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ARE ESTIMATES OF THE IMPACT OF SHAREHOLDER ACTIVISM PUBLISHED SELECTIVELY?

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Are Estimates of the Impact of Shareholder Activism Published Selectively?

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Abstract:
Shareholder activism constitutes an increasingly prominent feature of corporate governance landscape. There is a controversy in prior research over whether and how much value activism creates. We examine whether estimates of the impact of shareholder activism are published selectively in prior empirical research. We argue that economists may tend to view activism as a vital corporate governance tool to overcome agency problems and promote economic efficiency. Researchers and journal editors may thus be biased towards consider empirical results in support of the beneficial role of shareholder activism as more reliable than insignificant or opposite results. Consistent with this prediction we document a substantial bias towards publishing (i) higher (rather than lower) and (ii) statistically significant (rather than insignificant) estimates of the impact of shareholder activism. Due to that the pool of estimates in prior empirical literature is biased upwards. The value created by the various forms of shareholder activism corrected for these biases ranges from 0.38 to 3.23% with a median value of 1.94%.

JEL: G14, G30, G34, L20
Keywords: cumulative abnormal return, shareholder activism, eventstudy, meta-analysis, model averaging, publication bias

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An online appendix with data and codes is available at meta-analysis.cz/armington.

1. Introduction

In this paper, we examine how much value shareholder activism creates and how value creation varies with various activism characteristics. Shareholder activism has been an increasingly prominent feature of corporate governance. An article in the (Financial Times, 2020) states that companies nowadays face more shareholder activism than ever before. The article cites Jim Rossman, the head of the shareholder advisory at Lazard, who says that "activism has become a permanent feature of the corporate landscape". In their recent review, Lazard's Capital Market Advisory Group observes a global resurgence of shareholder activism as the challenging macroeconomic conditions give urgency to performance improvements (Lazard, 2022). The report points out that much of the activism targets technology companies that constitute the backbone of the modern economy. The report also mentions the increasing popularity of settlements relative to proxy fights to achieve board representation and the growing number of first-time activists. This implies that a growing number of owners are ready to take the initiative and actively influence the ways companies are run. Thus, the economic significance of shareholder activism grows over time, and it concerns an increasing number of shareholders.

Recent trends in shareholder activism summarized in (Lazard, 2022) are mostly consistent with longer-term empirical evidence documented in prior academic research. There seems to be a broad trend away from shareholder proposals on remuneration or voting practices often initiated by pension funds (Holderness & Sheehan, 1985; Wahal, 1996; Smith, 1996), towards direct negotiation with the management and potentially also litigation (Denes *et al.*, 2017). Furthermore, the increasing engagement of hedge funds and their ability to engage and coordinate a large number of shareholders has substantially affected the nature of the challenges companies face (Boyson & Mooradian, 2011; Bessler *et al.*, 2015; Becht *et al.*, 2017). Given the increasing importance and the evolving nature of shareholder activism, it is important to investigate how much value it actually creates and whether the value created varies across different forms of activism.

There is considerable controversy over the merits and shortcomings of shareholder activism (Brav *et al.*, 2008b). On the one hand, activist campaigns may mitigate agency problems that arise between the owners and managers due to the separation of ownership and control (Jensen & Meckling, 1976; Jensen, 1986). Shareholder activists may prompt changes that the management would otherwise resist, and they may enhance firms' economic performance by *inter alia* refocusing on profitable activities and reducing empire-building (Brav *et al.*, 2008a, 2018; Klein & Zur, 2009; Bebchuk *et al.*, 2015; Becht *et al.*, 2017; Brochet *et al.*, 2021; Maffett *et al.*, 2022). The Investor Forum, founded in 2014 by UK institutional investors, is explicitly intended to serve "as an 'escalation

mechanism' when firms ignore individual investors or exhibit problems that worry many shareholders" (The Economist, 2018).

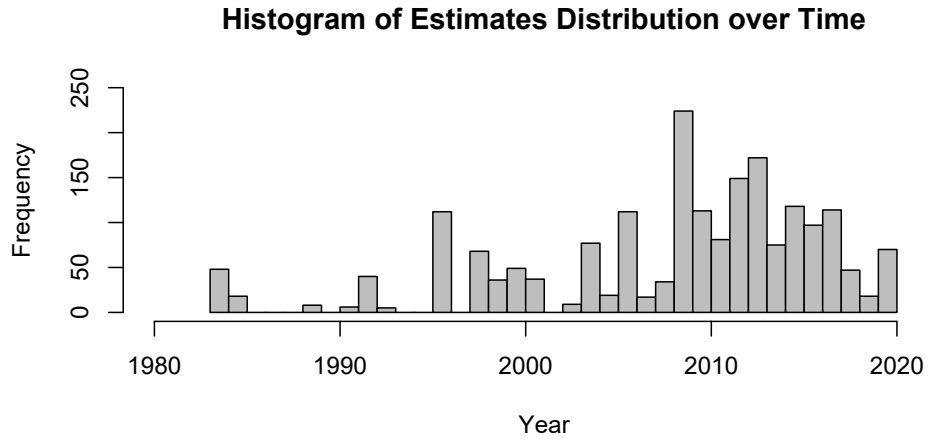
On the other hand, shareholder activism often challenges existing managerial practices, which may destabilize the company (O'Rourke, 2003) and distract the managers from long-term investment projects (Brav *et al.*, 2008b). Coffee & Palia (2016) mention concerns that frequently appear in the political discourse on corporate governance regulation that shareholder activism (especially by hedge funds) may pursue short-termistic "pump and dump" schemes that temporarily boost payouts but are detrimental to firms' long-term profitability. Prior research shows that shareholder activism constrains managerial control over the firm, lowers executive compensation, and increases executive turnover (Brav *et al.*, 2010; Edmans & Holderness, 2017). To preempt activism campaigns, managers can decide to increase dividend payouts, which may necessitate cutting back on capital expenditures and research and development (R&D). Shareholder activism may thus stifle innovation (Maffett *et al.*, 2022) and prompt managers to adopt more defensive corporate strategies that may be detrimental to a firm's long-term value creation (Bourveau & Schoenfeld, 2017). Furthermore, even well-intended shareholder activism may turn confrontational (O'Rourke, 2003), and it may lead to unanticipated adverse outcomes that damage the firm's reputation and increase the likelihood of accounting-related lawsuits (Guo *et al.*, 2021). Consistent with the greater risk of negative publicity, Guo *et al.* (2021) finds that shareholder activism targets pay higher audit fees even though they tend to provide more frequent voluntary disclosures (Bourveau & Schoenfeld, 2017).

Due to these conflicting perspectives, it is not *a priori* obvious whether shareholder activism, on average, enhances the firm value and what kinds of activism tend to be more beneficial than others. The optimal design of corporate governance regulation should trade off the benefit from efficiency improvements that result from shareholder activism against the cost of forgoing potentially beneficial long-term projects. Hence, an estimate of the magnitude of the value created by shareholder activism is an important input for regulatory decisions. In this paper, we aim to provide such an estimate by synthesizing prior empirical evidence on value creation by shareholder activism based on various data samples and research methodologies. The plurality of findings in prior empirical research also allows us to estimate how value creation varies with different activism characteristics.

The increasing prominence of shareholder activism as a corporate governance mechanism and the controversy over its advantages and drawbacks prompted extensive empirical research on this topic. Figure 1 shows the increasing number of short-term price responses to shareholder activism reported in academic research between 1980 and 2020. Given the extensive empirical evidence on the value creation by shareholder activism, it is suitable to perform a meta-analysis that allows us to aggregate prior empirical findings, adjust

them for a potential bias resulting from the selective publication, and to reconcile possibly conflicting findings in the primary studies. A meta-analysis represents an effective way of estimating the true effect in a setting when there is an extensive pool of prior estimates that are based on different data samples and that are estimated using various methodologies (Stanley & Doucouliagos, 2012; Habersang *et al.*, 2019). Furthermore, a meta-analysis also allows us to exploit the heterogeneity in the primary studies, simultaneously control for a host of characteristics in which the primary studies differ, and evaluate their joint impact on the magnitude of the reported estimates.

