, 1 if the largest shareholder of the firm is either a bank, a corporation, the state or a family, otherwise 0. For this variable, financial investors are the reference group.
Index membership	Dummy variable, 1 if the firm is member of either the DAX, MDAX, SDAX, or TecDAX, otherwise 0.
Number of analysts	Number of earnings per share (EPS) forecasts by analysts.
Analyst coverage	Dummy variable, 1 if the firm has at least one EPS forecast by analyst, otherwise 0.
Institutional ownership	Proportion of a firm’s shares held by institutional investors (in %).
Stock liquidity (ln)	Average number of shares traded over a year, logarithmized.
Market-to-book ratio	Total assets plus the market value of equity minus the book value of equity divided by total assets.
Market cap (m �)	Sum of share price multiplied by the number of outstanding shares in million EUR.
Market cap (ln)	Sum of share price multiplied by the number of outstanding shares in million EUR., logarithmized.
HHI sales	Herfindahl-Hirschman Index defined as the sum of the squared shares of segment sales in the firm’s total sales.
Equity issuance	Net proceeds from equity issues to total assets.
Sales growth	Percentage change in net sales from year $t-1$ to t .
Return on assets	Net income relative to total assets.
Return on equity	Net income relative to book value of common equity.
Leverage ratio	Total debt relative to total assets.
Tangibility	Net property, plant and equipment relative to total assets.
Capex-to-sales	Capital expenditures relative to net sales.
R&D dummy	Dummy variable, 1 if the firm reports expenditures for research and development, otherwise 0.
R&D-to-sales	Research and development expenses relative to net sales.
Payout ratio	Total common and preferred dividends to net income and depreciations.
Cash holdings	Cash relative to total assets.
Cash-flow-to-assets	Net income and depreciation & amortization relative to lagged total assets.
<i>Hedge Fund Behavior</i>	
Aggressive strategy	Dummy variable, 1 if the activist employs an openly hostile approach or used these aggressive tactics in the past, otherwise 0.
Wolf pack	Dummy variable, 1 if multiple activists target the same firm within three months subsequent to the first attack, otherwise 0.

Notes: This table presents the definitions of the employed variables in the analysis. The data comes from Refinitiv Eikon.

Table 3
Characteristics of target firms.

	Target Firms							Control Firms							Differences in Mean
	Mean	St. Dev.	10th	25th	Median	75th	90th	Mean	St. Dev.	10th	25th	Median	75th	90th	
Closely held shares	0.31	0.24	0.01	0.10	0.28	0.50	0.66	0.60	0.27	0.21	0.41	0.61	0.82	0.95	-0.285***
Financial visibility															
Number of analysts	10.58	8.59	1.00	3.00	9.00	16.00	22.00	7.26	8.28	1.00	1.00	3.00	10.00	21.00	3.318***
Institutional ownership	0.32	0.19	0.09	0.17	0.31	0.45	0.58	0.15	0.19	0.00	0.02	0.09	0.21	0.37	0.165***
Stock liquidity (ln)	9.66	2.54	6.65	8.21	9.93	11.50	12.60	6.78	3.62	1.39	4.94	7.24	9.07	11.18	2.884***
Valuation															
Market cap (m €)	3274.1	8369.8	43.2	135.7	542.2	2599.2	7835.2	1834.5	7128.4	7.1	22.7	85.6	447.9	2745.4	1439.653***
Market-to-book ratio	1.667	1.075	0.974	1.096	1.323	1.775	2.719	1.615	1.264	0.845	0.998	1.192	1.678	2.748	0.052
Accounting fundamentals															
Sales growth	0.177	0.677	-0.156	-0.034	0.057	0.181	0.428	0.164	0.751	-0.267	-0.069	0.037	0.159	0.498	0.014
Return on assets	0.010	0.150	-0.091	0.001	0.031	0.066	0.108	-0.022	0.195	-0.179	-0.021	0.019	0.056	0.106	0.031***
Return on equity	0.072	0.757	-0.254	0.011	0.096	0.161	0.276	-0.006	0.819	-0.381	-0.032	0.069	0.144	0.274	0.078*
Cash-flow-to-assets	0.049	0.112	-0.062	0.010	0.065	0.104	0.155	0.029	0.150	-0.125	-0.006	0.051	0.103	0.167	0.020**
Cash holdings	0.133	0.143	0.015	0.038	0.085	0.171	0.345	0.116	0.138	0.007	0.024	0.066	0.151	0.300	0.017**
Payout ratio	0.184	0.387	0.000	0.000	0.105	0.268	0.480	0.191	0.418	0.000	0.000	0.073	0.256	0.509	-0.007
Leverage ratio	0.247	0.211	0.003	0.070	0.202	0.358	0.546	0.208	0.216	0.000	0.016	0.148	0.330	0.511	0.039***
R&D-to-sales	0.050	0.061	0.001	0.010	0.025	0.067	0.122	0.059	0.083	0.001	0.007	0.031	0.075	0.144	-0.009*
Capex-to-sales	0.052	0.068	0.003	0.013	0.035	0.069	0.112	0.057	0.086	0.002	0.011	0.033	0.064	0.119	-0.004
HHI sales	0.564	0.243	0.285	0.360	0.519	0.726	1.000	0.628	0.244	0.334	0.430	0.574	0.847	1.000	-0.063***
Equity issuance	0.035	0.101	0.000	0.000	0.000	0.005	0.114	0.030	0.109	0.000	0.000	0.000	0.000	0.052	0.005
Tangibility	0.209	0.202	0.008	0.046	0.157	0.316	0.450	0.216	0.214	0.006	0.035	0.163	0.328	0.511	-0.007

Notes: This table presents the descriptive statistics for target and control firms. The sample includes 653 hedge fund activism events in Germany over the period from 2000 to 2020. The data is based on mean values at the end of the year prior to the event. We employ all non-targeted constituents of CDAX as control group. All variables are defined in Table 2. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

We find that the ownership structure of target firms is significantly less concentrated (**H4a**), with an average of only 31% relative to 60% of shares held by insiders and other blockholders in non-target firms. This facilitates the strategies of hedge funds as they face less resistance from larger controlling shareholders. On average, target firms are covered by more analysts (10.58 vs. 7.26), have a higher presence of institutional investors (32% vs. 15%) (**H4b**) and higher trading volume, suggesting that a higher capital market visibility is important. This observation confirms previous findings for the U.S. (Kedia et al., 2021).

In contrast to activism in the U.S. (Brav et al., 2008), our results reveal that hedge funds attack larger firms (**H1a**),⁵ while the difference in market-to-book ratio is statistically insignificant (**H1b**). With respect to firm growth and profitability, we find that targets do not exhibit higher sales growth (**H1c**) but are more profitable as measured by return on assets (3.1 pp), return on equity (7.8 pp), and cash flows (**H1d**), which supports the results of U.S. studies (Boyson & Mooradian, 2011; Klein & Zur, 2009). Consistent with U.S. evidence (Brav et al., 2008; deHaan et al., 2019), capital structure is an important determinant for German target firms having more cash holdings (**H2a**), lower payouts (**H2b**) and higher leverage (**H2c**), albeit the difference in payouts is insignificant. Related to corporate strategy, hedge funds tend to target firms that are more likely to report R&D expenditures (**H3a**), invest less in capex (insignificant) (**H3b**) and are more diversified across various product segments (**H3c**).

Overall, firms with these characteristics are attractive targets for activist investors, as higher payouts and restricting new investments are relatively easy to implement but usually generate positive short-term valuation effects. Moreover, the activists often enforce that non-core business units are divested to unlock value for shareholders by reducing the conglomerate discount. These patterns largely hold across all sub-periods (not reported). A more detailed analysis of the firm characteristics and the factors that determine the likelihood of becoming a hedge fund target during different periods is presented in Bessler and Vendrasco (2022).

4.1.2. Undervaluation of target firms

Our previous results suggest that activist hedge funds are not purely searching for undervalued target firms. To investigate this observation in more detail, we calculate the undervaluation index of Peyer and Vermaelen (2009). This index corresponds to the sum of three sub-indices, which are calculated from the market-to-book ratio, market capitalization and stock returns over the past six months. The sub-indices assign a value between 1 and 5 to the target firms if it belongs to the top or bottom quintile portfolio in these three dimensions, respectively. We use all other stocks in the CDAX index that have not become hedge fund targets as a control group. The undervaluation index assumes that a firm is considered as undervalued if it has (1) a low market capitalization, (2) a low market-to-book ratio, and (3) a weak performance in the past six months. Accordingly, the firms with the highest (lowest) undervaluation fall into the fifth (first) portfolio, which means that the index can assume a maximum (minimum) value of 15 (3).

Fig. 2 presents the distribution of the undervaluation index over the full period 2000–2020. In the event month, the mean (median) index value for the target firms is 7.9 (8.0), which is below the mean and median of the control firms of 9.6 (10.0). Therefore, target firms are less

⁵ This is somewhat in contrast to our Hypothesis 1a and our previous findings. However, the outcome of this analysis can be attributed to the high number of smaller firms in the CDAX universe (control group), which consists of all non-targeted stocks listed in the regulated market segment of Deutsche Börse, making the size of our sample relatively larger.

undervalued based on the index. This is due to the high number of smaller stocks in the control group, which are also for liquidity reasons less attractive for hedge funds.⁶ Nevertheless, the distribution has a positive skewness, indicating that relatively few target firms are strongly undervalued. The distribution of the undervaluation index for the sub-periods result in the following mean values of the target firms (control firms) of 8.2 (9.8) (2000–2006), 7.8 (10.0) (2007–2008) and 7.6 (9.2) (2009–2020).

Overall, an important question related to hedge fund activism is whether hedge funds have the ability to increase the value of target firms, or whether they only benefit from their superior selection and timing skills in targeting mispriced stocks. We find no evidence that activist hedge funds only select undervalued stocks in Germany. Typically, they do not only seek short-term positive valuation effects with their actions, but most often have an interest in long-term value creation through restructuring and turnarounds.

4.1.3. Probability of becoming a hedge fund target

The objective of our next analysis is to identify which firm characteristics affect the probability of becoming a hedge fund target. In Table 4, we present the results of the logistic regressions. Our results reveal that higher-valued firms are less likely to be targeted (**H1a**), as more capital is required to obtain significant influence. Interestingly, the coefficient for undervaluation as measured by the market-to-book ratio is insignificant (**H1b**). This suggests that hedge funds do not exclusively select stocks that are currently undervalued by the capital market. In contrast, this could indicate that the activists, but not the capital market, have recognized the firm's deficiencies first, resulting in the opportunity to create shareholder value and to profit from an engagement. We also find that target firms have higher sales growth (**H1c**) and are more likely to be profitable (**H1d**).⁷

The magnitude of cash holdings (**H2a**) or payouts through dividends and share repurchases (**H2b**) are not significantly associated with the probability of becoming a hedge fund target. Instead, firms with lower leverage are more likely to be targeted (**H2c**), which contrasts with the characteristics of U.S. target firms that have more debt (Becht et al., 2017; Kedia et al., 2021). Therefore, hedge funds seek to reduce potential agency conflicts of free cash flows, which usually results in stock price increases. We find that firms with lower investments in R&D (**H3a**) are more attractive targets, while investments in long-term assets (capex) are uninformative for the probability of becoming a target firm (**H3b**). Likewise, higher conglomerate activities in different product segments facilitates interventions (**H3c**).⁸ Activists reveal a preference for less complex and more transparent firms, where the implementation of their proposals are more likely to increase shareholder value, as documented for the U.S. (Boyson & Mooradian, 2011; Brav et al., 2022). A high institutional ownership increases the probability of becoming a target (**H4b**), as hedge funds need support from other institutional investors to enforce their agendas. Typically, both groups are interested in stock price increases and often have similar views on good corporate governance and unexploited value creation opportunities.

Furthermore, a higher 'financial visibility', which is measured by membership in major stock market indices, analyst coverage, and size of trading volume, reduces potential information asymmetries and makes the firm an attractive target. All this significantly increases the probability of a hedge fund attack, which confirms the empirical results for the U.S. (Becht et al., 2017; Brav et al., 2022; Kedia et al., 2021; Norli,

⁶ Even when we exclude firms with a market capitalization less than 50 million Euros, we find a higher undervaluation of control firms with mean index values of 7.6 (hedge fund targets) and 8.5 (control firms).

⁷ Although the coefficient is statistically insignificant in the full model, we document a significant negative coefficient in a model that includes only the accounting fundamentals (not reported).

⁸ See the previous footnote.

