International Review of Economics and Finance 89 (2024) 1120–1135

Contents lists available at ScienceDirect

International Review of Economics and Finance

journal homepage: www.elsevier.com/locate/iref

Can an influential and responsible investor indeed be influential through responsible investments? Evidence from a $1 trillion fund

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ARTICLE INFO

JEL classification:
G11
G14
G39

Keywords:
ESG
Divestments
Sovereign wealth fund

ABSTRACT

Via a case study of Norway's sovereign wealth fund (GPFG), the world's largest stockowner, we find that such a high-profile fund can immediately influence market prices through its ESG announcements. After assessing that the product or conduct of a portfolio constituent is in serious contravention of its ethical guidelines, the GPFG can divest from that firm or place it on an observation list and make after-the-fact public announcements. For both cases, we empirically investigate market reactions via the pricing and trading volume of the affected firms' stocks. Our results show a robust and significant average abnormal return of −0.31% for the firms on the announcement date. To disentangle the price effects, we condition on the rationale of each announcement and demonstrate that it indeed plays a role. Specifically, firms announced for their conduct face a larger magnitude of price reaction than those announced for their product. We, however, find no evidence of any effect of the announcements on trading volume. Nevertheless, we find some evidence suggesting that higher trading volume and more recent announcements are associated with more negative abnormal returns.

1. Introduction

The $1 trillion Norwegian Government Pension Fund Global (GPFG), which holds about 1.5% of all publicly listed equity worldwide, is the world's single largest stock investor. Besides its significant size in the market, it is an exceptionally transparent sovereign wealth fund (SWF) (Caner & Grennes, 2010) and a pioneer in environmental, social, and corporate governance (ESG) based investing (Reiche, 2010). Ever since its establishment, the GPFG has been an active contributor to the development of international standards on responsible business conduct. Specifically, it has a set of ethical guidelines governing its investment activities. If a firm's product or conduct is in violation of these guidelines, the fund can decide to divest from the firm or put it on an observation list.[1] Some time after the decisions, the fund will announce publicly its ESG decisions towards those firms. These announcements are reported in the financial media and are noticed by the investment community. However, do ESG announcements from such a large and influential investor affect pricing and trading of the affected firms' stocks? In this paper, we make a case study of the GPFG with their ESG announcements on both exclusion and observation decisions to shed light on this topic.

First, for the above research question, we find significant and negative abnormal price reactions on the announcement day for all of the affected firms as a whole. Second, the price reactions seem to only exist on this event date and are insignificant beyond the announcement date in our event window. The abnormal returns are relatively small, about −0.31% on average, and this smallness

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[1] According to the report "Grounds for decisions" by Norges Bank (2016), the fund puts firms under observation when it is undetermined that the exclusion criteria are met and when observation is more appropriate.

https://doi.org/10.1016/j.iref.2023.07.106
Received 16 June 2021; Received in revised form 27 July 2023; Accepted 27 July 2023
Available online 22 August 2023

can help explain why we are not able to detect any price effect beyond the event date.[2] Third, we find no measurable effect on trading volume for the affected firms. However, we find some evidence suggesting that higher trading volume is associated with more negative abnormal returns.

In recent years, ESG topics have received increasing attention by investors and portfolio managers (see e.g., Amel-Zadeh & Serafeim, 2018). Various other studies have documented negative abnormal price reactions to news regarding different ESG factors. Guest and Nerino (2020) find that downgrades in governance ratings by Institutional Shareholder Services are associated with negative returns of −1.14% over a three-day announcement window. Analyzing reactions to news about corporate social responsibility (CSR), Krüger (2015) finds strong, negative returns from negative news and weak negative returns from positive news.[3] Capelle-Blancard and Petit (2019) study short-term market reactions to both positive and negative ESG news from Covalence EthicalQuote. They find a drop of 0.1% in market value for firms encountering negative news and no change when the news is positive. They also observe that investors respond to media coverage, but not to releases by firms or NGOs. Distinguishing the ESG effects among countries, Aouadi and Marsat (2018) show a connection between ESG controversies and greater firm value for firms that are larger and located in countries with greater press freedom.

Beside short-term analyses like the studies above and ours, there is a number of studies focusing on long-term returns from ethically motivated trading strategies. Hong and Kacperczyk (2009) find that securities of firms producing tobacco, alcohol, etc. have higher expected returns than other stocks, and that norm-based investors under-invest in these firms. Capelle-Blancard and Monjon (2014) analyze mutual fund returns and various screening mechanisms. Except for exclusion of sin stocks (sector-specific screens), they do not find any association between other screening mechanisms and lower expected fund returns. On a similar topic, Atta-Darkua et al. (2020) find that long-term investors can face unrewarded risks regarding negative screening of sector portfolios.

In addition to ESG news' reactions, the literature on SWFs and market price reactions is also relevant in our study. Kotter and Lel (2011) show that when a SWF announces its investment in a firm, that firm's abnormal return on the announcement date is higher for more transparent SWFs. In the opposite case of SWF divestments, Dewenter et al. (2010) document negative price reactions, reflected by the cumulative abnormal return of −1.37% in the examined three-day event window. It is therefore likely that the negative price reactions we find in this study partially result from the loss of a transparent SWF investor. However, the granularity of our data makes a more detailed analysis possible.

A decision on either exclusion or observation builds on a thorough examination of the firm, and an announcement on such decisions can sometimes reveal new information about the firm for other investors. Investors should already have general knowledge about the products of the firms they invest in — learning that the fund has divested from a tobacco producer because of tobacco production does not reveal any new information about the excluded firm. The same goes for learning that the fund has put an energy firm under observation because the firm, under the fund's assessment, is likely to produce more coal than the tolerance threshold by the fund — such an announcement may not be surprising to investors. We therefore view it as unlikely that product-based announcements affect market participants' perception of such affected firms. On the other hand, learning that a firm is excluded or observed because its conduct is a contravention of the fund's ethical guidelines is another story. The conduct of a firm is often opaque to the general public until it is exposed in the media, and in this case, through the fund's announcements. Investors of the announced firms were probably not aware that those firms contributed to systematic human rights violations or serious environmental damage until the fund's announcements. Thus, to disentangle the price effects from the previously documented SWF divestment-effect, we condition on the rationale behind the GPFG's announcements utilizing this unique data set. Any difference in the price reactions for the two rationales therefore suggests that such a large investor can influence market prices by their ESG announcements.

In fact, we find that the announcements' rationale — product or conduct — indeed adds another dimension to the price effects. With empirical evidence, we demonstrate that there is a larger magnitude of the abnormal returns on the announcement date in the conduct-based subsample than in the product-based subsample. The cumulative return effect is also more pronounced for the conduct-based announcements. These results are consistent across different models and robustness tests. Therefore, our findings indicate that the GPFG can affect short-term market prices through not only SWF disownership but also the rationale behind its ESG announcements.

While scholars have not investigated the effect of different rationales, they have previously studied the overall return effects of the GPFG's announcements because of the fund's unique features. Beck and Fidora (2008) find no significant price impact on the affected stocks in their study period of 2005–2006. Dewenter et al. (2010) find non-economic-motive divestments from the GPFG to temporarily reduce firm values by 0.22%, but cannot reject the null hypothesis of zero abnormal returns. However, being early studies relative to the fund's establishment of ethical guidelines, these two studies have very limited sample sizes. Later, Hoepner and Schopohl (2018) analyze the returns on portfolios of excluded stocks by the GPFG and the Swedish AP-funds. They find no significant difference between the returns on these constructed portfolios and the returns on the funds' benchmark portfolios. While their study looks at long-term performance, our paper documents that the price effect from the GPFG's announcements wears off within a few days after the announcements. In a parallel but independent study to ours, Atta-Darkua (2020) also looks into the effects of the GPFG's announcements. However, this paper focuses on the equity value of firms and ownership structure following the announcements, so the study is limited to only exclusion announcements. The paper finds a negative association between excluded firms' equity value and the announcements, where the effect is stronger for more liquid firms.

[2] With our event study methodology, we are not able to detect any permanent price reactions, but in a related recent study, Berle et al. (2022) find permanent price effects.

[3] There have been discussions that agency problems can lead to shareholders' negative reactions to positive CSR news. For example, see Bénabou and Tirole (2010).

