The Power of Social Media –
Shareholder Activism via Twitter and a Firm's Market Value

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Aktionärsaktivismus, Hedge Funds, Soziale Medien, Twitter, Ereignisstudie, Carl Icahn, Apple

Shareholder activism, hedge funds, social media, Twitter, event study, Carl Icahn, Apple

Dieser Beitrag analysiert im Rahmen einer Eventstudie den Zusammenhang zwischen Hedge Fund Aktivismus mittels sozialer Medien und dem Marktwert eines Unternehmens. Anhand des Beispiels von Carl Icahn und Apple definieren wir im Zeitraum von August 2013 bis März 2015 jenes Datum als Eventdatum, an welchem Carl Icahn einen Post (Tweet) auf seinem Twitter-Profil bezüglich Apple veröffentlicht. Unsere Eventstudie basiert auf den Aktienpreisen von Apple sowie dem Dow Jones als Benchmark. Innerhalb dieser Analyse zeigen wir, dass ein Teil der Tweets zu signifikanten und positiven kumulierten abnormalen Renditen führt, die robust gegen die Veränderung spezifischer Testparameter sind. Unsere neue Art der Eventdefinition erweitert die bestehende Literatur und gibt Hinweise darauf, welchen Einfluss soziale Medien heutzutage auf Unternehmen haben können.

This paper analyzes the association of hedge fund activism via social media and a firm's market value using Carl Icahn and Apple as an exemplary case. We apply an event study methodology for the period spanning from August 2013 to March 2015 with Apple share prices and the Dow Jones as the benchmark. An event is defined as the date whenever Carl Icahn issues a post (tweet) on his Twitter profile related to Apple. We find that some tweets lead to significant positive cumulative abnormal returns, which are robust in a number of tests. This new form of event definition contributes to prior literature that solely uses regulatory filings to define events and points towards the influence that social media may have on companies nowadays.

1. Introduction

Shareholder activism can be described as a listed company's shareholder's (s') pursuit to actively initiate a change within the respective company (e.g., *Goranova/Ryan* 2014). While some consider shareholder activists as holding an active role to monitor firm perfor-

mance and uncover important information asymmetries (e.g., *Gillan/Starks* 2007), others blame them of being 'corporate raiders' aiming solely at short-term profits and distracting managers from their core tasks (e.g., *Kahan/Rock* 2007, 1022). Especially hedge fund activism, which has evolved as a very active form of shareholder activism in the past decade, is subject to close scrutiny. Some hedge fund activists increasingly use social media such as Facebook and Twitter to influence the companies they target. While social media has reached the world of activism and is acknowledged as being a useful tool, only little is known about the association of such platforms used by activists and the value of the target firm.

Several studies analyze the impact of hedge fund activism on the value of the target firm and consistently find significant positive abnormal returns (e.g., *Brav et al.* 2008; *Mietzner/Schweizer* 2014). They further use unanimously the issuance of regulatory filings as event definition. However, by that they are constrained by the fact that regulatory filings present a rather crude form of indicating a hedge fund's activism concerning the target company. In our study, we take a more direct approach and analyze the association of hedge fund activism via posts on Twitter (so called 'tweets') and a firm's market value. As opposed to other social media channels such as Facebook, the main purpose of Twitter is to disseminate information and opinions. In fact, in recent years Twitter has been used as a proxy for market sentiment establishing a strong link between tweets and future returns (*Sprenger et al.* 2014; *Mao et al.* 2015; *Azar et al.* 2016). In this study, we do not measure overall sentiment via Twitter but we use tweets by an individual hedge fund activist, namely Carl Icahn, as a new form of event definition. Carl Icahn serves as an ideal exemplary case given his strong influence and extraordinary Twitter profile within the community. After Carl Icahn, Jason Ader has the second most-followed Twitter profile among hedge fund activists but his number of followers in 2016 is about five times less (285,000 followers for Carl Icahn and 55,500 for Ader, respectively (*Twitter* 2016)). Focusing on Carl Icahn and his Twitter activities allows us to provide a first indication on the association between hedge fund activism via social media and a firm's market value.[1] We therefore analyze the following research question *"Is there a link between an individual hedge fund activist's tweets and the value of the target firm?"*.

We apply an event study methodology to assess the capital market reaction related to Carl Icahn's tweets by observing abnormal returns (*MacKinlay* 1997; *Goerke* 2009). After eliminating confounding events and consolidating multiple tweets per day as well as multiple events per event window, a total of 13 events remain in the sample. We find that a number of events considered during August 2013 to March 2015 lead to significant positive cumulative abnormal returns, which remain robust in various specifications. This is quite notable given Carl Icahn's fairly small stake in Apple during the research period as well as his still relatively small number of followers when compared to other Twitter profiles such as Warren Buffet (~1.2 million; *Twitter* 2016). Although not all tweets achieve significant positive abnormal returns, Carl Icahn's activist campaign on Apple seems to have been partly successful. Since the start of his Twitter campaign on Apple in August 2013, Carl Icahn's major objective has been to convince Tim Cook to substantially increase share repurchases in order to boost Apple's share price. In February 2015, Carl Ic-

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1 We acknowledge that this comes at the cost of limited generalizability. However, given the very young stream of research in this area, we believe that a study using an exemplary case can provide most valuable insights. Future research is encouraged to run large-sample analyses on this matter.

ahn then contentedly announced that Apple's CEO now indeed promised to buy back a substantial number of shares. The delight expressed through this announcement is indicative for Carl Icahn recognizing this as a success of his activist campaign. This may be interpreted as Tim Cook giving in to Carl Icahn's requests suggesting that the CEO of the nearly trillion-dollar-company is taking hedge fund activist Carl Icahn seriously. On 29 April 2016, Carl Icahn announced that he sold his stake in Apple. Through his investment in Apple, he made USD two billion in 32 months (*CNBC* 2016). Consistent with our findings, a part may be attributed to his own efforts via his activist's influence through Twitter on the company's share price.

We contribute to previous studies on the actual impact of hedge fund activism (e.g., *Klein/Zur* 2006; *Clifford* 2008) by using a new form of event definition. While prior research focuses on the submission dates of regulatory filings, this study uses the dates when hedge fund activist Carl Icahn publishes tweets targeting Apple. This new form of event definition has several benefits. Firstly, it speaks to the claim of being biased by using only one kind of event definition (*Brav et al.* 2008, 1738). Secondly, it allows assessing the link between hedge fund activism and the value of the target firm if the stake is less than five percent. Thirdly, defining an event by reference to the date of the respective filing might not be necessarily accurate. Some hedge fund activists may announce their intention to become active even before or only after the filing. Hence, the date of the filing might not be a precise proxy for the event date (*Brav et al.* 2008, 1756). Lastly, this new form of event definition enriches the research stream by accounting for the increasing importance and scope of social media nowadays and follows calls for future research in this area (e.g., *Kaplan/Haenlein* 2010, 67; *Miller/Skinner* 2015, 228).

