The expected returns of ESG excluded stocks. Shocks to firms' costs of capital? Evidence from the World's largest fund

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Abstract

We investigate the link between ESG-based portfolio exclusions and the expected returns of excluded firms. The exclusions of Norway's "Oil Fund," the world's largest SWF, provide a sample of stocks facing widespread exclusions by institutional investors. The portfolio of excluded firms have significantly superior performance (alpha) of about 5%. Looking at the time of exclusion, we note that while theory suggest that an increase in the cost of capital should drive the stock price down, we find little evidence of that. In fact, stock prices are increasing while the fund is dumping its stake. The implied corporate cost of being excluded is small, as shown by the few firms that take action to reverse their exclusion. The cost is not trivial, though, as we evaluate the incentives for getting the exclusion revoked, and find that companies with low ESG scores at the time of exclusion (scope for improvement), and higher revenue growth (investment needs) are more likely to get their exclusion revoked. In fact, firms that get off the exclusion list do not have superior performance going forward.

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JEL Codes: G10; G11; G20

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Abstract

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1 Introduction

We study ethical exclusions from institutional investor portfolios in the context of the exclusions by Norway's Government Pension Fund Global (GPFG), better known as the oil fund. This fund has excluded a number of firms for various reasons, such as ethical, social and climate concerns. One typically uses the term ESG (Environmental, Social and Governance) to summarise these concerns. The implications of such preference-based exclusions are a central question in sustainable finance. While there is a sizeable empirical literature that finds a negative return premium for ESG compliant firms (often termed "green premium", or "greenium"), theoretical literature (e.g. Berk and van Binsbergen (2024)) argues that the proposed causal mechanism, exclusions, is unlikely to be able to generate such a large return difference. We use the exclusions by GPFG to provide both an estimate of the return difference linked to ESG for the exclusions of the world's largest Sovereign Wealth Fund, and to look into the stock market and corporate reactions to exclusions to inform about the causal issues.

The starting point of our analysis is whether the corporate ESG stance is linked to the company's stock market performance. Theoretically, two groups of explanations link

ESG and equity performance: pecuniary and non-pecuniary views.[1] The pecuniary view, or "doing well by doing good," argues that stock prices currently do not fully incorporate the consequences of future sustainability shocks, i.e. it is a mispricing argument, as in the short-termism literature (Stein, 1989). With this view, over time more responsible/sustainable (good ESG) firms will do better, and there will be a return premium associated with ESG.

With the non-pecuniary view, some investors have preferences over both the monetary return from an investment and that investment's ESG characteristics. For example, investors can feel satisfaction in not supporting gun violence through the avoidance of weapon manufacturers (negative screening). In these types of models only a subset of investors has preferences over ESG. The remaining investors only care about cash flow.[2] In equilibrium, a number of firms will be excluded from the portfolios of responsible investors and pay a higher cost of capital. Firms can choose to take steps to improve their ESG to achieve a lower cost of capital, but will only do so if the cost of improving ESG is lower than their cost of capital gain.

Both types of models have predictions for the return difference of the equity of high quality ESG firms versus that of low quality ESG firms, let us call it the green return premium. With the pecuniary view, it is positive, green stocks do better. With the non-pecuniary view, it is negative.

In our research, we start by providing an estimate of this green return premium using the exclusions by GPFG. We believe using these exclusions are particularly pertinent for this estimation. The GPFG is one of the World's largest Sovereign Wealth Funds, with assets under management over 1 trillion USD in 2021. Our data sample starts in 2004 gives us a long period necessary for estimating returns (Merton, 1980). The GPFG exclusions are decided upon by a committee set up by the Norwegian Parliament, which needs to show clear evidence that a given firm violates ethical norms before exclusions are effected. The ethical committee investigates each firm, often communicating with the firm, before recommending exclusion. This leads us to argue that the GPFG's exclusions are a list of "worst offenders."[3] We find that we, in agreement with much of the relevant literature, estimate a negative green return premium, thus supporting the non-pecuniary

[1] This categorization is introduced by Hong and Shore (2023).

[2] Heinkel et al. (2001), Pástor et al. (2021) and Pedersen et al. (2021) are examples of models of this tradeoff.

[3] In the terminology of Starks (2023), the GPFG exclusions are the result of a *values* judgement, not results of a *value* estimate.

view.

Unlike many other institutional investor exclusions, the divestments by the GPFG are publicly announced. This lets us use them for several additional analyses. First, investigating what happens to stock prices at the point of exclusion. The public announcement may change the market's view on whether a stock is likely to be targeted for exclusion. While the mentioned equilibrium models clearly delineate which firms are divested, in practice, there is a lot of uncertainty whether a firm is viewed as an exclusion target.

For a marginal firm, one envisions that prices are set by a marginal investor trading off the likelihood of interacting with informed traders with the likelihood of underpricing being due to ESG-driven selloffs. How will this marginal investor react to an announcement that Norway's GPFG has excluded this stock?

Suppose the announcement/price pressure leads to a substantial revision to the market's perceived likelihood that a firm belongs in the "bad ESG" group and, therefore, has a higher cost of capital. In that case, stock prices can be expected to be pushed down, i.e. there is a permanent negative impact on stock price. To test this we investigate the behavior of a stock's price in the period around the exclusion announcement through an event study. While there is a small price drop at the day the fund announces the exclusion, an observation that has also been made by Atta-Darkua (2022), Ayoubi and Enjolras (2020), and Nguyen et al. (2024), we are more interested in the price behaviour in the month leading up to the announcement. During this period, the GPFG sells off its stake (its divestment is done before it is announced). There is thus a large selling pressure in the pre-announcement period. In the month prior to the announcement, we find that prices have *increased* by approximately one and a half percent. The announcement pushes this down to about one percent before it reverses and ends up at a three percent increase one month after the announcement of the divestment. We conclude that there is no permanent negative price effect.

The event study is about the stock market's reaction to exclusions. What about corporate reactions? To investigate these, we exploit the GPFG's decisions to revoke their exclusions. From 2005 to 2021, 26 of the GPFG's 189 exclusions have been revoked. To get the ethical committee to change their recommendation, a firm must have taken action to remove the offending activities. What pushes these firms to take action? Is it is a tradeoff of costs (of the actions necessary to remove the cause of exclusion) with benefits (for example, a lower cost of capital)? If so, what are the implications for a green return premium?

First, we note that only 14% of the exclusions have been revoked. Hence, the clear majority of exclusions are *not* revoked. Nevertheless, it is enough to make it interesting to understand the actions of the firms that manage to get their exclusions revoked.

We perform several analyses. Firstly, looking at the cost of changing ESG profiles, we find that firms with low ESG scores at the time of exclusion are more likely to get their exclusion revoked – possibly because their cost of ESG improvement was small, as they were starting from a low base.

We then look at the cost of capital issue. Higher costs of capital will primarily hurt when firms raise *new* capital, either through a SEO or debt issue. We find that firms with high revenue growth – likely to need to raise capital – are also those more likely to get their exclusion revoked. Additionally, we look at the number of deals where firms raise new equity (SEO's), and find that firms that got their exclusion revoked are more likely to raise new equity capital. These results are consistent with the idea that firms react to shocks to the cost of capital and attempt to fight staying excluded.

We also consider the issue of executive compensation. If announced exclusions lead to a price drop, and executives care about the effect on their options, firms where the option values are hurt more are those where executives are more likely to advocate actions to reverse the exclusion. To look for such an effect, we construct a measure of executive options' sensitivity to stock price changes (option delta). We find no significant effect of this sensitivity on the time before an exclusion is revoked.

Finally, we use the companies who have had their exclusions rescinded to ask: What happens to the green premium of these companies after they are "let back in the warmth"? Comparing the returns of a portfolio of these stocks before and after their exclusion is revoked, we find that their returns fall back immediately to a insignificant excess return (alpha), from a 5.6% (annualized) alpha, while excluded.

Our results present somewhat of a conundrum. On the one hand, we estimate a large magnitude of (negative) greenium. On the other hand, the reactions of stock prices and corporations to the actual exclusion are muted, making it unlikely that the GPFG's exclusions are directly causing large changes in the cost of equity. What do we make of this? Let us point to one possible interpretation of our results: There is a return difference. There may, however, be little uncertainty as to what firms deserve to be in the "big bad ESG" category for the stocks in our sample. In these cases, the exclusions by the GPFG do little to change market opinion. For the few where there is scope to change the market opinion, though, we find some evidence that the actual exclusion matters. Firms

do have incentives to try to get back in the fund's good graces (and revise the market opinion of the firm).

The structure of the paper is as follows. Section 2 gives an overview of the issues and sets up the hypotheses we test. Section 3 gives some background on the Norwegian Government Pension Fund Global (GPFG). Section 4 discusses the data sources and gives some summary statistics. Section 5 demonstrates that portfolios of excluded firms provide superior performance and use this to provide an estimate of the green return premium. Section 6 evaluates the stock price reaction to exclusion. Section 7 investigates corporate reactions to exclusions and, in particular, investigates firms who have had their exclusion revoked. Section 8 asks what happens to the green return premium if stocks' exclusions are revoked. We finally offer a short conclusion. A separate Internet Appendix provides additional supportive analysis.

2 Hypothesis development

2.1 Institutional Investors

Our analysis is concerned with the effect of the decisions of institutional investors. The chief reason to concentrate on this segment is their importance in terms of share of the world portfolio. More and more of the world's equity is held by mutual funds and ETFs.

While the concept of ethical investing has a long history (Liang and Renneboog, 2017), it is in the last fifteen years or so that the ESG viewpoint has moved to the forefront. Mutual funds marketed as "socially responsible" and "sustainable" have seen large inflows, to the extent that today, one third of U.S. assets under management are subject to a sustainable investment strategy (SIF, 2020).[4] Regulation is also a driver of the increased ESG focus. The best-known example is the EU's introduction of a taxonomy of sustainable activities, which directly affects institutional investors allocations.

From a large institutional investor's point of view, ESG considerations will affect all its portfolio decisions. The investor's investment universe needs ranking in the ESG dimension, which will affect over- and under-weighting decisions. For low ESG ranked stocks, an institutional investor will react by either dialogue or divestment. The most common reaction from institutional investors is dialogue, either directly, or through vot-

[4]For the practitioner view of the state of ESG, see the Special report on ESG investing in the 23 July 2022 issue of *The Economist*.

ing at the annual meeting. Institutional investors argue that dialogue is a better way of achieving change. There is also research pointing to the value effect of dialogue.[5] Exclusion is chosen in only a minority of cases and is viewed as a reaction of last resort. Even if it is a last resort, the number of stocks seeing widespread exclusions is increasing.

