

A Scientific Portfolio Publication

Do Climate-Related Exclusions Have an Effect on Portfolio Risk and Diversification? A Contribution to the Article 9 Funds Controversy

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Abstract

Despite regulatory efforts to enhance consistency, the increase in funds claiming to be sustainable has led to polemics about some of the funds' stock holdings having a negative impact on climate change. In contrast to the existing literature which focuses on short term performance, we examine the impact of these controversial stocks on the risk profile of 161 funds with a 'sustainable investment objective'. We show that excluding these stocks with a naive reallocation technique has a limited effect, which can be further reduced via an optimization procedure. These results suggest that holding stocks with a negative contribution to climate change currently has no justification from a risk perspective.

Key Takeaways

- Out of 161 funds reporting a 'sustainable investment objective' in accordance with the European sustainable financial disclosure regulation (article 9), 50 contain stocks of companies involved in coal, oil and gas or aviation. These stocks represent on average 2.8% of the funds' invested capital.
- Excluding these stocks with a naive (pro rata) reallocation leads to an average tracking error of 0.53% with the original portfolio. Sector deviations occur mainly in the 'Energy' and 'Utility' sectors. In terms of fundamentals, exclusions increase exposure to higher 'quality' stocks, whereas exposure to 'investment' and 'value' stocks is slightly reduced.
- Excluding these stocks with an optimized reallocation technique further reduces the average tracking error to 0.42%, while also reducing fundamental differences between the original and optimized portfolio. These results suggest that excluding climate controversial stocks has overall a limited impact on the risk profiles of the funds.

Keywords: ESG screening, exclusion, risk, sustainable investment, tracking error.

JEL codes: G11, G23, Q54.

I. Introduction

I. Introduction

With the increase in funds claiming to be ‘responsible’, ‘sustainable’ or ‘impact’, the regulators are clarifying the scope of these funds in order to improve transparency and prevent ‘financial greenwashing’. As part of its Action Plan for Sustainable Finance, the European Union (EU) now imposes, through its Sustainable Finance Disclosure Regulation (SFDR), reporting requirements that depend on the ambition of the funds: funds that claim to have a ‘sustainable investment objective’ must comply with ‘Article 9’ requirements, while funds that highlight environmental or social characteristics as part of a broader investment strategy must comply with ‘Article 8’ requirements. These two categories of reporting requirements have promptly been considered by the market as ‘labels’ associated with the funds, Article 9 funds being the most ambitious in terms of extra-financial impact. However, the reporting requirements of the SFDR leaves room for interpretation of the definition of a ‘sustainable’ investment, as well as flexibility with respect to the levers to be used to achieve the ‘sustainable investment objective’: exclusions, reallocation, shareholder engagement.

The flexibility left to managers in the implementation of impact strategies is at the root of a significant controversy concerning funds considered as ‘Article 9’. In November 2022, two investigative journalism platforms - Follow the money and Investico – published the Great Green Investment Investigation (GGII) in collaboration with a dozen European media¹. Their work revealed that nearly half of the 838 European ‘Article 9’ funds had invested in companies that are involved in the fossil fuels and aviation sectors and that the journalists identified as significant contributors to global warming due to their lack of ‘a credible climate strategy’. Following this investigation and other controversies, 40% of the initial ‘Article 9’ funds - many of these being passive funds tracking EU Climate Transition and Paris-Aligned benchmarks - were voluntarily downgraded to ‘Article 8’ by the fund managers at the end of 2022 according to Morningstar².

Several reasons may explain the holding of these controversial stocks in sustainable portfolios: data discrepancies in the assessment of their environmental impact, a willingness to engage with the company as a shareholder with the objective of improving their practice, or a strategy of gradual exclusion. Whatever the reason, a question that arises sooner or later for the asset manager is to know what the impact of a possible exclusion on the performance and risk profile of the fund would be. There is no consensus on the existing literature whether the integration of environmental, social, and governance (ESG) criteria in investment funds affects the financial performance of the funds (Friede, Busch and Bassen 2015). One of the reasons for this lack of consensus is the broad spectrum of practices that fall under ‘integration’ of ESG criteria. Among these different practices, several studies have investigated the effect of the exclusion of stocks, with mixed results (e.g., Khajenouri and Schmidt 2021; Capelle-Blancard and Monjon 2014). Even when focusing on the exclusion of fossil fuels, the effect on funds’ performance remains uncertain: Henriques and Sadorsky (2018) find negative effects while Trinks et al. (2018) find no difference and Hunt and Weber (2019) find positive effects. Our study aims to contribute to this literature by focusing on the effects of exclusion on risks rather than short-term performance. The risk profile of a fund is responsible for its long-term performance patterns, and thus it is a primary concern for managers. We therefore seek to answer the following question: what

1 - The main results of the investigation are available at: <https://www.ftm.eu/green-investments> (visited on September 2023).