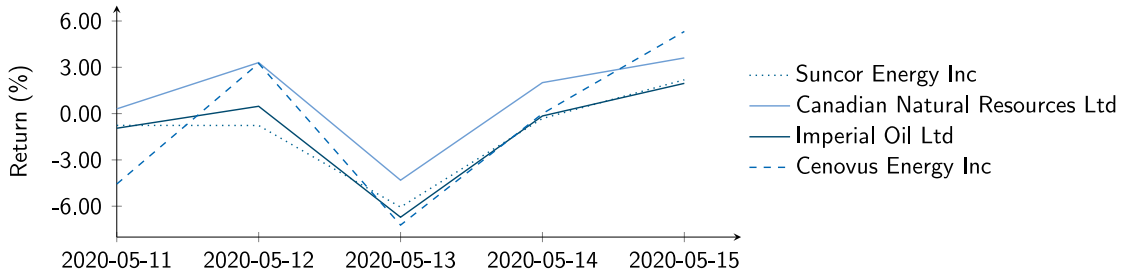

Fig. 1. Daily stock returns. This figure depicts the daily stock returns from May 11, 2020 to May 15, 2020 for several firms that were announced to be excluded from the NBIM's investment universe on May 13, 2020.

2. The GPFG and its ethical guidelines

The GPFG is managed by Norges Bank Investment Management (NBIM), which is the asset management unit of the central bank of Norway, Norges Bank. The GPFG's deposits come from the country's surplus revenue from petroleum activities, and its current market value is over $1 trillion. As the Norwegian economy's safeguard and a long-term savings plan for current and future generations, the fund operates as a (very) long-term participant in the financial markets. The fund's investment strategy has evolved over time to improve its long-term financial performance. The GPFG originally invested only in government bonds, but currently, about 70% of the fund is in equity investments. More than half of the GPFG's current value comes from returns on its investments in stocks, bonds, and real estate.

2.1. Why the GPFG and its announcements?

There are several compelling arguments for why we focus on the GPFG's announcements. First, as the single largest stockowner, the most transparent SWF (Truman, 2007), and a global leader in responsible investing, the GPFG has the potential to influence other investors. For example, for transparency, the fund has been making progress on transparent voting, such as publishing all voting decisions prior to each shareholder meeting starting from 2021. For responsible investing, the fund was early to establish its principles and expectations of firms on many issues, such as children's rights, climate change, anti-corruption, or tax and transparency. Atta-Darkua (2020) finds the exclusion announcements of the fund to cause a temporary drop in the average ownership by global pension funds and responsible mutual funds. This finding suggests that other investors may reassess their views on the excluded firms and possibly reduce their exposures pursuant to the GPFG's announcements, despite the fact that the fund itself is not a large investor in any single firm.[4]

Second, the announcements are well-known by investors and portfolio managers around the world. They are covered by major financial news media, like the Wall Street Journal, Financial Times, CNBC, and others. Bloomberg, which is used by most asset and portfolio managers, has even constructed an index of the fund's excluded firms due to ethical reasons in its database. On Wednesday, May 13, 2020, the fund announced that Canadian Natural Resources Limited, Cenovus Energy Inc, Suncor Energy Inc, and Imperial Oil Limited were excluded from NBIM's investment universe due to unacceptable greenhouse gas emissions on an aggregate firm level. On the same day, the Financial Post (2020) reported that the shares of these firms "all tumbled between 5 per cent and 7 per cent Wednesday after Norges Bank Investment Management [...] said it would exclude those firms from its portfolio". Fig. 1 shows the daily stock return of these firms around the announcement date.

Finally, the rationale for the GPFG's announcements is well documented and rooted in moral and social foundations. According to Reiche (2010), the fund is a pioneer investor for including morality in its investment standards. Additionally, the Norwegian parliament endorses the promoted values and norms embedded in the fund's ethical guidelines. Considering that Norway is ranked number one in the United Nation Human Development Index, we believe the country is an appropriate international standard setter. Besides, the fund's mandate is also in line with the OECD and the UN's standards for responsible investments, and it adheres closely to the Santiago Principles — principles and practices for responsible SWF activities. Therefore, we can rely on the GPFG's ethical guidelines as a quality check for responsible investments. We, however, are aware that some criteria set by the guidelines can be controversial among global investors.

2.2. Institutional background

There are three main institutions behind the ethical guidelines of the GPFG, which are illustrated in Fig. 2.[5] First, the institution that officially owns the fund and is responsible for its general responsible investment policies is the Norwegian Ministry of Finance. Second, the Council on Ethics (CoE) monitors the fund's portfolio constituents from an ethical perspective. The CoE can communicate

[4] The fund's ownership stakes are currently capped at 10 percent of the share capital of any firm.

[5] For more information, see p.84–87 in NBIM's publication "Responsible Investment 2016".

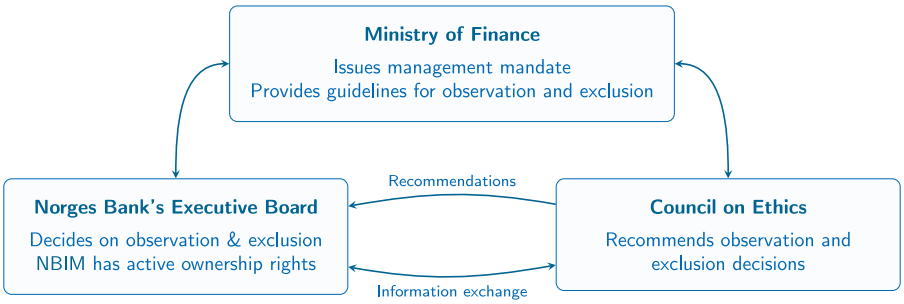

Fig. 2. Institutions behind the GPFG's ethical guidelines. This figure illustrates the interaction and responsibilities in the GPFG's ethical investment management.

directly with these firms to obtain more assessment opportunities. When the council comes to the conclusion that a firm has breached the fund's ethical norms, it submits a recommendation to the executive board of Norges Bank — the third institution. As the operational manager of the fund, the bank's executive board reviews the CoE's recommendations and decides to exclude firms or put them under observation. The board can also communicate with the firms for further assessment with a different communication level to the CoE's (Pia Goyer — CoE member, personal interview on March 9, 2018). The decisions are based on evaluation of different aspects of the violations, such as the prospect of future contravention, the seriousness of the violations, and the association between the violations and the firms.

Regarding the reporting of the fund's decisions, the fund also has guidelines on this matter. Within two months after the decision on divestment is made, the fund must divest completely from the firms. At the end of the two months, NBIM makes public announcements about the fund's decisions on both exclusions and observations (if a firm has been decided to be put under observation in the same period). Norges Bank has semi-annual and annual reports which provide its ESG decisions and grounds for those decisions in accordance with its well-established ethical guidelines. The semi-annual reports must be made within two months after the end of the relevant six-month period. Additionally, NBIM also frequently updates press releases on such decisions. Besides the decisions to exclude and observe firms, NBIM can also take other courses of action such as exercising ownership rights if they are deemed reasonable and can potentially reduce the likelihood of future violations. In fact, active ownership is considered a better alternative in many cases because "staying invested in a company with questionable conduct was better from an ethical perspective than selling its shares to investors who were less motivated or able to influence the company" (NBIM, 2020).

The rationales of the fund's announcements belong to either product-based or conduct-based criteria. Different kinds of product criteria have been considered throughout the years. Today, firms producing weapons that violate fundamental humanitarian principles or that are sold to certain states, tobacco producers, and mining corporations and power producers exceeding a specified proportion of their revenue from thermal coal may be excluded. The conduct-based criteria include violations of human rights, serious environmental damages and long-term harm to humans, gross corruption, and other consequential violations of fundamental ethical norms. In general, there have been more ethical target areas over the years. In 2020, the criterion of carbon emissions was applied for the first time.

3. Data and methodology

3.1. Data

Although restricting ourselves to the GPFG limits the size of our study, including other investors and funds would hinder us from exploiting this interesting data set. The fund is unique in many ways as we have mentioned earlier, and other large investors do not have the same transparent guidelines and processes of executing their decisions when it comes to ESG divesting as the fund does.