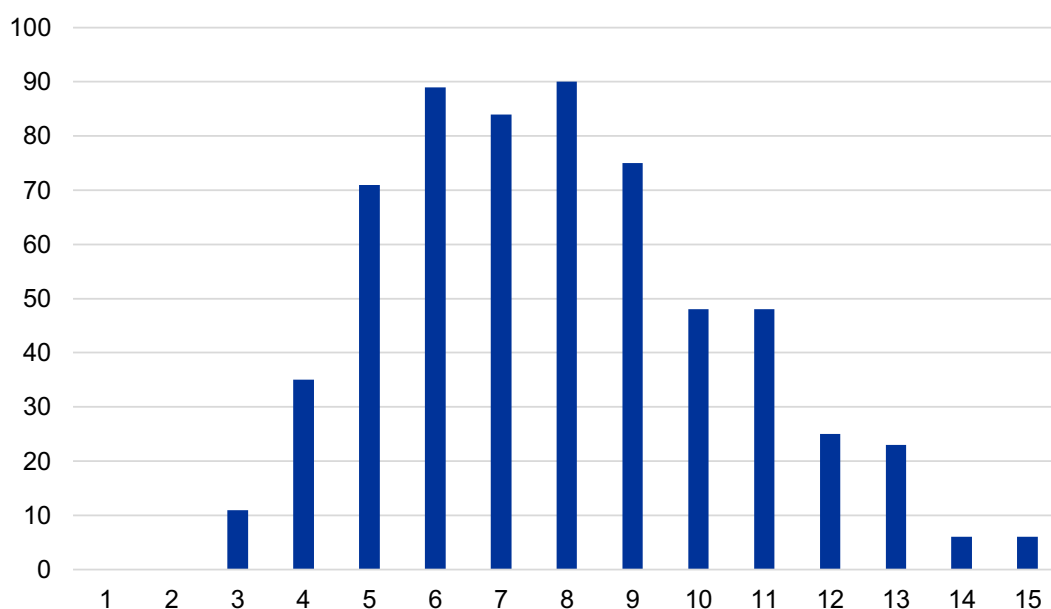


Fig. 2. Distribution of Undervaluation Index.

Notes: This figure presents the distribution of the undervaluation index by Peyer and Vermaelen (2009). The index is constructed using three sub-indices that assign a value between 1 and 5 to a target firm, based on the respective quintiles in the CDAX: (1) market capitalization, (2) market-to-book ratio, and (3) stock returns over the past six month. A higher value indicates higher undervaluation. The sample includes 653 hedge fund activism events.

Ostergaard, & Schindele, 2015). During the global financial crisis 2007–2008 (column 3), activists paid more attention to economic stability. Thus, firms with higher sales growth (H1c) and more investments in capex (H3b) are positively associated with the likelihood of becoming an activist target. In addition, more institutional ownership increased the attractiveness of target firms during the global financial crisis (H4b).

4.2. Valuation effects of hedge fund activism

4.2.1. Distribution of buy-and-hold returns

In Fig. 3, we present the distribution of buy-and-hold returns (BHR) for each event over time. We distinguish between the following three intervals: before the event (−40; 0), six months after the event (−40; 125 or 1; 125 days), and the subsequent six months (−40; 250 or 126; 250 days). We implement two different approaches, first an extended period and second a fixed rolling window with a variable starting point. Initially, we start at day −40 and lengthen the time window to 125 and 250 days (Figs. A). In Figs. B, we use a variable starting point. Including the run-up period (−40; 0) means taking the hedge fund's perspective as pre-event investing is possible. As the investor's perspective means

investing after the event, we exclude the run-up (−40; 0) in Figs. B2 and B3.

In the first period (2000–2006), we observe a pronounced activity with very high positive and negative results. During the financial crisis (2007–2008), we find an accumulation of negative and falling returns. The last period (2009–2020) has initially less activity, which increased over time. A comparison of the Figs. A and B indicates that the results are strongly affected by the run-up (−40; 0), meaning that hedge fund returns are much higher than what an ordinary investor could accomplish. These observations suggest that it is important to distinguish between different starting points in our analysis.⁹

4.2.2. Abnormal stock returns and trading volume

In Fig. 4, we present the targets' buy-and-hold abnormal returns (BHAR) for the interval from 40 days prior to 250 days after the event. At the event day the activist engagement becomes public knowledge. After the hedge fund intervention, target firms generated higher returns than the benchmark, which inevitably led to higher BHARs. We divide our analysis into three sub-periods, before (2000–2006), during (2007–2008), and after the financial crisis (2009–2020), revealing an out- or underperformance of 10.19%, −9.49% and 7.54%, respectively.

⁹ In the Internet Appendix (Part I), Figure IA.2, we also present the distribution of buy-and-hold abnormal returns (BHAR). These stock returns are market-adjusted and therefore reveal weaker valuation effects, especially during the financial crisis when all stock prices declined (Figures C2 and D2). For Figures D2 and D3, the dispersions are the smallest, as the returns are adjusted for the run-up effect and the market index. Figure IA.3 presents the histogram of BHAR (−40; +250) and reveals a positively skewed distribution for the full period with a mean (median) of 1.6% (−4.1%) and negative returns for 52.8% of the events (Panel A). Panel B indicates that the success of activist investors is time-variant, as the distributions clearly differ between the sub-periods. For the 2000–2006 period, the mean (median) is 6.8% (3.2%), with 46.9% negative return events. In the financial crisis, the distribution is clearly positively skewed, has a mean (median) of −11% (−14%) and high share of negative returns (68%). With respect to the 2009–2020 period, the distribution is less positively skewed with 5.0% (3.0%) mean (median) BHARs of which 45% are negative.

Table 4
Probability of becoming a hedge fund target.

Model:	I	II	III	IV
Period:	Full	2000–2006	2007–2008	2009–2020
Constant	-3.4220*** [-3.81]	-4.9916*** [-2.60]	-2.6683* [-1.75]	-4.6522*** [-3.39]
Largest shareholder				
Bank (t-1)	0.3808 [1.11]	1.6806*** [3.68]	.	.
Corporation (t-1)	-0.1381 [-1.00]	-0.7018** [-2.34]	0.0172 [0.05]	0.2025 [0.91]
Government (t-1)	0.4919** [2.22]	-0.209 [-0.43]	1.3082 [1.52]	0.7291** [2.38]
Individual/family (t-1)	-0.2198* [-1.67]	-0.135 [-0.52]	-0.137 [-0.35]	-0.1684 [-0.74]
Financial visibility				
Index membership (t-1)	0.5549*** [3.73]	0.4191 [1.41]	0.0687 [0.19]	0.7399*** [3.24]
Analyst coverage (t-1)	0.6530*** [2.66]	0.3083 [0.82]	0.696 [1.38]	2.1254** [2.04]
Institut. ownership (t-1)	0.9993*** [3.45]	-0.6393 [-1.03]	2.1586** [2.33]	1.4598*** [3.11]
Stock liquidity (ln) (t-1)	0.0621** [2.46]	0.1027** [2.54]	0.047 [0.70]	0.0161 [0.36]
Valuation				
Market-to-book ratio (t-1)	0.0643 [1.13]	-0.0332 [-0.28]	-0.3305* [-1.85]	0.1429* [1.77]
Market cap (ln) (t-1)	-0.1348*** [-3.64]	-0.0158 [-0.20]	-0.1205 [-1.14]	-0.1190** [-2.12]
Accounting fundamentals				
HHI sales (t-1)	0.0972 [0.48]	-0.3732 [-0.76]	0.3608 [0.73]	0.1744 [0.53]
Leverage ratio (t-1)	-0.0780*** [-2.79]	-0.0986** [-1.98]	-0.1393 [-1.02]	-0.0565*** [-2.11]
Payout ratio (t-1)	-0.189 [-0.84]	-0.1053 [-0.30]	0.1864 [0.40]	-0.4463 [-1.21]
Cash holdings (t-1)	0.3628 [0.81]	0.7837 [0.79]	-0.043 [-0.03]	0.4981 [0.80]
Capex-to-sales (t-1)	0.0013 [0.56]	-0.0137* [-1.69]	0.0112** [2.55]	-0.0011 [-0.26]
R&D-to-sales (t-1)	-2.3779** [-2.19]	-2.2052 [-1.05]	2.0873 [0.78]	-2.9517 [-1.58]
Return on assets (t-1)	0.132 [0.31]	-0.8019 [-1.30]	2.0139 [1.44]	0.8094 [1.08]
Sales growth (t-1)	0.1765* [1.92]	-0.3107 [-0.66]	0.4547** [2.09]	0.2777* [1.88]
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
pseudo-R ²	0.0967	0.0879	0.157	0.0852
Observations	8304	2193	793	5217

Notes: This table reports the results of logistic regressions on the likelihood of becoming a hedge fund target. The dependent variable is a dummy that is one if the firm becomes a hedge fund target in a given year, and zero otherwise. The sample includes 653 hedge fund activism events in Germany over the period from 2000 to 2020. We employ all non-targeted constituents of the CDAX as control group. All explanatory variables are lagged by one year. The regressions include year and industry fixed effects and t-statistics based on robust standard errors clustered at the firm-level. All variables are defined in Table 2. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

This supports the vast evidence from the U.S. capital markets where the disclosure of an activist engagement is associated with positive short-term valuation effects (Brav et al., 2022; Greenwood & Schor, 2009; Klein & Zur, 2009), while the long-term effects are mixed (Bebchuk et al., 2015; Cremers et al., 2021; deHaan et al., 2019).

Fig. 5 presents the abnormal turnover for sub-periods. It begins to increase steadily about 80 days before the event and stays at an elevated level thereafter. This is largely consistent with the pattern of abnormal returns. The price increase is mainly due to the increasing stock purchases by hedge funds, which are trying to minimize their costs for building their equity stake in the firm. To examine inter-temporal differences in trading patterns, we depict each sub-period separately. Particularly in the first period (2000–2006), we observe a continuous increase in abnormal trading volume that starts about 80 days before the event and remains at the higher level afterwards. During the financial crisis, we see a tendency of higher abnormal volume relative to the other two periods. In the third period (2009–2020), we find the general pattern, but at a lower level.

The strategy that hedge funds select for attacking the target is important for understanding the size of the valuation effects. To capture this effect, we distinguish between aggressive and non-aggressive hedge funds based on the employed tactics or reputation of the activist (Fig. 6). Before the event (40 days), aggressive hedge funds generated larger BHARs than less aggressive funds for the full period (Panel A). During the first period (Panel B), aggressive strategies were superior in the short run, while being inferior in the long run. This may indicate first that firms did not achieve their full potential when banks acted as the primary monitor, and second the expectation that the activist's engagement would significantly increase firm value. Eventually, hedge funds created less value for shareholders than expected, as their strategy was either deficient or management did not fully implement it. During the financial crisis, BHARs were negative and similar in both groups. Nevertheless, the aggressive tactics resulted in higher long-term valuation effects during the third period, as hedge funds had learned how to enforce their agendas.

Activist often need the support from other investors, as they typically hold only a minority stake. We distinguish between targets with high and low institutional ownership (Fig. 7) and find a significant out-performance of firms with high institutional ownership of 11.33% relative to the CDAX and 14.87% to firms with low institutional ownership (Panel A). In the first period, we observe pronounced positive valuation effects for target firms with high relative to low institutional ownership (24.42% vs. 0.00%) (Panel B). During the crisis, substantial losses occurred, which were more severe for targets with higher institutional ownership (-11.96% vs. -8.06%). During the last period, hedge funds generated a superior performance (BHAR) for targets with high institutional ownership (14.20% vs. -2.25%). Overall, our observations confirm the evidence for the U.S. (Becht et al., 2017; Kedia et al., 2021). In the Internet Appendix, Part II, we report the mean and median BHARs together with their significance levels for different intervals (Section IA.1; Table IA.1), investigate the relationship between short- and long-term valuation effects (Section IA.2, Fig. IA.4) and analyze industry effects (Section IA.3, Fig. IA.5).

4.2.3. Calendar-time portfolio returns

Fig. 8 presents the results for calendar-time portfolios that invest in the shares of target firms. Panel A reveals the performance of portfolios that establish a position 40 days prior to the disclosure of the hedge fund intervention with different holding periods. We find that shorter holding periods of 12 and 24 months have the highest performance. This suggests that the largest increases in value occurred in the first few months after the hedge fund intervened in the target firm. This also explains why hedge funds often stay invested in a company only for a limited time. Interestingly, all strategies performed better than an investment in the benchmark index (CDAX), meaning that hedge fund attacks resulted in an outperformance.