2 - Source: <https://www.sustainalytics.com/esg-research/resource/investors-esg-blog/sustainable-investments-definition-across-eu-regulations-still-unclear> (visited on September 2023).

I. Introduction

would be the impact of excluding stocks associated with climate change on the risk profile of funds that have a 'sustainable investment objective' ('Article 9') funds?

To do so, we study a sample of 161 funds considered as 'Article 9' as of July 2023 and study the effects of excluding stocks involved in coal, fossil fuels and aviation on their tracking error, their sector allocation, and their exposure to the five financial risk factors developed by Fama and French (2015).

We find that of the 161 funds studied, 50 funds contain companies that are involved in at least one of the three climate-related controversial activities and that these companies represent on average 2.82% of the funds' portfolios. Overall, the exclusion of these stocks has a small effect on the funds risk profile. The tracking error between the initial portfolio and the portfolio without the controversial stocks is on average 0.53% (the median is 0.32%) when the exclusion is performed using a naive (pro-rata), and 0.43% (the median is 0.23%) when the reallocation is optimized. Similarly, when we look at the tracking error relative to a regional benchmark, the changes remain small: on average the initial tracking error is 4.74% (before exclusion), and for 50% of the funds, the increase is less than 0.03% with the naive reallocation. The relative sector deviations that we observe are also small, and they affect mainly the 'Energy' and 'Utility' sectors. However, we find that excluding controversial stocks does affect exposures to traditional risk factors when performed naively. For instance, we observe a slight increase in average exposure to the 'Quality' factor (from 0.11 to 0.13), whereas exposure to the 'Investment' and 'Value' factors is reduced (from -0.05 to -0.07). As for the tracking error, the optimization method also mitigates the effect of exclusions on the exposure to factors.

These results suggest that maintaining the current risk profile does not constitute a ground for holding these environmentally controversial stocks, as they could be excluded without significantly altering it. To preserve the credibility of funds with a 'sustainable investment objective', particularly in the eyes of retail investors, it therefore seems essential to improve transparency regarding the holding of 'controversial' assets and the reasons for such holdings.

2. The Uncertain Effects of Exclusions on Financial Risks

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Regarding the existing literature, there is no consensus on whether the integration of responsible or sustainable³ criteria in investment funds, such as environmental, social and governance (ESG) criteria, influence funds' performance and risk metrics. Friede, Busch and Bassen (2015) synthesize the results of more than 2,200 empirical studies published between 1970 and 2015 on the relationship between financial performance and the integration of ESG criteria into investment decisions and show that 90% of studies find a '*nonnegative relation between ESG and corporate financial performance*'. Out of 155 studies concerning portfolios and financial products such as funds and indices, they show that 16% of them find a significantly positive relation between the integration of ESG criteria and fund performance while 11% find a significantly negative relation and the remaining studies find mixed or insignificant results. They also show that within the individual E, S, and G criteria, 59% of the studies focusing on the implementation of the E criteria find a positive relation with financial performance and only 4% find a negative relation⁴.

One explanation of this lack of consensus is that 'integration of ESG criteria' covers a wide range of practices. Among them, exclusion - or negative screening - of companies that are involved in controversial activities or behavior is one of the most widespread. It has been used since the 19th century but has received renewed interest with the development of environmental and social concerns (Arjaliès 2010).

Even when studies linking sustainable investment and financial performance are restricted to those examining the effects of exclusion, the results diverge. Capelle-Blancard and Monjon (2014) find for example that more restrictive screening slightly reduces financial performance (on a sample of 116 'socially responsible' mutual funds over the period 2001-2007). More precisely, they find that financial performance is only affected by screens targeting certain activities, while screens related to behavior - like controversies related to UN Global Compact and the Rights at Work principles - have no effect. These results at fund level are consistent with the results at stock level from Trinks and Scholtens (2017), who show that stocks involved in controversial activities⁵ have additional risk-adjusted returns and that excluding them from a portfolio might therefore reduce financial performance (over a sample of 1600 stocks between 1991 and 2012, consistent with Fabozzi et al, 2008). On the other side, several studies highlight a positive effect of exclusion on financial performance. Khajenouri and Schmidt (2021) find for example that ESG screened indices⁶ have provided better risk-adjusted returns than their references over the period 2013-2020. This lack of consensus on the relation between exclusion and financial performance is sometimes explained by differences sample characteristics (region, period, size) or the diversity of exclusion criteria.