For the data sample, we define an *event* to be a unique announcement on exclusion or observation made for a firm. Therefore, two events might regard the same firm but at two separate occasions. The fund re-excludes/-observes some firms due to repeated or new ethical violation, and we include both occasions in such cases.[6] Since any two consecutive events regarding the same firm are at least three and a half years apart and there is no evidence of long-term effects from such announcements (Hoepner & Schopohl, 2018), we are not concerned about the previous announcement affecting the analysis of the later event. We obtain the full list of all the excluded and observed firms via the annual reports of the GPFG from 2004 (the establishment of the CoE) to 2021 by NBIM. We do not solely rely on the updated list on the NBIM's website as it is incomplete.[7]

[6] We do not analyze the effect on firms when the GPFG revokes their earlier decisions. There are only 16 such occasions, which would lead to a very small data sample.

[7] The list, which can be found on "https://www.nbim.no", is incomplete for two reasons. First, the list does not include the firms that had their exclusion/observation revoked. Second, the firms that got re-excluded/observed get overwritten, therefore, there is no records of the previous exclusions/observations.

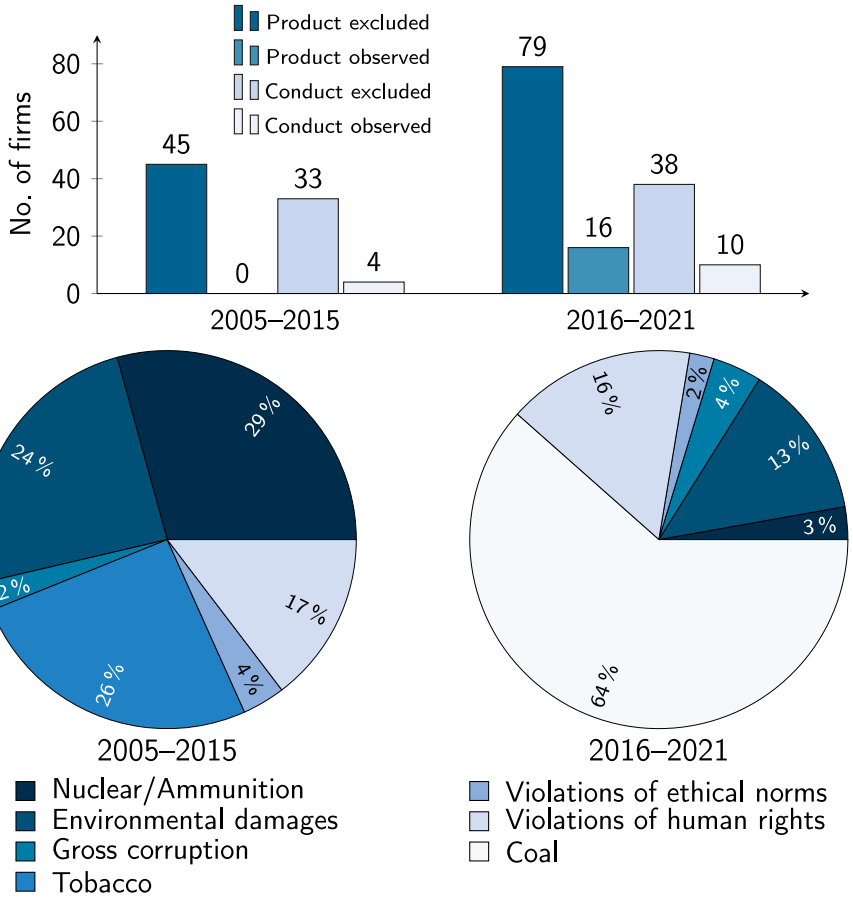

Fig. 3. The fund's decisions and violation criteria for announcements made over the years. This figure shows an overview of excluded and observed events in two different time periods. The upper chart depicts the kinds of decision made for all announcements. The lower charts illustrate the types of violations in those announcements.

To the best of our knowledge, a total of 235 events have occurred since the CoE's formation until the end of 2021. However, we exclude 22 events from our price analysis sample and 21 events from our volume analysis sample because of the lack of data. Fig. 3 gives an overview of exclusion and observation events in two different periods, 2005–2015 and 2016–2021. There are more firms excluded or put under observation in the latter period. The figure provides the proportions of different ethical criteria that lead to the fund's decisions.

The product-based criteria contain production of (1) nuclear weapons, cluster munitions or gross amount of military equipment, (2) tobacco, and (3) coal or coal-based energy. The conduct-based criteria consist of: (1) severe environmental damage or unacceptable gas emissions, (2) gross corruption, (3) violation of ethical norms, and (4) severe violations of human rights or of individuals' rights in situations of war or conflict. We observe that the product-based coal criterion is included in the later years and has a substantial proportion, while the tobacco and nuclear weapons criteria reduce their shares significantly in these years. The proportions of the conduct-based criteria are similar in both periods. On May 13, 2020, four out of seven firms were excluded under the new carbon emissions criterion, which we include in the severe environmental damage criterion in the figure.

Our daily market data come from Thomson Reuters/Refinitiv Eikon Datastream. We obtain the following variables for each event: closing stock prices, shares outstanding, trading volumes (by the number of shares), value of local market indices where the firms are listed (*local indices*), and value of two global stock indices. Some examples for the local indices are: FTSE 100, S&P 500, Hang Seng, etc. The first chosen global index, *global index 1*, is the MSCI World Index. This index represents developed markets in 23 countries and captures around 85% of the free float-adjusted market capitalization in each country (MSCI, 2020). The other global index, *global index 2*, is the FTSE All-World Index, a market-capitalization weighted index that represents developed and emerging markets. This index covers 90%–95% of the investable market capitalization (FTSE-Russell, 2020). We also retrieve daily data for the Fama–French three and five factor models in the relevant period of the study directly from Kenneth R. French Data Library. The inclusion of different indices and the Fama–French three and five factor models to determine the expected returns and hence abnormal returns is for robustness checks of our results.

For a firm to be included in our sample, it must have 220 daily observations within one calendar year and end at day –2 before the *event date* (day 0) to represent the *estimation window*. To represent the *event window*, we include data for the day prior to the

Table 1
Summary statistics.
Panel A reports the number of product- and conduct-based events split by geographical regions. Panel B provides descriptive statistics for trading volume (number of shares) and daily returns in the estimation window of 220 days for the events included in the data sample. We report the trading volume in two measures, raw daily volume and log transformed daily volume. We also report the average market value for the firms in each announcement type three months before the announcement date. The data set spans from 2005 to the end of 2021.

Panel A: The fund's total ESG announcements by region

	Product	Conduct	Total
North America	58	13	71
Europe	24	13	37
Africa	3	2	5
Asia	46	39	85
Oceania	5	1	6
Middle East	0	11	11
South America	4	6	10
Total	140	85	225

Panel B: Descriptive statistics of events in the data sample

		Volume	Log volume	Return
Product $N = 135$	Mean (no. of daily shares)	4,083,054	13.93	0.000
	Standard deviation	686,573	0.08	0.02
	Excess kurtosis	24.51	1.22	3.73
	Skewness	3.37	0.30	−0.31
	Mean market value* ($ million): 12,808			
Conduct $N = 78$	Mean (no. of daily shares)	6,823,716	14.22	−0.000
	Standard deviation	985,728	0.10	0.03
	Excess kurtosis	17.20	1.04	4.69
	Skewness	3.05	0.10	0.12
	Mean market value* ($ million): 19,736			

Note: *We report the mean market value three months before the announcement date to avoid any potential effects of the announcements or the fund's actual divestments, which occur within two months before the public announcements.

event date (day –1), the event date (day 0), and ten available observations within the following three weeks of the event date (day 1 to day 10).[8,9] Not all event dates, however, are the exact announcement date of exclusion or observation. This issue is due to the fact that the trading days of some firms are based on different trading systems, e.g., firms on the Tel Aviv Stock Exchange and the Egyptian Stock Exchange are traded from Sunday to Thursday. If the event date falls on a day that the announced firm is not trading (say, Friday), we select the event date to be the nearest trading day after the announcement date (Sunday), given the condition that it should be within seven days following the announcement. If not, we exclude the event from our sample.

The summary statistics for the data are provided in Table 1. Panel A reports the number of excluded and observed firms in different geographical regions. Approximately 60% of the announced firms in Asia and Europe fall into the product-based criteria. Most of the firms in North America were announced due to their products, while conduct-related violations led to all 11 events in the Middle East. Five out of six firms in Oceania (in fact, all are Australian firms) were announced due to their product, particularly related to production of coal or coal-based energy.