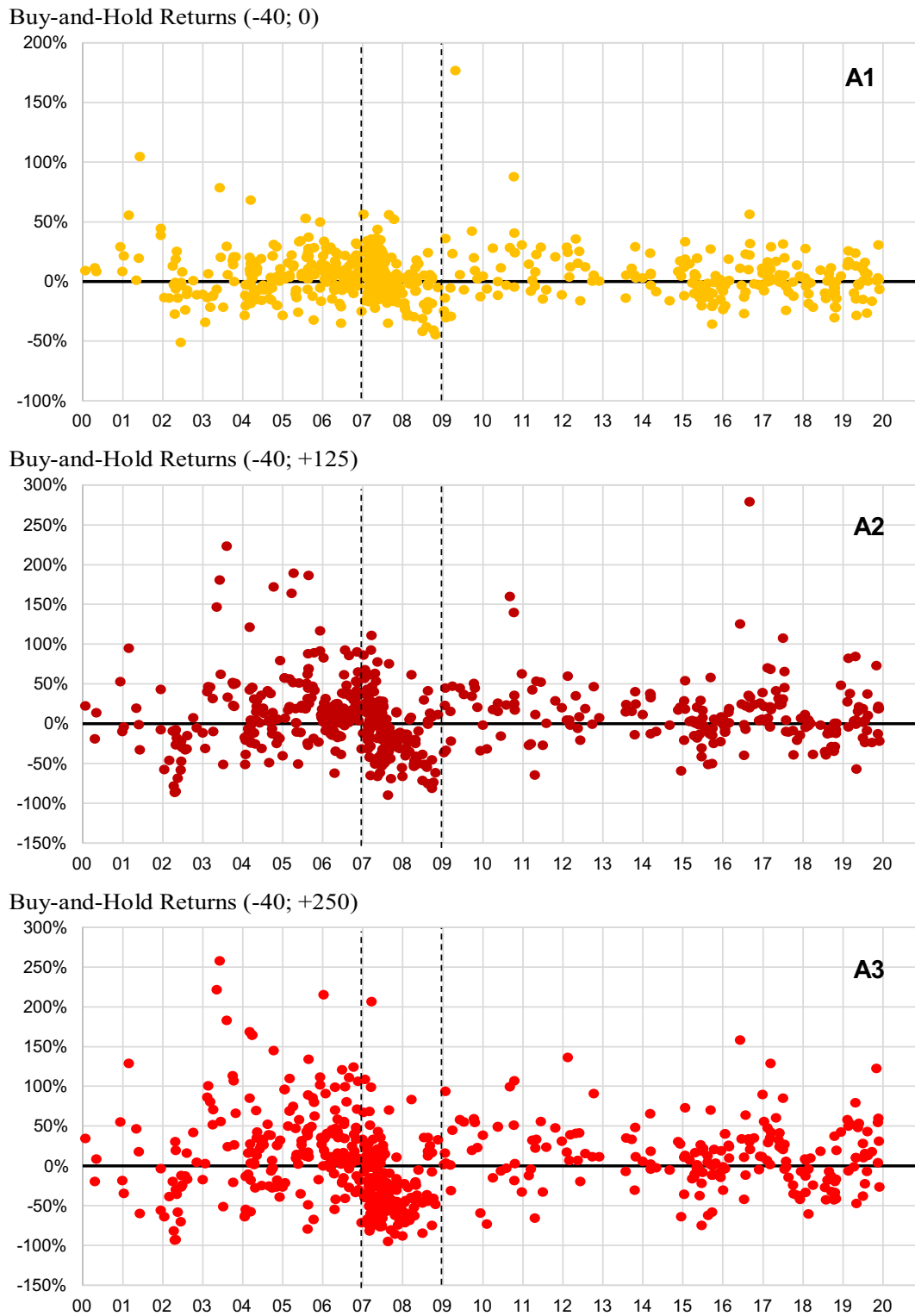


Fig. 3. Distribution of Buy-and-Hold Returns Over Time.

Notes: This figure presents the distribution of mean buy-and-hold returns for different event windows over time. Figs. A use an extended period and Figs. B a fixed rolling window with a variable starting point. The sample includes 653 hedge fund activism events over the period in Germany from 2000 to 2020.

We now compare the performance of three calendar-time portfolios with a holding period of 12 months that either establish a position in the target firms two months before the event (-40; hedge fund perspective), in the month of the event (0; investor perspective) or one month after the

event (+20; investor perspective). We present the results in **Panel B**. Our results reveal that the hedge fund portfolios benefitted significantly from the run-up, while a trading strategy that replicates hedge fund investments (with a time-lag of one month) was less successful, by about

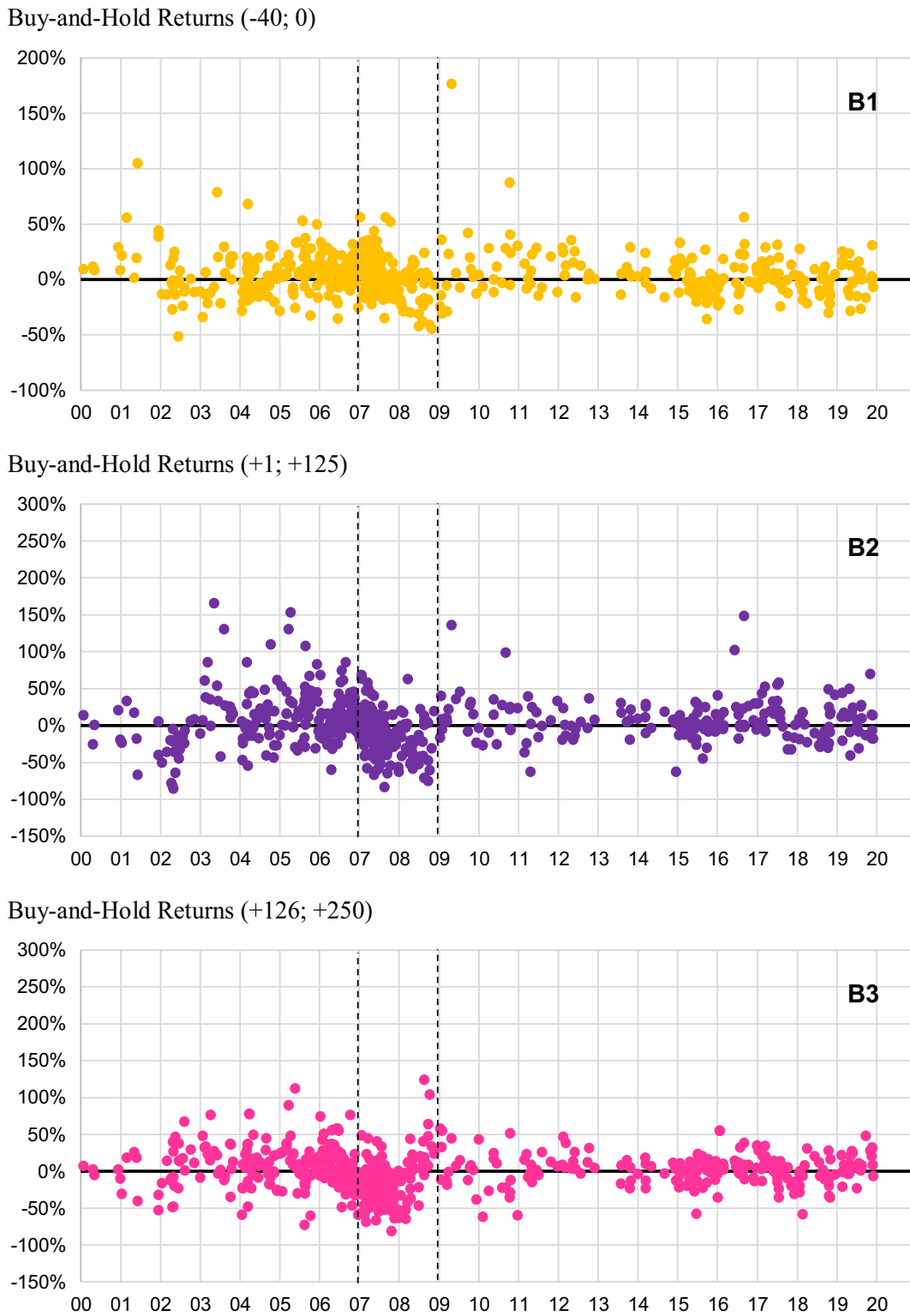


Fig. 3. (continued).

576 (742) points over the entire period. However, an investment in the ‘tracker portfolios’ still outperformed the benchmark (CDAX) by almost 298 (132) points. This suggests that hedge funds also provide profit opportunities for other investors that initiate their strategy when the information becomes public knowledge. In the *Internet Appendix*, Part II, we investigate the performance of calendar-time portfolios with and without aggressive hedge funds (Section IA.4; Fig. IA.6).

We now regress the excess returns of calendar-time portfolios on the Fama and French (1993) and Carhart (1997) risk factors and present the results in Table 5. We form portfolios with a holding period of 12, 24 and 36 months and differentiate between trading strategies of hedge funds and other investors that either invest in the target firm two months before or in the month of the event. We only discuss the results for the full period (Panel A). However, the results are qualitatively similar

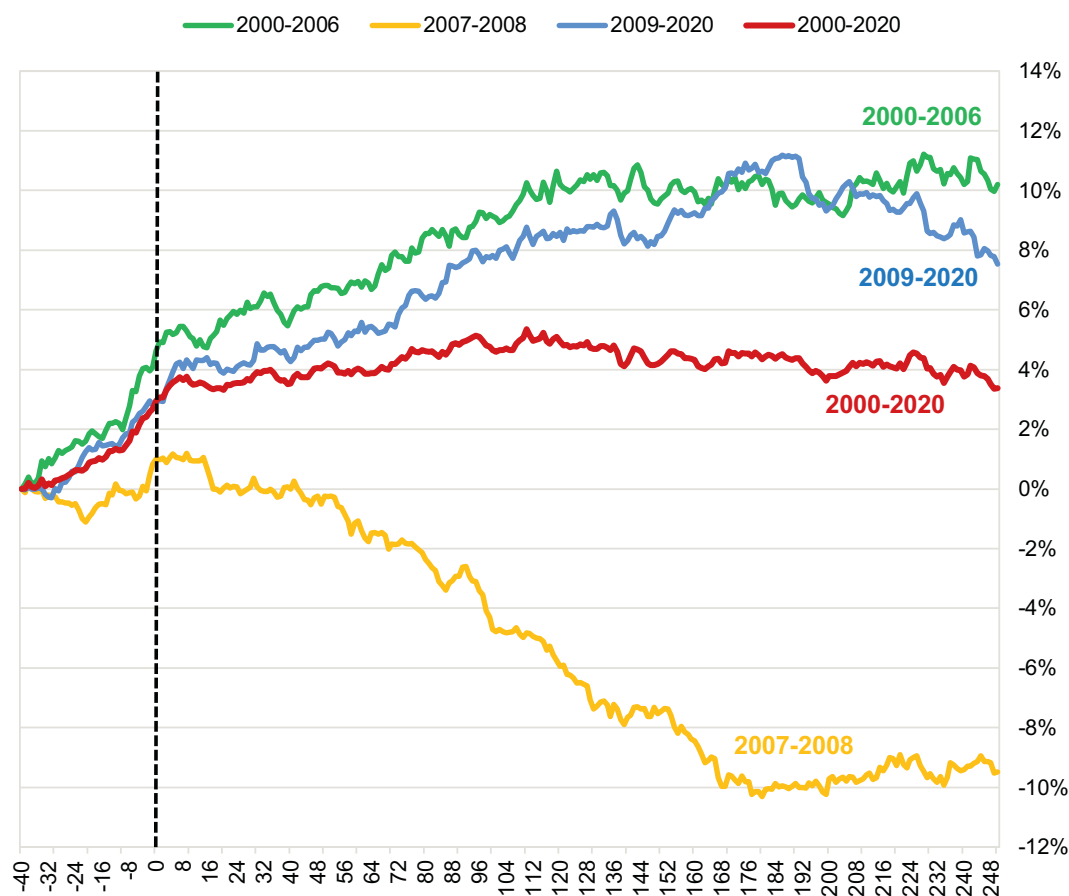


Fig. 4. Buy-and-Hold Abnormal Returns – Sub-Periods.

Notes: This figure presents the mean buy-and-hold abnormal returns (BHARs) from 40 days prior to 250 days after the event day 0 for the 2000 to 2020 period. The sample includes 653 hedge fund activism events in Germany. Differentiation is based on sub-periods. BHARs are calculated using the CDAX as benchmark.

across all sub-periods (**Panel B–D**).

For the 12 months holding period, we find that hedge funds generated positive alphas of 63 basis points per month that decline over longer holding periods. The alphas are only statistically significant for the 12-month holding period, indicating that hedge funds increased share prices but may not create shareholder value in the long run. The estimated coefficients for the SMB factor are positive and highly significant at the 1%-level, suggesting that hedge funds target smaller firms, confirming prior U.S. findings (Bebchuk et al., 2015; Brav et al., 2008; Brav et al., 2022; Clifford, 2008). Consistent with the evidence for U.S. markets that hedge funds invest in value stocks, the loadings on the HML factors are positive, albeit rarely and weakly significant. Finally, the coefficient for the MOM factors is negative and significant at the 1%-level, confirming the results of U.S. studies. When we take the perspective of the investor who invests in the event month, our results reveal alphas that decline to statistically insignificant 5 basis points per month for the 12-month holding period. For the risk factors, the coefficients remain qualitatively unchanged. Overall, our results highlight the importance of the pre-event run-up price effect for the long-term performance of hedge fund trading strategies.

4.2.4. Determinants of abnormal stock returns

4.2.4.1. Cumulative abnormal returns. In Table 6, we present the results from cross-sectional regressions on the CARs for the (–15; +15) interval. We find for the full period, Panel A, that the CARs are lower (column 1) when the government is the largest shareholder in a target firm, supporting the assumption that these shareholders have conflicts of

interests with other shareholders and therefore reject the activist's proposals. When several hedge funds form a coalition and attack the same target simultaneously (wolf pack), our results indicate higher valuation effects (column 2), as wolf pack activists most likely lever their bargaining power and exert collective pressure on the management (H5b and H8). For larger firms, the price effects are lower, as it is more difficult to obtain a significant stake in those firms (column 3). If the target has a lower leverage and a lower payout ratio or generates higher operating cash flows, the CARs are higher (column 4). Therefore, the level of valuation effects is closely related to agency problems resulting from free cash flows, confirming the results of prior U.S. studies (Brav et al., 2008; Klein & Zur, 2009).

The 2000–2006 period covers the first wave of hedge fund activism in Germany subsequent to the government-initiated corporate governance reforms (Panel B). When banks and corporations are the largest shareholders of the target firms, the share prices react positively to hedge fund activism (column 1 and 4). In both cases, the market expect that these shareholders want to profit from the 2002 tax reform and liquidate their positions. We also find higher short-term valuation effects for wolf pack activism with more institutional investors (H5b and H8) and in target firms with lower market-to-book ratios and higher cash (flows).