2.2 Green return premium (greenium)

We start by looking at the return difference between high-quality and low-quality ESG firms, often called "greenium." To simplify the discussion, let us label the stocks with high-quality ESG rankings "green" and those with low-quality ESG ratings "brown."[6] As mentioned in the introduction, there are two theoretical approaches to generating a price (return) difference between brown and green stocks.

The first is a mispricing argument. With this view, current stock prices do not fully reflect the ESG consequences of firms' choices, which could be due to brown stocks' prices not endogenizing the future climate consequences, or because the stock market does not appreciate the potential higher future returns for green firms "preparing for the new circular economy." One theoretical approach that generates such results is the classical short-termism argument of e.g. Stein (1989). While the short-termism argument is general, in the context of ESG, a prime source of disagreement concerns future *regulation*. As countries have to adapt to international agreements such as the Paris Climate Accords, firms may be facing intrusive regulation of climate-related aspects of their operations. Disagreement as to the degree of intrusion will translate into differences in views on cash flow consequences of regulation.[7]

This first argument is framed in a traditional risk-return framework. The second type of argument moves beyond this, by introducing non-pecuniary preferences, where the ESG component of a firm directly affects utility functions. For example, one allows the (dis)utility from owning stock in a company employing child labour to enter the utility function.[8]

[5]Dimson et al. (2023), Jagannathan et al. (2022), Lewellen and Lewellen (2022), and Slager et al. (2023) provides empirical evidence. Broccardo et al. (2023) provides theoretical arguments.

[6]Note that a green/brown categorization is often limited to sustainability criteria. In our discussion, we use it in the more extended sense of ESG criteria.

[7]Empirical evidence consistent with such different views is the differences between Democratic and Republican CEOs in their approach to ESG (Di Giuli and Kostovetsky, 2014).

[8]While the theoretical models typically only consider the preferences of equity buyers, a related argument concerns corporate management. ESG considerations may drive management to deviate from profit-maximizing behavior, either directly from CEO/Management preferences (as in Di Giuli and Kostovetsky

The argument of e.g. Pástor et al. (2021) is that when there is a subset of investors that gets utility from green stocks beyond the pure monetary return, green stocks can sustain lower returns.[9] There is, however, a tradeoff. The higher expected returns for brown firms also mean that the costs of capital for these firms are higher. Thus, when financing new investments, the brown firms will face a steeper hurdle rate than green firms. These brown firms will then have an incentive to become greener to access cheaper capital. Firms will be trading off the costs of improving ESG with the benefits of a lower cost of capital. In equilibrium, there will be a set of excluded firms where the costs of improving ESG outweigh the expected gains from a lower cost of capital.

In an article that explicitly models this tradeoff in the context of climate risk, Hong et al. (2023) model the equilibrium return difference between green and brown stocks. By Hong et al.'s argument the green return premium will be proportional to the costs of ameliorating externalities, which can be sizeable. Their argument implies that the green return premium can be large. Countering this is an argument of e.g. Luo and Balvers (2017) and Berk and van Binsbergen (2024). Instead of looking at it from the company's point of view, they ask: What will investors do when faced with the opportunity of earning such a large return premium? If there is a large enough pool of investors who do not care about the causes of exclusion, they will overweight their portfolios with excluded firms, pushing the prices up (and returns down). This is close to an arbitrage argument, relying on stocks being close substitutes.[10] By the Berk and van Binsbergen argument, if there is a green return premium, it will be small in magnitude.

However, Avramov et al. (2022), points to a moderating effect to the ESG-return relationship: ESG classification uncertainty. Empirical evidence shows that the various ESG ranking providers do not agree on their ESG rankings (Berg et al., 2022b,a). This introduces noise in any ESG-return relationship estimation.

Let us turn to the empirical implications of the above theoretical discussion. These two theoretical models have clear empirical predictions for the return difference between green and brown stocks (the green return premium). Under the pecuniary view, the green return premium will be positive. Under the non-pecuniary view, this premium will be negative. There are less clear predictions on the magnitude of any premium.

(2014)), or indirectly, through large owners' threat of exit affecting managerial decisions – the governance channel (Admati and Pfleiderer, 2009; Gantchev et al., 2022).

[9]Models with similar results include Pedersen et al. (2021) and Zerbib (2022). See also recent surveys by (Gillan et al., 2021, Section 5.2) and Hong and Shore (2023).

[10]An alternative way to make this argument is to say that share demand is elastic (Ahern, 2014).

There is a voluminous empirical literature that provides estimates of a green return premium, with various assumptions as to what ESG aspect is relevant, and variations in asset choice.[11] One strand of this literature investigates the performance of mutual funds with varying degrees of ESG. For example, Renneboog et al. (2008) find that green funds underperform. Liang et al. (2022), who looks at the returns of hedge funds, show that funds that endorse the United Nations Principles for Responsible Investment (PRI) underperforms other hedge funds by, on average, 2.45% per annum.[12] van der Beck (2021) argues that returns from sustainable investing are strongly driven by price pressure from flows toward sustainable funds.

Our research complements this literature by looking directly at the stocks in question, without the additional layer of the institutional investors. As such, it is closer to a second strand of the research literature, which uses individual stocks, and looks at links between stock returns and company ESG properties. A pioneering study is Hong and Kacperczyk (2009) investigation of so-called "sin stocks," industries such as alcohol, gambling, and tobacco. Hong and Kacperczyk show that sin stocks have significantly positive abnormal returns, their results imply an estimate of -3.5% for the green return premium (Hong and Shore, 2023). Studies using ESG rankings to sort into green and brown stocks include El Ghoul et al. (2011), Avramov et al. (2022) and Pástor et al. (2022). These studies generally find negative estimates of the green return premium. Other researchers use more specific aspects of ESG, such as Chava (2014) who investigate the effects of environmental concerns and argues that the stocks excluded by environmental screens have a higher cost of capital and higher expected returns. Similarly, looking at carbon emissions Bolton and Kacperczyk (2021) find that stocks with higher carbon emissions (both in terms of levels and innovations) earn higher returns. Most of the literature uses historical returns to estimate the green return premium. An exception is Eskildsen et al. (2024), who uses measures of expected returns to estimate greenium. They find a negative estimate, but of smaller magnitude than most empirical estimates.

[11] Surveys of empirical studies of ESG and performance include Friede et al. (2015), Coqueret (2021), Whelan et al. (2021), and Atz et al. (2023).

[12] There is some discussion as to what degree endorsing the PRI leads to improvements in ESG. Both Kim and Yoon (2020), who looks at active mutual funds, and Brandon et al. (2022), who investigates institutional investors, see signs of PRI used for greenwashing, particularly in the US context.

2.2.1 Hypotheses group 1 - Green return premium

This leads us to the first of the hypotheses we consider. We posit that the stocks excluded by the oil fund represent firms that are typically excluded from institutional investor portfolios. If we construct a portfolio of the excluded firms, it represents the returns of "brown" stocks. An estimate of the excess return for this portfolio (relative to an asset pricing model) will be an estimate of the return difference between brown and green stocks.

A key difference between our research and the second branch of investigations discussed above is that we only look at a small group of excluded firms, not the entire cross-section of stocks. While many of the firms excluded by GPFG are within industries typically labeled as "sinful" they are not exclusively in this narrow group. Only when the GPFG ethical committee decides that a specific firm is in violation will it be divested. It enters our exclusion portfolios after this active decision is made. Our analysis is thus closer to the Edmans et al. (2022) idea of only divesting from the worst offenders. To implement the estimation of greenium, we construct the return of the portfolio of firms excluded by the oil fund and estimate the abnormal return (alpha) for this portfolio. We will use this alpha as an estimate of the return differential between high-quality vs low-quality ESG firms.

We note that our results complement earlier studies that investigate the returns of the stocks excluded by the GPFG. Beck and Fidora (2008) and Dewenter et al. (2010) were early studies. More recent is Hoepner and Schopohl (2018), which analyzes the exclusions from the GPFG and the Swedish AP-funds. They find no significant return differences relative to the funds' benchmark portfolios, but their time period is shorter. As is well known from Merton (1980), it is necessary with a long time series to estimate average returns with precision.

2.3 Stock price reactions to exclusion

The equilibrium models that generate a green return premium are typically static. A firm is either in the excluded or not-excluded group. The models are silent on dynamics. How do firms move between being excluded or not? We do not attempt to build such a dynamic model. Instead, we posit that there is some uncertainty about the classification of a given firm. Actions such as exclusions will lead to the market updating beliefs about whether a stock is in the to-be-excluded group. If the underlying model is the

non-pecuniary framework of added utility for better ESG, we assume that an increase in the probability of exclusion will lead to a higher cost of capital.

The market's reaction to the GPFG selling off and announcing exclusion of a stock will then depend on whether this updates the market's belief that that stock is in the "bad ESG" group. Suppose we posit that the exclusion by the GFPG generally leads the market to increase the probability of exclusion (consistent with an estimate of negative greenium). In that case, we should see the market updating that company's cost of capital. That increase in the cost of capital should induce a fall in the stock price. This reasoning leads us to our second test: Evaluating the stock price evolution at the point of exclusion. The obvious way of testing it is through an event study centered on the day the GPFG exclusion is announced.

But we are not only interested in the price drop at the announcement. As interesting is the price evolution in the period leading up to the announcement. To explain that it is necessary to understand the process for deciding on exclusions from the GPFG. The exclusion is decided by the Ethical Council, which is a separate entity set up by the Norwegian Ministry of Finance. The ethical council decides upon the exclusion, and informs the GPFG when the exclusion will be announced. The GPFG then need to sell its holdings in short order. The fund's average ownership is 1.5% of outstanding shares in the companies in which they are invested.[13] This ownership share is being sold off, leading to substantial selling pressure. This selling pressure may lead the market to revise beliefs about exclusions.

2.3.1 Hypotheses group 2 - The stock market reaction around exclusion announcements

Our second set of hypotheses is concerned with the stock price behavior around the time an exclusion is announced. The analysis will be performed with an event study. Our event study will look at stock price evolution both in

A. The short period before the exclusion is announced, which we implement as one month.

B. The announcement date.

[13]Source: The Funds Annual Report 2023, pg 23.

For both periods our hypothesis to be tested is that there is a negative price reaction, which is permanent.

2.3.2 Prior studies

This part of our study is related to several recent event studies of the exclusion announcements by the oil fund (Atta-Darkua, 2022; Ayoubi and Enjolras, 2020; Nguyen et al., 2024). They all estimate negative announcement price effects, but only investigate a short window of a few days around the announcement.