In the face of the climate emergency, fossil fuels divestment has become increasingly popular - it is now estimated that nearly 1,600 institutions have publicly committed to divesting from fossil fuels, representing over \$40,000 billion in assets⁷ - and has therefore been the subject of recent academic research. Henriques and Sadorsky (2018) compare for example three portfolios: a portfolio containing companies involved in fossil fuels, a portfolio where these companies are excluded, and a portfolio where these companies are replaced with clean energy companies. They find that, portfolios that divest from companies involved in fossil fuels without replacing them have lower performance than

3 - In the rest of this document, we'll be referring to these funds as Social and Responsible Investment (SRI) or ESG, as they are mentioned in papers.

4 - These results exhibit a slightly more positive relation than G or S-focused studies.

5 - Defined as stocks of companies involved in the following activities: abortion, adult entertainment, alcohol, animal testing, contraceptives, controversial weapons, fur, gambling, genetic engineering, meat, nuclear power, pork, embryonic stem cells, and tobacco.

6 - These ESG screened indices exclude companies involved in controversial, civilian and nuclear weapons, tobacco, thermal coal and oil sands extraction, and companies that are not compliant with the United Nations Global Compact principles.

7 - <https://divestmentdatabase.org/>

2. The Uncertain Effects of Exclusions on Financial Risks

portfolios that do not divest, but that replacing the companies with clean energy companies leads to better performance (over the period 2005-2016). On the other hand, Hunt and Weber (2019) compare the effects of six different fossil fuels exclusion criteria⁸ and find that excluding these stocks lead to higher risk-adjusted returns for the six portfolios (on the Canadian TSX 260 stock index over the period 2011-2015). However, over a longer period, Trinks et al. (2018) find no difference in the performance of two major indices⁹ when excluding companies involved in fossil fuels (over the period 1927-2016).

These results - which diverge despite their focus on companies involved in fossil fuels - show the need to carry out ad-hoc studies based on the issues encountered by asset managers. In this paper, we aim to contribute to this literature and to the debate on funds that have a 'sustainable investment objective' through an analysis of the effects of divesting from climate-related sectors - expanding the fossil fuels criteria to aviation - on the risk profile of these funds. Indeed, few studies have investigated the effects of exclusion on risk. For example, Hunt and Weber (2019), who find a positive effect of fossil fuels exclusion on an index performance, observe however a higher variance of the divestment portfolios and Blitz and Swinkels (2023) argue that exclusions lead to under-diversification and an exposure to unrewarded, diversifiable risk, or tracking error.

However, in our study, we therefore propose to observe the effects of exclusions on several risk metrics regularly used by asset managers to construct and manage their portfolios: the tracking error, sector allocation and exposure to traditional risk factors (Fama and French 2015).

8 - They create six portfolios by applying the following exclusion criteria: i) coal, ii) coal & energy equipment and services, iii) coal & companies listed in the Carbon Underground 200 (a list of the biggest carbon emitters), iv) coal & oil, gas and consumable fuels, v) Energy sector, and vi) Energy & Utilities sectors.

9 - S&P 500 and FTSE 100.

3. Data and Model

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As there is no consensus on the definition of sustainable funds, we present in this section the criteria used to build our sample of funds, as well as the ESG data used to identify controversial stocks related to climate change. We finally present the risk metrics used to study the effects of exclusions on fiduciary liability.

Sample of Sustainable Funds

To avoid defining a new subjective criterion for considering a fund to be sustainable, our sample is composed of funds that meet the more stringent criteria of the SFDR, i.e., funds that have a 'sustainable investment objective' and must therefore comply with 'Article 9' requirements. These sample criteria are in line with those used by the GGII but differ in the observation date: our sample list has been extracted as of July 2023 while the sample list of the GGII has been extracted as of the 30th of June 2022. Following - among other things - the controversies that arose in the wake of the GGII, around 40% of Article 9 funds were reclassified as Article 8 by the end of 2022. We can therefore expect the results obtained from our sample to differ from those obtained by the GGII as a result of this wave of reclassification.

Our sample is composed of equity funds that comply with the requirements of Article 9 of the SFDR¹⁰. We excluded funds with historical tracks of less than a year, as well as funds with more than 1% of their holdings in emerging countries. Also, we only considered funds whose composition is available and account for at least 85% of the capital invested. Our sample thus contains 161 'Article 9' funds that contain a total of 2,362 stocks.