Panel C depicts the results from the financial crisis (2007–2008), where we expect potentially different effects caused by the particular market situation. Again, we document higher announcement effects for banks as the largest shareholder, whereas the CARs are lower in firms with the government as major shareholder. For larger firms, the announcement returns are lower, as hedge funds require more capital to accumulate a significant equity stakes and the success of restructuring is

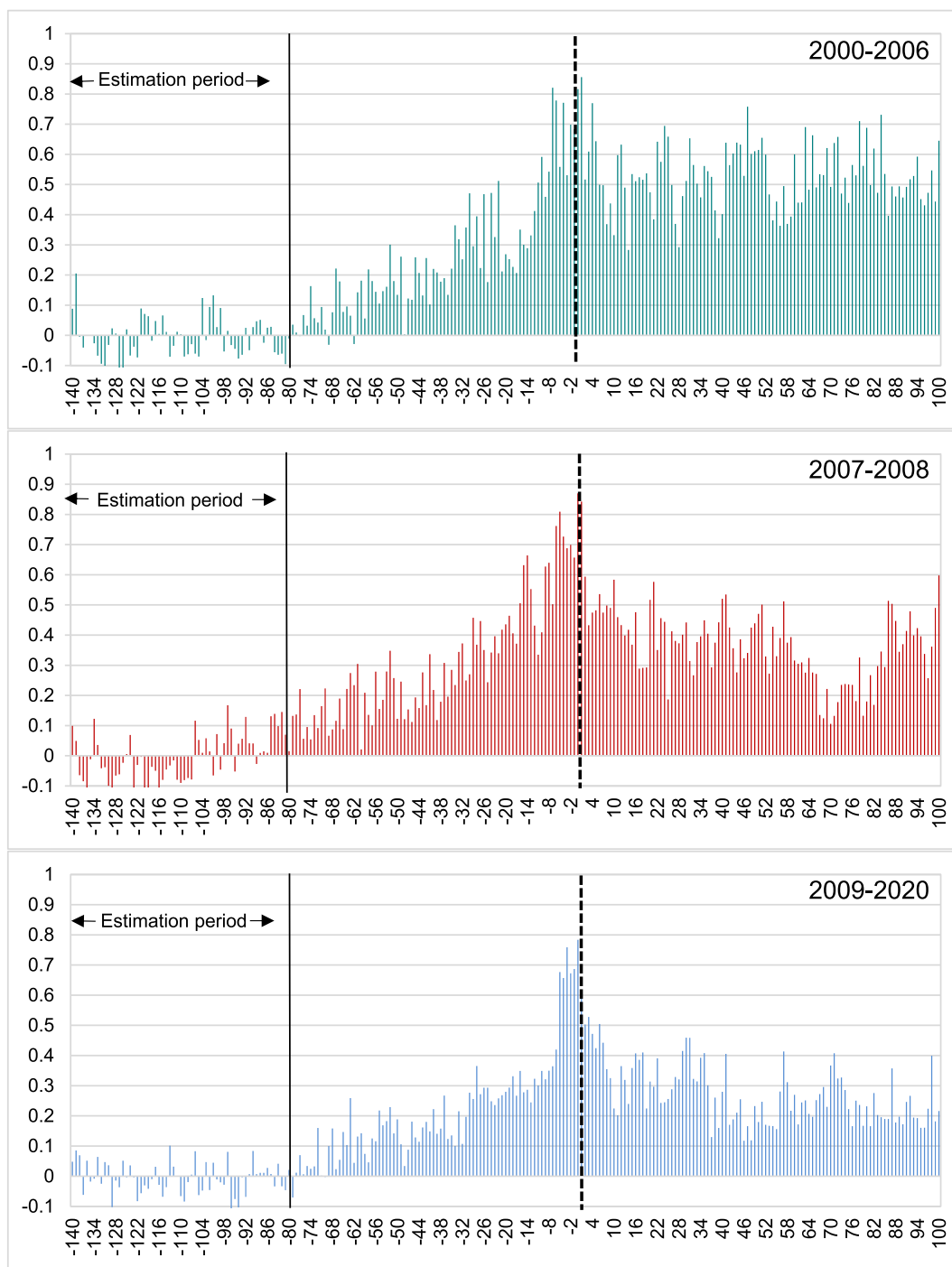


Fig. 5. Abnormal Trading Volume – Sub-Periods.

Notes: This figure presents the mean abnormal trading volume from 140 days prior to 100 days after the event day 0 for the 2000 to 2020 period. The sample includes 653 hedge fund activism events in Germany. Differentiation is based on sub-periods. The abnormal volume is calculated following the approach by [Brav and Gompers \(2003\)](#).

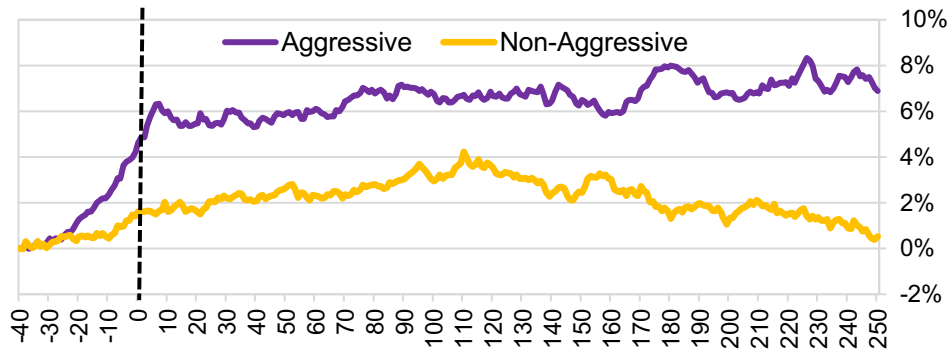
more challenging. If the target firms already have a high payout ratio, there is a lower expectation of high value creation from activist intervention, as one of the general governance tactics are dividend increases. In contrast, more operating cash flows are associated with stronger valuation effects, as profitable firms generate more cash for payouts. Nevertheless, due to the special circumstances during the global financial crisis, these effects may not be attributable to the hedge fund activism.

For the period 2009–2020, **Panel D**, our results are hardly statistically significant. We find that short-term abnormal returns are higher for

smaller firms, albeit with weak statistical significance. Moreover, the expectations that hedge fund activism increases shareholder value is lower when firms already pay higher dividends and engage in share buyback. This offers the activist hedge funds fewer profit opportunities, as they typically attempt to produce positive short-term price reactions with their general governance tactics.

4.2.4.2. Buy-and-hold abnormal returns. We now examine the determinants of long-term valuation effects of hedge fund activism over the three-year period. **Table 7** reports the results from the cross-

Panel A: Full-Period



Panel B: Sub-Periods

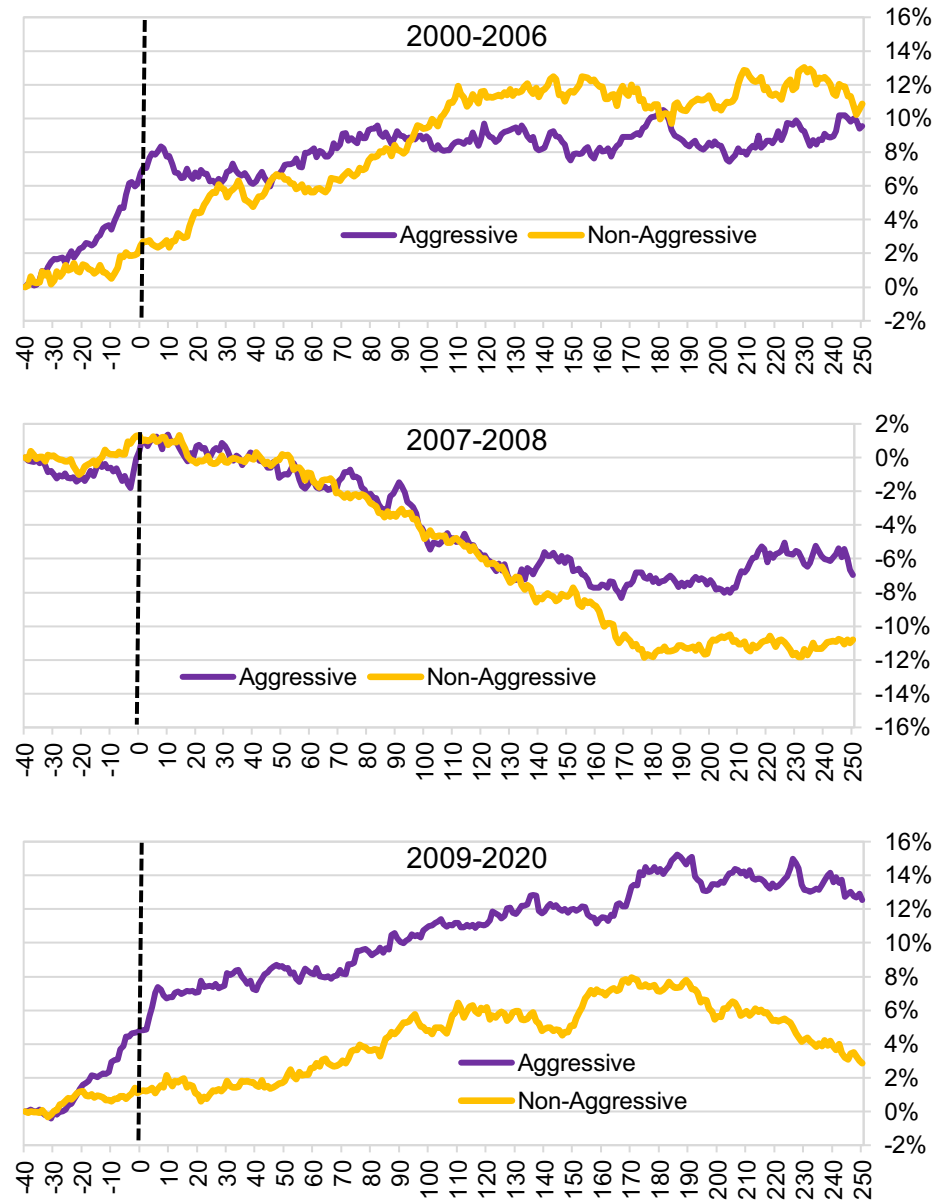
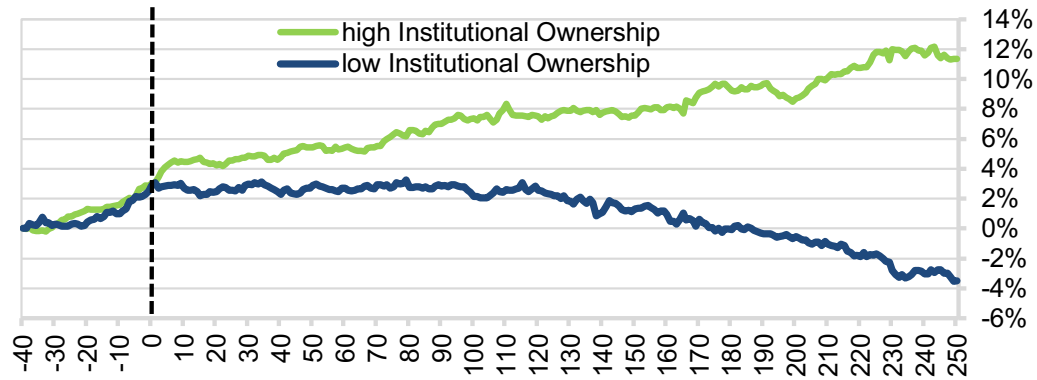