Our analysis complements these studies by using a longer time period, but more importantly, add to them by also considering the price pressure hypothesis in the period before the announcement. We summarize key features of these event studies in Table 1. For all the three mentioned analyses they find a negative CAR in a short-term period around the announcement. There are a number of additional interesting results. Atta-Darkua (2022), the most comprehensive of these studies, show that there are differences in the reaction depending on whether they are conduct or product based, and which market the stock is trading. This study also documents that firms seem to improve their ESG scores following the exclusions. We will get back to these studies when discussing our results.

Table 1: Summarizing results from other event studies of the GPFG exclusions

The table summarizes key features of three event studies that all study exclusions by the GPFG. We give the reference to the study, the sample period used, an illustrative CAR estimate, the time period for the CAR estimate (i.e. $CAR(-n, m)$ is an event study that starts cumulating abnormal returns n days before the event, and end m days after. The final column indicates whether the analysis include firms that are not excluded, but placed on the ethical council's observation list.

Study	Sample period	CAR estimate	Estimation period	Include observations
Atta-Darkua (2022)	2004–2017	-1.72%	$(-1, 5)$	no
Ayoubi and Enjolras (2020)	2006–2018	-0.986%	$(-1, 1)$	no
Nguyen et al. (2024)	2004–2021	-0.20%	$(-1, 1)$	yes

2.4 Corporate reactions to exclusion

Our third empirical investigation looks at the firm's reactions to an exclusion. In particular, do they act to reverse the exclusion?

The literature on whether/how firms react to ESG pressure, be it from the public, or its owners, is limited. For example Becht et al. (2023) looks at social media divestment campaigns against oil and gas producers. Gantchev et al. (2022) looks at public E&S (Environmental and Social) news coverage, and show that firms change their E&S policies in response to these E&S incidents. Turning to actions by owners, Heath et al. (2023) look at SRI funds, argue that these do not change firm behaviour, and even coin the term "impact washing" for their behavior. On the other hand, Rohleder et al. (2022) looks at mutual funds' decarbonization trades, and find that divested firms reduce their carbon emissions.

To develop our hypotheses, consider the decision problem faced by a corporation. An excluded corporation can potentially make changes to operations to remove the causes of exclusion. If for example a company is excluded because of its production of cluster munitions, it could close down this production line. In making this decision, the company is trading off the cost (loss of profit from the cluster munition production) with the potential benefits.

We will use the cases where exclusions are reversed to investigate this. As we will show later, for an exclusion to be reversed, firms must have taken a positive action to remove the cause of exclusion, for example by shutting down a product line. Can we show that the sample of firms getting the exclusion reversed is consistent with such a tradeoff theory?

In the theoretical models, the benefit boils down to a lower cost of capital for new investment. There are however other possible issues the corporations may factor in. For example, the exclusion announcement may lead to consumer boycotts and other reputational cost that actually hurts corporate cash flow. Another issue is executive compensation. If exclusions lead to drops in stock prices, executive options will fall in value. Executives will then have an incentive to argue for the importance of reversing exclusions.

2.4.1 Hypotheses group 3 - The corporate reaction to exclusions

Hypotheses that follow from a balancing of costs of actions necessary to reverse the exclusion, and benefits of a lower cost of capital:

A The easier it is for the firm to take the necessary actions (lower cost) to reverse the exclusion, the higher the probability of exclusion being reversed.

B The higher the benefit of a lower cost of a capital, the higher the probability of exclusion being reversed. In testing this hypothesis we will use the company's need for capital as a proxy for the benefit of a low cost of capital.

Hypotheses that follow from executives worrying about their executive option values:

C Companies with higher sensitivity of options to stock price declines (delta) are more likely to see exclusions being reversed.

2.5 What happens to a green return premium if exclusions are rescinded?

Our final group of hypotheses considers stocks whose exclusion is revoked.

2.5.1 Hypotheses group 4 - The green return premium of stocks whose exclusion is revoked

If stocks' exclusion is revoked, their green return premium is zero.

3 The oil fund and the fund's exclusions

In this section we provide some background information on Norway's GPFG, and the fund's evolving ESG and exclusion policies.[14]

The fund's purpose is to manage Norway's considerable resource wealth stemming from oil and gas production in the North Sea. The fund translates the oil and gas in the North Sea into a well-diversified financial portfolio invested outside of Norway. The fund started investing in equity in 1998, with a split into 40% equity and 60% fixed-income securities. The equity fraction has since increased to its current level of 70%, and several other asset classes, such as real estate and infrastructure investments, have been added. In our discussion, we will concentrate on the equity part of the portfolio. The equity part of the GPFG was valued at 8,878 billion NOK (1,014 billion USD) at year-end 2021. At the time, the fund's portfolio contained 9,338 stocks across 65 countries.

The fund is managed by Norges Bank (the central bank of Norway) on behalf of Norway's Ministry of Finance (which is instructed by the Norwegian Parliament). The fund

[14]For more information we refer to NBIM's recent survey of their ESG history (NBIM, 2020). For more academic views of the fund, we refer to Chambers et al. (2012, 2021) and the evaluations of the fund's performance: Ang et al. (2009), Ang et al. (2014), Dahlquist and Ødegaard (2018) and Bauer et al. (2022).

can thus be viewed as being owned by the people of Norway. The Ministry attempts hands-off management of the fund by limiting instructions to an investment mandate (Ministry of Finance, 2021). For our purposes, the most important part of this mandate is that the Ministry of Finance specifies a *target portfolio*, a weighted average of the developed worlds stock markets, close to a world portfolio, together with a maximal allowable tracking error (the difference between the return of the target portfolio and the GPFG portfolio). This construction ensures that the fund should be thought of as a "near index fund"[15]

3.1 Exclusions

Exclusions of companies from the fund's equity universe will lead to deviations from a well-diversified market portfolio, and are thus a cost for the GPFG.[16] Exclusions still happen, though, and are the subject of this article. It is helpful to consider some political issues to understand the reasons for exclusions.

By adding equities to the GPFG asset mix, the Norwegian Parliament effectively became part-owners of thousands of companies worldwide. As an owner, one is arguably party to the actions of companies one owns, which can quickly become a political issue. The first ethically motivated exclusion took place in 2002 of Singapore Tech, a producer of anti-personnel mines (Ministry of Finance, 2002). The first specific mention of Singapore Tech was in a 2001 discussion in the Parliament between human rights organizations and Christian Democratic and Social Democratic political parties. Singapore Tech was the only company mentioned by name, but the broader discussion raised the question of a need to ensure ethical guidelines for the fund's investments.

In the autumn of 2002, the Norwegian government appointed a public committee to propose ethical guidelines for the fund. The committee argued that owning shares or bonds in a company that can be expected to commit gross unethical acts can be considered as complicity in these actions (Graver et al., 2003). In the revised national budget of 2004, ethical guidelines were established and aligned with the recommendations in the report.

[15]Using standard classifications of mutual funds, (Dahlquist and Ødegaard, 2018, pg 91) shows that the GPFG's active share is so low that it would be classified as an index fund.

[16]Note that the Ministry of Finance adjusts the target index for the asset allocator removing the excluded firms from the index. This means these exclusions will not lead to tracking error for the asset allocator, but the exclusions still lead to the GPFG portfolio deviating from the unconstrained portfolio from the point of view of the ultimate owners, the people of Norway.

The Council on Ethics was established in November 2004. Its primary function is to advise Norges Bank on the observation and exclusion of companies from the fund. The ethical guidelines are determined by the Ministry of Finance and contain both product-based exclusions (currently including tobacco, cannabis, certain types of weapons, and coal), and conduct-based exclusions (currently including human rights abuses, environmental damage, unacceptable levels of greenhouse gas emissions, corruption, and sale of weapons to specific states). The threshold for exclusion is high. Only companies representing an unacceptable high future ethical risk to the fund are excluded.

Both the Ministry of Finance and the management of the GPFG acknowledge that the opportunity to exercise ownership rights instead of exclusion may be a more suitable alternative to reduce the risk of continued norm violations. The action to exclude is therefore grounded by a discussion with the Fund, which has information about their corporate interactions (Ministry of Finance, 2021).

To illustrate the process of exclusions, let us use the case of Wal-Mart. Historically, this is probably the most visible exclusion by the GPFG.[17] Wal-Mart was excluded June 6, 2006 on the basis of violations of human rights, where the list of violations included child labour, gender discrimination, supression of unionization and hazardous working conditions. At the time Wal-Mart was already targeted by instutional investors, to the degreee that Wal-Mart saw it necessary in January of 2005 to place a full-page ad in a lot of US newspaper, including the *Wall Street Journal* and *New York Times*, with a letter from their CEO countering critisism of the company. In the period before the exclusion, the ethical council interacted with Wal-Mart. Which does not seem to have gone too well, as in the ethical councils recommendation to the ministry they note[18] "there are no indications that the company is planning to change their conduct." When Wal-Mart was excluded, it made a big splash. The American ambassador to Norway even made visits to the Norwegian Ministry of Finance to complain.

The Ethical Council publishes its announcement after Norges Bank has agreed. The process provides the fund time to divest before the information is official.[19]

[17] Much of these details are from Ang (2008).

[18] Advise from the ethical council to the ministry in a letter of 15 nov 2005. (Our translation.)

[19] The time frame Norges Bank has had to implement their selloff has varied. An early mandate for the ethical council (Etikkrådet (Council of Ethics), 2006, pg. 9) explicitly gave Norges Bank two months to sell their stake before the exclusion was announced. This mention of an explicit time is no longer present in more recent mandates. The mandate is now just specifying that the ethical council will make their announcement after Norges Bank's announcement of the divestiture — which means the fund has ample opportunity to sell its stake before anything is public.

Table 2: Reasons for exclusions

Overview of the reasons for exclusions in the period 2005–2021. The reasons are grouped into two major causes, conduct and product based. Data from the Ethical Council and GPFG.

Exclusion reasons	Events
Conduct	67
Environmental damage	28
Individuals' rights in war or conflict	12
Violation of human rights	12
Environmental damage / Violation of human rights	4
Violation of ethical norms	5
Greenhouse gas emissions	4
Gross corruption	2
Product	122
Coal or coal-based energy	75
Weapons	26
Tobacco	21

Throughout the 2005-2021 period, 189 companies have been excluded for shorter or longer periods. In Table 2 we break down the official reasons for exclusion. The majority of exclusion justifications are product-based, with the production of coal the largest group. We note that of the 189 excluded firms, 26 have had their exclusion revoked and again been allowed to enter the GPFG portfolio. The ethical council also announces that some firms are placed on observation, with a warning they may face future exclusion. We do not include these cases, as they are very few. In the period of our study only 22 firms were on the observation list. The 189 excluded firms is a very small number compared to the fund's investment universe, where the fund had almost ten thousand different companies in its portfolio at year-end 2021. Exclusion is thus truly an exceptional reaction for the GPFG.