Chapter 2 provides an overview of prior research. Chapter 3 introduces the exemplary case of Carl Icahn and Apple. Chapter 4 presents the research methodology and the data used. Chapter 5 discusses the empirical results. Chapter 6 concludes.

2. Prior literature

2.1 Shareholder and hedge fund activism

From a positive point of view, activist shareholders do not see themselves as powerless stockholders, but as "agents of change" who take on an active role and closely analyze the company they have invested in, thereby reliably monitoring firm performance and helping to overcome information asymmetries (e.g., *Gillan/Starks* 2007, 55-58). Today, shareholder activism has transformed the balance of power in corporations (*Kahan/Rock* 2007, 1089), representing "a dynamic institutional force" (*Goranova/Ryan* 2014, 1261).

From a more negative point of view, shareholder activists are accused of aiming at short-term profits at the expense of the long-term profitability of the firm (e.g., *Pearson/Altman* 2006, 26; *Brav et al.* 2008, 1731). They are also blamed of imposing stress on managers and distracting them from their core tasks. It is further questionable whether the interests of the activists are consistent with the interests of other shareholders (*Kahan/Rock* 2007, 1022).

Shareholder activism can take two different forms: institutional and hedge fund activism. In this paper, we focus on the latter. Compared to institutional investors, hedge funds pursue an active form of shareholder activism (*Kahan/Rock* 2007, 1027). By that, "[h]edge fund activism has rapidly emerged as both the most promising and most potent

form of activism" (*Goranova/Ryan* 2014, 1241). Today, assets of more than USD 100 billion are under activist hedge fund management. Since 2003, 275 activist hedge funds have been founded with expected increasing numbers (*PwC* 2015, 2). The overall objective of hedge fund activism is to improve firm performance (*Goranova/Ryan* 2014, 1241). Hedge funds focus on significant changes with immediate outcomes implying that hedge funds buy shares of a company with the specific purpose of initiating concrete changes (*Kahan/ Rock* 2007, 1043; *Bratton* 2008, 11).

The approach to pursue an active hedge fund strategy highly depends on the underlying individual setting. Target companies may show poor performance or poor governance (*Pearson/Altman* 2006, 26; *Gillan/Starks* 2007, 59) but may also be profitable and healthy corporations (*Klein/Zur* 2006, 2). Hence, an active strategy may imply changes in corporate control (*e.g., Kahan/Rock* 2007, 1034), corporate governance (e.g., *Klein/Zur* 2009, 198), or the corporate strategy (e.g., *Gillan/Starks* 2007, 68) but also initiating operational efficiencies or financial restructurings (*PwC* 2015, 2). Such ambitious objectives imply a great amount of effort and motivation. The dominant incentive to take on such demanding steps is the return that hedge fund activists hope to achieve from their investments and activist efforts (*Pearson/Altman* 2006, 26; *Kahan/Rock* 2007, 1064). They are encouraged to maximize the return on their investments because they directly benefit from achieving absolute returns via a personal stake in their fund or via their absolute return-based compensation (e.g., *Partnoy/Thomas* 2006, 25).

The tactics to gain influence applied by shareholder activists depend on the form of shareholder activism. Tactics applied by both institutional and hedge fund activists range from shareholder proposals, media campaigns, and direct negotiations with management (e.g., *Gillan/Starks* 2007, 68; *Baloria et al.* 2014). In contrast, tactics applied solely by hedge funds imply proxy contests, litigation, outright takeover, public pressure (e.g., *Kahan/Rock* 2007, 1029), and nowadays also the use of social media networks to gain influence. Although the influence of social media has increased heavily during the past decade (e.g., *Auer* 2011, 710), this tactic has not gained much attention in the activism literature to date.

2.2 The impact of hedge fund activism and the use of social media

The evaluation of the actual impact of hedge fund activism on firm value has been the objective in several studies. Prior literature clearly demonstrates the success of hedge fund activism in earning significant positive abnormal returns. *Table 1* provides an overview of selected studies.

With a research period spanning from 1998 to 2005, *Clifford* (2008) investigates the impact of both activist and passivist shareholders around the U.S. filing date. He finds that hedge funds are able to achieve significant positive target abnormal returns with a mean cumulative abnormal return of activists (3.39%) being higher than that of passivists (1.64%). Both *Klein/Zur* (2006) and *Brav et al.* (2008) investigate the abnormal returns that hedge funds achieve in the U.S. around a 13D filing[2] date and their ability to reach

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2 Hedge funds in the U.S. are obliged to file a Schedule 13D to the SEC whenever they buy a stake of five percent or more of a company. However, if the hedge fund is acquiring a stake between five and 20 percent and is clearly understood to be only a passive investor (i.e., does not intend to change or influence the control of the company issuing the shares), the filing of a more abbreviated Schedule 13G is permitted (*SEC* 1998; *SEC* 2012).

Table 1: Overview of empirical research on hedge fund activism

Authors	Period	Region	Sample	Main findings
Boyson/Mooradian 2011	1994-2005	U.S.	418 13D filings by 111 hedge funds	Significant positive short-term and long-term market reaction (depending on the length of the event window)
Clifford 2008	1998-2005	U.S.	1,902 13G and 13D filings by 197 hedge funds	3.4% significant average abnormal return for 13D filings and 1.6% for 13G filings
Klein/Zur 2006	2003-2005	U.S.	194 13D filings by 102 hedge funds	Significant average abnormal return of 10.3%; hedge fund activists achieve their objectives in over 60% of the cases
Klein/Zur 2009	2003-2005	U.S.	151 13D filings by 101 hedge funds	Significant average abnormal return of 10.2% and 11.4% in the year following the initial 13D filling
Greenwood/Schor 2009	1993-2006	U.S.	784 13D filings by 139 hedge funds and 196 13D filings by 38 non-hedge funds	Large positive average abnormal returns, depending on the type of activism and the length of the event window
Brav et al. 2008	2001-2006	U.S.	1,032 13D filings by 236 hedge funds	Average abnormal return of approx. 7%; hedge funds achieve their objectives or parts of them in two thirds of the cases
Edmans et al. 2013	1995-2010	U.S.	1,112 13G filings by 101 hedge funds	"A 13G filing leads to a positive market reaction, a positive holding period return, and an improvement in operating performance" (p. 1445), numbers depending on the level of firm liquidity
Mietzner/Schweizer 2014	1993-2007	Germany	159 private equity and 67 hedge fund engagements	Significant average abnormal return of 4.5% around the announcement date of a stake of five percent or more
Becht et al. 2010	2000-2008	Europe	362 activist interventions mainly by hedge funds	Significant positive average abnormal returns around the announcement date (stake disclosure depends on country regulation), depending on the length of the event window
Uchida/Xu 2008	2000-2008	Japan	Two hedge funds targeting over 70 companies	Significant average abnormal return of 5% around the announcement of large stakes
Weber/Zimmermann 2013	2005-2008	Germany	230 transactions by 51 hedge funds targeting 44 companies	Small but significant volume effect at transaction date and (temporary) limited information effect upon publication