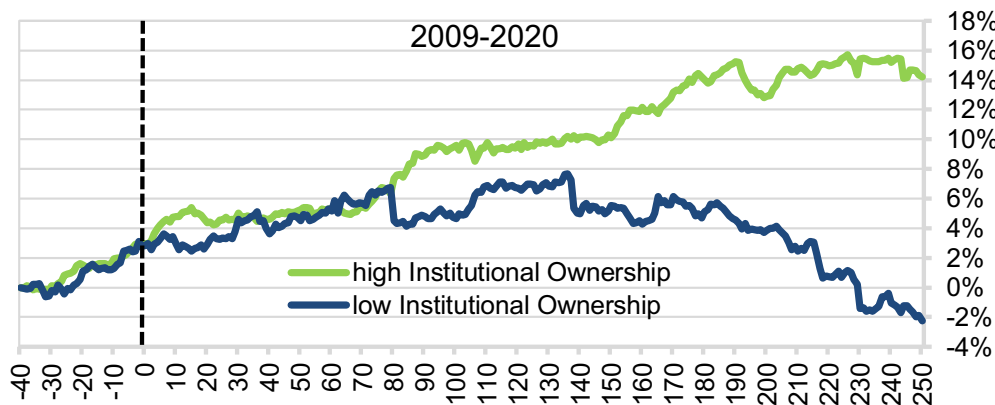
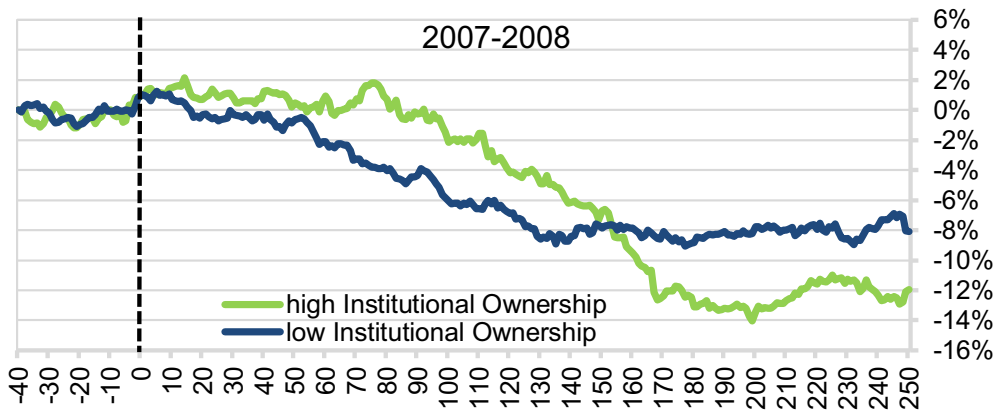
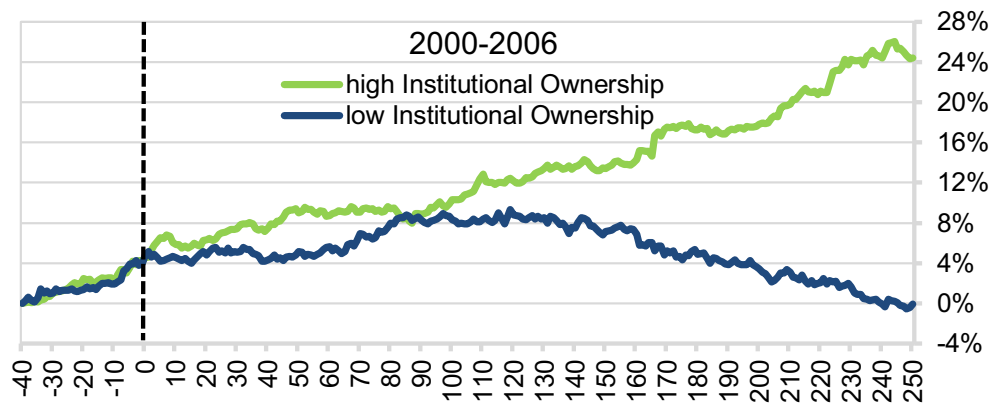
Fig. 6. Performance Differentials – Hedge Fund Behavior.

Notes: This figure presents the mean buy-and-hold abnormal returns (BHARs) from 40 days prior to 250 days after the event day 0 for the 2000 to 2020 period. The sample includes 653 hedge fund activism events in Germany. Differentiation is based on activist tactics. BHARs are calculated using the CDAX as benchmark.

Panel A: Full-Period



Panel B: Sub-Periods

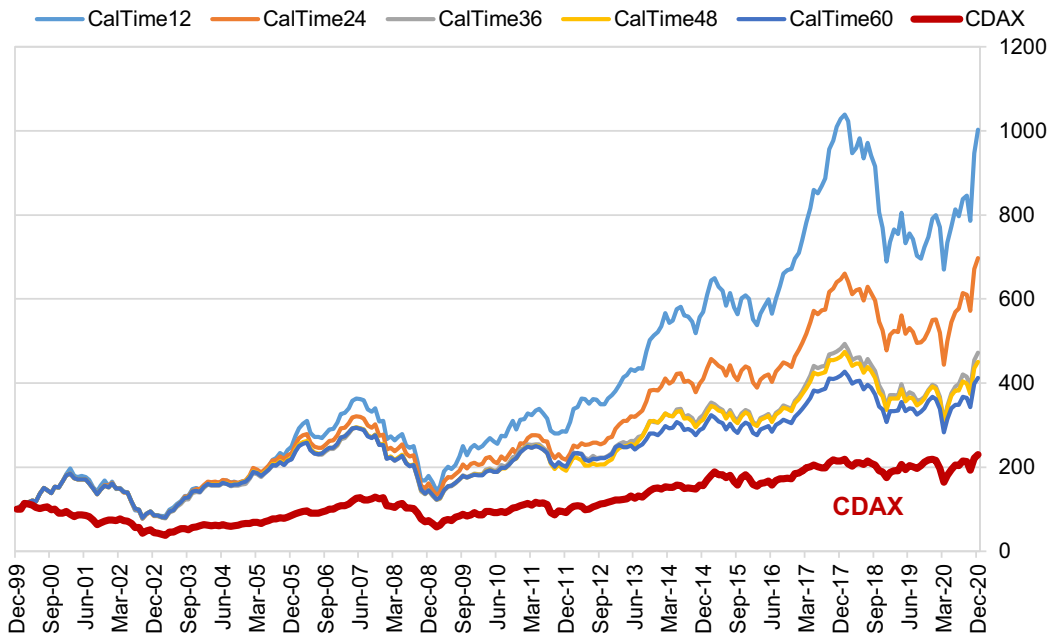


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Fig. 7. Performance Differentials – Institutional Ownership.

Notes: This figure presents the mean buy-and-hold abnormal returns (BHARs) from 40 days prior to 250 days after the event day 0 for the 2000 to 2020 period. The sample includes 653 hedge fund activism events in Germany. Differentiations is based on ownership structure of the target firms. BHARs are calculated using the CDAX as benchmark.

Panel A: Calendar-Time Portfolios for Different Holding Periods



Panel B: Hedge Funds vs. Hedge Fund “Tracker”

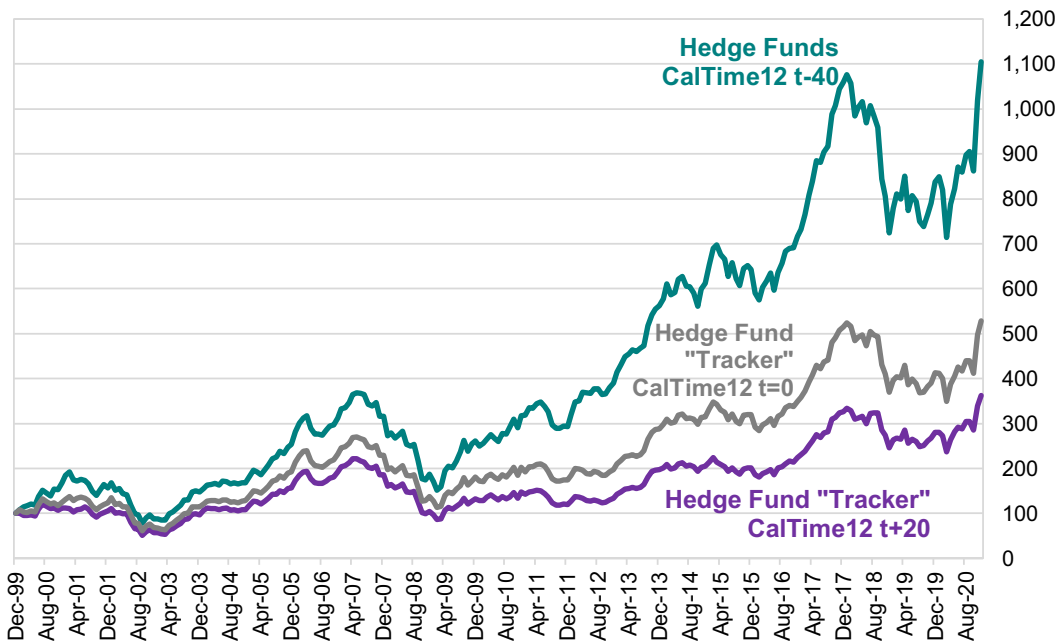


Fig. 8. Calendar-Time Portfolios.

Notes: This figure presents the performance of calendar-time portfolios over the period from 2000 to 2020. The sample includes 653 hedge fund activism events in Germany. Panel A differentiates by holding period (12, 24, 36, 48, 60 months) and Panel B by investments either before, at or after the event month. CDAX is the benchmark.

Table 5
Calendar-time portfolio returns and four-factor model regressions.

Holding period	Alpha	Market	SMB	HML	MOM	R ²
<i>Panel A: Full Period</i>						
Hedge fund perspective						
12 months	0.0063** [2.39]	0.9315*** [18.56]	0.4759*** [4.76]	0.1621 [1.61]	-0.1687*** [-2.63]	0.6998
24 months	0.0039 [1.65]	0.9151*** [21.73]	0.4730*** [5.33]	0.1304 [1.47]	-0.1438** [-2.49]	0.7341
36 months	0.0019 [0.86]	0.8938*** [22.03]	0.4638*** [5.58]	0.1448* [1.79]	-0.1341*** [-2.62]	0.7551
Investor perspective						
12 months	0.0005 [0.18]	0.9012*** [16.93]	0.4223*** [4.02]	0.1526 [1.47]	-0.2093*** [-2.80]	0.7082
24 months	-0.0013 [-0.52]	0.8914*** [19.54]	0.4788*** [5.23]	0.155 [1.60]	-0.1820*** [-2.65]	0.7384
36 months	-0.0015 [-0.65]	0.8816*** [20.10]	0.4634*** [5.49]	0.1541* [1.71]	-0.1826*** [-2.84]	0.7673
<i>Panel B: 2000–2006</i>						
Hedge fund perspective						
12 months	0.0071 [1.50]	0.9366*** [11.18]	0.5137*** [2.71]	0.2539 [1.59]	-0.1888 [-1.65]	0.5466
24 months	0.006 [1.47]	0.8712*** [15.88]	0.3965*** [3.03]	0.2250* [1.82]	-0.1847** [-2.03]	0.6461
36 months	-0.0013 [-0.33]	0.8563*** [14.67]	0.3881*** [3.22]	0.0986 [0.84]	-0.0839 [-1.17]	0.6696
Investor perspective						
12 months	0.0026 [0.50]	0.9357*** [10.81]	0.4324** [2.56]	0.2976** [2.10]	-0.2634* [-1.94]	0.6135
24 months	-0.0018 [-0.40]	0.8373*** [13.03]	0.3955*** [2.95]	0.2290* [1.88]	-0.2229** [-2.16]	0.6850
36 months	-0.0036 [-0.86]	0.8539*** [13.69]	0.3749*** [3.34]	0.1534 [1.31]	-0.0036 [-0.86]	0.7262
<i>Panel C: 2007–2008</i>						
Hedge fund perspective						
12 months	0.022 [1.44]	1.0701*** [6.22]	0.8097*** [3.25]	0.1264 [0.53]	-0.3815*** [-3.66]	0.7004
24 months	0.0029 [0.65]	1.0180*** [17.00]	0.5643*** [6.12]	0.0104 [0.08]	-0.1084* [-1.74]	0.8660
36 months	0.0002 [0.04]	0.9792*** [18.98]	0.6255*** [7.68]	0.1563 [1.14]	-0.1112* [-1.94]	0.8606
Investor perspective						
12 months	-0.0101 [-0.95]	0.8224*** [8.14]	0.5183** [2.65]	-0.1791 [-1.36]	-0.3323*** [-3.96]	0.7877
24 months	0.0033 [0.82]	1.0157*** [17.27]	0.5841*** [5.95]	0.028 [0.24]	-0.1013* [-1.81]	0.8767
36 months	-0.0042 [-0.91]	0.9675*** [20.53]	0.6777*** [5.07]	0.0244 [0.26]	-0.1647*** [-2.76]	0.7427
<i>Panel D: 2009–2016</i>						
Hedge fund perspective						
12 months	0.0057 [1.60]	0.8749*** [11.15]	0.3253* [1.90]	-0.0118 [-0.10]	-0.1652 [-1.47]	0.6774
24 months	0.0035 [1.04]	0.9154*** [12.09]	0.3898** [2.58]	-0.01 [-0.09]	-0.1606 [-1.44]	0.7150
36 months	0.0018 [0.59]	0.9035*** [12.28]	0.3467** [2.50]	-0.0191 [-0.19]	-0.2036** [-2.00]	0.7556
Investor perspective						
12 months	-0.0012 [-0.32]	0.8674*** [10.20]	0.4553** [2.41]	0.1338 [1.24]	-0.1614* [-1.67]	0.6216
24 months	-0.0019 [-0.56]	0.9117*** [12.16]	0.4885*** [3.18]	0.0891 [0.99]	-0.1479 [-1.54]	0.6857
36 months	-0.0021 [-0.71]	0.9265*** [12.67]	0.4974*** [3.54]	0.0652 [0.78]	-0.1866** [-2.16]	0.7335

Notes: The table reports the results from regressions of equal-weighted calendar-time portfolio returns (in excess of the 3-month Euribor rate) for different holdings periods. We use the Fama-French-Carhart four-factor model with the size (SMB), book-to-market (HML), and momentum (MOM) factors, constructed by Brückner et al. (2015) for German stocks. The market portfolio is proxied by the CDAX stock index and the risk-free rate by the 3-month Euribor rate. This analysis only covers the period from January 2000 to June 2016 due to factor data availability. Hedge fund perspective: positions in the target firms are initiated two months before the public announcement, including the price run-up captured by the activist. Investor perspective: position in the target firms are initiated in the event month by another investor tracking the hedge fund strategy and does not benefit from the pre-event price run-up. We report t-statistics based on robust standard errors in parentheses. R² is the adjusted R². *, **, *** indicate significance at the 0.10, 0.05, and 0.01 level, respectively.

Table 6
Determinants cumulative abnormal returns.