In Panel B, we report trading characteristics for the firms in our sample. The table reports summary statistics for trading volume (both raw and log scale) and stock returns in the estimation period, corresponding to about one trading year (see Section 3.2). The average daily stock returns for both of the product- and conduct-violation categories are minimal, essentially zero. The standard deviations, however, are relatively large. The return distribution is generally heavy-tailed, but has no significant skewness.

Firms in both criteria have large dispersion in raw volume, with the standard deviations accounting for around 14%–17% of the means. The table shows that after we do the log transformation of the raw volume, the distribution becomes much closer to a normal distribution, reflected by the much lower excess kurtosis and skewness. We also report the average market value three months before the announcement date instead of the event date for all firms in the corresponding type of criteria. In this way, we can avoid any potential effects of the announcements or the fund's actual divestments reflected on the market values of firms. From the report, we observe that the firms announced due to their conduct are much larger firms than those due to the product criteria.

3.2. Methodology

We employ the event study methodology to measure the announcement effects, both on price and volume. The event study methodology is well-reviewed by MacKinlay (1997); we only briefly summarize what is essential and particularly relevant to our study.

[8] The definitions of *estimation window*, *event date*, and *event window* are given in Section 3.2.

[9] One year consists of roughly 250 trading days. We set the threshold to be 220 available daily observations within a one-year calendar before the event date as most of the announcements in our study can pass this threshold. Using 250 trading days within a year prior to the event date would halve the sample size of our study.

The events of interest are Norges Bank's public announcements about the excluded and observed firms due to ethical reasons. The announcements are made regarding the fund's decisions: *exclusion announcements* inform that the fund has divested completely from the firms in the announcements, while *observation announcements* notify the public that the firms in the announcements are being watched by the fund but not yet excluded from the fund's portfolio. We define the day of announcement to be the *event date*, i.e., day 0, and a range of days surrounding it to be the *event window*. Since this event date happens after the fund has either put firms under observation or completed the divestments, there is little reason to believe that there is leakage of information to the market of the fund's decisions before the announcements, especially regarding exclusion announcements. Any leakage prior to a complete divestment would lower the fund's portfolio returns and consequently contradict the fund's main goal of securing highest possible return. We use a 12-day event window for the analyses of abnormal returns and abnormal trading volume.

Abnormal returns. The abnormal return of firm i on day t (AR_{it}) is the difference between the actual return and the conditional expected return on that day for the firm. To estimate conditional expected returns $E\left[R_{it}|\mathbf{R}_{mit}\right]$, we use the standard market models (with different proxies for market returns as robustness checks) and the Fama French models as additional robustness tests. We focus on the market models to explain the abnormal returns in this section, a similar procedure is applied to the Fama–French models.

The proxy for market returns, $\mathbf{R}_{mit}$, is the returns on either the local indices or one of the global indices. Note that the market return is indexed by i because the local index is specific for firm i. Consequently, the conditional expected return on day t is $E\left[R_{it}|\mathbf{R}_{mit}\right] = \hat{\alpha}_i + \hat{\boldsymbol{\beta}}_i\mathbf{R}_{mit}$. The parameters α_i and $\boldsymbol{\beta}_i$ are estimated by the standard market model in the *estimation window* of roughly one trading year prior to the event window. The event window and the estimation window do not overlap.

The estimated abnormal return ($\widehat{AR}$) for firm i on day t in the event window is

$$\widehat{AR}_{it} = R_{it} - E\left[R_{it}|\mathbf{R}_{mit}\right], \tag{1}$$

where R_{it} is the raw stock return. Our raw returns are log-returns.

Let τ_1 be the first day and τ_k be any day of interest in the event window. We aggregate the estimated ARs in the event window to get the cumulative abnormal returns (CARs). We also average the data across observations to draw inferences about the overall observed data, i.e., average AR, or $\overline{AR}$ (AAR), and average CAR, or $\overline{CAR}$ ($CAAR$):

$$\widehat{CAR}_i(\tau_1,\tau_k) = \sum_{t=\tau_1}^{\tau_k}\widehat{AR}_{it},$$

$$\overline{\widehat{AR}_t} = \frac{1}{N}\sum_{i=1}^{N}\widehat{AR}_{it},$$

and

$$\overline{\widehat{CAR}}(\tau_1,\tau_k) = \frac{1}{N}\sum_{i=1}^{N}\widehat{CAR}_i(\tau_1,\tau_k) = \sum_{t=\tau_1}^{\tau_k}\overline{\widehat{AR}}_t. \tag{2}$$

For the significance tests of the average abnormal returns ($\overline{\widehat{AR}_t}$) and average cumulative abnormal returns ($\overline{\widehat{CAR}}(\tau_1,\tau_k)$) in the event window, we use two different test statistics. The first one is the test statistic used by MacKinlay (1997), which is a standard approach and was well-reviewed in his paper. We also utilize the adjusted Patell test-statistic proposed by Kolari and Pynnönen (2010), which is based on the Patell test-statistic in Patell (1976). The adjusted Patell test-statistic by Kolari and Pynnönen (2010) derives from the standardization of the abnormal returns, which takes the adjusted forecast-error corrected standard deviations into consideration. This test statistic then takes care of the possible sample cross-correlation of the residuals in the estimation period. We later report our results based on both of the test statistics.

Abnormal trading volume. We use a standardized measure for trading volume (V_{it}). To standardize, we measure the number of shares traded on day t relative to the number of outstanding shares on the same day,

$$V_{it} = \frac{n_{it}\times 100}{S_{it}},$$

cf., the measure in Campbell and Wasley (1996). Here, n_{it} and S_{it} are respectively the number of shares traded and the number of outstanding shares for firm i on a given day t.

As suggested by Ajinkya and Jain (1989) and Cready and Ramanan (1991), we then perform a log-transformation of the volume measure. This way, the distributions become more symmetric and closer to a normal distribution, which is in line with the log-transformed volume in Table 1. We therefore obtain the log volume metric

$$LV_{it} = \frac{\ln[(n_{it})\times 100]}{\ln(S_{it})}. \tag{3}$$

For the expectation model of trading volume, we use mean-adjusted trading volume. The average daily trading volume in the estimation period is used as a proxy for the expected trading volume in the event window.[10] In line with these prior studies (Ajinkya

[10] There are other common approaches for the expectation models for trading volume, such as the ordinary least squares market model or an estimated generalized least squares version of a market model, both used in Campbell and Wasley (1996). We, however, use the mean-adjusted model as we lack access to the full data of trading volume for all our market indices.

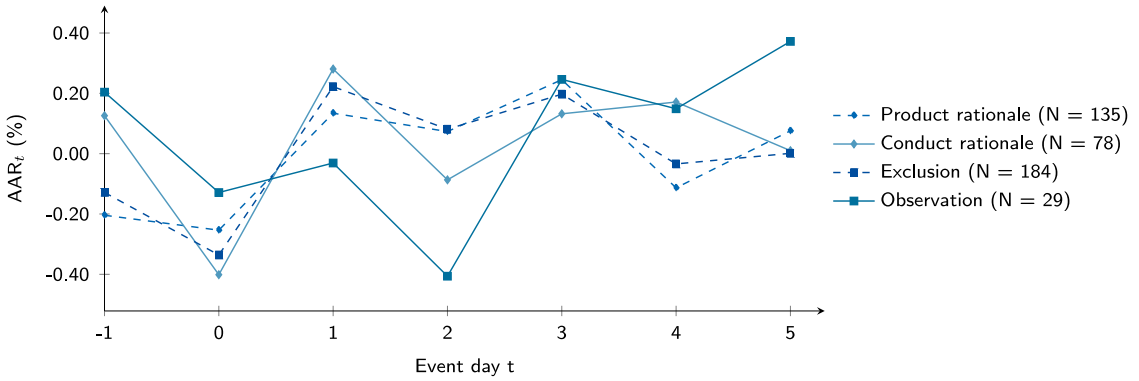

Fig. 4. Average abnormal returns in the event window. This figure plots the *AARs* in the event window one week following the announcement date for four different subsamples. We estimate the expected returns from a one-factor model using the local indices.

& Jain, 1989; Cready & Ramanan, 1991), we choose estimation periods of 100, 170, and 238 days, where one-half of the estimation period is prior to the event period, and the other half is after the event period.