Notes: This table presents an overview of selected studies related to the field of hedge fund activism and its impact on firm value. The table shows the authors of the respective study, the research period, the geographical scope, the data of filings and/or hedge funds considered as well as the summarized results of each study.

their set targets. *Klein/Zur* (2006) find that hedge funds gain financially through an increase in the share price and dividends paid by the target firm. The latter earns an average abnormal return of 10.3% from 2003 to 2005. In addition, they document a success rate of 60% for hedge funds in achieving their objectives regarding the target firm. *Brav et al.* (2008) document comparable findings. *Mietzner/Schweizer* (2014) investigate the impact of private equity firms and hedge funds on German firms. By using a filing comparable to

13D in the U.S.[3], they find that hedge funds and private equity firms achieve significant and positive abnormal returns of 4.5%. A major part of hedge fund activism often takes place "behind closed doors" (*Becht et al.* 2010, 5) with the activist engagement only being recognizable after the respective hedge fund submits the regulatory filing. Hence, existing studies on hedge fund activism have only focused on SEC filings (or a comparable regulatory filing outside the U.S.) to define events.

In this study, we contribute to previous studies on hedge fund activism by assessing the impact of another form of event definition based on social media. Especially during the last decade, social media platforms such as Facebook and Twitter have influenced our society to a large extent. They have further enabled new forms of communication that have not existed before (e.g., *Auer* 2011, 710; *Lu/Su* 2015, 1).[4] Social media enables timely and direct contact at high levels of efficiency compared to more traditional communication tools (*Kaplan/Haenlein* 2010, 67). In particular, social media channels have evolved as a common means of communication not only for companies' investor relations departments to inform investors and analysts (*Blankespoor et al.* 2014, 84) but also for other actors who wish to express and spread their views on a particular company (*Miller/Skinner* 2015, 227).

We take advantage of this new communication channel being publicly available, multicast, interactive, and networked (*Murthy* 2012, 1061) and use social media posts of hedge fund activists to define the event dates. In particular, we define an event as the date of an activist's tweet on a target firm. This form of event definition entails several benefits: Firstly, it is comparable to an official announcement as it is accessible to everyone and can have a significant reach depending on the number of followers. The wide spread is enforced through the so-called 'push approach' which allows the distribution of information directly to the user instead of relying on the user himself to 'pull' or access the information (*Miller/Skinner* 2015, 227). Secondly, in comparison to e.g., an SEC filing, such an announcement can also be made for a stake of less than five percent. Thirdly, as an activist is not forced (e.g., by law) to publish on social media and rather intendedly uploads a post, we can assume that the content includes new and relevant information. As social media posts are generally born from individual contributions and self-presentation (*Murthy* 2012, 1062), they may uncover actions that would otherwise not be recognizable. For example, if a hedge fund activist informs his followers that he acquired a stake smaller than five percent, this could be made public via social media while a regulatory filing would not be required by law in this case.

Prior research suggests that hedge fund activism may have a positive impact on the share price of the target firm. We introduce a new form of event definition and ask whether hedge funds may be able to achieve significant positive abnormal returns on the target firm also under this new form of event definition.

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3 Investors in Germany are required by law (§§ 21 et seq. German Securities Trading Act) to report acquisitions of five percent and more of any German publicly traded company within nine days after the acquisition (*Mietzner/Schweizer* 2014, 186).

4 As of June 2016, there are 1.65 billion users of Facebook and 310 million active users of Twitter (*DMR* 2016). Twitter was created in 2006 as a microblogging website and is today one of the largest social networks, with more than 500 million tweets sent per day (*Blankespoor et al.* 2014, 80; *ILS* 2016).

3. Exemplary case: Hedge fund activist Carl Icahn

Our study is based on the exemplary case of hedge fund activist Carl Icahn and the association between his activist campaigns and the share price of Apple. We choose Carl Icahn because he is a highly visible and influential hedge fund activist who has a unique social media profile. While Carl Icahn maintains social media profiles on Facebook and on Twitter, we will focus on his activities on Twitter due to the following reasons. Firstly, Carl Icahn has more followers on Twitter (~285,000; *Twitter* 2016) than on Facebook (~26,000; *Facebook* 2016). Thus, we assume that the tweets receive a higher attention than Facebook posts. In addition, compared to other hedge fund activists and their Twitter profiles, Carl Icahn has with about 285,000 followers by far the widest reach.[5] Secondly, while Facebook is based on the notion of friendship and mutual interaction, Twitter mainly focuses on disseminating information and opinions. The latter is particularly important in the context of hedge fund activism. Lastly, with tweets being timelier compared to other social media channels the probability that information on Twitter is more relevant for the capital markets is higher (*Huang et al.* 2015, 2). We therefore expect Twitter to play a larger role and use this form of communication in our research design.

In 2013, Carl Icahn's company 'Icahn Enterprises L.P.' (Nasdaq: IEP) issued a press release indicating that Carl Icahn also uses Twitter for information purposes (*IEP* 2013):

> *Our Chairman, Carl C. Icahn, intends to use Twitter from time to time to communicate with the public […]. It is possible that the information that Mr. Icahn posts on Twitter […] could be deemed to be material information. Therefore, in light of the SEC's guidance, we encourage investors, the media, and others interested in our company to review the information that Mr. Icahn posts on Twitter […].*

This statement clearly shows that Carl Icahn sees Twitter as a means of communication and encourages investors as well as the media to follow him on Twitter. This is also emphasized in an interview of Carl Icahn with *CNBC* (2014): "If I want people to know what I'm doing, I'll go on Twitter and tell my followers about it." In addition, the frequency and regularity by which Carl Icahn issues a post related to a target firm reveals the importance that Carl Icahn ascribes to Twitter. Warren Buffet, for example, has about four times more followers on Twitter (*Twitter* 2016) but with a total of only seven tweets since 2013 does not regularly inform them. It seems reasonable that the financial information homepage 'MarketWatch' has named Carl Icahn's Twitter profile first among the "Twitter accounts that stock-market investors need to follow in 2016" (*MarketWatch* 2016). While we do not intend to capture market sentiment by means of Twitter, we expect Carl Icahn to be able to achieve significant positive target abnormal returns through his tweets given the way he uses social media. A prominent case of Carl Icahn's Twitter activities is his ongoing activist campaign on Apple. His tweets are characterized by their demanding nature as well as their straightforwardness. For example, on 1 October 2013 (refer to *Figure 1*), Carl Icahn informed his followers on Twitter about a personal meeting he had with Tim Cook, the CEO of Apple.

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5 For comparison, in terms of the number of followers, Carl Icahn is followed by hedge fund activists Jason Ader (SpringOwl Asset Management) with 55,500 followers and David Einhorn (Greenlight Capital) with 26,300 followers on Twitter (as of June 2016; *Twitter* 2016).