Panel A: Full Period					
Model:	I	II	III	IV	V
Period:	Full	Full	Full	Full	Full
Constant	-0.0228 [-0.77]	-0.0245 [-0.81]	-0.0064 [-0.19]	-0.0324 [-0.89]	0.0001 [0.00]
Largest shareholder					
Bank	0.0259 [1.40]				0.0521 [1.60]
Corporation	-0.0032 [-0.34]				-0.0016 [-0.15]
Government	-0.0340* [-1.87]				-0.0224 [-1.16]
Individual/family	-0.0088 [-0.92]				-0.0132 [-1.22]
Hedge fund behavior					
Wolf pack		0.0149* [1.77]			0.0110 [1.08]
Aggressive strategy		0.0036 [0.49]			-0.0027 [-0.31]
Valuation					
Market-to-book ratio			-0.0054 [-1.44]		-0.0078 [-1.62]
Market capitalization			-0.0000** [-2.35]		0.0000 [-1.47]
Accounting fundamentals					
Leverage ratio				-0.0439* [-1.66]	-0.0524** [-1.98]
Payout ratio				-0.0291** [-2.23]	-0.0261* [-1.91]
Cash holdings				0.0047 [0.14]	0.0327 [0.86]
Capex-to-sales				-0.0002 [-1.05]	-0.0002 [-0.74]
R&D dummy				-0.0086 [-0.81]	-0.0142 [-1.31]
Return on equity (RoE)				-0.0101 [-1.19]	-0.0116 [-1.40]
Return on assets (RoA)				-0.0705 [-1.28]	-0.0749 [-1.40]
Cashflow-to-assets				0.1552** [2.58]	0.1662*** [2.78]
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
R ²	0.0605	0.0567	0.0602	0.0921	0.1243
Observations	588	595	585	486	477
Panel B: 2006–2006 Period					
Model:	I	II	III	IV	V
Period:	2000–2006	2000–2006	2000–2006	2000–2006	2000–2006
Constant	-0.0926** [-2.48]	-0.0948*** [-2.77]	-0.0955** [-2.41]	-0.1595*** [-4.15]	-0.0986** [-2.06]
Largest shareholder					
Bank	0.0538* [1.89]				0.0379 [0.66]
Corporation	0.0215 [1.23]				0.0509** [2.37]
Government	-0.0295 [-0.71]				-0.0399 [-0.95]
Individual/family	-0.0085 [-0.52]				-0.0005 [-0.02]
Hedge fund behavior					
Wolf pack		0.0400*** [2.91]			0.0693*** [3.62]
Aggressive strategy		-0.0154 [-1.24]			-0.017 [-1.17]

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Table 6 (continued)

Panel B: 2006–2006 Period					
Model:	I	II	III	IV	V
Valuation					
Market-to-book ratio			–0.006 [–0.97]		–0.0217** [–2.07]
Market capitalization			0.0000 [0.13]		0.0000 [0.49]
Accounting fundamentals					
Leverage ratio				–0.0254 [–0.49]	–0.0613 [–1.22]
Payout ratio				0.0224 [0.54]	0.0488 [1.20]
Cash holdings				0.0829 [1.21]	0.1979** [2.52]
Capex-to-sales				–0.0008 [–0.53]	–0.001 [–0.65]
R&D dummy				–0.0018 [–0.09]	–0.0074 [–0.34]
Return on equity (RoE)				–0.0028 [–0.18]	–0.0102 [–0.68]
Return on assets (RoA)				–0.176 [–1.65]	–0.1119 [–1.03]
Cashflow-to-assets				0.2076* [1.94]	0.1443 [1.27]
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
R ²	0.1589	0.1722	0.1325	0.2043	0.3392
Observations	202	208	204	156	151
Panel C: 2007–2008 Period					
Model:	I	II	III	IV	V
Period:	2007–2008	2007–2008	2007–2008	2007–2008	2007–2008
Constant	0.036 [1.28]	0.0362 [1.40]	0.0604** [2.40]	0.0498 [1.23]	0.1055** [2.19]
Largest shareholder					
Bank	0.1127*** [4.14]				0.1110* [1.91]
Corporation	0.0031 [0.17]				0.0041 [0.18]
Government	–0.0751** [–2.16]				–0.0053 [–0.11]
Individual/family	–0.0004 [–0.02]				–0.0085 [–0.36]
Hedge fund behavior					
Wolf pack		0.0078 [0.52]			–0.0039 [–0.21]
Aggressive strategy		0.0008 [0.05]			–0.0271 [–1.41]
Valuation					
Market-to-book ratio			–0.0107 [–1.48]		–0.0136 [–1.49]
Market capitalization			0.000 [–0.95]		–0.0000* [–1.93]
Accounting fundamentals					
Leverage ratio				–0.0255 [–0.41]	–0.0468 [–0.80]
Payout ratio				–0.0589** [–1.99]	–0.0588* [–1.87]
Cash holdings				–0.1205** [–2.02]	–0.0706 [–1.15]
Capex-to-sales				–0.0001 [–0.20]	–0.0001 [–0.15]
R&D dummy				–0.0209 [–0.95]	–0.0273 [–1.12]
Return on equity (RoE)				–0.0082	–0.0035

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Table 6 (continued)

Panel C: 2007–2008 Period					
Model:	I	II	III	IV	V
Period:	2007–2008	2007–2008	2007–2008	2007–2008	2007–2008
Return on assets (RoA)				[−0.22] 0.1719	[−0.09] 0.1011
Cashflow-to-assets				[1.17] 0.1667	[0.67] 0.2235*
Year FE	Yes	Yes	Yes	[1.47] Yes	[1.94] Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
R ²	0.0817	0.0657	0.088	0.1655	0.243
Observations	173	173	169	136	135
Panel D: 2009–2020 Period					
Model:	I	II	III	IV	V
Period:	2009–2020	2009–2020	2009–2020	2009–2020	2009–2020
Constant	−0.0183 [−0.25]	−0.0232 [−0.32]	−0.0087 [−0.11]	0.0125 [0.14]	0.0065 [0.07]
Largest shareholder					
Bank
Corporation	−0.0186 [−1.27]				−0.0171 [−0.98]
Government	−0.0043 [−0.20]				0.0171 [0.72]
Individual/family	−0.0039 [−0.23]				−0.0107 [−0.56]
Hedge fund behavior					
Wolf pack		−0.0026 [−0.18]			−0.0111 [−0.68]
Aggressive strategy		0.0126 [1.04]			0.0177 [1.19]
Valuation					
Market-to-book ratio			−0.0031 [−0.50]		−0.0035 [−0.46]
Market capitalization			−0.0000* [−1.84]		−0.0000* [−1.70]
Accounting fundamentals					
Leverage ratio				−0.0301 [−0.70]	−0.0296 [−0.68]
Payout ratio				−0.0300* [−1.89]	−0.0290* [−1.75]
Cash holdings				0.0235 [0.41]	0.0609 [0.90]
Capex-to-sales				−0.0001 [−0.25]	−0.0001 [−0.44]
R&D dummy				−0.0076 [−0.42]	−0.0107 [−0.58]
Return on equity (RoE)				−0.0136* [−1.90]	−0.0085 [−1.05]
Return on assets (RoA)				−0.0746 [−1.09]	−0.086 [−1.18]
Cashflow-to-assets				0.1218 [1.37]	0.1248 [1.29]
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
R ²	0.1209	0.1187	0.1284	0.1413	0.171
Observations	213	214	212	194	191

Notes: This table reports the results of cross-sectional regressions using the cumulative abnormal returns (CARs) of the target firm over the (−15; +15) time window as dependent variable. The CDAX is used as common benchmark for all firms. All variables in the category largest shareholder are dummy variables, with financial investors as reference group. All other variables are defined in Table 2. Firm-level fundamental characteristics are measured in the year prior to the event. The t-statistics are based on robust standard errors. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

Table 7
Determinants of buy-and-hold abnormal returns.

Panel A: Full Period					
Model:	I	II	III	IV	V
Constant	0.3194 [0.95]	0.4152 [1.33]	0.4293 [1.26]	0.2356 [0.62]	0.3333 [0.93]
Largest shareholder					
Bank	0.3685*** [2.87]				0.4666** [2.11]
Corporation	0.1555 [1.48]				0.1578 [1.34]
Government	0.2947 [1.28]				0.3462 [1.35]
Individual/family	-0.115 [-1.14]				-0.0053 [-0.04]
Hedge fund behavior					
Wolf pack		0.1593* [1.66]			0.1271 [1.14]
Aggressive strategy		-0.0832 [-1.01]			-0.0639 [-0.67]
Valuation					
Market-to-book ratio			-0.0503 [-1.03]		-0.0314 [-0.61]
Market capitalization			0.0000 [0.25]		0.0000 [-1.17]
Accounting fundamentals					
Leverage ratio				0.1527 [0.50]	0.1332 [0.44]
Payout ratio				-0.2168** [-1.98]	-0.2219* [-1.85]
Cash holdings				0.3747 [1.13]	0.5648 [1.56]
Capex-to-sales				0.0004 [0.23]	-0.0005 [-0.24]
R&D dummy				0.2764** [2.19]	0.2900** [2.09]
Return on equity (RoE)				-0.0036 [-0.03]	-0.0153 [-0.15]
Return on assets (RoA)				0.2739 [0.35]	0.2892 [0.36]
Cashflow-to-assets				0.9912 [1.49]	0.807 [1.16]
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
R ²	0.086	0.076	0.0705	0.1446	0.1605
Observations	485	491	483	402	396
Panel B: 2006–2006 Period					
Model:	I	II	III	IV	V
Constant	0.227 [0.75]	0.2702 [0.99]	0.0747 [0.20]	-0.3553 [-0.85]	-0.3345 [-0.77]
Largest shareholder					
Bank	0.3615 [1.51]				0.3904 [0.63]
Corporation	0.3693* [1.81]				0.3792 [1.42]
Government	0.9746 [1.45]				0.65 [1.00]
Individual/family	-0.4391** [-2.40]				-0.2281 [-0.97]
Hedge fund behavior					
Wolf pack		0.4099** [2.10]			0.5795** [2.40]
Aggressive strategy		-0.0752 [-0.49]			-0.1068 [-0.60]

(continued on next page)

Table 7 (continued)

Panel B: 2006–2006 Period					
Model:	I	II	III	IV	V
Valuation					
Market-to-book ratio			0.0426 [0.45]		0.1501 [1.18]
Market capitalization			0.0000* [1.86]		0.0000 [−0.79]
Accounting fundamentals					
Leverage ratio				1.2495** [2.40]	0.9849** [2.07]
Payout ratio				0.8360** [2.12]	1.0881*** [2.81]
Cash holdings				0.5989 [0.98]	0.2905 [0.36]
Capex-to-sales				−0.0109 [−0.73]	−0.0204 [−1.29]
R&D dummy				0.7219*** [3.25]	0.7203*** [2.73]
Return on equity (RoE)				−0.0136 [−0.12]	−0.0166 [−0.16]
Return on assets (RoA)				−0.1795 [−0.12]	−0.2789 [−0.17]
Cashflow-to-assets				1.547 [1.20]	1.1258 [0.87]
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
R ²	0.2319	0.1583	0.14	0.3178	0.4075
Observations	198	203	199	153	149
Panel C: 2007–2008 Period					
Model:	I	II	III	IV	V
Constant	−0.1461 [−0.58]	0.0022 [0.01]	−0.0024 [−0.01]	0.1291 [0.51]	0.4411 [1.29]
Largest shareholder					
Bank	0.2632 [1.27]				0.5825** [2.60]
Corporation	0.2202 [1.62]				0.1345 [0.94]
Government	−0.2422 [−1.13]				−0.2247 [−0.52]
Individual/family	0.0683 [0.59]				0.1271 [0.70]
Hedge fund behavior					
Wolf pack		−0.1046 [−1.16]			−0.2656** [−2.03]
Aggressive strategy		−0.1181 [−1.45]			−0.1746* [−1.76]
Valuation					
Market-to-book ratio			−0.0268 [−0.39]		−0.1502*** [−2.79]
Market capitalization			0.0000 [0.27]		0.0000 [−0.70]
Accounting fundamentals					
Leverage ratio				−0.7530** [−2.17]	−1.0227*** [−2.85]
Payout ratio				0.054 [0.44]	0.1057 [0.86]
Cash holdings				−0.6574 [−1.56]	−0.1744 [−0.39]
Capex-to-sales				−0.0002 [−0.10]	0.0009 [0.61]
R&D dummy				0.014 [0.11]	0.0389 [0.25]
Return on equity (RoE)				−0.1879 [−1.09]	−0.0998 [−0.53]
Return on assets (RoA)				0.4095	0.4876

(continued on next page)

Table 7 (continued)