Figure 1: Number of Published Estimates in Years



Note: The figure shows the number of estimates of short-term stock returns surrounding shareholder activism campaigns published in individual years.

Performing a meta-analysis is particularly suitable for analyzing value created by shareholder activism because data on activist campaigns are scattered, and most primary studies use diverse and often fairly small data set. For example, a well-published study by Matsusaka *et al.* (2019) uses a hand-collected data set covering only six years. Furthermore, Weber & Zimmermann (2013); Krishnan *et al.* (2016) use a data set covering only four years, and Cai & Walkling (2011) uses data only for three years. The median length of the sample period used in the primary studies we collect our estimates from is only 8.3 years. Systematic coverage of activism campaigns differs across jurisdictions and over time (Becht *et al.*, 2017; Maffett *et al.*, 2022). This makes it challenging for researchers to cover the phenomenon systemically. Empirical results based on these samples may thus be affected by the regulatory and macroeconomic conditions specific to a given setting and time period. This may compromise the generalizability of the reported findings and contribute to the substantial heterogeneity in the reported estimates. Fur-

thermore, prior studies employ a multitude of methodological approaches, which implies that the individual results may not be directly comparable. Aggregating the findings based on diverse samples and adjusting for the various methodologies allows us to obtain results that are likely more robust and representative of the overall population. Thus, results from our meta-analysis are helpful in drawing stronger conclusions about the value created by shareholder activism.

A meta-analysis also allows us to adjust the estimates of value created by shareholder activism for a potential publication selection bias. Selective publication arises when authors and editors tend to publish results that are (i) consistent with their *a priori* expectations and/or with prior empirical findings and (ii) statistically significant. Despite the skepticism voiced in the social discourse about the benefits of shareholder activism (Coffee & Palia, 2016), we expect researchers in the fields of economics and finance to perceive activism as an essential corporate governance mechanism that is vital for overcoming agency problems in firms (Jensen & Meckling, 1976; Jensen, 1986). Hence, economists may be prone to mistrust results suggesting that shareholder activism is ineffective or even detrimental in performing this essential role in promoting economic efficiency. This prediction is consistent with the conclusions of several prominent studies that document a positive impact of various forms of shareholder activism on firm value (Brav *et al.*, 2008a; Klein & Zur, 2009; Edmans *et al.*, 2013; Denes *et al.*, 2017; Albuquerque *et al.*, 2021). Authors and editors may thus select for publication results that conform with the view that shareholder activism is beneficial and it enhances firm value (Gillan & Starks, 2007). Some of the results that contradict this perspective may get discarded as implausible, which may bias the pool of estimates reported in research journals.

Furthermore, researchers may consciously or subconsciously select to examine the types of shareholder activism that are prominently featured in the financial press and other media. These kinds of activism may have attracted media attention, particularly because they impacted stock prices. Hence, activism covered in research articles may be more likely to create value than shareholder activism in general. In other words, the estimates reported in prior empirical literature may not depict a balanced view of its overall impact. This concern may be particularly pressing for studies that investigate the activities of individual shareholder activists. The decision to include an individual activist in a data sample of a primary study may be affected by his or her success as in prior campaigns, which may potentially lead to a substantial self-selection problem. Thus, we consider it possible that prior empirical estimates of shareholder activism may be biased upwards. Results published in academic journals likely constitute the most important source of information that shapes researchers' and practitioners' perceptions of

how beneficial or detrimental shareholder activism actually is. Adjusting for the publication selection bias is thus an important step in evaluating the economic role shareholder activism plays.

We collect a sample of 1,973 estimates of short-term stock price responses to shareholder activism campaigns from 67 studies published between 1983 and 2021. To detect and correct for the impact of potential publication selection bias, we use several techniques, including both the classic techniques that rely on the commonly made assumption of a linear association between the estimates and their standard errors, as well as recent state-of-art nonlinear approaches that are capable of detecting selective publication even if this conventional assumption is violated. These methods include the kinked-method (Bom & Rachinger, 2019), the stem-based approach (Furukawa, 2019), and the non-parametric approach by (Andrews & Kasy, 2019). Furthermore, we use the caliper test (Bruns *et al.*, 2019) and the p-curve approach (Simonsohn *et al.*, 2014b,a) to test for discontinuities in the distribution of the t-statistics collected from the primary studies to find out whether the likelihood of publishing statistically significant results is higher than what would be expected given the distribution characteristics.

Our main results are threefold. First, publication bias exaggerates the reported estimates significantly. Second, the merit of the hedge fund activism as well as the value of the activism in the US and Europe are usually overstated. Third, the value created by the various forms of shareholder activism corrected for the publication bias ranges from 0.38 to 3.23% with a median value of 1.94%.

The remainder of the paper is organized as follows. Section 2 describes the collection of the primary studies and provides some preliminary estimates. Section 3 tackles the presence of publication bias in the field. Section 4 concludes the paper.

2. Data Sample

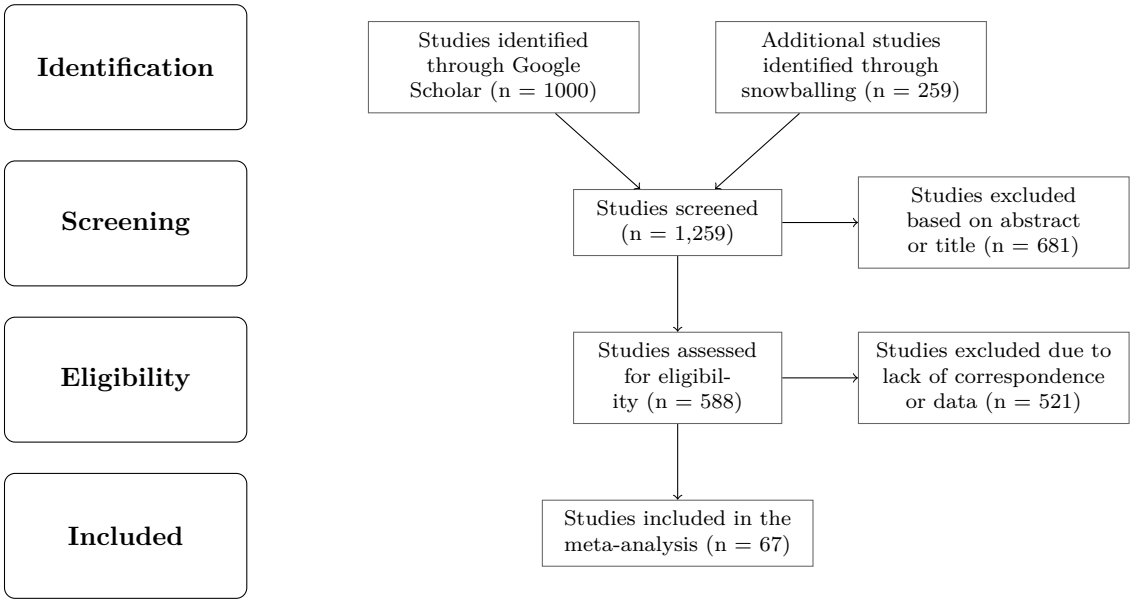
Prior literature uses two broad approaches to measure the value created by shareholder activism. The event study approach (e.g., Brown & Warner, 1985) approximates the value created by the price response to the activism announcement or filing using a fairly short-term return window of several days to a month (Denes *et al.*, 2017; Brav *et al.*, 2008b). This approach essentially captures how marginal investors in the stock market update their perception of firm value based on the expected impact of shareholder activism. The second approach is based on the proposition that successful shareholder activism should be reflected in improved operating performance and superior long-run stock returns (Mitchell & Stafford, 2000).