Figure 1: Tweet by Carl Icahn on Apple on 1 October 2013

Carl Icahn @Carl_C_Icahn · 1 Oct 2013
Had a cordial dinner with Tim last night.
We pushed hard for a 150 billion buyback.
We decided to continue dialogue in about
three weeks.

↩   ⟲ 477   ★ 138   ⊕   •••

Notes: This figure shows a tweet by Carl Icahn on Apple on 1 October 2013 (*Twitter* 2015). Starting in the top line, the tweet shows the author of the tweet (here: Carl Icahn), his username on Twitter (referred to with an '@'; here: @Carl_C_Icahn), and the date of the tweet. The main body of the tweet entails the message as such, i.e., what the author wants to convey to his followers. At the bottom, from left to right, the tweet shows the number of retweets (i.e., a tweet that somebody forwards to his followers, here: Carl Icahn's tweet has been retweeted by 477 other users) as well as the number of favorites (i.e., the star icon on which a follower can click on in order to signal that he likes the tweet; *Twitter Support* 2014). The number of retweets and favorites is as of 18 March 2015.

Via his first tweet related to Apple on 13 August 2013 (refer to *Figure 2*), Carl Icahn publicly revealed that IEP acquired a stake in Apple. IEP's stake in Apple amounted to 0.8% or USD 4,817 million as of fiscal year-end 2015, compared to 0.9% or USD 5,316 million in 2014 and 0.5% or USD 2,654 million in 2013 (*IEP* 2016, 17).

Figure 2: First tweet by Carl Icahn on Apple on 13 August 2013

Carl Icahn @Carl_C_Icahn · 13 Aug 2013
We currently have a large position in
APPLE. We believe the company to be
extremely undervalued. Spoke to Tim
Cook today. More to come.

↩   ⟲ 2K   ★ 664   ⊕   •••

Notes: This figure shows Carl Icahn's first tweet on Apple on 13 August 2013 (*Twitter* 2015). The number of retweets and favorites is as of 18 March 2015.

In total, Carl Icahn posted 33 tweets on Apple via his Twitter account from his first tweet on 13 August 2013 until 18 March 2015 (cut-off date for this event study). The content of Carl Icahn's tweets on Apple reflects the major objective that Carl Icahn pursues with Apple: Convincing the CEO, Tim Cook, to use the company's large cash reserves to raise share repurchases. This should help to increase the at least in Carl Icahn's view undervalued share price. We analyze all 33 tweets and find that the tweets contain iterative elements, which we cluster into five main areas (refer to *Table 2*). For example, in his first tweet on Apple (refer to *Figure 2*), Carl Icahn mentioned the acquired stake ('IEP's stake'), the 'extremely undervalued' share price ('Undervalued'), and that he had a conversation with the CEO ('Personal contact'). 'Reference' refers to cases where Carl Icahn uses his tweets to refer to another source of information. *Table 2* provides an overview of all tweets posted by Carl Icahn on Apple during the research period together with the mentioned keywords.

Table 2: Overview of the tweets posted by Carl Icahn during the research period (*Twitter* 2015)

# Tweet	Date	# Retweets	# Favorites	Personal contact	Under-valued	Buy-back	IEP's stake	Reference
				Keywords mentioned:				
1	13-Aug-13	981	311	✓	✓		✓	
2	13-Aug-13	2,021	665	✓		✓		
3	22-Aug-13	661	181	✓		✓		
4	01-Oct-13	478	138	✓		✓		
5	23-Oct-13	337	121	✓				
6	24-Oct-13	121	56	✓				✓
7	24-Oct-13	53	27					✓
8	18-Nov-13	71	44					✓
9	04-Dec-13	242	85			✓		
10	22-Jan-14	254	134		✓		✓	
11	22-Jan-14	504	168				✓	
12	22-Jan-14	264	122			✓		
13	23-Jan-14	629	253		✓		✓	
14	23-Jan-14	199	128			✓		✓
15	28-Jan-14	1,200	464			✓	✓	
16	07-Feb-14	399	196		✓			
17	07-Feb-14	449	245		✓	✓		
18	10-Feb-14	114	63					✓
19	23-Apr-14	686	325			✓		
20	23-Apr-14	362	228		✓			
21	19-Aug-14	225	176		✓			
22	19-Aug-14	138	109		✓			
23	19-Aug-14	139	110		✓			
24	08-Oct-14	318	244		✓		✓	
25	08-Oct-14	496	233	✓				
26	09-Oct-14	39	29					✓
27	09-Oct-14	34	28					✓
28	09-Oct-14	204	146					✓
29	09-Oct-14	358	169					✓
30	05-Jan-15	59	77			✓		✓
31	11-Feb-15	208	165					✓
32	12-Feb-15	48	63			✓		
33	19-Feb-15	113	103		✓			✓
Average		376	170					

Notes: This table provides an overview of all tweets posted by Carl Icahn on Apple during the research period from 13 August 2013 to 18 March 2015. The overview includes the date of the tweet, the number of retweets and favorites as well as the keywords mentioned in the respective tweets. The numbers of retweets and favorites are as of 18 March 2015.

Carl Icahn has not only achieved great fame in the world of social media, but his company is also well-known on Wall Street (*Ablan/Goldstein* 2013). At fiscal year-end 2014, IEP had stakes in several companies, among them Apple, eBay, Chesapeake Energy, Herbalife, Gannett Co., and Hertz Global Holdings (*IEP* 2016, 16). According to the company itself, the hedge fund around Carl Icahn has been part of the activist community since 1980 (*IEP* 2016, 5). Hence, Carl Icahn was among the first pursuing hedge fund activism. The sub-

sidiary most important to Carl Icahn's activist efforts is 'Icahn Capital L.P.' – an investment fund through which Carl Icahn actively invests in companies such as Apple (*IEP* 2016, 16).

On the one side, Carl Icahn targets undervalued companies that are either poorly managed (*IEP* 2016, 5) and/or poorly performing. *Pulliam/Peers* (2005) argue that Carl Icahn's "own outrage is aimed at those chief executives who are overpaid and don't perform". On the other side, the case of Apple shows that Carl Icahn also targets profitable and healthy companies with high cash reserves, but which are at least in his view undervalued and thus entail a higher potential than the market ascribes them (*IEP* 2016, 5).

According to IEP (2016, 11), the hedge fund around Carl Icahn aims at increasing the performance of the target through operational turnarounds, strategic initiatives, corporate governance changes, or financial as well as balance sheet restructurings. The latter applies to Apple where Carl Icahn urges Tim Cook to increase share repurchases. Carl Icahn believes that through this initiative the large cash reserves of Apple (USD 205.67 billion as of fiscal year-end 2015; *Apple* 2015) can be effectively used to raise the share price and thus bring it closer to its (seemingly) 'true' value. The overall objective that Carl Icahn sets for his activist campaigns coincides with that of shareholder activism in general, namely improving shareholder value (*Pulliam/Peers* 2005). Since Carl Icahn predominantly owns and controls IEP, he also benefits directly and personally from his activist efforts (*IEP* 2016, 5).