Panel C: 2007–2008 Period					
Model:	I	II	III	IV	V
				[0.62]	[0.66]
Cashflow-to-assets				0.3025	0.4044
Year FE	Yes	Yes	Yes	[0.58]	[0.69]
Industry FE	Yes	Yes	Yes	Yes	Yes
R ²	0.1478	0.1374	0.1197	Yes	Yes
Observations	153	153	149	0.2398	0.3374
				128	127
Panel D: 2009–2020 Period					
Model:	I	II	III	IV	V
Constant	−0.0561	0.0043	0.2735	−0.7561	−0.6688
	[−0.08]	[0.01]	[0.42]	[−0.83]	[−0.72]
Largest shareholder					
Bank	.				.
Corporation	−0.0874				0.1597
	[−0.45]				[0.78]
Government	−0.091				−0.0747
	[−0.44]				[−0.30]
Individual/family	0.3503				0.2134
	[1.33]				[0.72]
Hedge fund behavior					
Wolf pack		0.0632			−0.2625
		[0.39]			[−1.20]
Aggressive strategy		−0.0154			0.1347
		[−0.09]			[0.73]
Valuation					
Market-to-book ratio			−0.1850**		−0.1412*
			[−2.04]		[−1.78]
Market capitalization			−0.0000*		0.0000
			[−1.66]		[0.83]
Accounting fundamentals					
Leverage ratio				−0.0498	−0.2115
				[−0.11]	[−0.41]
Payout ratio				−0.7421***	−0.7276***
				[−3.73]	[−3.41]
Cash holdings				1.6458*	2.4929**
				[1.78]	[2.60]
Capex-to-sales				0.0018	0.0035
				[0.53]	[0.86]
R&D dummy				0.0232	−0.0511
				[0.09]	[−0.21]
Return on equity (RoE)				0.0852	0.6407
				[0.09]	[0.61]
Return on assets (RoA)				−2.2896	−4.0108**
				[−1.32]	[−2.28]
Cashflow-to-assets				4.0700**	4.0751**
				[2.22]	[2.13]
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
R ²	0.15	0.1248	0.159	0.33	0.3785
Observations	134	135	135	121	120

Notes: This table reports the results of cross-sectional regressions using the buy-and-hold abnormal returns (BHARs) of the target firm over the (−40; +720) time window as dependent variable. The CDAX is used as common benchmark for all firms. All variables in the category largest shareholder are dummy variables, with financial investors as reference group. All other variables are defined in Table 2. Firm-level fundamental characteristics are measured in the year prior to the event. The t-statistics are based on robust standard errors. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

sectional regression on BHARs over the (−40; +720) event window. In Panel A, we start with the full period. The ability of activist hedge funds to restructure target firms may be exacerbated if there are large shareholders that benefit from the status quo. With a bank as the dominant shareholder, BHARs are higher because they may not oppose the hedge funds' demands (column 1). The success of activist also depends on their behavior and strategies to pressure management. When multiple hedge

funds engage in a target firm (wolf pack), we find larger BHARs (H5b and H8, column 2), consistent with the evidence for the U.S. (Becht et al., 2017; Boyson & Mooradian, 2011). However, the long-run performance is independent from the firm valuation prior to the event (column 3). Finally, investments in R&D and dividends have positive and negative effect on long-term abnormal returns, respectively (column 4).

To analyze the time variabilities of the long-term valuation effects, we distinguish again between our three sub-periods 2000–2006, 2007–2008, and 2009–2020. **Panel B** contains the results for the first period, in which activists realized higher BHARs when the major shareholder is a corporation. This could be related to the 2002 tax reform with tax-free profits from the sale of long-term owned shareholdings. It could also be explained by the fact that companies at that time were not optimally governed and that the potential for large improvements and value creation was at its best at that time. In contrast, we find lower BHARs when families and individuals are the controlling shareholders, as the success of the hedge fund activism becomes less likely due to resistance against restructuring proposals. For tactical actions such as wolf packs of institutional investors, we document a positive coefficient in the first hedge fund wave (**H5b** and **H8**), which is also reported for U.S. target firms (Becht et al., 2017; Kedia et al., 2021). Moreover, abnormal returns are higher in target firms with more leverage and higher payout, suggesting that firms with less agency conflicts of free cash flows generate a long-term outperformance.

In **Panel C**, we present the findings for the financial crisis (2007–2008). We find higher long-term valuation effects when the largest shareholder is a bank. Interestingly, the BHARs are lower if the hedge funds choose a more aggressive approach and several investors attack the firm at the same time (**H5b**). This suggests that in times of crisis, these typical strategies are incapable of creating value and an outperformance, but instead, achieve quite the opposite. For undervalued stocks (low market-to-book ratio), activism increases the long-term value of the firm, as there is more potential for improvement. For targets with low debt, a higher BHAR is realized, as hedge funds choose economically more stable firms in crisis periods. However, other factors can strongly influence our results due the special circumstances of the financial crisis.

Over the 2009–2020 period, **Panel D**, the identity of the largest shareholder and the behavior of hedge funds do not have a significant effect on the level of long-term abnormal returns. Again, the long-term performance is lower for larger target firms, where the activist strategies are more difficult to implement. In addition, activism is more successful in undervalued stocks (market-to-book ratio), where active intervention potentially leads to higher value increases. Finally, our results indicate that the long-term valuation effects are closely related to potential agency problems of free cash flow, supporting previous U.S. findings (Brav et al., 2008; Klein & Zur, 2009). Consistently, hedge funds achieve higher BHARs in target firms with lower payout ratios, but high cash holdings and operating cash flows.

Overall, our cross-sectional regressions results provide supporting evidence for the Hypotheses **5b** and Hypothesis **8** on larger valuation effects associated with more aggressive tactics and more institutional ownership in target firms, respectively.

4.3. Hedge fund activism and real effects

To gain more detailed insights into the effects of hedge fund activism on target firms, we analyze trends in profitability and growth, financial strategies and payout policies, and corporate strategies. We perform an ordinary least squares regression analysis on the development of firm characteristics in the five years prior to the hedge fund activism ($t=0$), and five years afterwards.¹⁰ The explanatory variables of interest are dummies that are one for each of the five years before and after the event ($t \pm x$ with $x = 0, 1, \dots, 5$). We use all firms from the CDAX that have not been targeted by hedge funds as control firms. To take the time trend in the characteristics and the influence of industry- and market-wide factors into account, we include the market capitalization of the firm as well as industry and year fixed effects. Standard errors are clustered at

¹⁰ In this analysis, we follow the empirical approach of Bebczuk et al. (2015) in their study on the long-term effects of U.S. hedge fund activism.

the firm level. The coefficients of the dummy variables ($t-5$), ($t-4$), ..., ($t+5$) should be interpreted as difference-of-differences. We take the difference between each observation (firm year) and the average value of all firms in the same year and also the average value of all firms from the same industry across all years. Finally, the estimation determines the difference between the adjusted dependent variables of target firms and control firms in a given year around the event.

In **Panel A of Table 8**, we report the results for the five-year period prior to the event. With respect to firm valuation, we find a negative coefficient consistent with the expectation that hedge funds target smaller firms (**H1a**), while the results for the market-to-book ratio are insignificant (**H2b**). As expected, asset growth is higher relative to control firms during the pre-event period (**H1c**). Our results suggest that the operative performance (RoA) is not significantly different in target firms (**H1d**). Prior to the activist intervention, target firms have higher cash holdings (**H2a**) than non-targeted firms. Further, target firms are more likely to report R&D expenses (**H3a**), while the coefficients for capex (**H3b**) and product segment diversification (conglomerate) are insignificant (**H3c**). Target firms have a significantly lower ownership concentration (**H4a**) and more institutional ownership (**H4b**) in the years prior to the hedge fund attack. This makes them attractive targets, as active influence requires high free float and the support of institutional investors who often have similar objectives and a comparable approach to corporate governance.

In **Panel B**, we present the results for the five-year period subsequent to the hedge fund activism event. In contrast to U.S. activism (Bebczuk et al., 2015), we find that profitability (RoA/RoE) declines significantly in the first years after the activist intervention (**H5c**). For the payout policy, our results do not suggest that target firms pay higher dividends compared to control firms that are not targeted by activist, whereas share repurchases are higher in the second year (**H6a**), as they first need to be approved in the next annual shareholder meeting. Therefore, we find some evidence for increases in payouts as a result of hedge fund activism. With respect to cash holdings, we only document a statistically significant difference in the event year but none in the years thereafter (**H6b**), as the reduction to a lower level occurs only once. After the hedge fund engagement, the leverage increased continuously as expected (**H6c**). Overall, the regression analysis confirms most of our hypotheses for financing strategies and payout policies, with a reduction of cash holdings and increases of debt, while the evidence for payout increases is weaker.¹¹ The findings are also consistent with results from prior U.S. studies (Autore et al., 2019; Boyson & Mooradian, 2011; Brav et al., 2008).

In **Panel B**, we also report the regression results on the effects of activism on corporate strategy. With regard to the addition of new assets from acquisitions (M&A activity), we find a decline in the second year after the intervention (**H7a**), consistent with U.S. results (Gantchev et al., 2020; Wu & Chung, 2022). In the years following the hedge fund attack, R&D expenditures are not less frequently reported than in control firms (**H7b**). This supports the empirical results of Brav et al. (2018) and Klein and Zur (2009), which document even more investments in R&D and higher quality of innovations after the intervention. Moreover,

¹¹ A specific listing requirement of the 'Neuer Markt' market segment (1997–2003) was that IPO firms had to issue more new shares when initial investors sold their shares at the IPO, which often resulted in more equity, higher proceeds, and higher cash holdings. These unused large surplus of cash holdings resulted in lower RoA and declining stock prices. Consequently, firms returned excess cash holdings through share repurchases within the first three years after the IPO, while the longer listed or established firms used operating cash flows for share repurchases (Bessler, Drobetz, & Seim, 2014; Bessler, Drobetz, Seim, & Zimmermann, 2016). This peculiarity may affect our results for hedge fund activism on payout policy of target firms at this time. However, the impact is negligible, as there were only 39 target firms that were formerly 'Neuer Markt' IPOs in the first period (2000–2006).

Table 8
Development of firm characteristics.

Panel A: Characteristics of Target Firms – Regressions												
Hypothesis:	1a	1b	1c	1d	2a	2b	2c	3a	3b	3c	4a	4b
Dependent variable:	Market Cap	Market-to-Book	Asset Growth	Return on Assets	Cash	Payout (Div)	Leverage Ratio	R&D Reporting	Capex-to-sales	HHI Sales	Closely held	Inst Owner
<i>t</i> - 5	-295.6849 [-0.81]	0.0281 [0.49]	0.0486* [1.96]	-0.0005 [-0.08]	0.0062 [0.99]	-0.008 [-0.51]	0.002 [0.22]	0.0726*** [3.83]	0.0051 [1.45]	0.005 [0.45]	-0.0731*** [-5.43]	0.0509*** [4.98]
<i>t</i> - 4	-729.2307** [-2.05]	-0.044 [-0.96]	0.0734*** [2.91]	-0.002 [-0.31]	0.0133** [2.03]	0.0054 [0.30]	0.0093 [0.99]	0.0724*** [3.77]	-0.003 [-1.16]	0.0101 [0.90]	-0.0638*** [-4.82]	0.0629*** [6.42]
<i>t</i> - 3	-906.3259** [-2.42]	-0.0009 [-0.02]	0.0279 [1.39]	-0.003 [-0.48]	0.0104* [1.68]	-0.0286* [-1.79]	0.0135 [1.48]	0.0536*** [2.88]	-0.0017 [-0.62]	-0.0015 [-0.13]	-0.0823*** [-6.35]	0.0707*** [7.62]
<i>t</i> - 2	-1257.6177*** [-3.38]	0.0251 [0.57]	0.0420* [1.89]	-0.0097* [-1.65]	0.0195*** [3.24]	-0.0115 [-0.78]	0.0123 [1.39]	0.0389** [2.10]	0.0027 [1.03]	-0.0013 [-0.12]	-0.0937*** [-7.56]	0.0788*** [8.73]
<i>t</i> - 1	-1528.9142*** [-4.19]	0.0441 [0.99]	-0.0083 [-0.45]	-0.0064 [-1.17]	0.0169*** [2.72]	-0.0273* [-1.86]	0.0131 [1.52]	0.027 [1.53]	0.0037 [1.42]	-0.001 [-0.09]	-0.0862*** [-6.93]	0.0917*** [9.87]
<i>t</i> = <i>Event Year</i>	-1523.9981*** [-4.11]	0.0212 [0.50]	0.0317 [1.61]	-0.0088* [-1.68]	0.0130** [2.25]	0.0004 [0.03]	0.011 [1.27]	0.0207 [1.19]	-0.0003 [-0.12]	0.0037 [0.35]	-0.0665*** [-5.02]	0.1207*** [12.04]
<i>Market Cap (ln)</i>	3131.6802*** [15.35]	0.0380*** [3.67]	0.0099*** [4.92]	0.0178*** [13.48]	-0.0113*** [-9.23]	0.0216*** [10.18]	-0.0043* [-1.85]	0.0577*** [11.96]	-0.0018*** [3.31]	-0.0432*** [-17.51]	-0.0177*** [-5.78]	0.0266*** [13.59]
Year & Ind. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post-Event Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.4329	0.1204	0.0795	0.1187	0.0917	0.0436	0.1019	0.3939	0.1204	0.192	0.081	0.2127
Observations	17,307	17,221	16,504	17,221	15,093	16,668	17,178	17,307	16,612	16,335	13,857	12,545