The excluded stocks are distributed across 32 countries. The country with the largest number of exclusions is the US, with 51 exclusions. Following the US are China and India, with 27 and 13 exclusions, respectively.[20]

[20]See the Appendix for detailed breakdowns by country, industry, and year, as well as a complete list of companies.

3.2 Revoking exclusions

Through continued dialogue with the excluded firms, the Ethical Council can revoke the decision to exclude in the event of a change in operations for the excluded company. The fund has rescinded a number of exclusions. The first case was in 2006 and involved the firm *Kerr-McGee Corp*, which initially got on the exclusion list due to participation in oil exploration in Western Sahara. Their exclusion was revoked when the company ended its involvement with this oil field.

Generally, the mandate for the Counsel of Ethics state that the council shall assess whether the reasons for exclusion still apply and, in light of new information, potentially retract the exclusion decision. Thereby, most of the communication leading to a revocation is initiated by the Ethical Counsel. Investigating the 26 instances where the exclusion has been revoked, the causes of these retractions are: cease of specific activity (e.g. end of an oil contract in a particular area, or end of involvement with cluster munition), change in product mix (e.g. reduction of coal production, or cease of production of specific weapons types), or sale of a subsidiary or part of the company. Table 3 summarizes the revocations and their reasons.

Table 3: Reasons for discontinuations of exclusion

The tables summarize the main reasons why exclusions are revoked and firms delist. Data source: Ethical Council and GPFG.

Cause	no
Change in product mix	10
Cease of activity	7
Sale of subsidiary	3
Other reasons	6
Total	26

3.3 How standard are the GPFG exclusions?

To close our discussion of the GPFG, let us consider how similar these exclusions are to those of other institutional investors. The majority of exclusions are product based. These products (tobacco, weapons, etc.) are by now standard exclusion reasons among institutional investors.

As for the conduct based exclusions, there is more judgement involved. For a number of these, such as Wal-Mart, GPFG was one of the early movers, certainly in terms of publicly announcing their exclusion. GPFG is widely acknowledged as an example in the financial industry, due to its transparency, among others with respect to their ESG decisions. Many instutional investors do not publicly announce their exclusions, making it hard to judge how widespread the GPFG exclusions are followed. We do know that all larger Norwegian banks and pension funds follow the exclusions announced by the ethical council.[21] Also, most banks have some exclusion policies. For example, while SEB, Danske Bank, BlackRock, and Morgan Stanley HSBQ have similar robust exclusion criteria in writing, their published lists of excluded companies is not identical to the list followed by the NBIM.

Hence we don't know to what degree this exact set of conduct-based exclusions is acted upon outside of Norway. We however note that many of the GPFG exclusions have made headlines in newspapers like the Wall Street Journal and the Financial Times. As clearer evidence of influence, we note that in the step before exclusion, corporate engagement, GPFG is part of a network of institutional investors cooperating to influence firms on environment and social issues (Dimson et al., 2023). Finally, the criteria used by the GPFG in their exclusions are similar to criteria published by other large institutional investors and investor groupings.[22]

4 Data

4.1 Exclusions

The prime source of data is announcements from the Ethical council and GPFG. From these announcements, we construct a history of companies excluded, with the key dates those of the GPFG news release. For the identified companies, we gather stock market data from Refinitiv, including daily prices and shares outstanding. We also gather exchange rates, from Yahoo Finance. Of the 189 excluded companies, we are able to match 184 stocks with Refinitiv data. In Figure 1 we give an overview of the exclusions over time. The number of exclusions has been increasing gradually, except for a major jump

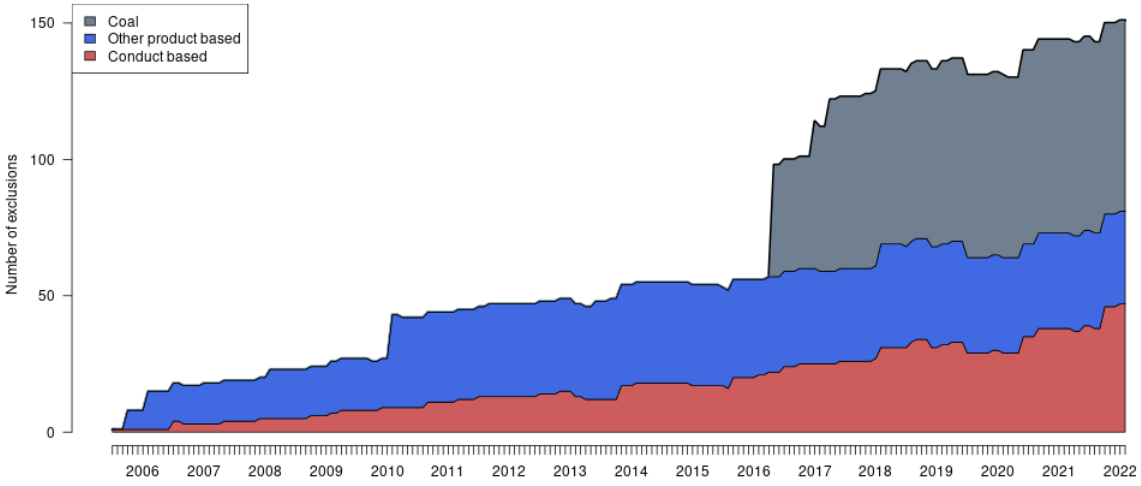
[21] In the appendix we give a list of these funds.

[22] See for example lists published by The World Banks International Finance Corporation and European finance institutions (EDFI).

in exclusions in 2016. That is the year when the Fund introduces the production or use of coal as a separate product-based cause of exclusion (coal based exclusions are shown separately in the figure).

Figure 1: The number of excluded shares over time

The figure shows the number of stock returns in the exclusion portfolios, broken down by product-based and conduct-based. The product-based category is further broken down by coal-based and other product-based exclusions. Data from the Ethical council, GPFG and Refinitiv.



4.2 Equity data

The basis for our analysis is equity returns. In addition to the returns, we calculate market capitalizations as the product of shares outstanding and closing prices. All returns and market capitalizations are denominated in dollars (USD). Figure 2 provides some data descriptives. Amongst these is some information on the size distribution of the excluded firms. Most of them are relatively small, half of the firms in the sample have a market capitalization below 6 bill USD, but there are also some very large companies, with the largest equity value being 316 bill USD.

Figure 2: Equity data

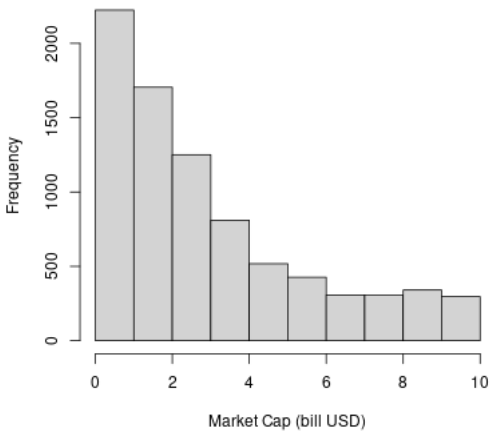
Panel A provides descriptive statistics for the data series. Returns are monthly percentages (not annualized). Market Cap are monthly figures, calculated as month-end price times shares outstanding. Panel B illustrates the distribution of equity market capitalization (in bill USD) for the excluded firms. They are shown separately for firms with market cap below 10 bill USD (left-hand figure) and above 10 bill USD (right-hand figure). Monthly estimates are calculated for all firms. Data from Refinitiv. Returns and values in US dollar terms.

Panel A: Descriptives

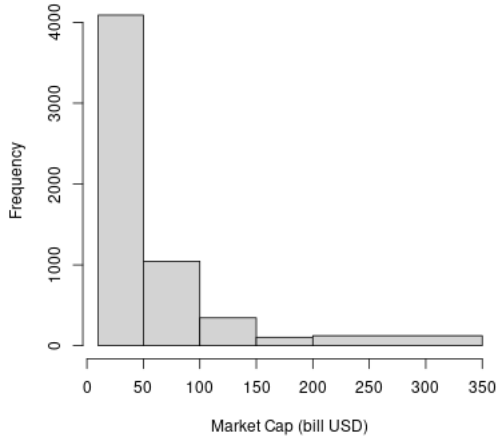
	min	mean	med	max
Monthly Return (percent)	-72.8	1.1	0.6	166.2
Market Cap (bill USD)	0.0	20.4	6.0	315.8

Panel B: Distribution of Firm Size (Market Capitalization)

B.1: Mkt Cap $\leq$ 10 bill USD



B.2: Mkt Cap $>$ 10 bill USD



4.3 Corporate data

In addition to the equity returns, in the later analysis of revoked exclusions, we use various corporate data, such as ESG scores, accounts, and data on raising equity capital. All data is collected from Eikon Refinitiv.

The Refinitiv ESG corporate scores come in several flavors, as shown in panel A of Table 4. As our measure of the corporate ESG score, we select the `TRESGCS` score, which combines the self-reported scores with additional information on company controversies. The ESG score is between 0 and 100, increasing in ESG quality. ESG scores are not available for all companies. We have been able to identify the scores of 144 companies. Panel B of the table provides some descriptives for the company ESG scores of excluded firms' portfolios.

We also collect the history of annual accounts (income and balance statements) for the firms in the sample. The accounting variables we use in the later analysis are the growth of earnings (EPS) and revenues. We use growth measures as they are easier to compare across countries and accounting regimes. Panel C of Table 4 provides some descriptive statistics for these measures.

We further collect data on deals of corporate raising of capital. The data contains details about dates, amounts, and types of capital events. We concentrate on equity capital and remove issues of debt and convertible securities.

Finally, we construct a proxy for the sensitivity of executive options to changes in stock prices. This is approximated as the delta of a generic at-the-money call with one-year maturity.[23]

5 Estimating the green return premium

This section analyses Hypothesis 1, the green return premium. Does the portfolio of excluded firms have exceptional returns? To estimate that we construct Exclusion Portfolios. We let a stock enter the Exclusion Portfolio the at start of the month after the company has been excluded by the GPFG. If an exclusion is revoked, the stock leaves the

[23]The delta is calculated as $\Delta_c = N(d_1)$, where $d_1 = \left(r + \frac{1}{2}\sigma^2\right)/\sigma$, N the cumulative normal distribution function, r an estimate of the risk free rate, and σ the option volatility. We use the US one-year treasury rate as a proxy for the risk-free rate on this one-year option. The option volatility is estimated from daily dollar returns for the three years leading up to the estimation date. The delta is estimated at the time of the exclusion announcement by the GPFG.