Criteria for Climate-Related Exclusion

To identify the controversial companies that have a negative contribution to climate mitigation and should therefore be excluded, we rely as far as possible on the same criteria and data as the GGII. Consequently, we used Bloomberg's sector classification 'airlines' and 'airport development/maintenance' to identify companies involved in the aviation sector, and the Urgewald's¹¹ Global Coal Exit List (GCEL) and Global Oil & Gas Exit List (GOGEL). The GCEL is a list of 2,799 companies involved in coal, oil and gas production¹², based on a database that covers the entire thermal coal value chain. This list contains companies that meet criteria based on their share of coal-related revenues or power generation, their quantity of coal production or generation, and their coal-related expansion plans. Similarly, the GOGEL is a list of companies involved in the oil and gas industry. The database covers 901 companies responsible for 95% of the world's oil and gas production, operating in upstream and/or midstream subsectors¹³. The list contains companies based on criteria of production, production expansion and exploration budgets.

These criteria for identifying climate controversial activities are similar to those defined by the European Union regulation to build Paris-aligned benchmarks. These benchmarks also contain criteria for companies engaged in coal, oil and gas activities, with variations in thresholds¹⁴. However, they do

10 - Data from Morningstar.

11 - Urgewald is a German non-profit organization whose objective is to establish environmental and social standards for the international finance industry.

12 - As of April 2023.

13 - As of April 2023.

14 - Companies' revenues from coal must be inferior to 1%, from oil, to 10% and from gas, to 50%.

3. Data and Model

not consider the aviation sector, but encompass other sectors that are more related to social concerns like companies that violate the United Nations Global Compact principles.

Risk Profile of the Funds

To assess the impact of exclusions on the funds' risk profile, we measure a number of key indicators. First, we estimate the tracking error between the screened and the initial funds¹⁵ using a sample covariance matrix normalized with the methodology proposed in Ledoit and Wolf (2003). We also measure the impact of exclusions on sectors¹⁶ weights, as well as exposures to traditional risk factors. For the latter, we use the five-factors model of Fama and French (2015), and obtain factor exposures (or betas) by estimating the following regression on the last five years of daily returns

$$R_{it} = \beta_{Mi}R_{Mt} + \beta_{SMB,i}SMB_t + \beta_{HML,i}HML_t + \beta_{RMW,i}RMW_t + \beta_{CMA,i}CMA_t + \varepsilon_{it}$$

where R_{it} represents the return of the i th fund, the returns of the local market factor are denoted by R_{Mt} and ε_{it} is the error term. There are different sets of risk factors for every geographical region, and hence exposures are evaluated with the set corresponding to the region where the company is domiciled, which can be any of North America, Europe, Japan or Asia Pacific ex-Japan. Exposures to the SMB (small minus big) and HML (high minus low) factors are associated with small stocks and good-value stocks, respectively. Stocks exposed to the RMW (robust minus weak) factor are associated with high quality companies, whereas those exposed to the CMA (conservative minus aggressive) factor with companies that invest conservatively.

Exclusion Methodologies

We apply essentially two methods to perform exclusions from the funds' portfolio. The first, that we call naive, is an exclusion followed by a pro-rata reweighting of the portfolio remaining stocks¹⁷. This methodology assumes that an investment manager sells the controversial positions and reinvests the proceedings in the remaining equity positions proportionally to their initial weight.

The second methodology is based on a tracking error minimization between the original portfolio w_{old} and the new portfolio that does not contain the excluded stocks. The new portfolio is therefore the solution to the minimization program:

$$w_{new} = \operatorname{argmin}_w (w - w_{old})^T \Omega (w - w_{old})$$

Here the covariance matrix is the same sample covariance matrix normalized with the methodology proposed in Ledoit and Wolf (2003) that we use to measure the ex-post tracking error¹⁸. Here portfolios are long-only and their budget constraint is set so that the old and new portfolio have the same amount of capital invested. The resulting portfolios correspond to the action of an investment manager who would sell the controversial positions and reinvest the proceeds in a way that reduces the impact of the exclusions on the risk of the portfolio. It will therefore favor re-investments in stocks with risk profiles as close as possible to the excluded ones.

15 - The tracking error is computed using daily returns over 5 years. Missing returns are replaced by zero, which does not alter the calculation since the covariances used to calculate the tracking error are zero.

16 - We use the Refinitiv Business Classification for 13 economic sectors

17 - During this reallocation, however, we keep the equity portion of the fund constant, so that the tracking errors and factor exposures are consistent to the funds' behavior. If, for example, a fund has 85% equity and 15% has to be excluded, this 15% will be distributed in proportion to the remaining 70% of equity stocks, but in such a way that the sum of equity is always equal to 85%.

18 - All prices are in US dollars.