Even though the second approach is appealing because it focuses on the actual performance improvements resulting from shareholder activism, implementing it is subject to several important limitations. First, performance measurement over longer windows may be confounded with other factors unrelated to shareholder activism, which lowers the power of these tests (Filatotchev & Dotsenko, 2015). These confounding factors may plausibly be systemically related to the incidence of shareholder activism campaigns. For example, if activists target underperforming or undervalued firms, subsequent improvement in their performance may be driven by a simple reversion to the mean rather than by the impact of shareholder activism. Second, it is inherently challenging to adequately adjust long-term returns for the systematic risk a given investment involves. There seems to be little consensus on how long-run returns should be measured Croci (2007). Thus, results in studies examining long-term returns following activism campaigns may be contaminated by insufficient risk adjustments. Third, some shareholder activism may be launched with the intention of forcing the companies to become acquisition targets (Greenwood & Schor, 2009), which cease to exist as independent entities after a successful activism campaign. Excluding acquired firms from the performance measurement sample may substantially bias the long-term performance estimates (Greenwood & Schor, 2009). Due to these limitations, we restrict our attention to the analysis of short-term price responses to shareholder activism campaigns reported in the prior empirical literature.

Our data sample collection follows the guidelines proposed by Havránek *et al.* (2020). We provide a comprehensive overview of our sample collection procedure in the PRISMA diagram shown in Figure 2. First, we inspect the lists of references in the most influential review articles in this research area, including Denes *et al.* (2017), Filatotchev & Dotsenko (2015), and Albuquerque *et al.* (2021) to identify studies that may be relevant for our analysis. We then develop combinations of two subsequent keywords for our search queries. We observe the list of articles generate by each query, and we iteratively modify the set of keyword combinations to most effectively identify relevant studies. This process generates the following combination of keywords: "abnormal return" AND "activist investor" OR "investor activism" OR "activist shareholder" OR "shareholder activism" OR "shareholder proposal" OR "contested proposal" OR "hedge fund activism" OR "proxy contest" OR "proxy fight" OR "negotiation" OR "litigation" OR "takeover". We verify that these keyword combinations successfully identify the vast majority of the relevant articles cited in the above-mentioned review articles.

We run our search query using Google Scholar because of its ability to consider the entire full-text contents of articles rather than solely their titles, abstracts, and keywords. This increases the chances of finding relevant articles regardless of how their titles, ab-

Figure 2: PRISMA Diagram



Note: The figure shows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram that depicts the process we follow to identify relevant estimates in the primary studies that constitute our sample. Our sample collection procedure follows the guidelines proposed by Havránek *et al.* (2020).

stracts, and keywords are formulated. We download and examine the first 1,000 research articles in the list generated by the above-described search query. We select articles that contain estimates of price responses to shareholder activism that meet our criteria specified below. We collect the price response estimates from these articles together with information on their statistical significance and their key characteristics (see below for details). After that, we screen the lists of references in these articles to potentially identify additional relevant studies on the impact of shareholder activism, and we search them for additional estimates meeting our criteria. We concluded our data collection at the end of March 2022. Any articles published after that date may not be included in our sample.

To increase the likelihood that the estimates we use for our analysis are reliable, we disregard any sources that are not published in research journals, e.g. working papers, theses, etc. Before getting published in an academic journal, a study must successfully clear the peer-review process intended to assure the quality and reliability of the reported findings. Therefore, estimates reported in published articles are less likely to suffer from flawed methodology or inconsistent measurement. Furthermore, empirical evidence published in academic journals tends to be the most influential in shaping researchers' and professionals' views of the impact of shareholder activism. Thus, limiting our analysis to estimates published in research articles lets us focus on the empirical findings that matter most for the academic and business communities. We do not expect this research design

choice to have a dramatic impact on our results. Prior research shows that selectivity in the publication is fairly comparable between the published and unpublished studies (Doucouliagos & Stanley, 2013).

We only collect estimates of stock price responses to shareholder activism measured over short-run windows that we define as being fully contained within the two month period stating 30 days prior the event day and ending 30 days after it (Brav *et al.*, 2008b; Denes *et al.*, 2017). Furthermore, to be able to perform our tests of the publication selection bias, we require the price response estimates to be accompanied by corresponding t-statistics, standard errors, or other statistics from which standard errors can be computed. When several measures of statistical significance is provided, we collect corresponding standard errors wherever available. Where t-statistics are reported in a primary study, we compute standard errors by dividing the t-statistics by the corresponding coefficient. When a primary study reports p-values, we compute the corresponding standard error through a corresponding two-tailed test. Our data collection procedure yields 1,973 estimates that we collect from 67 research articles. Table 1 provides a list of the primary studies from which we source our estimates. The substantial number of primary studies that we identify as relevant for collecting our data and the number of reported coefficients demonstrate the breadth of empirical research on this topic, which underscores the benefits of aggregating these findings by means of a meta-analysis.

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Figure 3 shows the histogram of the price response estimates in our sample. As expected, the distribution looks fairly normal. However, relative to the normal distribution, it is more dispersed. Its excess kurtosis is equal to 2.358 (not tabulated), which implies that the distribution is leptokurtic, i.e. it has has heavier tails. This implies that there is a substantial disagreement across the individual primary studies over the magnitude of value created by shareholder activism and the values that are far from the overall mean are more common than would be expected in a normal distribution. The diversity in these observations underscores the importance of investigating the overall picture this stream of research depicts.

We also observe that the distribution of short-term stock returns surrounding shareholder activism campaigns is highly positively skewed; its skewness is equal to 1.499 (not tabulated). Due to the positive skewness in the distribution, the mean value of 1.52% is

Table 1: List of Primary Studies

Alexander *et al.* (2010)	Croci (2007)	Lee *et al.* (2018)
Anson *et al.* (2003)	Cuñat *et al.* (2012)	Lin *et al.* (2016)
Azizan & Ameer (2012)	Cziraki *et al.* (2010)	Matsusaka *et al.* (2019)
Barber (2007)	DeAngelo & DeAngelo (1989)	Mietzner *et al.* (2011)
Barber (2009)	Del Guercio & Hawkins (1999)	Morgan & Poulsen (2001)
Barclay & Holderness (1991)	Dodd & Warner (1983)	Mulherin & Poulsen (1998)
Bassen *et al.* (2016)	El-Khatib *et al.* (2017)	Nelson (2005)
Bassen *et al.* (2019)	English II *et al.* (2004)	Nelson (2006)
Bebchuk *et al.* (2020)	Filatotchev & Dotsenko (2015)	Ong *et al.* (2010)
Becht *et al.* (2009)	Fortin *et al.* (2014)	Park *et al.* (2008)
Becht *et al.* (2017)	Ghosh *et al.* (1992)	Prevost & Rao (2000)
Bessler *et al.* (2015)	Gillan & Starks (2000)	Prevost *et al.* (2012)
Bhabra & Wood (2014)	González & Calluzzo (2019)	Renneboog & Szilagyi (2011)
Bizjak & Marquette (1998)	Goodwin & Rao (2014)	Smith (1996)
Borstadt & Zwirlein (1992)	Greenwood & Schor (2009)	Smythe *et al.* (2015)
Boyson *et al.* (2017)	Hamao & Matos (2018)	Stadler *et al.* (2015)
Boyson & Pichler (2019)	Holderness & Sheehan (1985)	Strickland *et al.* (1996)
Brav *et al.* (2008a)	Chen & Feldman (2018)	Venkiteshwaran *et al.* (2010)
Brav *et al.* (2008b)	Chen *et al.* (2020)	Wahal (1996)
Brav *et al.* (2010)	Ikenberry & Lakonishok (1993)	Weber & Zimmermann (2013)
Cai & Walkling (2011)	Karpoff *et al.* (1996)	Yang *et al.* (2012)
Carleton *et al.* (1998)	Krishnan *et al.* (2016)	Yeh (2014)
Caton *et al.* (2001)		

Note: This table shows a list of the 67 primary studies, from which we source 1,973 estimates of short-term stock price response to shareholder activism that constitute our sample.