Table 4: Additional corporate data

Panel A shows Refinitiv's definitions of their ESG scores. Panel B provides summary descriptives for the two overall scores TRESGS and TRESGCS for the sample of excluded stocks. Panel C provides descriptives for the measures of earnings and revenue growth for the sample of excluded stocks. Data sources: Ethical Council, GPFG and Refinitiv.

Panel A: ESG Scores - definitions

TRESGS	Overall company score based on the self-reported information in the environmental, social and corporate governance pillars.
TRESGCS	Overall company score based on the reported information in the environmental, social and corporate governance pillars (ESG Score) with an ESG Controversies overlay.

Panel B. Descriptives for ESG Scores

	min	mean	median	max
TRESGS	4.8	55.8	57.2	92.1
TRESGCS	4.8	51.4	50.4	89.3

Panel C: Additional Corporate data

	min	mean	median	max
EPS growth (%)	-7000	64	1.8	35933
Revenue growth (%)	-98	9.4	3.6	2489
Delta (Δ_c)	0.54	0.59	0.58	0.69

Exclusion Portfolio at the end of the month in which the revoke decision is announced. We consider two methods to calculate portfolio returns: equally weighted and value weighted, where the latter uses market capitalizations as weights. Table 5 gives descriptive statistics for various portfolio returns.

Table 5: Descriptives, exclusion portfolio returns

Describing portfolio returns for the various exclusion portfolios. All returns in USD. Returns and Excess returns in monthly percentage returns. Sharpe Ratio is $\text{avg}(r_i - r_f)/\text{sd}(r_i - r_f)$. The first column in each table describes the market portfolio, where the market is proxied by the Global market portfolio of Ken French. The other portfolios are exclusion portfolios. All – all exclusions. Conduct, Product, Coal and US exclusions – subsets of exclusions.

Panel A: Equally weighted exclusion portfolio

		EW Exclusion Portfolios				
	Market	All	Conduct	Product	Coal	US
Average return (%)	0.79	1.17	1.44	1.00	1.02	1.24
Std.dev	0.79	5.21	7.73	4.92	4.33	5.06
Average excess return (%)	0.01	1.07	1.35	0.91	0.94	1.14
Sharpe Ratio	0.15	0.21	0.17	0.18	0.22	0.23
n	199	199	199	196	69	199

Panel B: Value weighted exclusion portfolio

		VW Exclusion Portfolios				
	Market	All	Conduct	Product	Coal	US
Average return(%)	0.79	1.37	1.67	1.22	1.27	1.37
Std.dev	0.79	4.23	5.64	4.77	3.47	4.11
Average excess return (%)	0.01	1.28	1.58	1.13	1.19	1.28
Sharpe Ratio	0.15	0.30	0.28	0.24	0.34	0.31
n	199	199	199	196	69	199

To formally make a return comparison it is necessary to account for risk differences through a performance estimation in the setting of an asset pricing model. To measure portfolio performance we rely on the Fama-French international five-factor model (Fama and French, 2017):[24]

$$\begin{aligned}(r_{p,t} - r_{f,t}) &= \alpha + \beta(r_{m,t} - r_{f,t}) + b^{SMB} SMB_t + b^{HML} HML_t \\ &\quad + b^{RMW} RMW_t + b^{CMA} CMA_t + \varepsilon_{p,t},\end{aligned}$$

[24]See Dahlquist et al. (2015) and Dahlquist and Ødegaard (2018) for a discussion of relevant performance measurement for a fund like GPFG.

Table 6: Estimates of alpha for exclusion portfolios

Column (1) reports estimates of the regression $(r_{p,t} - r_{f,t}) = \alpha + \beta(r_{m,t} - r_{f,t}) + b^{SMB}SMB_t + b^{HML}HML_t + b^{RMW}RMW_t + b^{CMA}CMA_t + \varepsilon_{p,t}$, where r_{pt} is the return of the exclusion portfolio, r_{ft} the risk free rate, SMB, HML, RMW, CMA and WML the Ken French factors. Column (2) estimates the one-factor CAPM $(r_{p,t} - r_{f,t}) = \alpha + \beta(r_{m,t} - r_{f,t}) + \varepsilon_{p,t}$, (3) estimates of the regression three-factor regression $(r_{p,t} - r_{f,t}) = \alpha + \beta(r_{m,t} - r_{f,t}) + b^{SMB}SMB_t + b^{HML}HML_t + \varepsilon_{p,t}$, and (4) the four-factor regression $(r_{p,t} - r_{f,t}) = \alpha + \beta(r_{m,t} - r_{f,t}) + b^{SMB}SMB_t + b^{HML}HML_t + b^{WML}WML_t + \varepsilon_{p,t}$. The Exclusion Portfolios constructed from shares excluded from the GPFG. Data is from 2005 to 2021. The international asset pricing factors are from Ken French's data page. Standard errors are Newey-West adjusted. Annualized alphas are calculated from monthly α_i as Annual $\alpha_i = (1 + \alpha_i)^{12} - 1$. Significance levels are indicated as: * $p < 10\%$, ** $p < 5\%$, *** $p < 1\%$. All individual returns are denominated in USD. Data sources: Ethical Council, GPFG, Ken French and Refinitiv.

Panel A: Equally weighted exclusion portfolio

	(1)	(2)	(3)	(4)
Alpha	0.004***	0.004**	0.004***	0.005***
	(0.002)	(0.002)	(0.002)	(0.002)
Rm-Rf	0.961***	1.021***	0.993***	0.962***
	(0.040)	(0.049)	(0.042)	(0.049)
SMB	0.173		0.178	0.177
	(0.115)		(0.115)	(0.123)
HML	0.467***		0.310***	0.224***
	(0.115)		(0.074)	(0.089)
RMW	0.155			
	(0.156)			
CMA	−0.257			
	(0.233)			
WML				−0.138***
				(0.076)
Annualized Alphas(percent)	5.170	4.420	5.220	5.980
Adj. R^2	0.809	0.788	0.808	0.813
Num. obs.	199	199	199	199

Panel B: Value weighted exclusion portfolio

	(1)	(2)	(3)	(4)
Alpha	0.006***	0.007***	0.007***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)
Rm-Rf	0.871***	0.801***	0.809***	0.817***
	(0.040)	(0.038)	(0.037)	(0.038)
SMB	−0.313***		−0.421***	−0.421***
	(0.113)		(0.116)	(0.111)
HML	0.183*		0.264***	0.287***
	(0.102)		(0.078)	(0.100)
RMW	0.340***			
	(0.143)			
CMA	0.373***			
	(0.139)			
WML				0.036
				(0.064)
Annualized Alphas(percent)	6.850	9.000	9.010	8.810
Adj. R^2	0.785	0.735	0.773	0.772
Num. obs.	199	199	199	199

where the factors are international versions of the corresponding US factors (Fama and French, 2015).[25] Column (1) in Panel A of Table 6 reports estimates of the global five-factor Fama-French model. For our purposes, the key result is the alpha estimate, which is a positive, statistically significant alpha, in annualized terms 5.2%. Thus, the premium for the portfolio of "ethically challenged" firms is more than 5%.

To show robustness, we also report a number of alternative formulations, including one-factor (CAPM), three- and four-factor specifications. The finding of a positive alpha is confirmed using the alternative asset pricing specifications in models (2)–(4) in the table, where the alphas vary between 4.4% and 6% in annual terms.

The equally weighted portfolio above measures the expected return difference without regard to company size. Another approach is to think in terms of economic importance. To measure this, we consider the value weighted version of Exclusion Portfolio, where the return of each excluded stock is weighted by market capitalization. Panel B of Table 6 reports performance regressions using value weighted returns. The alpha estimates are higher for the value weighted portfolio than the equally weighted one. In annual terms, the alpha in the five-factor model is almost 7%.

The table also reports estimates of the factor loadings. We note that the estimate of the market beta is below 1, for both the equally weighted and value weighted exclusion portfolios. The exclusion portfolios thus have lower systematic risk than the market. One cause for this is a large number of coal related companies in the exclusion portfolio. Many of these companies are in "Utilities" related industries, with corresponding low betas.

The fund excludes companies for different reasons, with the main distinction being conduct and product-based exclusions. In Table 7 we report regression results for the two subsamples, using both equally and value weighted portfolios. In either case, we find that the alphas of the conduct based exclusion portfolios are double those of the alphas for the product based exclusion portfolios.[26]

The results can be summarized as showing that portfolios of firms excluded by the GPFG have a significant positive alpha in the region of 5% in annual terms.[27] In terms

[25]The factors are downloaded from Ken French's homepage. We are grateful to him for making the data available to the research community.

[26]In the appendix we show cumulative return plots, where we show that it is particularly the last few years that seem to be driving the higher alpha estimates for the conduct based portfolio.

[27]We have performed a larger number of additional robustness tests, which we will not show explicitly, just mention the key findings. The analyses are provided in the separate Internet Appendix. First, we have

Table 7: Estimates of alpha for conduct and product-based exclusion portfolios

The table shows estimates of the regression $(r_{p,t} - r_{f,t}) = \alpha + \beta(r_{m,t} - r_{f,t}) + b^{SMB}SMB_t + b^{HML}HML_t + b^{RMW}RMW_t + b^{CMA}CMA_t + \varepsilon_{p,t}$, where $r_{p,t}$ is the return on the exclusion portfolio. We consider two different samples of exclusion portfolios: The stocks excluded based on conduct, or based on product. For each of these samples we calculate equal or value weighted portfolios. The international factors are from Ken Frenchs' homepage. Standard errors are Newey-West adjusted. Significance levels are indicated as: * $p < 10\%$, ** $p < 5\%$, *** $p < 1\%$. All individual returns denominated in USD. Data sources: Ethical Council, GPFG, Ken French and Refinitiv.

	Conduct		Product	
	EW	VW	EW	VW
Alpha	0.007*	0.009***	0.003	0.004**
	(0.004)	(0.003)	(0.002)	(0.001)
Rm-Rf	1.061***	0.793***	0.926***	0.935***
	(0.130)	(0.077)	(0.037)	(0.037)
SMB	0.139	−0.269	0.167	−0.280**
	(0.293)	(0.255)	(0.136)	(0.128)
HML	0.967***	0.293	0.295***	0.208*
	(0.214)	(0.165)	(0.107)	(0.107)
RMW	0.231	0.419	0.164	0.345*
	(0.349)	(0.285)	(0.174)	(0.211)
CMA	−1.241***	0.306	0.070	0.305*
	(0.412)	(0.244)	(0.167)	(0.157)
Annualized Alphas(percent)	8.540	11.310	3.370	4.680
Adj. R^2	0.579	0.371	0.766	0.731
Num. obs.	199	199	196	196

of the more common green premium, which is the negative of this estimate, our results imply negative green return premium of approximately -5% in annual terms. The estimate is negative, in line with most of the literature, lending support to the non-pecuniary type of model. It is larger in magnitude than most estimates in the literature, possibly reflecting the sample of the "worst offenders."