We estimate the abnormal trading volume (AV) for firm i on day t by

$$\widehat{AV}_{it} = LV_{it} - E\left[LV_i\right],$$

where

$$E\left[LV_i\right] = \frac{1}{T}\sum_{t\in D} LV_{it},$$

and D is the set containing the days in the estimation window.

Similarly, to draw statistical inferences about AVs, we average the estimated AVs across observations $i = 1, \ldots, N$ to get the average AV, or $\overline{AV}$ (AAV), on day t :

$$\overline{\widehat{AV}}_t = \frac{1}{N}\sum_{i=1}^{N} \widehat{AV}_{it}.$$

We determine the significance based on the above non-parametric approach with a standard t-test statistic, i.e., the ratio between the average abnormal volume on day t ($\overline{\widehat{AV}}_t$) and its standard error on that day.

4. Empirical results and discussions

In this section, we report whether or not ESG announcements made by the GPFG regarding divestments or observations have immediate negative stock price effects and trading volume changes for the affected firms. To test for significance of the announcement effects, we perform both non-parametric and parametric tests on different subsamples of firms and on firms individually.

As a quality check, we have compared multiple independent computer implementations of the analysis to ensure the correctness of the results. The results are also robust to the model specifications discussed above and different statistical tests. The reported results in the paper's main text are based on the market model with the local indices for the return analysis, and on the 170-day estimation period for the volume analysis. Results of different model specifications and statistical tests are available in the Online Appendix. We discuss them here only when these specifications give different results. Furthermore, while we perform the analyses for the whole event window of 12 days (the period for t in $[-1, 10]$), we only choose a sample of representative days to keep the reported tables short. Unless stated otherwise, the days that we do not include in the tables give similar results to the chosen representative days.

Before moving on to the results of different analyses, we would like to make a note on the event window for accurate interpretation. When we collected the data from the database, the time zone was by default set to the user's time zone (GMT +1). Additionally, the exact time of the fund's announcements, which belongs to the GMT +1 time zone, is not known, but the specific announcement dates are transparent.[11] Due to the working hours of the stock exchanges as well as the differences in time zones, the first market reactions should be reflected on the event date and possibly on the next local trading day compared to GMT +1. Therefore, it is possible, though unlikely, that there are some unavoidable errors in terms of the actual event date. For the majority of the observations, the event date is the actual announcement date (day 0), but for some observations, it can be on day +1. We thus

[11] Currently, all announcements are made at 10:00 p.m.

Table 2
Test for aggregation of abnormal returns.
The table provides the average abnormal return (AAR) and the cumulative average abnormal return ($CAAR$) aggregated from event day 0 for each subsample using the market model with *local indices*. The data sample is divided into subsamples, where *All events* represents the whole data set, which can be categorized by the following subsamples: *Product-based* and *Conduct-based*, or *Excluded* and *Observed*, or *Product-excluded*, *Product-observed*, *Conduct-excluded*, and *Conduct-observed*. We calculate AAR_t and $CAAR_t$ for event day t relative to the announcement date. The test statistic is based on the approach used in MacKinlay (1997). *, **, ***, **** indicate that the $AAR_t/CAAR_t$ is significantly negative or positive at the 10%, 5%, 2.5%, and 1% level, respectively. N denotes the number of observations. We also report the conventional $CAAR_{[-1,1]}$ for comparison.

Day t	All events	Product-based	Conduct-based	Excluded	Observed	Product-excluded	Product-observed	Conduct-excluded	Conduct-observed
$AAR_t(\%)$									
−1	−0.08	−0.20	0.13	−0.13	0.20	−0.22	−0.06	0.04	0.53
0	**−0.31** ***	**−0.25** *	**−0.40** *	**−0.34** ***	**−0.13**	**−0.30** *	**0.06**	**−0.41** *	**−0.36**
1	0.19 *	0.13	0.28	0.22 *	−0.03	0.17	−0.10	0.33	0.05
2	0.01	0.07	−0.09	0.08	−0.41 *	0.09	−0.04	0.07	−0.86 *
5	0.05	0.08	0.01	0.00	0.37	0.05	0.27	−0.09	0.49
10	0.11	0.21 *	−0.06	0.09	0.22	0.20	0.28	−0.10	0.15
$CAAR_t(\%)$									
0	**−0.31** ***	**−0.25** *	**−0.40** *	**−0.34** ***	**−0.13**	**−0.30** *	**0.06**	**−0.41** *	**−0.36**
1	−0.12	−0.12	−0.12	−0.11	−0.16	−0.13	−0.04	−0.08	−0.31
2	−0.11	−0.05	−0.21	−0.03	−0.57	−0.04	−0.08	−0.01	−1.17
5	0.14	0.16	0.11	0.13	0.20	0.07	0.83	0.24	−0.57
10	0.46	0.64	0.15	0.59	−0.34	0.66	0.46	0.45	−1.33
[−1, 1]	**−0.20**	**−0.32**	**0.01**	**−0.24**	**0.04**	**−0.35**	**−0.10**	**−0.04**	**0.22**
N	213	135	78	184	29	119	16	65	13

focus our study on the event date and the event window $[0, 1]$ when considering CAR. We also report the conventional $CAR[-1, 1]$ for comparison.

Using Eq. (1), we plot the average abnormal returns in the trading week following the event date in Fig. 4. We sort the firms by actions taken by the fund (observation and exclusion) and by the rationales of the announcements (product and conduct). The $AAR_{t=0}$ is negative for all subsamples, and the conduct subsample has the most negative AAR. The AARs generally seem to bounce back right after the event date, except for the observation subsample — the smallest subsample which seems to have a return effect until event day 2 and fluctuates the most throughout. We now report the results of statistical tests on the return effects from the fund's announcements.

4.1. Test for aggregation of (standardized) abnormal returns

Under the null hypothesis of no abnormal returns in the event window, we first analyze the abnormal return observations aggregated both across firms and through time to draw inferences for the announcement effect. We report the results in Tables 2 and 3. While Table 2 deals with abnormal returns and the standard test statistics like in MacKinlay (1997), Table 3 deals with standardized abnormal returns and the adjusted test statistics like in Kolari and Pynnönen (2010). For both tables, we report the $(C)AAR$s in the event window for different subsamples of the data set, with a particular interest in the event days highlighted in bold.

Both Tables 2 and 3 provide robust evidence of return effects on the announcement date, i.e., day 0. We emphasize three robust findings throughout all different statistical tests and model specifications, including those in the Online Appendix:

1. The data sample as a whole shows a consistently and strongly significant negative AAR on the event date;
2. The conduct subsample has a significant negative AAR on the event date;
3. The AARs in the conduct subsample have much a larger magnitude than those in product subsamples on and only on the event date.

The first finding indicates that the fund's ESG announcements immediately affect stock prices of the firms in the announcements negatively. On average, the AAR for the affected firms on the event date is −0.31%, which is −13.14% when standardized, and

Table 3
Adjusted Patell test for aggregation of abnormal returns.
The table provides the average standardized abnormal return ($ASAR$) and the cumulative average standardized abnormal return ($ASAR$) aggregated from event day 0 for each subsample using the one-factor model with *local indices*. The data sample is divided into subsamples, where *All events* represents the whole data set, which can be categorized by the following subsamples: *Product-based* and *Conduct-based*, or *Excluded* and *Observed*, or *Product-excluded*, *Product-observed*, *Conduct-excluded*, and *Conduct-observed*. The $ASAR_t$ and $CASAR_t$ are standardized by the adjusted forecast-error corrected standard deviation for each event day t relative to the announcement date. We calculate the adjusted Patell test statistic to determine significance (see Kolari and Pynnönen 2010). *, **, ***, **** indicate that the $ASAR_t/CASAR_t$ is significant negative at the 10%, 5%, 2.5%, and 1% level, respectively. N denotes the number of observations. We also report the conventional $CASAR_{[-1,1]}$ for comparison.