Panel B: Consequences for Target Firms - Regressions									
Hypothesis:	5c	5c	6a	6a	6b	6c	7a	7b	7c
Dependent variable:	Return on Assets	Return on Equity	Payout (Div)	Payout (SRP)	Cash	Leverage Ratio	Assets from M&A	R&D Reporting	Capex-to-sales
<i>t</i> = <i>Event Year</i>	-0.0088* [-1.68]	-0.042 [-1.48]	0.0004 [0.03]	0.0091 [1.43]	0.0130** [2.25]	0.011 [1.27]	0.0005 [0.26]	0.0207 [1.19]	-0.0003 [-0.12]
<i>t</i> + 1	-0.0173*** [-3.12]	-0.024 [-0.92]	-0.0265 [-1.50]	0.0053 [0.85]	0.0059 [1.03]	0.0197** [2.18]	0.0008 [0.42]	0.0099 [0.55]	-0.0047** [-2.47]
<i>t</i> + 2	-0.0132** [-2.16]	-0.0714*** [-2.73]	-0.0052 [-0.26]	0.0123* [1.75]	0.0013 [0.23]	0.012 [1.30]	-0.0025* [-1.75]	0.0146 [0.78]	-0.0045** [-2.40]
<i>t</i> + 3	-0.0226*** [-3.49]	-0.0293 [-0.81]	0.0018 [0.09]	0.0029 [0.48]	-0.0067 [-1.14]	0.0241** [2.48]	0.0013 [0.67]	0.0246 [1.28]	-0.0026 [-1.35]
<i>t</i> + 4	-0.0089 [-1.45]	-0.0252 [-0.76]	-0.0416** [-2.31]	-0.0184*** [-3.58]	0.0013 [0.20]	0.0202** [2.08]	-0.0017 [-0.99]	0.007 [0.37]	-0.0022 [-1.16]
<i>t</i> + 5	-0.0024 [-0.44]	-0.0703** [-2.07]	-0.0152 [-0.81]	0.0034 [0.43]	0.0033 [0.53]	0.0188** [1.99]	-0.0002 [-0.11]	0.0079 [0.42]	-0.0004 [-0.14]
<i>Market Cap (ln)</i>	0.0178*** [13.48]	0.0368*** [9.75]	0.0216*** [10.18]	0.0052*** [6.80]	-0.0113*** [-9.23]	-0.0043* [-1.85]	0.0010*** [4.35]	0.0577*** [11.96]	0.0018*** [3.31]
Year & Ind. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-Event Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.1187	0.033	0.0436	0.0379	0.0917	0.1019	0.0492	0.3939	0.1204
Observations	17,221	17,201	16,668	13,765	15,093	17,178	13,580	17,307	16,612

Panel C: Consequences for Target Firms - F-tests									
Hypothesis:	5c	5c	6a	6a	6b	6c	7a	7b	7c
F-Tests for:	Return on Assets	Return on Equity	Payout (Div)	Payout (SRP)	Cash	Leverage Ratio	Assets from M&A	R&D Reporting	Capex-to-sales
Relative to t									
($t + 3$) versus t	-0.0140*	0.0130	0.0014	-0.0062	-0.019***	0.0131*	0.0008	0.0039	-0.0020
F-statistic	3.6406	0.0827	0.0035	0.6027	9.647	3.4691	0.1063	0.0781	1.1832
p-value	5.67%	77.38%	95.30%	43.77%	0.19%	6.28%	74.44%	78.00%	27.70%
($t + 4$) versus t	0.0000	0.0170	-0.0414*	-0.0271***	-0.0117*	0.0092	-0.0015	-0.0137	-0.0020
F-statistic	0.0005	0.1783	3.8221	12.7729	2.7181	1.3576	0.7895	0.7252	0.7129
p-value	98.22%	67.29%	5.08%	0.04%	9.95%	24.42%	37.45%	39.46%	39.87%
($t + 5$) versus t	0.0060	-0.0280	-0.0154	-0.0057	-0.0097	0.0078	-0.0005	-0.0128	0.0000
F-statistic	0.7614	0.374	0.434	0.3761	1.7001	0.8009	0.0774	0.5394	0.0006
p-value	38.31%	54.10%	51.02%	53.98%	19.26%	37.10%	78.09%	46.28%	98.05%
Relative to ($t - 1$)									
($t + 3$) versus ($t-1$)	-0.0160**	-0.0416	0.0288	0.0059	-0.0229***	0.0110	0.0013	-0.0024	-0.0057**
F-statistic	4.6872	0.9154	1.5993	0.6805	11.3846	1.8744	0.8367	0.0238	5.8305
p-value	3.06%	33.89%	20.63%	40.96%	0.08%	17.13%	36.06%	87.74%	1.59%
($t + 4$) versus ($t-1$)	-0.0020	-0.0376	-0.0140	-0.0150**	-0.0156**	0.0071	-0.0010	-0.0200	-0.0057**
F-statistic	0.1233	0.8552	0.4424	5.3305	4.1561	0.656	0.1183	1.3142	4.8743
p-value	72.56%	35.53%	50.61%	2.12%	4.17%	41.81%	73.09%	25.19%	2.75%
($t + 5$) versus ($t-1$)	0.0040	-0.0826*	0.0120	0.0064	-0.0136*	0.0057	0.0000	-0.0191	-0.0037
F-statistic	0.297	3.4719	0.2711	0.5415	2.897	0.3813	0.0851	1.0441	1.5581
p-value	58.59%	6.27%	60.27%	46.20%	8.91%	53.70%	77.05%	30.71%	21.22%

Notes: These tables reports the results from panel regressions with dummy variables for 5 years before and after the event year (Panels A and B) and corresponding F-tests (Panel C). All non-targeted constituents of the CDAX are employed as control group. This analysis is based on [Bebchuk et al. \(2015\)](#). *, **, *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

investments in capex are always lower relative to non-target firms over the first two years (H7c).

Finally, we conduct two F-tests for each of the regressions on the consequences of hedge fund activism for target firms (Panel B). One F-test for the difference between coefficients in (t+3), (t+4) and (t+5) relative to the event year (t), and one relative to the year before (t-1). Panel C contains the results, which indicate that the coefficients for return on assets in (t+3) are lower than in the event year and the pre-event year (H5c). With respect to payouts, we find that dividends and share repurchases are significantly lower in (t+4) compared to both years (t) and (t-1) (H6a). For the changes in financing strategies, the coefficients of cash holdings from years three to five are always smaller than in the (pre-) event year (H6b). However, the negative differences decline over this period. For the leverage ratio, only the difference between the coefficients (t+3) versus (t) is statistically significant (H6c). Finally, we document that the investments in capex are lower in the third and fourth year after the intervention relative to the pre-event year. This is consistent with our previous results, suggesting that hedge funds enforce lower cash holdings, higher leverage, and lower long-term investments. Table 9 summarizes the results of all hypothesis tests.

5. Robustness tests

This section provides additional evidence in support of our findings as well as further insights into the long-term performance effects of hedge fund activism. We focus on four different aspects: (1) the impact of firm size on valuation effects, (2) the differences between using value-weighted instead of equal-weighted returns, (3) the probability that a hedge fund intervention creates additional shareholder value and (4) the determinants for the size of these valuation effects separated by value creating and value destroying outcomes. The detailed results of our robustness tests are provided in the Internet Appendix, Part III.

Firm size is typically an important variable in empirical capital market research. We analyze size effects in two different ways, first by separating the target firms into smaller and larger firms and second by creating four size groups to obtain more differentiated insights. As before, we analyze the effects for the entire period and for three sub-

periods (Section IA.6). Our results indicate that activist investors targeted smaller firms during the 2000–2006 period subsequent to the regulatory changes in the German corporate governance system. After the global financial crisis (2009–2020), hedge funds expanded their target radius by including larger firms. This increase in firm size is also observed in the U.S. Overall, activist shareholders generated a higher outperformance in smaller compared to larger targets, especially immediately after the German governance reforms. We also calculate value-weighted returns to complement the equal-weighted return analysis. Consistent with the size distributions, the value-weighted BHRs are marginally lower than the equal-weighted BHRs, as the performance of smaller firms increased more after hedge fund interventions. (Section IA.7). However, the differences between equal- and value-weighted BHRs are relatively small in the first and second periods. Consistent with the shift to target more larger firms subsequent to the global financial crisis, the BHRs diverge more in the third period.

We now examine the probability that the activist intervention is value-increasing for target shareholders. For this, we distinguish between activism events that created and those that destroyed shareholder value during the first year subsequent to the attack (Section IA.8) and examine the factors that determine the size of these stock price reactions. Again, we analyze the full period and the three sub-periods and test the effect of the firm characteristics before the event and the changes afterwards (Section IA.9). The performance difference between shareholder value creating and destroying attacks increased from the 2000–2006 to the 2009–2020 period. During the first period, activist intervened in smaller and more visible target firms with banks and other corporations acting as controlling shareholders. These firms have a higher probability to generate a positive outcome. During the global financial crisis, hedge fund interventions in economically stable target firms were more likely to be successful. They eventually increased dividends and attracted higher institutional ownership. Banks (founding families) as controlling shareholders had a positive impact on the magnitude of these valuation effects of targets in which hedge funds created (destroyed) shareholder value. Moreover, firms with higher sales growth, less R&D spending, and an undervaluation generated a higher performance. For the group with negative returns, the crisis exacerbated the underperformance while banks had stabilizing effects.

Table 9
Results of hypothesis tests.

Hypothesis	Descriptive Analysis				Logit Analysis				Descriptive Analysis				Regression Analysis				
	Full	2000-2006	2007-2008	2009-2020	Full	2000-2006	2007-2008	2009-2020	Full	2000-2006	2007-2008	2009-2020	Full	2000-2006	2007-2008	2009-2020	
1a	×	×	n.s.	×	✓	×	×	✓	5a	✓	✓	×	✓	-	-	-	-
1b	n.s.	n.s.	×	n.s.	n.s.	n.s.	✓	×	5b	✓	✓	✓	✓	✓	✓	×	n.s.
1c	n.s.	n.s.	n.s.	n.s.	✓	n.s.	✓	✓	5c	-	-	-	-	×	-	-	-
1d	✓	n.s.	✓	✓	n.s.	n.s.	n.s.	n.s.									
2a	✓	n.s.	✓	n.s.	n.s.	n.s.	n.s.	n.s.	6a	-	-	-	-	✓	-	-	-
2b	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	6b	-	-	-	-	✓	-	-	-
2c	×	×	n.s.	n.s.	✓	✓	n.s.	✓	6c	-	-	-	-	✓	-	-	-
3a	×	×	n.s.	n.s.	×	n.s.	n.s.	n.s.	7a	-	-	-	-	✓	-	-	-
3b	n.s.	×	n.s.	✓	n.s.	×	✓	n.s.	7b	-	-	-	-	n.s.	-	-	-
3c	✓	✓	✓	✓	n.s.	n.s.	n.s.	n.s.	7c	-	-	-	-	✓	-	-	-
4a	✓	✓	✓	✓	-	-	-	-	8	✓	✓	✓	✓	-	-	-	-
4b	✓	✓	✓	✓	✓	n.s.	✓	✓									

Analyzing the hedge fund-initiated changes in firm characteristics, a decrease in cash holdings as well as an increase in dividends had a positive effect on the returns one year after the hedge fund intervention. All these robustness tests confirm our previous results and conclusion and provide additional insights into the effects that hedge fund activism has on a firm's future performance.

6. Conclusion

In this study, we investigate the consequences of the regulatory changes in the German financial and governance system that occurred at the beginning of the new millennium and shifted corporate control activities from universal banks to capital market participants. Hedge funds took advantage of the resulting control vacuum that strongly prevailed at least up to the global financial crisis. One obvious strategy was to acquire stakes in weakly governed firms. We document for the initial period (2000–2006) that, on average, hedge funds increased shareholder value in the short- and long-run. However, more aggressively operating hedge funds generated higher returns only at the very beginning of the attack but the outperformance quickly diminished. This is consistent with the idea that Germany, due to the banks' strong influence on corporate control, had a weak corporate governance system at that time. Consequently, profit opportunity for hedge funds were greatest during this period. In contrast, less aggressive hedge funds ultimately outperformed their aggressive peers and created long-term shareholder value. These findings suggest that the initially aggressive hedge funds did not create shareholder value and did not provide benefit for the target firm's shareholders. However, by exiting when share prices temporarily increased, they generated high return for themselves.

During the subsequent financial crisis period (2007–2008), the empirical findings reverse because hedge fund activities in crisis periods or down markets are hardly successful by design of their strategies. One typical hedge fund approach is to demand higher payouts such as higher dividends and share repurchases usually resulting in share price increases in the short term. However, activist investors could not implement this strategy during crisis periods, often resulting in an underperformance. During the most recent period (from 2009 to 2020), hedge funds became more sophisticated, as they better understood the German financial and corporate governance system and their strategies changed accordingly. They even became much more aggressive in Germany and started to implement negative activism strategies.

Overall, hedge funds may become an even stronger force in the German corporate governance system in the future, as their ideas often find support by institutional investors and by proxy advisory firms. Even owners of smaller stakes may request and initiate dramatic changes, especially when they are combined with environmental demands. Consequently, management may face an extraordinary strong influence and pressure from shareholder activist groups to increase shareholder value or to achieve other objectives, even if these groups possess only very limited economic exposure. Although hedge fund interventions increased shareholder value, on average, the magnitude of the performance depends on the period, industry, level of aggressiveness, and magnitude of institutional ownership.

CRedit authorship contribution statement

Wolfgang Bessler: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – review & editing, Visualization. **Marco Vendrasco:** Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – review & editing, Visualization.

Declaration of Competing Interest

None.

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Appendix A. Supplementary data

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