6 Stock price reaction to exclusion

We now turn to the second set of hypotheses, concerning stock price reactions around the time of the GPFG exclusion announcement. We perform an event study. Some care is necessary in constructing the event study, as these are events happening in a diverse set of equity markets, and it is necessary to make them comparable. The obvious concern is currency. If one runs these as separate event studies in each market, the estimated excess returns would be in different currencies. Our maintained asset pricing model is thus an international CAPM, [28] denominated in dollars.

$$E[r_{i,t}] = r_{f,t} + \beta_i(E[r_{m,t}] - r_{f,t}),$$

where $r_{i,t}$ is the dollar return of the stock, $r_{f,t}$ the US risk free rate, and $r_{m,t}$ is the return on a world market index. As market index we use Ken French's index of global developed markets. As risk free rate we use the Ken French estimate.

looked at the timing of when stocks enter or exit the exclusion portfolio. In addition to analysis delaying the entry into the exclusion portfolio, we have also done the estimations including the month of the exclusion, without seeing any major changes in the alpha estimates. We also look at keeping stocks in the exclusion portfolio after their exclusion is revoked, without a major effect on portfolio performance. We also construct a portfolio of the excluded firms two years *before* the oil funds exclusion. While not significant, the point estimates of alpha are of a similar magnitude to the post-exclusion portfolio. Further, we split the estimation period into two subperiods, 2005–2015 and 2016-2021. We find that in the later period, the alpha estimates are still positive but lower and not always significant. We however note that this period only contains six years, which means the sample period is relatively short. We have also done the analysis separately on just the US companies in the portfolio. Here we also find a significantly positive alpha. We also look at whether the group of coal companies has a different effect on returns. Constructing an exclusion portfolio without the coal companies we find similar alpha estimates to the returns in the paper. We also construct a portfolio of just coal companies. This is again similar to the whole portfolio. Finally, in the value weighted portfolio there is one company, Wal-Mart, which has a very large weight in the early part of the period. We have therefore redone the analysis removing Wal-Mart from the value weighted portfolio. This does not change our inferences.

[28] We have also done the calculations using a market model as an alternative to the CAPM. The results are in the Internet Appendix.

The method of calculation is standard (MacKinlay, 1997). To calulate a Cumulative Abnormal Return one picks a starting point m days before the exclusion announcement, ending n days after the announcement ($CAR(-m,n)$). $\widehat{\beta}_i$ is estimated using a three-year pre-period of daily (dollar) returns. This beta is then used in the calculation of abnormal returns

$$AR_{i,t} = r_{i,t} - \left(r_{f,t} + \widehat{\beta}_i(r_{m,t} - r_{f,t})\right)$$

which are aggregated into cumulative abnormal returns: $CAR_{i,t} = \sum_{j=-m}^{t} AR_{i,j}$. The event date (day 0) is the announcement of the exclusion. While an event study typically present a large number of test statistics for the various CAR estimates, it turns out to be unnecessary for our purposes, it is sufficient to illustrate the results using a CAR plot.[29]

The two hypotheses we investigate both specify a permanent fall in stock prices linked to the exclusion by the GPFG. The first starts with the one-month period leading up to the announcement, and the second with the day of announcement.

We calculate two event studies, one starting on trading day -20, the other starting on day -1. In both cases we extend the cumulation till trading day 40 (roughly two calendar months). The evolution of these CARs are presented in Figure 3, Panels A and B.

Looking at the one-month CAR picture in Panel A, we see prices drifting upward until the announcement date. At the announcement date there is a short-term dip in prices, before prices drift upward further. At the of the period the CAR has reached 4%. For the one-day CAR picture in Panel B we see the immediate drop, but after 40 trading days the CAR has reached a positive 2%. These figures clearly contradict any notion that there is a permanent drop in stock prices.

The event study in Panel B is consistent with the evidence in extant event studies (Atta-Darkua, 2022; Ayoubi and Enjolras, 2020; Nguyen et al., 2024), which all start at date -1, and find significantly negative CARs (either $CAR(-1,1)$ or $CAR(-1,5)$).

Where we add to the extant studies is by looking at the month prior to the exclusion announcement, and extending the post period for two months. In particular the extension to the longer post-period is the important result, because it lets us conclude that price changes following exlusions are not permanent.

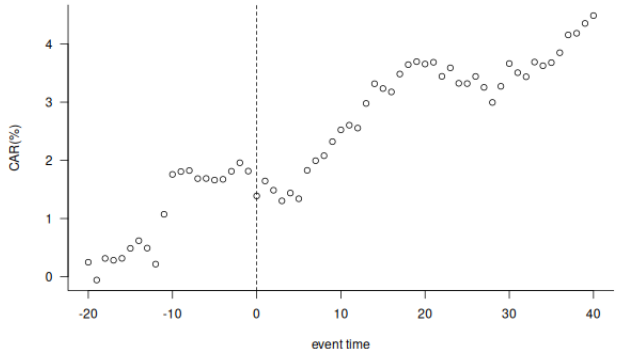
One possible objection to our results is the use of a world market portfolio. Event studies are typically done relative to a local market index. To show the robustness to this

[29] Standard test statistics are included in the Internet Appendix.

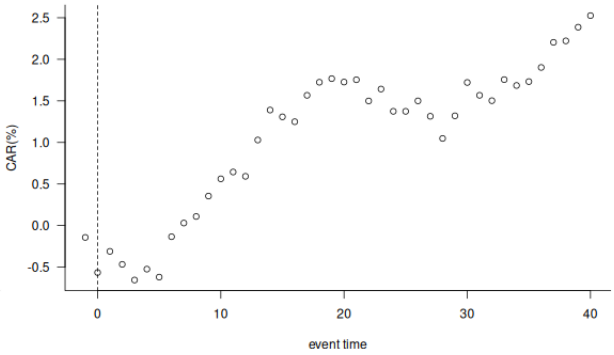
Figure 3: Event Study of Exclusion Announcement

The figures show the results of event studies of the oil fund's exclusions announcements. The figures plots averages across firms of cumulative abnormal returns (CAR). All returns are calculated from the perspective of an US investor, denominated in USD. Abnormal returns AR are calculated as $AR_{i,t} = r_{i,t} - \left(r_{f,t} + \widehat{\beta}_i(r_{m,t} - r_{f,t})\right)$, where $r_{i,t}$ is the dollar return of the stock, $r_{f,t}$ the US risk free rate, and $r_{m,t}$ is the return on a market index. In panels A and B the abnormal return (AR) is calculated using a world market index, Ken French's index of global developed markets. In panel C and D the market index is the S&P 500. As risk free rate we use the Ken French estimate. The parameter $\widehat{\beta}_i$ is estimated using a three-year pre-period using daily returns. The CAR is aggregated from abnormal returns as $CAR_{i,t} = \sum_{j=-20}^{t} AR_{i,j}$ The event date is the announcement of the exclusion. In panels A and C we start estimation one calendar month before the event date and end it two calendar months after. In panels B and D we start estimation one day before the event date and end it two calendar months after. See the Internet Appendix for details. Panel A and B uses all exclusions. Panels C and D only uses exclusions of US companies. CAR in percent.

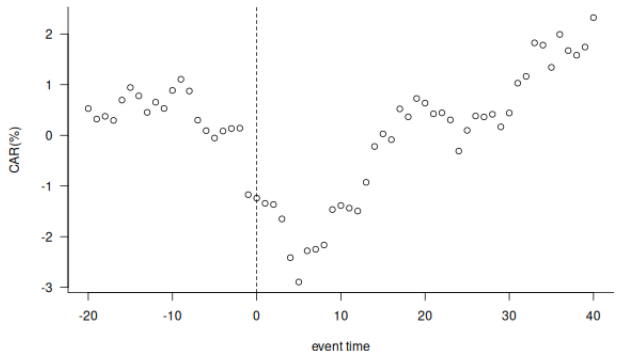
Panel A: Event study (-20,40)



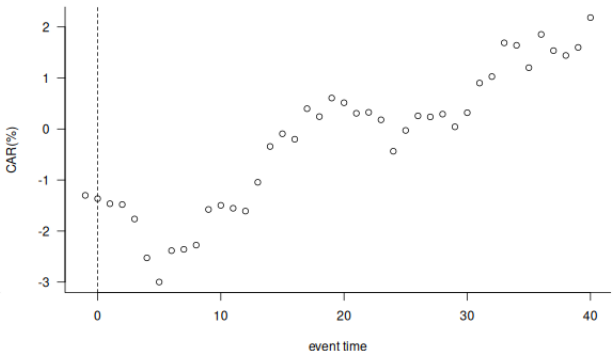
Panel B: Event study (-1,40)



Panel C: US Event study (-20,40)



Panel D: US Event study (-1,40)



we do the estimation for only the exclusions of the US companies. The corresponding event studies using only the US stocks are shown in Panels C and D. While there are some differences in terms of levels, they give the same conclusions.

7 Corporate reactions to exclusions

Our third set of hypotheses are concerned with corporate reactions to exclusions. To analyze the various hypotheses we need to employ a number of different econometric methods. Our analysis will be partial, there is no single framework where all the proposed mechanisms can be tested. We instead look at this hypothesis by hypothesis.

7.1 The company cost of improving ESG

We start by investigating Hypothesis 3.A, which states that the probability of revoking the exclusion is linked to the cost of taking the necessary actions to revoke the exclusion. For this particular hypothesis, we model it in the econometric context of modelling the *time period* a firm stays excluded. That means we turn to the econometric framework of duration, or survival, analysis. This style of analysis treats the *time* until an event as the object of study. In the present context, we are interested in the time until a given stock drops out of the exclusion sample. Survival analysis will estimate the likelihood of exit, adjusting for the sample being right-truncated. The right truncation is due to the large number of firms still excluded at the end of the sample, whose exit time is still in the future.

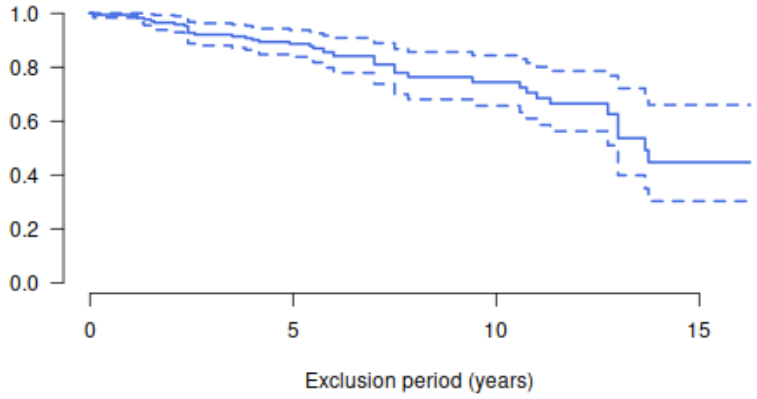
In survival analysis, we either work with survival curves (roughly: the probability of survival till a given time), or hazard curves (roughly: the probability of exit at a given time). Figure 4 illustrates estimated survival and instantaneous hazard curves for the sample of excluded firms. One observation to make, which is easiest to observe using the estimated hazard curve: the likelihood of exit increases with time in the sample.