Day t	All events	Product-based	Conduct-based	Excluded	Observed	Product-excluded	Product-observed	Conduct-excluded	Conduct-observed
$ASAR_t$(%)									
−1	−6.99	−13.15 *	3.68	−10.26 *	13.77	−13.90 *	−7.62	−3.60	40.09 *
0	**−13.14** **	**−9.26**	**−19.84** **	**−13.37** **	**−11.65**	**−10.85**	**2.55**	**−17.98** *	**−29.12**
1	6.30	4.60	9.23	7.75	−2.93	7.17	−14.48	8.81	11.28
2	−1.10	3.43	−8.94	2.39	−23.18	3.83	0.47	−0.27	−52.29 **
5	−1.45	−2.58	0.51	−4.29	16.53	−5.82	21.50	−1.48	10.42
10	9.27 *	12.31 *	4.01	9.01	10.96	12.14	13.60	3.27	7.73
$CASAR_t$(%)									
0	**−13.14** **	**−9.26**	**−19.84** **	**−13.37** **	**−11.65**	**−10.85**	**2.55**	**−17.98** *	**−29.12**
1	−6.84	−4.66	−10.61	−5.62	−14.58	−3.68	−11.93	−9.17	−17.84
2	−7.93	−1.22	−19.55	−3.23	−37.76	0.15	−11.46	−9.43	−70.12 *
5	−12.15	−12.11	−12.22	−15.30	7.82	−19.86	45.58	−6.94	−38.65
10	10.59	18.99	−3.95	18.07	−36.89	20.48	7.91	13.66	−92.03
[−1, 1]	**−13.83**	**−17.81**	**−6.93**	**−15.88**	**−0.81**	**−17.58**	**−19.55**	**−12.77**	**22.25**
N	213	135	78	184	29	119	16	65	13

these estimates are strongly significant. The magnitudes hold consistent when other model specifications apply. When we divide the data sample into different subsamples, all subsamples show a consistently negative AAR on the event date, except for the product-observed subsample whose AAR is essentially 0. We see in Tables 2 and 3 that the excluded firms are associated with strongly negative AARs, which can partly result from the public information of the disownership of a significant SWF such as the GPFG.

Interestingly, the rationale behind the announcements seems to add an extra negative effect to the affected firms' stock prices when it is about how these firms conduct their business. As the second finding points out, the conduct subsample is the only one that has a consistent result of significant AAR on the event date across all models and tests, while other subsamples show negative but mostly statistically insignificant results. We can thus conclude that the conduct subsample is certainly affected by the GPFG's ESG announcements. We find it most probable that the exposure to the media, and in this case — via the fund's announcements, on a vague matter like a firm's conduct, leads to a larger price effect than the rationale based on rather obvious knowledge, such as a firm's product. Our hypothesis is strengthened with the third finding on AARs, which is larger AARs in absolute terms for the conduct subsample. Specifically, in comparison with the product subsample, the $AAR_{t=0}$ for the conduct subsample is much larger in magnitude (−0.40% versus −0.25% in Table 2), and more than twice as much after being corrected for varying standard deviations in the data (−19.84% versus −9.26% in Table 3). This noticeable difference in AARs in fact only exists on the announcement date, which indicates that the ESG's rationale effect is instantaneous. This finding is strongly consistent in all models and it is a highlight of our study. We therefore confirm that the results of our study indicate that a large investor like the GPFG can have an influence on market prices through their ESG announcements.

Regarding cumulative abnormal returns, Tables 2 and 3 provide both the results of the $CAAR$s accumulated from the event date and from the previous day as conventionally done. While the $CAAR$s on event day 1 are consistently negative on both measures, the results on statistical significance, however, are mixed across different models. Table 3 shows that the return effect lasts until event day 2 for the whole data set and the conduct-based subsample, but Table 2 does not provide the same picture. Despite its small sample size with potential noise in the data, the conduct-observed subsample consistently shows a robust result on the significant $CAAR$s on event day 2.

Table 4
Sign test for abnormal returns.
The table reports results for the sign test. The chosen market models use different market return proxies, including: *Local indices* (LI), *Global index 1* (GI1), and *Global index 2* (GI2). We also use the Fama–French three- (FF3) and five-factor (FF5) models to measure the abnormal returns for individual firms. $\hat{p}_-$ presents the daily average proportion of negative abnormal returns across all firms in the estimation window. $z_{\text{day t}}$ is the test statistic formed by the hypothesis that *the proportion of negative ARs on event day t is expected to be higher than the expected proportion* $\hat{p}_-$. *, **, ***, **** indicate that the examined proportion is significantly higher than the expected proportion at the 10%, 5%, 2.5%, and 1% level, respectively.

	LI	GI1	GI2	FF3	FF5
$\hat{p}_-$ (%)	50.86	49.97	49.91	50.05	49.94
$z_{\text{day 0}}$	2.28 ***	3.51 ****	3.53 ****	3.70 ****	3.31 ****
$\widetilde{AR}_{t=0}$(%)	−0.26	−0.36	−0.37	−0.41	−0.38
$z_{\text{day 1}}$	−1.41	−1.11	−0.96	0.20	0.51
$z_{\text{day 2}}$	0.37	0.85	1.15	1.32	0.65
No. of events	213	204	204	203	203

Note: We report the median of abnormal returns on event day $t = 0$ ($\widetilde{AR}_{t=0}$) in addition to the main reported statistics. This extra information serves as an indication that the results are not driven by outliers.

In conclusion, the results of abnormal return analysis are robust to different model specifications and statistical tests.[12] We have shown that the fund's announcements have a negative impact on the affected firms' stock prices, and stronger on firms in the conduct-related subsamples. Even though we have robust evidence of consistently negative $CAARs$ on the day following the announcement, we see no lasting effect beyond this day. The influence on market prices via the fund's ESG announcements, hence, does not persist.

4.2. Test for abnormal returns on firm level — Event date

We now continue with the analysis on the firm level. To this end, we focus mostly on the event date to further analyze the effects detected earlier in the full sample. We begin with a non-parametric sign test of the abnormal returns in Table 4. Our hypothesis for this test is: *The proportion of negative ARs in the event window is higher than the proportion of negative ARs in the estimation window*. Equivalently, if the examined proportion on an event day is significantly higher than the expected proportion from the estimation period, we can conclude that firms experience more negative ARs on that day than they would normally do.

For all model specifications, the average daily proportion of negative abnormal returns in the estimation window, i.e., the expected proportion, is around 50% as shown in Table 4. The test statistic, $z_{\text{day t}}$, is calculated as the normal approximation to the binomial test. We use the expected proportion as the probability of success, and the number of observations for each model as the sample size. The results of $z_{\text{day 0}}$ are strongly significant for all models at 2.5% and 1% levels. The reported significance indicates that the proportion of negative ARs on the event date is significantly higher than the expected proportion for all model specifications. Thus, we once again confirm and conclude that the announcements have a negative effect on the stock prices of the affected firms.

The statistically significant results of this non-parametric test provide additional robustness checks for the main analysis results reported in the paper, i.e., negative ARs. To strengthen this point, we have also reported the median of abnormal returns on event day $t = 0$ ($\widetilde{AR}_{t=0}$) for all models in Table 4 to show that the reported $AAR_{t=0}$ values are not driven by outliers. In fact, the medians of four out of five models are more negative than the reported $AAR_{t=0}$.[13] These magnitudes cross-check and strengthen our analysis results.

We now present the results of our firm-level parametric test in Table 5. In this test, we perform the abnormal return analysis for each individual observation in different subsamples. For all subsamples, we report the average abnormal returns ($AARs$). For each observation in a subsample, we estimate the t-statistic for AR and CAR. We report the percentage of significant negative ARs in each subsample according to different statistical levels. The highest proportion for each significance level falls into the conduct-observed subsample. The conduct-related subsamples generally have higher proportions of statistically significant negative abnormal returns. These findings are robust and consistent with all other model specifications.[14]

When we test for significance in cumulative abnormal returns for firms, the aggregation is once again within event days $[-1, 1]$ and $[0, 1]$. For both $CAR_{[-1,1]}$ and $CAR_{[0,1]}$, the proportions that are found to be significant are very low. This finding is in line with the results in other models in the Online Appendix. From both the conventional measure of $CAR_{[-1,1]}$ and the measure aggregated only from the event date, $CAR_{[0,1]}$, we observe that the cumulative return effect on the firms is small.

[12] See Tables 10, 11, 12, 13, 14, 15, 16, and 17 in the Online Appendix for robustness checks. We use different choices for the market return proxies in some of these tables, while others are based on the Fama–French models to derive the abnormal returns. Tables 10, 11, 12, and 13 deal with abnormal returns. Tables 14, 15, 16, and 17 deal with standardized abnormal returns.