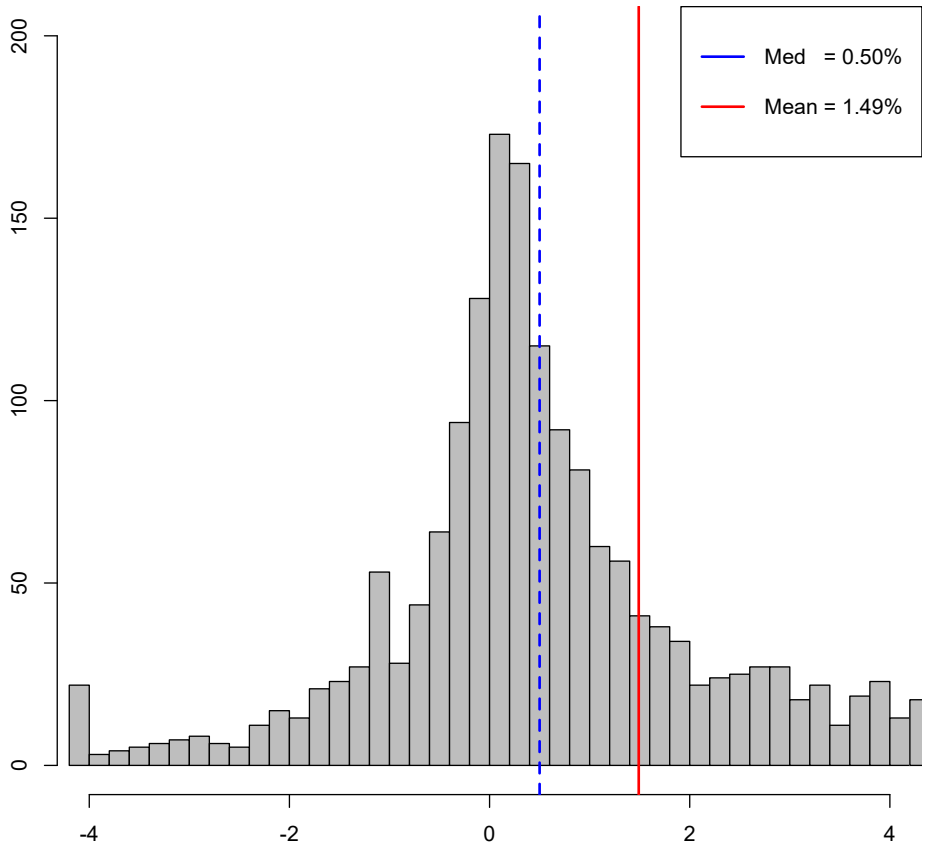
substantially higher than the sample median of 0.50%. This implies that the pool of estimates that we collect from the primary studies features a higher-than-expected frequency of observations that are positive and large, while the corresponding low or negative observations seem to be much less numerous. Some of the estimates collected from primary studies thus imply rather high value creation by shareholder activism. Even though a simple histogram does not provide any insights about possible explanations for the higher incidence of positive observations, this finding is consistent with a higher propensity to report empirical results suggesting that shareholder activism is beneficial for enhancing firm value.

3. Publication Bias

3.1. Funnel Plot

Publication selection bias is a phenomenon that arises when authors and editors have a conscious or subconscious tendency to publish estimates that are consistent with their *a priori* expectations about the nature of the examined relationship or with previously published results, and/or that are statistically significant Ioannidis *et al.* (2017). Especially

Figure 3: Distribution of Value Creation Estimates



Note: The figure shows the distribution of short-term stock returns estimates surrounding shareholder activism campaigns that we collected from the primary studies. The vertical solid red line indicates the sample mean and the dashed blue line shows the sample median.

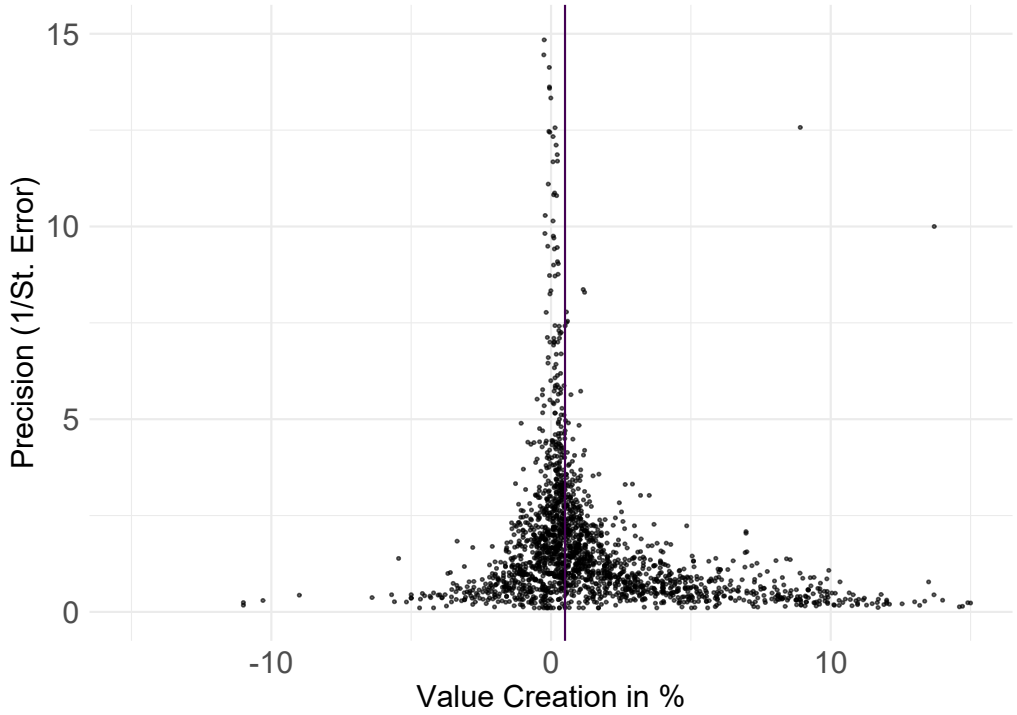
research based on smaller datasets should sometimes generate counter-intutive results simply because a given dataset may, purely by chance, happen not to be representative of the entire population. While it may be considered reasonable to discard results that seem implausible given the presumed relationship or in light of prior findings, doing so distorts the pool of estimates published in the body of empirical research literature. Such a distortion may bias the perception of the overall strength of the studied relationship and lead to undue conclusions about the level of consistency of empirical evidence supporting it. This issue may be further compounded if researchers choose not to publish results that are inconsistent with prominent studies published in leading academic jour-

nals, that "set the tone" for the general understanding of the nature of the relationship. Prior research documents selective reporting of results in numerous research settings in economics (Ugur *et al.*, 2018; Campos *et al.*, 2019; Blanco-Perez & Brodeur, 2020; Brown *et al.*, 2021) and finance (Zigraiova & Havranek, 2016; Geyer-Klingeberg *et al.*, 2018; Astakhov *et al.*, 2019; Gric *et al.*, 2021). Ioannidis *et al.* (2017) concludes that the results published in research journals in economics tend to suggest a magnitude of a relationship that is, on average, twice as large as the true effect.