To proxy for the ease with which firms can improve their ESG, we consider the corporations' ESG scores. While the oil funds exclusions are for specific ethical reasons, these are typically reasons that will also lead to a bad ESG score. We, therefore, look for a relationship between a firm's ESG score and the likelihood that the firm will have its exclusion revoked.

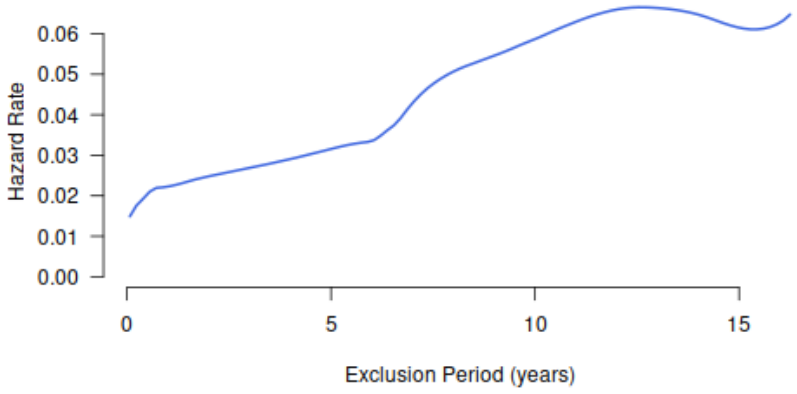
Figure 4: Survival and Hazard curves for the Exclusion Portfolio

Panel A: Survival curve, adjusting for right-truncation. The broken lines indicate one standard deviation. Panel B: Instantaneous hazard curve (smoothed estimate). Both are estimated using the sample of excluded firms, where exit is either a delisting or the exclusion is revoked. Survival curve estimated using `R` library `survival`, Instantaneous hazard curve estimated the `R` library `muhaz`. Data sources: Ethical Council, GPFG and Refinitiv.

Panel A. Survival curve



Panel B. Instantaneous hazard curve (smoothed)



We estimate this by asking whether the level of the ESG score at the time of exclusion affects the survival time. This is a classical survival analysis, where the analysis test whether survival times are affected by initial conditions, and modelled by investigating determinants of a Cox proportional hazard function.[30] As determinants, we use the firm's combined ESG Score (TRESGCS). We also control for firm size and the source of exclusion (product or conduct-based), as well as control for annual fixed effects. Differentiating between product and conduct-based firms is relevant because it affects the ease with which firms can change their ESG score. A product-based exclusion, such as coal production, is something the firm will find it hard to do much about without becoming a very different firm. However, a conduct-based exclusion, such as employing child labour, is easier to take action on.

Table 8: Contributions to survival of exclusion

The table summarizes analyses of estimation of contributions to a Cox proportional hazard model. Explanatory variables: *ESG score*: (Refinitiv TRESGCS). *Ind(Conduct)*: Dummy variable equal to one if the exclusion is for a conduct-based reason. *ln(Mkt Cap)*: Firm equity size (the logarithm of the market capitalization at yearend). *Delta*: Option delta. All values in USD terms. Data sources: Ethical Council, GPFG and Refinitiv.

	(1)	(2)	(3)	(4)	(5)
ESG Score	-0.03^{***}	-0.03^{***}	-0.02^{**}	-0.03^{**}	-0.02^{**}
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Ind(Conduct)		0.73^{*}		0.85^{*}	0.77
		(0.40)		(0.44)	(0.48)
ln(Mkt Cap)			-0.06	-0.11	-0.11
			(0.09)	(0.09)	(0.08)
Delta					4.87
					(5.76)
AIC	218.84	217.97	220.54	219.01	220.49
R^2	0.03	0.05	0.04	0.06	0.06
Max. R^2	0.77	0.77	0.77	0.77	0.77
Num. events	28	28	28	28	28
Num. obs.	149	149	149	149	149
PH test	0.46	0.76	0.55	0.70	0.43

$^{***}p < 0.025$; $^{**}p < 0.05$; $^{*}p < 0.1$

Figure 8 shows the results. We find that the ESG score has a significantly negative

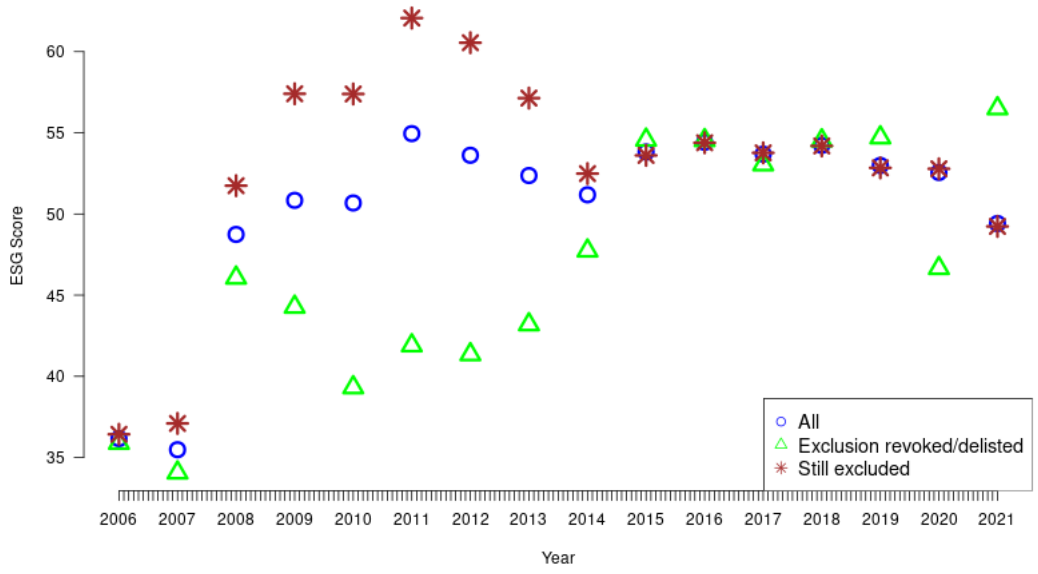
[30] In the appendix, we provide evidence using alternative functional assumptions for the Cox model.

coefficient. The interpretation of a negative coefficient is that increasing the explanatory variable in question *decreases* the hazard rate, i.e. it increases the survival time. Thus, a low ESG score leads to a *higher* probability of having the exclusion revoked. A possible interpretation is that it will be less costly for firms to improve on a low ESG basis. Alternatively that the firm has lots of scope for improvement.

To supplement the survival regressions, we provide some additional descriptives. Figure 5 plots the annual average ESG score for firms still excluded by 2021 and for firms that have had their exclusion revoked. The average firm which later got off the exclusion list clearly had a lower ESG rating, particularly in the early part of the period. A word of warning, though. The figure uses ex-post information (whether the stock has dropped off the excluded list) in the grouping. It should, therefore, only be viewed as supportive of the econometric analysis, which does not suffer from an ex-post bias.

Figure 5: ESG scores of Excluded Firms, Revoked and Non-Revoked.

The figure plots the crossectional average ESG score (Refinitiv TRESGCS). The averages are done for all shares (blue circles), shares still excluded by the end of the period (brown crosses), and shares no longer excluded, either by delisting or having the exclusion revoked (green triangles). Data sources: Ethical Council, GPFG and Refinitiv.



7.2 The cost of corporate capital channel

We now turn to Hypothesis 3.B, the cost of capital channel. We look at the cost-of-capital issue in an indirect way, by looking at the times cost of capital matters most to a corporation, namely the times when the corporation need to interact with the capital markets to raise new capital. We look at measures of the need for new capital, and ask: Are firms that need new capital more likely to get their exclusion reversed?

7.2.1 Growth-driven need for capital

One way to assess capital needs is to look at corporate growth. Growing companies are more likely to need new capital. High revenue growth will likely lead to investment needs as the firm is increasing in scope. The effects of increases in earnings, on the other hand, are less clear. While increases in earnings may indicate investment needs, high earnings also imply a higher ability to finance investments using retained earnings.

We, therefore, look at whether revenue or earnings growth affects the likelihood that a firm's exclusion is revoked. To estimate this, we can not use the survival framework of the previous section, as accounts change every year, leading to time-varying covariates. Instead, we use a method better known in finance, binary choice models. Since accounts are annual, each year we look at the binary event that a firm either stays on the excluded list or not. We stack these annual choices into a probit formulation, using the two mentioned accounting variables: earnings growth and revenue growth. We include firm size (market cap) and exclusion cause (conduct/product) as control variables in the estimations.

The results in Panel A of Table 9 show that the coefficient on earnings growth is negative, i.e. that high earnings growth increases the probability that the firm will stay on the list of excluded firms, but this relationship is not significant. More interesting is the coefficient on revenue growth, where we find a positive and significant coefficient. The implication is that currently high-revenue-growth firms are more likely to get their exclusion revoked. We note that here too we find that conduct-based exclusions are more likely to be revoked.

This can be argued for through the cost of capital. High revenue growth is associated with a need for investments and hence new capital. Firms with high capital needs would want to get off the exclusion list, if possible. If these firms have scope for improving ESG they will want to do it.

Table 9: The need for new capital – estimates

In panel A, the tables report results of probit estimates of determinants of exclusion revoked by the GPFG. Two separate probit estimations:

$$p(\text{Exclusion Revoked}) = \begin{cases} f(\text{EPS growth}, \text{Controls}). \\ f(\text{Revenue growth}, \text{Controls}) \end{cases}$$

In each case, for each year, the dependent variable tests whether a firm stays excluded, or not, that year. The dependent variable is equal to one if a firm's exclusion is revoked in a given calendar year. Explanatory variables are: `EPS growth`: Percentage change in EPS from the previous year to this year. *Revenue growth*: Percentage change in total earnings from the previous year to this year. *ln(Mkt Cap)*: Firm Size – The log of year-end market capitalization, denominated in USD. *Ind(Conduct)*: Dummy variable equal to one if the exclusion is for a conduct-based reason. Estimations (3) and (4) include annual fixed effects (unreported), and are estimated without a constant term. T statistics in parenthesis. Significance levels are indicated as: * $p < 10\%$, ** $p < 5\%$, *** $p < 1\%$.
In panel B, the table gives the number of firms in each group that has raised equity capital at least once in the period. For the firms still excluded, the period is the whole exclusion period. For the firms having had the exclusion revoked, it is the period *after* the exclusion is revoked. Data sources: Ethical Council, GPFG and Refinitiv.