4. Research design and data

4.1 Methodology and research design

We apply an event study methodology, which is the prevailing methodology for assessing capital market reactions (*MacKinlay* 1997, 13) in order to investigate the link between Carl Icahn's Twitter activities and Apple's share price. Event studies measure how particular events affect the share price and thus, the firm value by observing abnormal returns (e.g., *Brown/Warner* 1980, 205). An 'event' may not be anticipated by the capital market and hence, must include new information about the firm(s) in question (e.g., *McWilliams/ Siegel* 1997, 630). As Carl Icahn intentionally uses his Twitter profile as a means of communication and IEP signalizes that the information itself may be material, we can reasonably assume that the information included is new and can neither be found somewhere else nor beforehand. Newspapers (e.g., *Vardi* 2014) and investment blogs (e.g., *Cabural* 2015) cite his tweets.

We analyze all tweets which were posted between Carl Icahn's first tweet on Apple on 13 August 2013 and 18 March 2015, the cut-off date for this study. From a total of 33 tweets within the research period, 13 events remain in the sample due to an adjustment for confounding events[6] as well as multiple tweets per day[7] and multiple events per event win-

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6 Confounding events are different events that occur at the same point in time as or close to the event of interest and which are also significant to the company or companies being examined. Such events need to be eliminated from the dataset because they make it difficult to isolate the effect of the event of interest (*Goerke* 2009, 469). Related to our study, Carl Icahn sent a tweet on 28 January 2014 and 23 April 2014 just when the Q1 and Q2 results of Apple were published as well. We therefore eliminate the two events.

7 There are eight days on which Carl Icahn issued more than one tweet per day related to Apple. In such cases, all tweets occurring on one day are consolidated, i.e., we assume that the keywords mentioned in these multiple tweets per day are stated only during this one tweet per day. In addition, we add up the number of retweets and favorites of the two events.

dow[8] to prevent a distortion of the dataset. In order to prevent an endogeneity problem due to reverse causality, the 'event window' starts on the event day itself as given its nature we do not expect the tweet to be anticipated. The event window spans over a total of four days [0, +3] to ensure that late reactions to the event are also considered. Abnormal returns are calculated for each day[9] within the event window by subtracting the expected normal return from the actual share price return:

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \qquad (1)$$

with: $AR_{i,t}$ abnormal returns of security i on date t

        $R_{i,t}$ return of a security i on date t

        $E(R_{i,t})$ expected normal return of security i on date t.

We calculate the expected normal return based on the market model (e.g., *Brown/Warner* 1985, 3; *MacKinlay* 1997, 18):

$$E(R_{i,t}) = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \qquad (2)$$

with: $R_{m,t}$ return of the chosen benchmark m on date t

        α_i, β_i parameters of the market model of security i

        $\varepsilon_{i,t}$ error term of security i on date t with an expected value of zero.

α_i and β_i are estimated by an ordinary least squares (OLS) regression of $R_{i,t}$ on $R_{m,t}$ over the estimation window where α_i describes the unsystematic and autonomous return of a security i and β_i the dependency of the observed share return on the market return (e.g., *Corrado* 2011, 210). Regarding $R_{m,t}$ we use the Dow Jones, which is a broad-based market index and together with the S&P 500 among the two most-followed indexes in the U.S. (*Elton et al.* 2009, 22). The advantage of the Dow Jones over S&P related to our study is that Apple was not included in the former until 18 March 2015. On this day, Apple replaced AT&T and was incorporated in the index (*Vaishampayan/Winkler* 2015). The development of the index until that date was thus fairly independent of any events related to Apple and hence, the index presents a suitable benchmark in our study as the target company is excluded from the index (*Goerke* 2009, 474). Consequently, we define 18 March 2015 as the cut-off date for this event study. In addition, the fact that the S&P 500 is a market-capitalization-weighted index makes it sensitive to companies with a relatively high market capitalization. Hence, the Dow Jones is further preferred as Apple has the highest market capitalization of all companies in the S&P 500 (*Platt/Badkar* 2015)
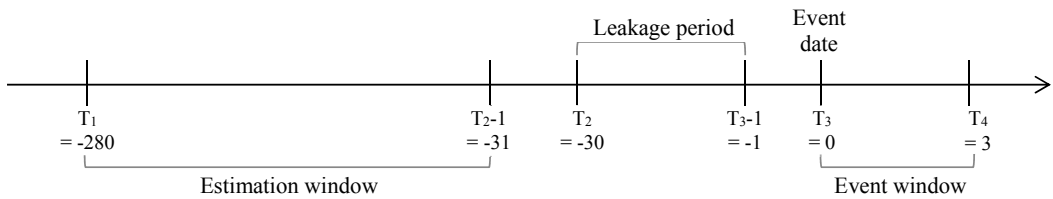
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8   There are five event windows which contain two consecutive events. In order not to overestimate our results, we combine both consecutive event dates to one hypothetical consolidated event date or 'event window'. We assume that the keywords mentioned in these consecutive events are stated only during this single hypothetical 'event window'. In addition, we add up the number of retweets and favorites of the two events.

9   We refrain from using intraday data in this study. In order to understand how Twitter is used within the actual investment process one would need to know which investor groups hedge fund activists target. Depending on the degree of professionalism the way how and when new tweets are received may differ. For example, there may be integrated Twitter news feeds within a trading terminal while private investors would need to purposely gather such tweet information. Hence, investments triggered by tweets can take place at different times during the event window depending on the type of investor, which makes it difficult to determine an adequate intraday event window. Although intraday data would be more precise, using daily data allows capturing tweet-related investments by all types of investors.

and is influencing the development of the index disproportionally (*Martin* 2014). We will test the results for robustness with the S&P 500 as a benchmark.

The 'estimation window' is the period prior to the event window for which the parameters of the market model are estimated (refer to *Figure 3*). We apply the recommended length of 250 days (e.g., *Corrado* 2011, 210) with a leakage period of 30 days. *Figure 3* summarizes the applied timeline.

Figure 3: Timeline of this event study

Notes: The timeline of this event study shows the estimation window (250 days), leakage period (30 days), event window (4 days) and the event itself (t = 0). The timeline is not scaled and based on *Goerke* (2009, 475).

In order to calculate the cumulative abnormal returns per event, we aggregate the abnormal returns across the days in the event window: $\sum_{T_3}^{T_4} AR_{i,t}$.

The main purpose of an event study is to test the significance of a certain type of event on a firm's market value (*McWilliams/Siegel* 1997, 626; *Goerke* 2009, 476). Thus, in a final step, we test the statistical significance of Carl Icahn's tweets on Apple's market value. If the event window is set to more than one day, significance tests are performed for the cumulative (average) abnormal returns. After confirming normality of our abnormal returns with both the Shapiro-Wilk test statistics (*Shapiro/Wilk* 1965) and the kernel density estimation, we run two popular parametric tests for significance, the classic t-test and the Patell t-test (*Kolari/Pynnonen* 2011, 954).