We find it plausible to expect publication selection bias to be present in the stream of research studying the impact of shareholder activism on firm value. We presume that researchers may tend to consider shareholder activism a vital economic force to overcome agency problems and promote efficient allocation of capital. Hence, they may be skeptical about results suggesting that shareholder activism is ineffective or even detrimental in performing this essential economic role. They may also be reluctant to submit articles that contain results inconsistent with key studies that likely reflect the consensus understanding of the phenomenon that has built up over time, e.g. (Gillan & Starks, 2000; Cuñat *et al.*, 2012; Matsusaka *et al.*, 2019). Eliminating some of the contra-intuitive estimates with the "wrong sign" and simultaneously publishing similarly implausible results from the opposite end of the spectrum introduces a bias in the pool of reported findings. A meta-analysis of published results on value created by shareholder activism allows us to assess how much they are affected by selectivity in reporting and to adjust the corresponding coefficients for this bias.

Following prior research, e.g. Egger *et al.* (1997), we start our analysis of the publication selection bias by examining a funnel plot depicted in Figure 4. On the horizontal axis, the funnel plot shows the value of the 1,973 reported price response estimates that constitute our sample. The vertical axis measures the precision of these estimates defined as the inverse of their standard errors ($=1/SE$). This graph should have the shape of an inverted funnel because the most precise estimates should be centered around the sample mean, whereas the less precise estimates should be more dispersed. Absent any publication bias, the funnel plot is expected to be symmetric. Less precise estimates that may deviate from *a priori* expectations and from results reported in prior research should be equally likely published regardless of whether they are high or low/negative. In contrast, if the publication of results is selective, the funnel plot tends to be asymmetric. Under selective publication, some of the imprecise estimates that are low or negative get discarded. These never enter the sample collected from the primary studies, and so they are missing from the funnel plot. In contrast, equally imprecise estimates with the expected positive sign get published and so they are shown in the funnel plot, which introduces positive skewness into the funnel plot. The asymmetry thus suggests that estimates tend

Figure 4: Funnel Plot



Note: This figure shows a funnel plot of the short-term price responses to shareholder activism campaigns. On the horizontal axis, the funnel plot shows the value of the 1,973 reported price response estimates that constitute our sample. The vertical axis measures the precision of these estimates defined as the inverse of their standard errors ($=1/SE$). Absent any publication selection bias, the observations should form a symmetric inverted funnel centered around the most precise estimates. Estimates with a precision greater than 15 are excluded for ease of exposition. But in the analysis, they are included.

to be reported selectively in the primary studies and that their mean value constitutes a biased estimate of the magnitude of the true effect.

A visual examination of Figure 4 suggests that the funnel plot is skewed to the right. This indicates that imprecise estimates are more likely to get reported if they are high rather than low or negative. In other words, prior empirical literature may suffer from under-reporting of low and negative price responses to shareholder activism. This finding suggests that the average value of the empirical results on the value created by shareholder activims overstates the true impact activism has on enhancing company value. Nevertheless, the shape of the funnel plot does not constitute a formal test. Thus, we only use it as suggestive evidence consistent with selective publication.

3.2. Linear Tests

We formally test for the publication selection bias with the use of the following equation that follows (Egger *et al.*, 1997; Stanley & Doucouliagos, 2012):

$$\hat{x}_{ij} = \beta_0 + \beta_1 S\hat{E}_{i,j} + e_{ij}, e_{ij} \sim N(0, \sigma^2), \tag{1}$$

where $\hat{x}_{ij}$ stands for the i-th estimate of the value created by the shareholder activism in the j-th study and $S\hat{E}_{i,j}$ denotes its corresponding standard error as repored in a given primary study. The conventional way of estimating Equation 1 assumes that absent selectivity in publication, there is no association between the estimate ($\hat{x}_{ij}$) and its standard error ($S\hat{E}_{i,j}$). It also assumes that any potential publication selection bias has a linear association with the estimates' standard errors. When these two assumptions can reasonably be made, the slope coefficient β_1 can be interpreted as a measure capturing the effect of publication selection bias and, correspondingly, the intercept term β_0 reflects the mean coefficient corrected for the effect of publication bias. This interpretation is substantiated by the following argument. If low and/or negative estimates that are imprecise are more likely to get discarded than equally imprecise high estimates then reported estimates that are high are more likely to have higher standard errors. In other words, high estimates that get published tend to be imprecise, but the converse is not true for low and/or negative estimates because many of them never get published. Selective reporting of higher estimates and suppressing low/negative estimates thus implies a positive slope coefficient β_1. Furthermore, after controlling for the selective publication captured by the coefficient's standard error, the intercept term represents the "true" effect corrected for the effect of any potential publication bias.

Panel A of Table 2 shows the results of our estimation of Equation 1. We use six different conventional approaches for estimating the equation (Stanley & Doucouliagos, 2012). Using multiple approaches allows us to evaluate how robust our results are to the choice of the estimation method. First, we use simple ordinary least squares (OLS) estimation with two-way clustering on study and country-level as suggested by Cameron *et al.* (2012). The two-way clustering is recommended in this setting because higher or lower price response estimates may be concentrated in specific studies or in results from specific countries. Second and third, we run fixed effects (FE) and between effects (BE) regressions. These techniques allow us to exploit specific components in the variation in our dataset. Study-level fixed effects absorb idiosyncratic study-level variation. Including controls for potential confounding effects of particular methodological choices and specific data samples used in the individual primary studies. By comparison, study-level between-effect estimation accounts for the differences in size of the 67 studies, from which we source

our price response estimates.

Table 2: Publication Selection Bias

	OLS	FE	BE	Study	Precision	IV
Panel A - Linear Estimation Methods						
Effect beyond bias	0.590***	1.256***	1.473***	0.713***	0.008	0.657***
	(0.202)	(0.296)	(0.318)	(0.239)	(0.010)	(0.208)
	[0.249, 0.956]			[0.324, 1.100]	[-0.003, 0.095]	
Publication bias	0.686***	0.178*	0.233**	0.836***	1.130***	0.635***
	(0.126)	(0.104)	(0.104)	(0.148)	(0.158)	(0.159)
	[0.456, 0.917]			[0.597, 1.098]	[0.851, 1.399]	
Panel B - Nonlinear Techniques						
	Stanley *et al.* (2010)	Furukawa (2019)	Bom & Rachinger (2019)		Andrews & Kasy (2019)	
Effect beyond bias	0.196**	0.021***	0.000		1.062***	
	(0.079)	(0.006)	(0.001)		(0.024)	

Note: The uncorrected mean value creation by shareholder activism is 1.49%. The presented results are from regression $\hat{x}_{ij} = \beta_0 + \beta_1 S\hat{E}_{i,j} + e_{ij}$, where $\hat{x}_{ij}$ denotes the i-th value creation estimated in the j-th study and $\beta_1 S\hat{E}_{i,j}$ denotes the corresponding standard error. Column Study uses inverse number of observation per study as a weight. Precision uses inverse of the standard error as a weight and IV uses inverse of square root of number of observation as instrument. Standard errors clustered at the study level and 90% confidence intervals for wild bootstrap in squared brackets reported whenever it is possible. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Fourth and fifth, we follow Stanley & Doucouliagos (2012) and Astakhov *et al.* (2019) and we weigh the observations by measures of study size and by their precision. In the fourth column (labeled "Study") we use as a weight the inverse number of observations reported in a given study. This approach "levels the playing field" for studies that report more or less estimates and it makes each of the 67 primary studies that contribute to our sample equally important in shaping this result. In the fifth column (labeled "Precision") we weigh the observations by the inverse of their standard error, i.e. $1/SE(r_{ij})$. This approach assigns more weight to more precise estimates, which helps us adjust for potential heteroskedasticity of the observations in our sample.