[13] The reported $AAR_{t=0}$ can be found in Table 2, 10, 11, 12, and 13.

[14] For robustness check, see Tables 18, 19, 20, and 21 in the Online Appendix.

Table 5
Abnormal return analysis for each individual event.
The table reports results for the analysis performed on the abnormal returns for each firm using the market model with *local indices*. The sample is divided into subsamples, where *All events* represents the whole data set, which can be categorized by the following subsamples: *Product-based* and *Conduct-based*, or *Excluded* and *Observed*, or *Product-excluded*, *Product-observed*, *Conduct-excluded*, and *Conduct-observed*. $AAR_{t=0}$, $CAAR_{[t_1,t_2]}$ are the averages of the abnormal returns and cumulative abnormal returns on the specified event date for each subsample. The *t*-statistic of each event is calculated by dividing the event date's (cumulative) abnormal return by the estimation window's standard deviation. α denotes the level of statistical significance. The numbers in the α rows present the percentage of each subsample with significant negative (cumulative) abnormal returns. $AR^{-}_{t=0}(\%)$ and $CAR^{-}_{t=1}(\%)$ indicate the percentage of the sample with negative abnormal return on the event date and cumulative abnormal return on the next day, respectively.

	All events	Product-based	Conduct-based	Excluded	Observed	Product-excluded	Product-observed	Conduct-excluded	Conduct-observed
$AAR_{t=0}(\%)$	**−0.31**	**−0.25**	**−0.40**	**−0.34**	**−0.13**	**−0.30**	**0.06**	**−0.41**	**−0.36**
Percentage of the sample statistically significant at:									
$\alpha = 0.1$	5.63	2.22	11.54	4.89	10.34	2.52	0.00	9.23	23.08
$\alpha = 0.05$	4.23	1.48	8.97	4.35	3.45	1.68	0.00	9.23	7.69
$\alpha = 0.025$	3.29	1.48	6.41	3.26	3.45	1.68	0.00	6.15	7.69
$\alpha = 0.01$	1.41	0.74	2.56	1.09	3.45	0.84	0.00	1.54	7.69
$AR^{-}_{t=0}(\%)$	58.69	57.04	61.54	60.33	48.28	58.82	43.75	63.08	53.85
$CAAR_{[-1,1]}(\%)$	**−0.39**	**−0.46**	**−0.28**	**−0.46**	**0.08**	**−0.52**	**−0.00**	**−0.36**	**0.17**
Percentage of the sample statistically significant at:									
$\alpha = 0.1$	3.76	2.22	6.41	3.80	3.45	2.52	0.00	6.15	7.69
$\alpha = 0.05$	1.88	1.48	2.56	1.63	3.45	1.68	0.00	1.54	7.69
$\alpha = 0.025$	0.47	0.00	1.28	0.00	3.45	0.00	0.00	0.00	7.69
$\alpha = 0.01$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$CAR^{-}_{t=1}(\%)$	61.97	63.70	58.97	63.59	51.72	63.87	62.50	63.08	38.46
$CAAR_{[0,1]}(\%)$	**−0.12**	**−0.12**	**−0.12**	**−0.11**	**−0.16**	**−0.13**	**−0.04**	**−0.08**	**−0.31**
Percentage of the sample statistically significant at:									
$\alpha = 0.1$	4.69	4.44	5.13	4.89	3.45	4.20	6.25	6.15	0.00
$\alpha = 0.05$	1.88	1.48	2.56	2.17	0.00	1.68	0.00	3.08	0.00
$\alpha = 0.025$	0.94	0.74	1.28	1.09	0.00	0.84	0.00	1.54	0.00
$\alpha = 0.01$	0.47	0.00	1.28	0.54	0.00	0.00	0.00	1.54	0.00
$CAR^{-}_{t=1}(\%)$	53.99	52.59	56.41	53.80	55.17	52.94	50.00	55.38	61.54
No. of events	213	135	78	184	29	119	16	65	13

Table 6
Summary statistics for events with significant AR.
This table provides summary statistics for events with significant negative abnormal return on the event date. The model chosen here is the market model with *local indices*. We sort the table by the level of statistical significance. For each level, we provide the percentage of the events based on types of criteria (conduct vs. product), the fund's decision (exclusion vs. observation), and violated criterion (environmental damage, corruption, human rights, production of coal, production of nuclear weapons, and production of tobacco). Minimum AR and maximum AR represent the range of the daily abnormal returns in each corresponding column.

Significance level	0.1	0.05	0.025	0.01	Total sample (%)*
Conduct (%)	75	78	71	67	38
Product (%)	25	22	29	33	62
Excluded (%)	75	89	86	67	87
Observed (%)	25	11	14	33	13
Env. damage (%)	33	44	43	67	16
Corruption (%)	17	0	0	0	6
Human rights (%)	25	33	29	0	16
Coal (%)	17	11	14	0	40
Nuclear weapons (%)	8	11	14	33	12
Tobacco (%)	0.0	0.0	0.0	0.0	9
Minimum AR (%)	−5.7	−5.7	−5.7	−5.7	−5.8
Maximum AR (%)	−1.8	−2.8	−2.9	−4.0	6.6

Note: *21% of total announcements in the sample are made on 14/04/2016 due to production of coal or coal-based energy, which skews the overall announcements to later years.

Since the focus of our study is on the event date, we can identify the exact events that are associated with significant negative abnormal returns on this day from the results in Table 5. We find that the absolute magnitude of ARs increases as the statistical significance level becomes stronger. This observation indicates that the detected significance is driven by the extremity of the firms' abnormal returns, not the varying standard deviations across different firms. We report the summary statistics in Table 6. By significance-level sorting, 75% of these significant events are associated with conduct announcements. In contrast, the conduct announcements only account for 38% of the total sample. While only 16% of the total announcements are made due to the *severe environmental damage* criterion, our results show that this criterion accounts for one third to two thirds of the significant negative abnormal returns.

Table 7
Test for aggregation of abnormal volume by event types.
This table provides the average abnormal volume on day t (AAV_t) in the event window measured in log volume metric. Mean and σ indicate the average mean and average standard deviation of the volume measures in the 170-day estimation window (centered on the event date) for each subsample sorted by event type. The t-test statistic is computed to determine significance. *, **, ***, **** indicate that the AAV_t is significantly different from 0 at the 10%, 5%, 2.5%, and 1% level, respectively. N denotes number of observations.

	Mean (σ)	$AAV_{t=-1}$	$AAV_{t=0}$	$AAV_{t=1}$
All events	0.924	−0.001	**−0.002**	0.002
$N = 214$	(0.003)			
Product-based	0.925	0.000	**−0.005**	−0.001
$N = 136$	(0.004)			
Conduct-based	0.922	−0.002	**0.002**	0.007
$N = 78$	(0.005)			
Excluded	0.924	−0.001	**−0.002**	0.003
$N = 185$	(0.004)			
Observed	0.925	0.000	**−0.003**	−0.003
$N = 29$	(0.006)			
Product-excluded	0.926	0.001	**−0.004**	0.000
$N = 120$	(0.004)			
Product-observed	0.918	−0.007	**−0.010**	−0.006
$N = 16$	(0.007)			
Conduct-excluded	0.919	−0.004	**0.001**	0.008
$N = 65$	(0.006)			
Conduct-observed	0.934	0.009	**0.006**	0.002
$N = 13$	(0.008)			

In short, Tables 4 and 5 have shown that for statistical tests on the firm level, firms experience significantly more negative ARs on the event date than on other days, and that conduct-related subsamples have the highest percentage of significant negative ARs on this day. Further investigation into significant observations confirms that the most significant negative ARs belong to firms that are deemed to have unethical conduct, especially those damaging the environment severely. These analyses of abnormal returns on the firm level confirm the results of the tests performed on the aggregation of the abnormal returns and give us insightful information about the difference in the return effect between the two rationales.

4.3. Test for abnormal volume

We move on to the study of volume. To test if the fund's ESG announcements have an effect on the trading activities of the affected firms, we analyze the trading volume of firms around the announcement date. In Table 7, we report the average abnormal volumes ($AAVs$) for the volume measure in Eq. (3) with a 170-day estimation period. Like in the abnormal return analyses, we divide our data set into different subsamples, where the all-events subsample is the full data set. We use a non-parametric test with the t-statistic to report significance for the $AAVs$ in the event window. Since the results are similar for all days in the event window, we only report the event window of days $[-1, 1]$ for convenience.