Many parametric tests are based on the classic t-test, which is also often applied in event studies. The test statistic for each event is obtained by dividing the cumulative abnormal return by the standard deviation of the cumulative abnormal returns (Brown & Warner, 1985, 7). Based on the t-test we further apply an additional parametric test in order to account for the classic t-test's proneness to event-induced variance. The Patell t-test standardizes the abnormal returns of each event window (*Kolari/Pynnonen* 2011, 954) and weights the dates in the event window equally (*Corrado* 2011, 212). Thereby, the test corrects for the classic t-test's "tendency to reject the null hypothesis too often" (*Corrado/Zivney* 1992, 471).[10]

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10 We acknowledge that due to intertemporal or contemporaneous correlation, standard errors in this event study may be underestimated (*Salinger* 1992).

4.2 Data set

Table 3 provides an overview of the variables used in and resulting from the event study.

Table 3: Summary statistics of the variables used in this event study

Explanation	Variable	Source	Obs.	Mean	Vola.	Min.	Max.
Event dates	*Date*	Twitter	13	-	-	-	-
Date of closing price of Apple share	$Date_{AAPL}$	Bloomberg	16,913	-	-	-	-
Date of closing price of Dow Jones	$Date_{DJ}$	Bloomberg	16,913	-	-	-	-
Closing price of Apple share	$Price_{AAPL}$	Bloomberg	16,913	68.03	23.35	27.44	133.00
Closing price of Dow Jones	$Price_{DJ}$	Bloomberg	6,331	16,300.88	964.70	14,537.14	18,288.63
Return of Apple share	$R_{i,t}$	Based on $Price_{AAPL}$	16,913	0.0012	0.0168	-0.1236	0.0887
Market return of Dow Jones	$R_{m,t}$	Based on $Price_{DJ}$	16,913	0.0004	0.0092	-0.0555	0.0424
Expected normal return	$E(R_{i,t})$		52	-0.0004	0.0058	-0.0159	0.0121
Abnormal return	$AR_{i,t}$		52	0.0053	0.0126	-0.0231	0.0475
Cumulative abnormal return	CAR		13	0.0211	0.0268	-0.0116	0.1022

Notes: This table presents the variables of our analysis together with the explanation, the data source, and descriptive statistics such as the number of observations, the mean, the minimum and maximum value, and the volatility. The returns of the Apple share and the market benchmark are calculated based on the respective closing prices. The table further shows the main variables of the event study, i.e., the expected normal, abnormal, and cumulative abnormal returns.

After adjusting the 33 tweets for confounding events and multiple tweets per day, we obtain five event windows that contain two consecutive events.[11] These create overlapping event windows in the sample. In order to address the inherent bias of overestimating our results by including two consecutive events, we combine both consecutive event dates to one consolidated event date or 'event window' for each of the five overlapping event windows (refer to *Table 4*). As such, we do not simply exclude one of the two events but rather investigate both tweets within the same 'window'. We keep the event window length at four days for these merged events (starting the combined 'event window' on the event day of the earlier event of the consecutive events) and later examine their robustness under a five-day event window. Overall, a total of 13 events remain which, multiplied by an event window length of four days, leads to a total of 52 expected and abnormal returns. The summary statistics show that the mean abnormal return is higher (0.53%) than the expected return (-0.04%). For each event window, the abnormal returns are accumulated to cumulative abnormal returns, resulting in 13 cumulative abnormal returns. The descriptive results reveal that immediate returns to hedge fund activism by Carl Icahn on

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11   23 and 24 October 2013; 22 and 23 January 2014; 07 and 10 February 2014 (with 08 and 09 February being a weekend); 08 and 09 October 2014 as well as 11 and 12 February 2015.

Apple are fairly large with an average cumulative abnormal return of 2.11% over the four-day event window.

5. Empirical results

5.1 Main results

Table 4 reports our main results obtained from the event study.

Table 4: Overview of the results obtained from the event study

| # Event | Date | CAR (%) | p-values | | # Retweets | # Favorits | Keywords mentioned: | | | | |
			t-test	Patell t-test			Pers. contact	Under-valued	Buy-back	IEP's stake	Refer-ence
1	13-Aug-13	10.22	0.001***	0.002***	3,002	976	✓	✓	✓	✓	
2	22-Aug-13	-1.16	0.585	0.590	661	181	✓	✓			
3	01-Oct-13	2.21	0.341	0.344	478	138	✓	✓			
4	23/24-Oct-13	1.90	0.449	0.452	511	204	✓				✓
5	18-Nov-13	-0.40	0.810	0.811	71	44					✓
6	04-Dec-13	-0.17	0.958	0.961	242	85			✓		
7	22/23-Jan-14	2.40	0.187	0.189	1,850	805		✓	✓	✓	✓
8	07/10-Feb-14	3.39	0.015**	0.015**	962	504		✓	✓		✓
9	19-Aug-14	1.14	0.386	0.389	277	219		✓			
10	08/09-Oct-14	1.42	0.414	0.426	1,449	849		✓		✓	✓
11	05-Jan-15	1.52	0.684	0.688	59	77			✓		✓
12	11/12-Feb-15	3.45	0.068*	0.070*	256	228			✓		✓
13	19-Feb-15	1.45	0.657	0.659	113	103		✓			✓
Average:		2.11			764	339					
W statistic:		0.97									

Notes: This table reports the results obtained from the event study. It shows the four-day cumulative abnormal returns of the Apple share for each event date as well as the p-values and associated significance levels of the t-test and Patell t-test, respectively. In addition, it shows the number of retweets and favorites of the respective tweet as well as the keywords mentioned. The keywords are based on our qualitative analysis of all tweets and an associated clustering of iterative elements. *, **, and *** indicate statistical significance at the 0.1, 0.05, and 0.01 level (two-tailed). The numbers of retweets are as of 18 March 2015. Values of the Shapiro-Wilk W statistic close to one indicate that a normal distribution is prevalent for the abnormal returns under examination (*Shapiro/Wilk* 1965, 603).
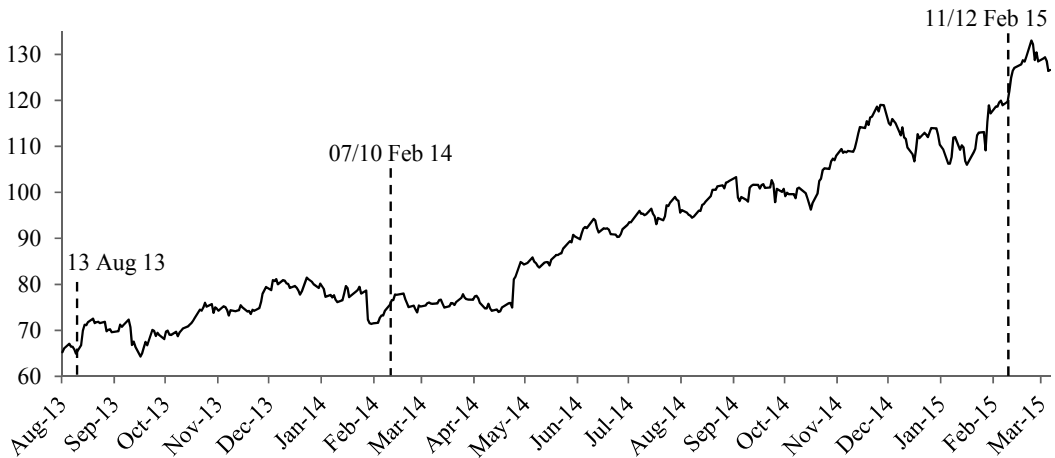
We find that the Apple share experiences positive cumulative abnormal returns in the majority of the cases. In addition, we find that the average tweet by Carl Icahn in our sample leads to an average cumulative abnormal return of 2.11%. A closer look at the sample reveals that this is primarily driven by Carl Icahn's first tweet on 13 August 2013. This tweet achieved an outstanding 10.22% cumulative abnormal return over the four-day event window with the highest abnormal return within the event window being achieved on the event date itself (4.75%, not displayed).