The five tests described above constitute established methodology for testing for the publication selection bias. Nevertheless, prior research discusses a possibility that both the estimated coefficient and its standard error may be jointly determined by specific study characteristics, which raises concerns about the endogenous nature of the two measures (Stanley, 2005; Havránek, 2015). To address this issue, Havranek *et al.* (2021) suggests using the inverse of the square root of the number of observations used for the estimation in the primary studies as an instrumental variable for the standard error. The inverse of the number of observations has several desirable characteristics that make it

suitable for the use as an instrument. By construction, the number of observations is correlated with the standard error and so the instrument is likely to be valid. At the some time, it is unlikely to be related to the methods used in the primary studies and so it is reasonable to assume that it is quasi-randomly distributed among the individual estimates. Following this proposition, in the sixth column Panel A of Table 2 (labeled "IV") we report the results from our estimation that uses the inverse of square root of number of observation as instrument for the coefficient's standard error. This approach is also used by Zigraiova & Havranek (2016); Astakhov *et al.* (2019) to address potential endogeneity between an estimate and its standard error.

Results reported in Panel A of Table 2 provide evidence of a substantial publication selection bias in empirical studies investigating value created by shareholder activism. All six β_1 are positive, which is consistent with underreporting of low and/or negative price responses to shareholder activism campaigns. Five out of these six β_1 coefficients are statistically significant at the conventional 5% level. The remaining FE estimate is significant at 10% level (coef. 0.178, std. err. 0.104). Taken together, these results suggest that studies on the value creation by shareholder activism underreport results on low or negative price responses.

Panel A of Table 2 also shows that regardless of how we estimate the empirical model, all the six intercept terms β_0 are positive. Furthermore, five out of six β_0 coefficients are statistically significant at the conventional 5% level. The intercept in Equation 1 captures the true effect adjusted for selectivity in publishing the results. Thus, these results suggest that even after controlling for selective publication of results shareholder activism is associated with positive price responses. At the same time, the magnitude of the intercept terms is substantially lower than what is commonly suggested in the prior research literature. Specifically, β_0 coefficients range from the statistically insignificant 0.008% for the model that weighs the observations by their precision to 1.473% for the model using between effects. This evidence suggests that shareholder activism creates value but its magnitude is more modest than commonly proposed.

3.3. Nonlinear Tests

The tests reported in Panel A of Table 2 rely on assumptions that the price response estimates and their standard errors are independent if there is no selective publication, and that the publication selection bias is a linear function of the estimate's standard error. While these assumptions are likely plausible in most research settings, Stanley & Doucouliagos (2014), Andrews & Kasy (2019), and Havranek *et al.* (2021) argue that in some settings these assumptions may be violated. Thus, we complement the above analysis with the following four recently developed techniques that do not require the

independence and linearity assumptions to be satisfied: the Top10 method developed by Stanley *et al.* (2010), the selection model by Andrews & Kasy (2019), the stem-based model suggested by Furukawa (2019), and the kinked-regression by Bom & Rachinger (2019).

First, the Top10 method developed by (Stanley *et al.*, 2010) estimates the "true effect" in the studied relationship based on the 10% most precise estimates reported in prior empirical literature. The technique is substantiated by the idea that highly precise estimates are unlikely to be substantially affected by selective reporting of results. Second, the selection model developed by Andrews & Kasy (2019) builds on Hedges (1992) and exploits potential discontinuities in the distribution of p-values around conventional cut-offs for statistical significance. Havranek & Sokolova (2019) argues that this technique should remain unbiased under any form of publication selection.

Third, we employ the stem-based method developed by Furukawa (2019). The technique builds on (Stanley *et al.*, 2010) in that it attributes greater weight to more precise estimates. However, instead of discarding 90% of the less precise estimates it more carefully trades-off the potential bias and the size of the data sample. The technique uses an algorithm that identifies a subset of estimates that improve the trade-off and it computes the magnitude of the "true effect" based on this subset of estimates. Fourth, we use the kink method proposed by Bom & Rachinger (2019). This approach is based on the notion that the propensity to withhold some results may change based on the magnitude and the precision of the estimate. Therefore, this approach assumes that the relationship between an estimate and its standard error is linear only in some interval. The approach aims at identifying an "endogenous kink" in the reported precision of the empirical estimates, which would be characteristic of selective reporting.

We report our results based on these non-linear techniques in Panel B of Table 2. These approaches do not measure directly the magnitude and significance of publication bias. Instead, they directly estimate the true effect beyond bias, which we report in the table. The results based on these non-linear techniques lead us to conclusions similar to those we made based on the linear techniques reported in Panel A of Table 2. The estimated "true effect" based on these non-linear techniques ranges from 0% for the kink method to 1.062% for the selection model, which is broadly comparable to the interval of (0.008%, 1.473%) that we observe for the linear techniques. Furthermore, similarly to the results based on the linear techniques, three out of four results reported in Panel B of Table 2 are statistically significant at the conventional 5% level. Thus, even based on these modern non-linear approaches we reach the conclusion that shareholder activism likely creates positive value, however, its magnitude is relatively small.

3.4. Caliper Test

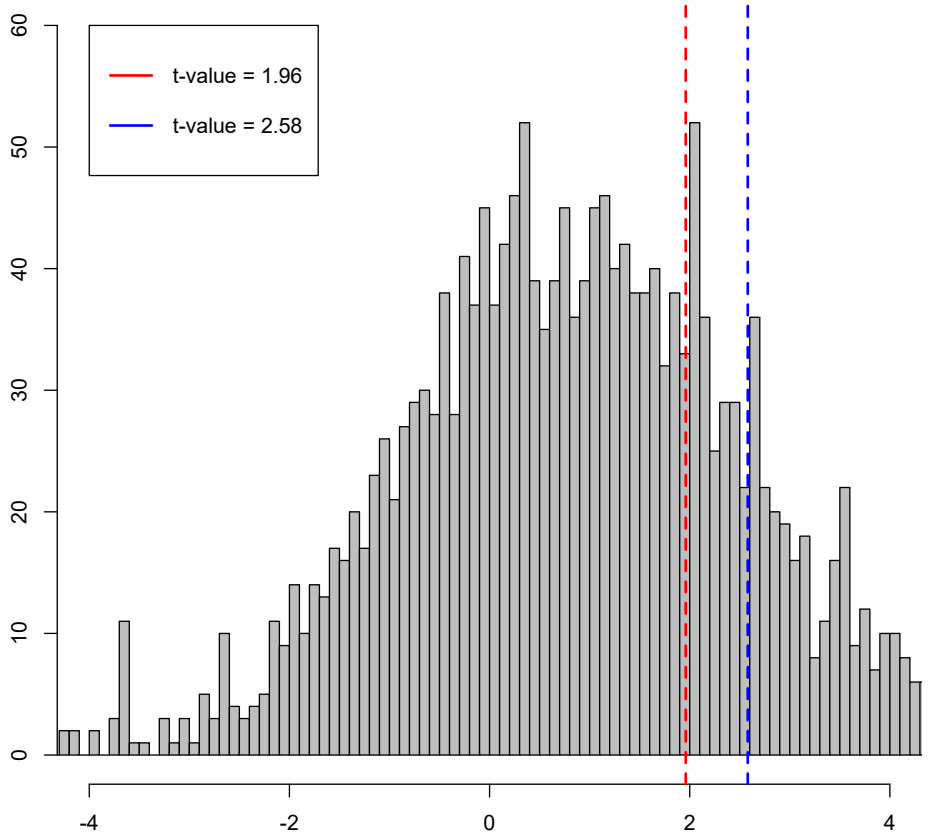
In this section, we address the question whether selectivity in publishing results on the value created by shareholder activism also manifests itself in a greater likelihood of publishing statistically significant rather than insignificant results. It could be argued that statistically insignificant "non-results" are less attractive for publication because they fail to provide unequivocal evidence about the relationship of interest. While statistically significant results clearly support the notion of the existence of a proposed association between in two variables, statistically significant results may arise either because the proposed relationship does not exist or because of the empirical tests they are based on lack statistical power. Discriminating between the two latter alternatives is challenging and so statistically significant results are arguably less informative to the readers than significant results. Journal editors may thus prefer studies reporting statistically significant results, which may incentivize the authors to select for publication those results that are statistically significant. The propensity to publish statistically significant rather than insignificant results may also contribute to the bias in the pool of estimates reported in the empirical research literature.