As Table 7 shows, none of the estimates are significant. This finding indicates that there is no abnormal trading activity around the event date. This result is robust to different estimation periods of 100 and 238 days (see Tables 22 and 23 in the Online Appendix).

Additionally, we perform the same analysis but sort the data sample by firm size on the announcement date. The different subsamples are based on the market cap, reported by the instrument *MarketCapDS* from Thomson Reuters/Refinitiv Eikon.[15] Table 8 lists ten different subsamples. There are 12 firms with market cap between $50,000 million to $100,000 million (group 9), and four with over $100,000 million (group 10). These firms have very large market values, and they are the world's top largest corporations in their industry. Therefore, we have different number of observations in each group. We also report the mean and median announcement time for each group. Very large firms (listed in groups 8, 9, and 10) are excluded or observed much earlier compared to other, smaller firms. This finding is in line with Norges Bank's early caution on divesting from particularly large firms as it feared that such divestments can put the fund at a disadvantage compared to other investors, which led to the formation of the observation list and more active ownership exercise.

We report in the Online Appendix the results for the abnormal trading volume analysis when the sample is divided into groups based on the market cap. Similarly to the results based on the event type, the $AAVs$ on the event date are not significant.[16]

As we have estimated the abnormal returns and abnormal volumes of the firms due to the fund's ESG announcements, we regress the negative abnormal returns on a set of variables. With this cross-sectional regression, we identify factors of firms and announcements that are associated with these negative abnormal returns on the event date. The regression results are reported in

[15] The definition of *MarketCapDS* by Eikon Datastream for listed securities: "the share price multiplied by the number of ordinary shares in issue", and for unlisted securities: "the prices of the associated listed security".

[16] Tables 22, 23, 24, 25, and 26 in the Online Appendix provide results for robustness tests for AAV analyses.

Table 8
Groups sorted by market cap on the event date.
This table illustrates the data sample divided into groups based on the market cap (X) on the announcement date. We report the defined range for market cap (in $ millions), average market cap (in $ millions), and the mean and median announcement time for each group.

	Market cap ($ millions)	$\bar{X}$ ($ millions)	Mean anncmt. time	Median anncmt. time
Group 1 ($N = 13$)	$X < 500$	333.64	June 2014	April 2016
Group 2 ($N = 15$)	$500 \leq X < 1000$	768.36	July 2015	April 2016
Group 3 ($N = 24$)	$1000 \leq X < 2000$	1,414.86	October 2016	May 2016
Group 4 ($N = 33$)	$2000 \leq X < 3500$	2,719.88	May 2016	May 2016
Group 5 ($N = 30$)	$3500 \leq X < 6000$	4,576.57	June 2015	December 2016
Group 6 ($N = 28$)	$6000 \leq X < 10,000$	7,984.99	July 20214	April 2016
Group 7 ($N = 28$)	$10,000 \leq X < 20,000$	14,647.75	April 2015	April 2016
Group 8 ($N = 27$)	$20,000 \leq X < 50,000$	27,082.66	February 2014	December 2015
Group 9 ($N = 12$)	$50,000 \leq X < 100,000$	65,109.79	August 2012	December 2010
Group 10 ($N = 4$)	$100,000 \leq X$	189,278.74	April 2010	September 2008

Table 9
Regression analysis on the negative ARs.
In this table, we report the regression results of the *negative* Abnormal Returns (ARs) on a set of control variables. The AR data is from the market model with *local indices* with a 220-day *estimation window*. Depending on the model, the set of control variables may include: region of the affected firms (*Asia, North America*, or *Europe*), rationale behind the announcements (*conduct* versus *product*), decision of the fund (*observation* versus *exclusion*), firm size's group (*smaller* versus *bigger*), abnormal volume on the same day, change in market return, and the year of the announcement (*before 2016* versus *2016 and after*). The base model is set with region = Asia, rationale = Conduct, decision = Exclusion, firm size's group = bigger, year = before 2016. *, **, ***, **** indicate that factor is significant at the 10%, 5%, 2.5%, and 1% level, respectively.

Dependent variable: *Negative AR on the event date*		
	(I)	(II)
Constant	−0.013****	−0.011****
Region of firm		
Europe	−0.004	−0.004
North America	0.001	0.001
Rationale behind the announcement		
Product	0.005**	0.005**
Decision of the GPFG		
Observation	0.004	0.004
Firm size group:		
Smaller	−0.000	−0.001
Abnormal Volume on the event date	−0.100**	−0.100**
Change in market return		−0.192
Year		
2016 and after	−0.004	−0.004*
Number of observations	108	108
$R^2_{adjusted}$	0.14	0.18
Standard Errors	Robust	Robust

Table 9. The regressors include region of the affected firms (*Asia, North America*, or *Europe*), rationale behind the announcements (*Conduct* versus *Product*), decision of the fund (*Observation* versus *Exclusion*), firm size's group (*Smaller* versus *Bigger*), abnormal volume on the same day, change in market return, and when the announcement is made (*Before 2016* versus *2016 and after*). Regions such as Africa, Oceania, Middle East, and South America are not included in this analysis because they have too few firms to be representative. The base model for both regressions is set with Asia as region, Conduct as announcement's rationale, Exclusion as the fund's decision, Bigger as firm size's group, and Before 2016 as announcement's year.

Table 9 shows that both regression models suggest similar results. Among the statistically insignificant factors, we would like to comment on the variable *Change in market return*. In our estimated market model, market return is the factor that determines the size of the estimated abnormal returns. The insignificance of this variable is noteworthy. If the change in market return from the previous day indeed determines the abnormal return of a firm, it would imply that the abnormal return is not a measure of the effect of the fund's announcements but rather of the direction of the general market. Overall, we observe that a more negative abnormal return on the announcement date is significantly associated with higher stock trading activities of a firm on the same day, which is indicated by the negative sign of the coefficients. Additionally, firms that are announced due to the conduct rationale have 0.5 percentage point more negative abnormal returns on the event date compared to those due to the product rationale. We also find firms that are announced in the later years to suffer more negative abnormal returns (0.4 percentage point) on the announcement date.

5. Summary

In our study, we provide insightful findings regarding a topic with much current interest: *Can a large investor affect the market through its ESG announcements?* Utilizing the ESG announcements made by the Government Pension Fund Global about divesting from firms in its portfolio or putting them on a watch-list, we provide empirical evidence of market reactions when firms' ethical breaches come to light. Via the study of the price and trading effects following the announcements, we have found some robust findings.

First, there is a significant negative price effect on the announcement date for the affected firms reflected by the abnormal return measures. This result is in line with previous studies into SWF disownership and the divested firms. The effect is, however, small and only present on the announcement date. Second, the announcements under the conduct-based rationale are associated with significant negative abnormal returns on the announcement date that are much larger than the estimates in the product-related subsamples. We confirm this result in the analysis on the firm level. The rationale behind an announcement is therefore important, and it can add to the price effects for the affected firms. Previous studies on the fund's ESG announcements have not examined this rationale effect before. Third, we find no effect on the aggregated trading volume of the affected firms around the announcement date. Lastly, a cross-sectional analysis of the negative abnormal returns helps us find both affirmative results and driving factors of the negative abnormal returns. We find more recent announcements and those that are from the conduct rationale seem to be associated with more negative abnormal returns and that these negative abnormal returns are correlated with higher stock trading activities on the event dates.

In summary, our results suggest that a high-profile fund such as the GPFG can immediately influence market prices through its ESG announcements.

CRediT authorship contribution statement

Quynh Trang Nguyen: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization. **Snorre Lindset:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision. **Sondre Hansen Eriksen:** Conceptualization, Methodology, Writing – original draft. **Marie Skara:** Conceptualization, Methodology, Writing – original draft.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We thank Colin P. Green, Kåre Johansen, Khine Kyaw, Knut Anton Mork, Lars Qvigstad Sørensen, Dagfinn Rime, and Ragnar Torvik for helpful suggestions and comments. We also appreciate input and feedback from the participants at the conferences and seminars where we presented the paper. We thank Erlend Magnus Viggen for extensive technical assistance and proof reading.

Funding

This project received support from Finansmarkedsfondet (project #294398).

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.iref.2023.07.106.

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