Furthermore, the Apple share experiences significant cumulative abnormal returns on 07/10 February 2014 (merged event window) and on 11/12 February 2015 (merged event window). Hence, three of the 13 events under investigation lead to significant positive cumulative abnormal returns (refer to *Table 4*). On average, these events achieve a cumulative abnormal return of 4.57%.

As these three significant events do not have any major similarities concerning the specific keywords mentioned in the tweets or the number of retweets and favorites, we analyze the three significant consolidated events more in-depth in the following to understand why they are perceived that favorably by the market. The three events are highlighted graphically in *Figure 4*.

Figure 4: Share price development of Apple during the research period (in USD)

Notes: This graph depicts the development of Apple's share price during the research period, i.e., from August 2013 until March 2015. The events that lead to significant and positive cumulative abnormal returns throughout the main analysis and robustness tests are highlighted. The share prices at closing rates are extracted from Bloomberg, adjusted for Apple's stock split of 6 June 2014.

The significance of Carl Icahn's first two tweets on 13 August 2013 (refer to *Figure 5*) can be explained by the high amount of attention received and information included. In these tweets, Carl Icahn informed his followers about the stake IEP acquired, his belief of Apple's 'extreme undervaluation' as well as a personal conversation he had with Tim Cook. The number of retweets for those two tweets is also outstanding and one of the highest among all of his tweets during the research period (refer to *Table 2*). The highest abnormal return within the event window was achieved on the event date itself. On the day of the tweet the abnormal return was 4.75% (not displayed), compared to an outstanding 10.22% cumulative abnormal return over the four-day event window (refer to *Table 4*).

Figure 5: Carl Icahn's tweets on Apple on 13 August 2013

Notes: This figure shows Carl Icahn's tweets on Apple on 13 August 2013 (*Twitter* 2015). The number of retweets and favorites is as of 18 March 2015.

In his first tweets on 13 August 2013 on Apple, Carl Icahn urged Tim Cook for the first time to substantially increase share repurchases. As the tweet on 1 October 2013 reveals (not displayed), Carl Icahn tried to convince Tim Cook to repurchase shares of USD 150 billion. About one and a half years later (on 11 February 2015; refer to *Figure 6*), Carl Icahn then contentedly informed his followers that Tim Cook now publicly announced to buy back a considerable number of shares. In April 2015, Apple disclosed more details about the increased 'capital return program'. Until 2017, Apple plans to return a total of USD 200 billion of cash to its investors, including share repurchases and an increased dividend (*Apple Press Info* 2014).

Figure 6: Carl Icahn's tweets on Apple on 11 and 12 February 2015

Notes: This figure shows Carl Icahn's tweets on Apple on 11 and 12 February 2015 (*Twitter* 2015). 'AAPL' is the company ticker symbol for Twitter. It is preceded by the U.S. dollar sign which creates a hyperlink and forwards users to other tweets mentioning the same ticker symbol (*Twitter Support* 2014). The number of retweets and favorites is as of 18 March 2015.

Consequently, on the one hand, Carl Icahn's tweet of 11 February 2015 can be considered as displaying the final result of his activist campaign as Apple's capital return program of USD 200 billion exceeds Carl Icahn's suggestion of USD 150 billion.[12] On the other hand, this tweet may be seen as an interim success (only). One may assume that Carl Icahn urges further changes at Apple as he continued his activist campaign after 11 February 2015

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12 Note that it is not clear how much of the USD 200 billion is actually provided for share repurchases.

(*Twitter* 2015). Both arguments may support the significant cumulative abnormal returns caused by this tweet.

The significance of Carl Icahn's tweets on 07 and 10 February 2014 (refer to *Figure* 7) can be attributed to their strong message highlighting Apple's outstanding financial performance. The tweets further strongly push for additional buybacks and address analysts and investors to increase their share predictions. Overall, all tweets on these days contain information relevant to Apple's share price and are fairly concrete and informative in their nature.

Figure 7: Carl Icahn's tweets on Apple on 07 and 10 February 2014

Carl Icahn @Carl_C_Icahn · 7 Feb 2014
$GOOG @ 19x2014 est operating profit. At same multiple $AAPL=$1,245 per share. Ridiculous. Keep buying Tim! You still have $145 billion cash
449   245

Carl Icahn @Carl_C_Icahn · 7 Feb 2014
Tim Cook again confirms $AAPL will launch new products in new categories (plural) this year. Wall Street apparently still not listening.
399   196

Carl Icahn @Carl_C_Icahn · 10 Feb 2014
See our open letter to $AAPL Shareholders re "the precatory" on The Shareholders' Square Table: shareholderssquaretable.com/our-letter-to-…
114   63

Notes: This figure shows Carl Icahn's tweets on Apple on 07 and 10 February 2014 (*Twitter* 2015). The number of retweets and favorites is as of 18 March 2015.

Overall, Carl Icahn seems to be able to influence Apple's share price through his tweets on a few occasions but not all of them. We suggest potential explanations for these findings:

Firstly, our event definition allows for stakes of less than five percent. Carl Icahn's relatively small stake of 0.8% as of 2015 could be a reason why the capital market only deems a subordinated portion of the tweeted information to be relevant. Secondly, the impact of a tweet might nowadays still be relatively small as compared to the issuance of a regulatory filing. This is supported by the fact that few hedge fund activists do actually possess a Twitter profile and an even smaller number uses it regularly for activist purposes. The analysis of our case though shows that such social media platforms do convey information beyond regulatory filings that may influence a firm's market value, at least in the case of Apple and Carl Icahn. Especially the strong results for Carl Icahn's first tweet on 13 August 2013 suggest that Twitter acts like a "magical wealth-creation machine" when used by Carl Icahn and that his tweets of a maximum of 140 characters in length are indeed an instrument of power (*Carr* 2013).