The tendency to overreport statistically significant results relative to insignificant results is observable in the distribution of statistics used to evaluate statistical significance. Thus, we start our analysis in this section by examining the distribution of t-statistics reported for the short-term stock returns surrounding shareholder activism campaigns in the primary studies. The distribution should approach normality. However, if statistically significant results are overreported and statistically insignificant results are underreported we expect to observe discontinuities in the distribution around the cut-offs conventionally used to assess statistical significance. Specifically, we expect enquotejumps in the distribution around 1.96, which corresponds to statistical significance at the most common 5% level, and also above 2.58, which is typically interpreted as a benchmark for strong significance at 1% level.

Figure 5 shows a histogram of t-statistics trimmed within the interval (-5, +5) that we collect or compute from other measures of statistical significance reported in the primary studies. The vertical lines at 1.96, 2.58 represent important thresholds for the conventional levels of statistical significance. If academic journals tend to publish positive significant results more frequently than insignificant results discontinuities in the distribution should be observable around these cut-off levels. Consistent with our expectation and with our earlier results on selective publication, we observe clustering of t-statistics just above both cut-off levels for statistical significance. In both cases the incidence of estimates with corresponding t-statistics just exceeding the threshold is more than 1.5 times greater than the incidence of estimates with t-statistics just below it. These find-

ings provide further support for our earlier conclusion that the estimates of value created by shareholder activism are reported selectively. The relative incidence of reported t-statistics suggests that the results that provide statistically significant support for the perspective that shareholder activism enhances firm value are reported more frequently than would be expected given the characteristics of the remainder of the distribution.

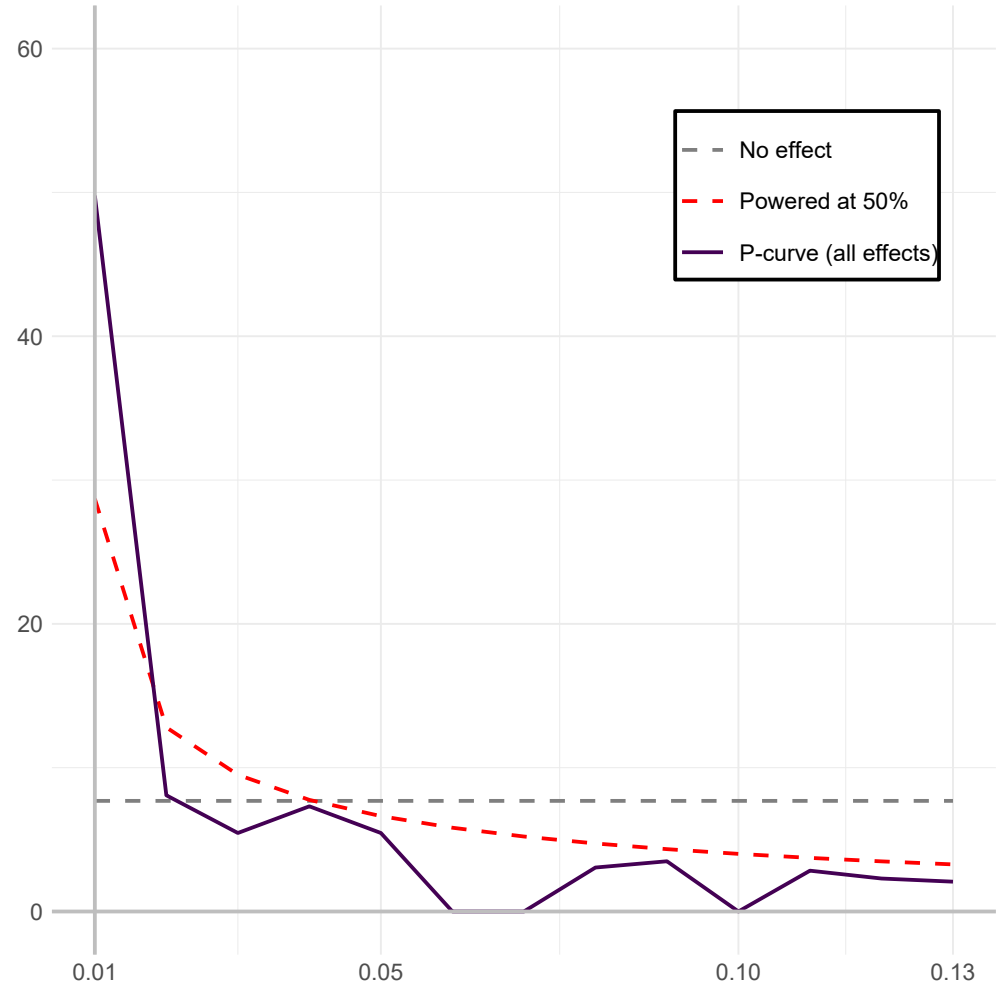
Figure 5: Distribution of T-statistics



Note: The figure shows the distribution of t-statistics corresponding to the short-term stock returns surrounding shareholder activism campaigns. The vertical dashed lines indicate the boundary of 1.96, which corresponds to statistical significance at 5% level, and 2.58, which corresponds to statistical significance at 1% level.

Unsurprisingly, we reach similar conclusions when observing the p-value curve depicting the distribution of the levels of significance of the value creation estimates reported in prior empirical literature following the method proposed by Simonsohn *et al.* (2014b,a). Figure 6 shows that the estimates that just exceed 1% level of significance are overrep-

Figure 6: P-Value Curve



Note: .

resented, while those that would be potentially significant at 2% or 3% levels, as well as those that would be significant at hypothetical thresholds at 6% and 7% levels are underrepresented. It is unlikely for such a pattern in implied p-values to be generated purely by chance. Thus, we interpret these results as indicating selectivity in reporting positive value created by shareholder activism.

We use the caliper test (Gerber *et al.*, 2008; Gerber & Malhotra, 2008; Bruns *et al.*, 2019) to formally assess whether the patterns observed in Figure 6 represent significant deviations from the expected incidence of various levels of statistical significance. The so-called "p-hacking" refers to the tendency to select empirical tests that generate results that just surpass the common benchmarks for statistical significance. Harvey (2017) argues that such a tendency is present even in the literature studying financial markets.

The caliper test explicitly evaluates the strength of empirical evidence on the presence of breaks in the distribution of test statistics around the critical values used to evaluate statistical significance.

It is merely a convention to consider empirical results with corresponding p-values below 5% and 1% statistically significant and strongly statistically significant respectively. Thus, absent selective publication, there is no reason to expect p-values of published results to be concentrated just above these arbitrary thresholds. The caliper test is based on a comparison of the proportion of results with corresponding p-values in narrow equal-sized intervals (i.e., the "calipers") just above and just below these cut-off levels. In case of no "p-hacking", the incidence of reported coefficients with p-values in the narrow interval just above the threshold ("over caliper") should be comparable to the incidence of reported coefficients with p-values just below the threshold ("under caliper"). Thus, the expected over-to-under caliper ratio of reported coefficients should be equal to 0.5 (50:50) (Clopper & Pearson, 1934). Ioannidis *et al.* (2017) argue that to detect "p-hacking" in economics and finance research, the cut-off level for over-to-under caliper ratio should be adjusted for the fact that empirical tests in these fields tend to be underpowered. We follow Bruns *et al.* (2019) who suggests the over-to-under caliper ratio of 0.4 (60:40). To perform the test, we consider four caliper widths (0.05, 0.1, 0.15, and 0.2).