Panel A: Probit estimation of determinants of discontinuation of exclusion

	(1)	(2)	(3)	(4)
(Intercept)	-3.55^{***}	-3.47^{***}		
	(1.14)	(1.15)		
Growth EPS	-0.01		-0.01	
	(0.02)		(0.02)	
Growth Revenue		0.43^{*}		0.50^{*}
		(0.26)		(0.30)
Ind(Conduct)	0.65^{***}	0.51^{***}	0.71^{***}	0.55^{***}
	(0.19)	(0.19)	(0.20)	(0.21)
ln(Mkt Cap)	0.06	0.05	0.06	0.07
	(0.05)	(0.05)	(0.05)	(0.06)
Annual fixed effects			*X*	*X*
Log Likelihood	-95.29	-95.67	-85.81	-85.48
Num. obs.	981	969	981	969

Panel B: Raising new equity capital

	Firms raising capital	
	Number	Percent
Firms still excluded	56	37.1
Firms with exclusion revoked and not delisted	11	57.9

7.2.2 Actually Raising Equity Capital

In the previous estimation, we looked at conditions that would lead to a need for raising capital. An alternative investigation of Hypothesis 3.B is to use data on the actual raising of capital. We have to that end collected data on corporate equity deals, which allows us to identify the firms that raise equity capital.

As a simple investigation, we count the firms issuing equity (without any accounting for the relative size of the capital issue). Panel B of Table 9 summarizes the results. Of the 151 companies that were still excluded at the end of the sample, 37% had raised capital at least once during the period they have been excluded. Of the 21 firms that got off the exclusion list without delisting, 11, or 57%, have raised equity capital in the shorter time after the exclusion was revoked.

We note that the sample is small, and it will be hard to make strong statistical inferences from these data. We still point to this as evidence consistent with the idea that firms try to improve their ESG (and reverse exclusions) when they see that they will need to raise capital.

7.3 Executive compensation

We finally consider Hypothesis 3.C, concerning the actions of corporate executives. As discussed, executives will be concerned if exclusions affect stock prices, as a price drop will affect the value of executive options. To test the hypothesis we introduce a measure of option sensitivity to changes in stock price (option delta) as a predictive variable in the duration analysis performed in section 7.1. The estimation including option sensitivity as an explanatory variable is shown in the last column of Table 8. The coefficient on option sensitivity is not significant, and it even has the wrong sign, as it is positive. In this analysis, a positive coefficient has the interpretation that it increases the time till exit. So we conclude that we don't find effects linked to the sensitivity of corporate options, and reject Hypothesis 3.C.

8 Do post-excluded firms actually lower their cost of capital?

The final analysis concerns Hypothesis 4. We investigate what happens to the cost of capital of firms that get off exclusion lists. To answer this, we construct a "Revoked Portfolio" containing previously excluded stocks. To construct this portfolio representing

the revoked firms, we let stocks enter the Revoked Portfolio at the end of the calendar month in which their exclusion is revoked.

We again conduct a regression analysis to make a formal statement about performance. The regression results in Panel A of Table 10 shows that the Revoked Portfolio does not have significant alpha. Some point estimates are even negative. The relevant comparison is what these stocks did while they were excluded. Therefore, we also look at the constituent stocks in the Revoked portfolio but construct the portfolio of these stocks before their exclusion is revoked, i.e. while they are still excluded. In Panel B of Table 10 we show the results. Here we find that the portfolio of these stocks had a significantly positive alpha of 5.6% in annualized terms. These results show that firms which contributed to superior performance of the Exclusion Portfolio reverts to a "normal" portfolio alpha of zero once they get off the exclusion list.

9 Conclusion

We used the exclusions by the Norwegian Government Pension Fund Global, the world's largest SWF, to identify a set of firms excluded by institutional investors. We use these firms to look at four separate issues.

First, we use the returns of excluded firms to estimate the return differential of excluded vs non-excluded firms. Applying a battery of performance tests to portfolios of excluded firms, we establish that these portfolios have a considerable excess return relative to the predictions of standard asset pricing models. The portfolios of these stocks have highly statistically significant excess returns (alpha) as high as 5% in annual terms. When we compare different reasons for exclusion, the stocks excluded for reasons of conduct have higher alphas than product-based exclusions. The returns of small firms do not drive these results, as value-weighted versions of the portfolios have even higher excess returns than the equally weighted ones. Translating this into an estimate of "greenium," this implies a negative five percent annualized greenium.

Second, we look at the stock price reaction to an exclusion by the GPFG, using an event study of $(-1$ to $+2)$ months. Earlier research have found a negative announcement effect around the GPFG's exclusions. While we confirm a short-term negative effect a couple of days around the announcement, we temper this by observing that over the three month period we analyze the stock price is actually drifting upwards. This re-

Table 10: The Post-Exclusion Portfolio

The tables show performance analysis. The revoked portfolio is constructed from all firms which have had their exclusions revoked and remain listed. Starting the month after the exclusion is rescinded. The table shows regressions with the return of the post-revocation portfolio as dependent variable. Each column reports estimates of the regression $(r_{p,t} - r_{f,t}) = \alpha + \beta(r_{m,t} - r_{f,t}) + b^{SMB}SMB_t + b^{HML}HML_t + b^{RMW}RMW_t + b^{CMA}CMA_t + \varepsilon_{p,t}$, where r_{pt} is the return of the post-revocation portfolio, r_{ft} the risk free rate, SMB, HML, RMW, CMA and WML the Ken French factors. The first column shows the results for the equally weighted post-exclusion portfolio, and the second column for the value weighted. Panel B shows the same regressions, but for this portfolio of revoked firms in the period *before* the exclusion is revoked, while the stocks are excluded. Data for 2006–2021. The international asset pricing factors are from Ken French's data page. Standard errors are Newey-West adjusted. Significance levels are indicated as: * $p < 10\%$, ** $p < 5\%$, *** $p < 1\%$. All individual returns denominated in USD. Data sources: Ethical Council, GPFG, Ken French and Refinitiv.

Panel A: Performance analysis - revoked portfolio after exclusion lifted

	(EW)	(VW)
Alpha	0.000	−0.000
	(0.003)	(0.003)
Rm-Rf	1.119***	1.014***
	(0.074)	(0.070)
SMB	0.375	−0.196
	(0.197)	(0.195)
HML	0.359	−0.148
	(0.167)	(0.185)
RMW	0.176	−0.043
	(0.283)	(0.265)
CMA	0.066	0.329
	(0.341)	(0.259)
Annualized Alphas(percent)	0.350	−0.120
Adj. R^2	0.586	0.676
Num. obs.	150	148

Panel B: Performance analysis - revoked portfolio before exclusion lifted

	(EW)	(VW)
Alpha	0.005***	0.006***
	(0.002)	(0.002)
Rm-Rf	0.957***	0.866***
	(0.041)	(0.039)
SMB	0.201*	−0.281***
	(0.128)	(0.115)
HML	0.469***	0.186*
	(0.119)	(0.098)
RMW	0.139	0.320**
	(0.161)	(0.145)
CMA	−0.238	0.396***
	(0.240)	(0.144)
Annualized Alphas(percent)	5.630	7.400
Adj. R^2	0.804	0.774
Num. obs.	200	200

sult is inconsistent with an increase in company cost of capital triggered by the GPFG exclusions.

Third, we investigate company reactions to exclusions. We consider the firms that have acted to reverse their exclusions. First, only 14% of the firms in the sample had their exclusion revoked, so it does not seem like a strong incentive. On the other hand, many of these firms may not be able to change enough to get the exclusion reversed. Coal related firms, for example, have little opportunity, at least in the short term, to move into other lines of business. This is consistent with the observation that the majority of exclusions revoked are linked to conduct based criteria.

We ask why those few firms pay the cost necessary to reverse the GPFG exclusion. We identified a number of hypotheses, linked to the cost of changing ESG, the marginal benefit of a lower cost of capital, and effects on executive options. Our results show that the ESG rating at the time of exclusion matters. Lower-ranked ESG firms seem to find it easier to get the exclusion revoked. We also investigated the cost of capital channel by asking whether firms that got their exclusion revoked were more likely to need capital. Here we investigate both corporate growth-motivated capital needs, and actual raising of equity capital, and identified a link between our proxies for capital needs and the likelihood that the exclusion is revoked. Finally, we do not find any support for an executive option-linked hypothesis.

Fourth, we look what happens to the green premium when firms' exclusions are revoked. We compare the alpha of the portfolio of revoked firms before (while they are still excluded) and after the exclusion is revoked. It falls from significant 5.6% (in annual terms) to close to zero and insignificant.

What are the implications of the above results? How can we reconcile the large magnitude of the (negative) greenium of this sample with the lack of price reaction at the announcement of the exclusions? A plausible explanation is that the exclusion by the GPFG in itself contains little additional information. The basis for their exclusions are public sources about the company's activities, something which is also available to everybody else. The information in the exclusion announcement is about the GPFG's *evaluation* of this public information. The event study results indicated that even the selling off by an owner owning 1.5% of the company's stock before announcing their excclusion does little to shift the markets evaluation of price.

This perspective is also relevant for our last result, that the green premium disappears when exclusions are revoked. The ethical council has used public information about com-

panies to determine that the cause of exclusion is no longer there. This is a confirmation that the corporations have changed, it is not just about the GPFG judgement. Hence the ESG-linked aspect of the firms operations has changed, and an ESG-linked premium may no longer be there, which is what the fall in alpha post-exclusion imply.

Our results have implications for political discussion about exclusions. These discussions often make the case for achieving political goals through exclusions affecting the cost of capital. Our results show that in most cases, exclusions have little consequences for stock prices, and hence for incentives. There are however some cases where the is scope for exclusions to influence firm changes, either because the costs to the firm of doing it are low, or the firm has urgent need of capital. For these firms it pays to get off the exclusion list, as evidenced by the lowering of cost of capital in the post-exclusion period. In terms of the political discussion, the take home may be that if the goal is to bring about corporate change, broad exclusions will have little effect, but more targeted exclusions may be more effective. To change broad industries, more targeted regulation may be necessary (Pedersen, 2024).

We view the corporate finance dimension as the most promising research direction following up our research. What firms may react to conduct-related exclusions? Understanding how firms react to ESG-related shocks is also a topic of explicit interest to regulators, for example, in the final design of the EU reporting standards and taxonomy.

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