In light of the rising importance and scope of social media (e.g., *Auer* 2011, 710), such social media activist campaigns are becoming increasingly relevant. Responses, retweets, and likes can fuel the public debate as well as increase the attention and media coverage. The results of this study and especially Carl Icahn's first tweets on 13 August 2013 demonstrate that social media activities may have the potential to indeed influence the share price of the target firm.

While Carl Icahn's tweets show some effect on Apple's share price, we acknowledge that based on our results the overall impact is presumably still rather modest. However, our analyses suggest that social media seem to play a role. Our findings are particularly strong for the first tweet that experienced most retweets and by that the greatest amount of dissemination. With social media becoming increasingly important future research is encouraged to further analyze this phenomenon.

5.2 Robustness tests

We test our results and the validity of the applied event study model by altering the following parameters within seven robustness tests: (1) The event window is reduced from four to three days, the estimation window of 250 days is (2) reduced to 120 days as well as (3) increased to 375 days, the leakage period of 30 days is (4) decreased to ten days as well as (5) increased to 50 days, (6) the market benchmark applied is changed from the Dow Jones to the S&P 500, and (7) market-adjusted returns[13] are used instead of the market model for approximating the expected normal return. *Table 5* reports the results of the robustness tests conducted in this event study.

The results of these robustness tests show that our main results remain fairly robust. Reducing the event window (robustness test (1)) has no impact on the significance of our results, indicating that the main effect on the share price takes place immediately on or after the event date. Furthermore, the results remain robust against altering the length of the estimation window and leakage period (robustness tests (2) to (5)) as well. The p-value for the event of 11/12 February 2015 is not significant at the conventional level when changing the market index (robustness test (6)) but with a value of 0.137 it is still comparably small. As described above, the S&P 500 may be disproportionally influenced by Apple's strong presence in this index. Lastly, the results are relatively robust against changing the market model to market-adjusted returns (robustness test (7)). Only the event of 07/10 February 2014 is not robust against a change to market-adjusted returns. However, again the p-value with 0.127 is still fairly small.

As an additional robustness test for the five merged events (combining consecutive event dates), we enlarge the event window length from four to five days [0, +4], i.e., starting the combined 'event window' on the earlier event of both consecutive events and lasting for a total of five days. Our results for these five cases remain unchanged (not displayed).

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13 We refrain from using market-adjusted returns in our main analysis given the popularity of the market model and evidence by e.g., *Cable/Holland* 1999 that regression-based models such as the market model outperform non-regression-based ones.

Table 5: Overview of the results obtained from the robustness tests

# Event	Date	(1) 3d. event w. t-test	c?	(2) 120d. est. w. t-test	c?	(3) 375d. est. w. t-test	c?	(4) 10d. leakage p. t-test	c?	(5) 50d. leakage p. t-test	c?	(6) S&P 500 t-test	c?	(7) Market-adj. returns t-test	c?
1	**13-Aug-13**	0.002***	✓	0.005***	✓	0.002***	✓	0.001***	✓	0.001***	✓	0.000***	✓	0.002***	✓
2	22-Aug-13	0.753		0.556		0.395		0.544		0.543		0.557		0.357	
3	01-Oct-13	0.188		0.611		0.446		0.293		0.281		0.503		0.458	
4	23/24-Oct-13	0.702		0.596		0.532		0.450		0.447		0.429		0.611	
5	18-Nov-13	0.390		0.488		0.708		0.720		0.794		0.939		0.526	
6	04-Dec-13	0.635		0.772		0.902		0.972		0.980		0.953		0.848	
7	22/23-Jan-14	0.441		0.923		0.056*		0.399		0.118		0.060*		0.010**	✓
8	**07/10-Feb-14**	0.001***	✓	0.030**	✓	0.031**	✓	0.019**	✓	0.009***	✓	0.046**	✓	0.127	
9	19-Aug-14	0.691		0.469		0.242		0.353		0.351		0.379		0.408	
10	08/09-Oct-14	0.135		0.168		0.273		0.344		0.502		0.066*		0.050*	
11	05-Jan-15	0.634		0.652		0.688		0.625		0.649		0.623		0.423	
12	**11/12-Feb-15**	0.097*	✓	0.087*	✓	0.055*	✓	0.095*	✓	0.055**	✓	0.137		0.061*	✓
13	19-Feb-15	0.346		0.678		0.628		0.716		0.623		0.599		0.617	
Average CAR (%)		1.72		1.67		2.03		2.02		2.20		2.18		2.09	
W statistic:		0.96		0.95		0.97		0.96		0.97		0.97		0.97	

Notes: This table shows the results obtained from the seven robustness tests, compares these results to the main results, and reports the p-values with the associated significance levels of the t-test for each robustness test. 'c' is short for 'confirmation of main results' and the checks indicate whether the respective robustness test confirms the main results. The Patell t-test results in similar p-values as the t-test and is excluded from the table for brevity. The dates with significant cumulative abnormal returns for the main results are printed bold. *, **, and *** indicate statistical significance at the 0.1, 0.05, and 0.01 level (two-tailed). 'd' is the short form of 'days', 'w' for 'window', 'p' for 'period', 'est' for 'estimation' and 'adj' for 'adjusted'.

6. Conclusion and outlook

This paper aims to answer the research question whether there is a link between an individual hedge fund activist's tweets and the value of the target firm using an event study methodology. While existing studies on the effect of hedge fund activism conclude that the latter leads to significant positive abnormal returns, they all use regulatory filings to define the events in question. To the best of our knowledge, we are the first to use a new form of event definition based on social media posts. Using the exemplary case of hedge fund activist Carl Icahn and the target company Apple, we define an event as the date when he publishes a tweet on Apple via his Twitter profile. Our research period includes all tweets from 13 August 2013 (Carl Icahn's first tweet on Apple) until 18 March 2015 (cut-off date for this study). Our findings are robust against changing key parameters and show that three consolidated events lead to significant positive cumulative abnormal returns on Apple. Especially Carl Icahn's opening tweet on 13 August 2013 leads to a notable significant cumulative abnormal return of 10.22%. Two consecutive tweets on 07/10 February 2014 and 11/12 February 2015 generate significant positive cumulative abnormal returns as well.

We observe that Carl Icahn seems to have been able to achieve his actual objective at Apple, namely convincing Tim Cook to substantially increase share repurchases. Carl Icahn, who initiated his Twitter campaign on Apple in August 2013 informed his Twitter followers in February 2015 that Apple's CEO promised to buy back a substantial number of shares.

A major limitation of our study is the use of a single exemplary case. Thus, we encourage future research to expand our study and include a larger number of target companies and hedge fund activists also in settings outside the U.S., allowing greater generalizability of the results. This may further provide useful insights and stimulate the research on social media activities and their influence on a firm's market value.

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