Table 3 summarizes our results from the caliper tests. We observe consistent evidence on "p-hacking" at H1: $C \leq 0.4$ for both the 1.96 and the 2.58 levels of statistical significance. All the lower bounds of the lower 95% confidence interval for the over-to-under caliper ratio are above the critical value of 0.4 that is recommended as the cut-off level for research in economics and finance (Bruns *et al.*, 2019). Furthermore, for the narrowest caliper of 0.05 for the 2.58 significance level the entire 95% confidence interval is above the critical value of 0.5. Thus, consistent with the suggestive evidence in Figure 6, the results in Table 3 show that estimates of price responses to shareholder activism that narrowly surpass the thresholds for statistical significance at 1.96 and 2.58 are more likely to be published than corresponding estimates that just fall short of the threshold. This result lends further support to the proposition of publication selection bias in the empirical literature on the firm impact of shareholder activism.

4. Conclusions

Shareholder activism may enhance firm value by curbing economic inefficiency resulting from the agency problem between the owners and managers. On the other hand, activist campaigns may harm firms by inciting a confrontation between the owners and managers and by prompting managers to adopt defensive strategies that cut back on long term

Table 3: Caliper Test

T-statistics	C	All	
1.96	0.05	0.520	(0.411)
	0.10	0.491	(0.417)
	0.15	0.531	(0.469)
	0.20	0.522	(0.467)
	0.30	0.490	(0.443)
2.58	0.05	0.633	(0.512)
	0.10	0.544	(0.457)
	0.15	0.520	(0.447)
	0.20	0.523	(0.458)
	0.30	0.506	(0.449)

Note: The table shows the results of the caliper test for four caliper sizes 0.05, 0.1, 0.15 and 0.2 around two significant thresholds: 1.96 and 2.58. The figures denote the share of the observation above and below a given threshold for statistical significance, i.e. the over-to-under caliper ratio. The numbers in the brackets indicate the lower bound of 95% confidence intervals. We follow Bruns *et al.* (2019) and interpret confidence intervals lower bounds above 0.4 as evidence on "p-hacking".

investments. To design a regulatory framework that optimally trades off the benefits and and drawbacks of shareholder activism, it is essential to understand how much value shareholder activism actually creates. Systemically investigating this question is complicated because the date are on investor activism campaigns is fragmented and there is a multitude of approaches of measuring the value-creation that arises from shareholder activism. We address this question by performing a meta-analysis of 1,973 estimates of short-term price responses to activism campaigns reported in 67 empirical research articles. Our study aggregates and synthesizes these estimates obtained with the use of various data samples and methodologies, it corrects them for the impact of publication selection bias, it examines the importance of various estimation characteristics, and it provides the best practice estimates for the most common types of shareholder activism. We use the state-of-art techniques for correcting for publication bias and for exploiting the heterogeneity in the distribution of the estimates.

We conclude that the research literature on shareholder activism is indeed affected by selectivity in publication, which implies that the pool of estimates reported in prior empirical studies overstates the true effect shareholder activism actually has. We demonstrate that imprecise estimates that are high are less likely to get discarded than equally imprecise estimates that are low or negative. We also show that positive estimates of value creation by shareholder activism are substantially more likely to get published if they are just above the threshold for statistical significance rather than below it.

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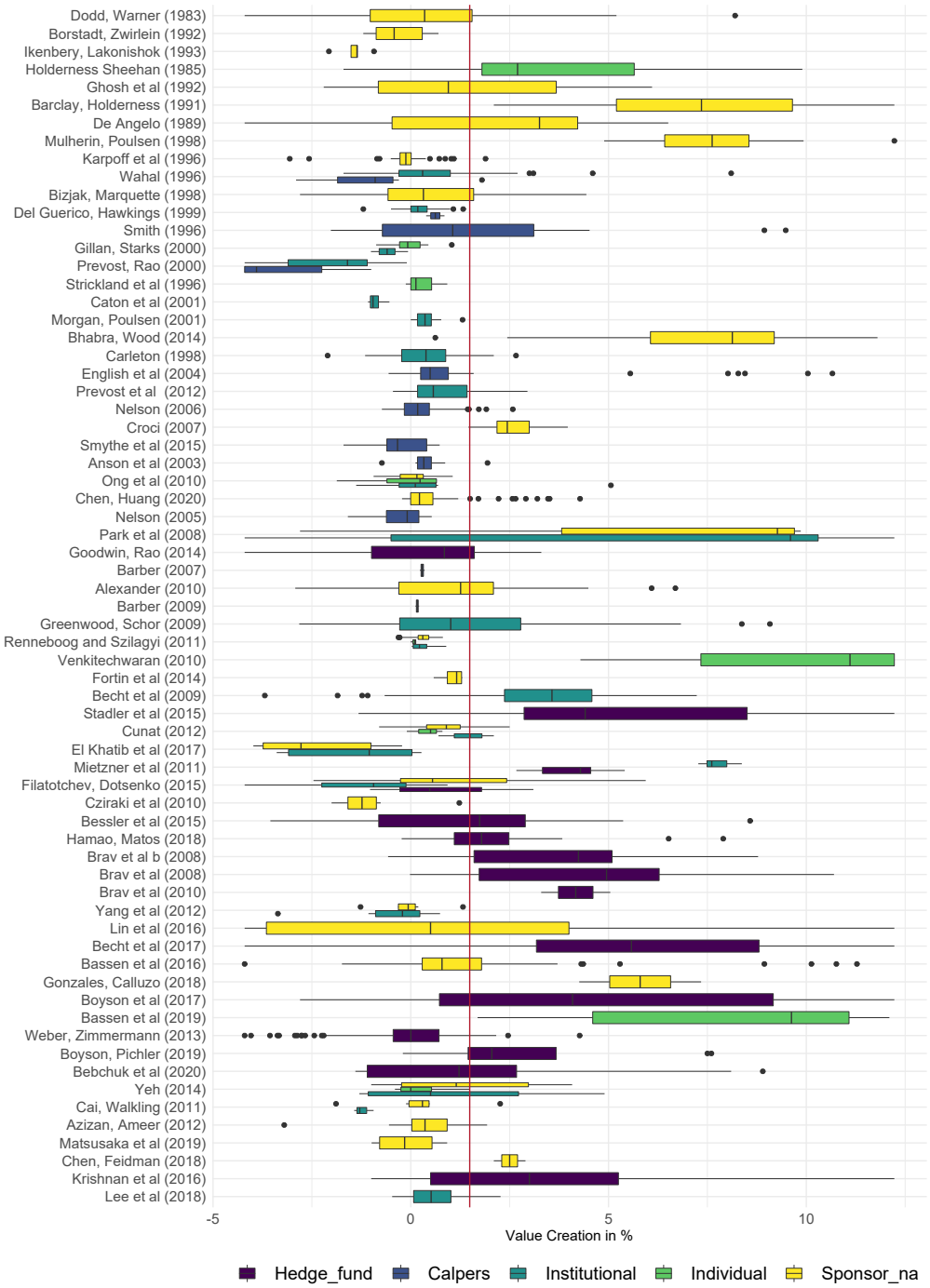
Appendix

Figure A1: Boxplot of Studies by Sponsor Type



Note: The box plot of the value created by various sponsors of shareholder activism in primary studies sorted by midyear of primary data. It highlights both median and interquartile range (P25 – P75). The coverage of whiskers reaches from (P25 – 1.5*interquartile range) to (P75 + 1.5*interquartile range). The dots stand for outlying estimates. The red vertical line signifies the mean value created in %. The winsorization of 1% handles with overall outliers before computational tasks.

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