4. Results

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In this section, we first show that despite the wave of reclassification from Article 9 to Article 8 funds, almost a third of our fund sample still contains controversial climate-related stocks. We then show that excluding these stocks would have small effects on the risk profiles of the funds and that these effects can be reduced by optimizing the reallocation.

Investments in Controversial Climate-Related Stocks

In our sample of 161 funds (representing 2,362 different stocks), 50 funds contain stocks whose underlying companies are involved in at least one of the three climate-related controversial activities; coal, other fossil fuels and aviation (representing 60 different stocks). While being one of the most controversial activities, involvement in coal is the most frequently encountered criterion, both in terms of number of stocks and number of funds (Table 1).

Table 1. Controversial stocks

	Involved in Coal	Involved in Oil & Gas	Involved in Aviation	Involved in Controversial Activities	Total
Number of stocks*	23	18	21	60	2,362
Number of funds	36	22	22	50	161

Note: some stocks are excluded for multiple controversial activities.

From a sector perspective, the companies involved in these controversial activities are concentrated into three sectors: industrials (that contains the aviation industry), Utilities and Energy (Table 2).

Table 2. Number of controversial stocks by sector

	Involved in Coal	Involved in Oil & Gas	Involved in Aviation	Involved in Controversial Activities	Total
Industrials	2	1	21	23	455
Utilities	18	0	2	19	87
Energy	1	13	0	14	53
Basic materials	1	0	1	2	161
Financials	0	1	1	2	481
Other sectors	0	0	0	0	1125

From a regional perspective, the companies involved in the controversial activities are mainly located in Europe and North America (Table 3), which is in line with the region distribution of the funds in our sample (nearly half are based in Europe and over a third in United States). In proportion, controversial stocks represent 2.3% of the number of stocks in our sample based in Europe (in line with North America), while this figure is approximately twice as large for Asia-Pacific.

4. Results

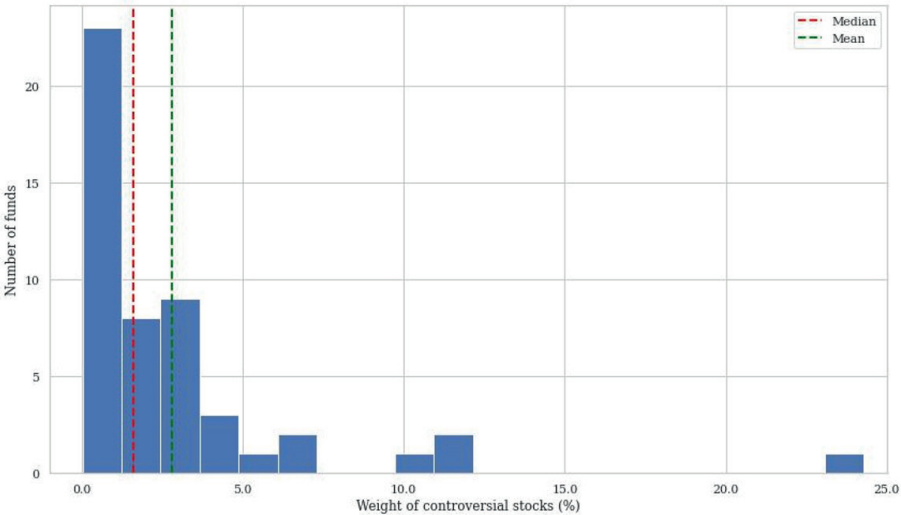
Table 3: Number of controversial stocks by region

	Involved in Coal	Involved in Oil & Gas	Involved in Aviation	Involved in Controversial Activities*	Total
Europe	5	11	10	25 (2.3%)	1079
North America	14	3	4	21 (2.4%)	860
Asia-Pacific	4	2	2	8 (5.8%)	138
Japan	2	3	2	6 (2.1%)	285

Note: *This figure is given in number of stocks and in proportion to total number.

When it comes to weights into funds, the share of controversial stocks in our sample of sustainable fund is on average 2.82%. However, this number is driven by three funds with extreme values: 50% of the funds have less than 1.60% of their weight invested in controversial stocks (Figure 1). Interestingly, these three funds with the highest share of controversial stocks have committed to investing in infrastructure companies aligned with sustainability objectives for at least a given share of their assets. One of these funds have for example committed to invest ‘*at least 80% of its total assets in the equity securities of companies globally whose predominant economic activity is in the infrastructure sector and aligning with the objectives of the UN Sustainable Development Goal*’. Our results suggest that the remaining share (20%) of the funds’ assets are not subject to environmental criteria, as it is invested in stocks with a negative impact on sustainable development objectives linked to climate change.

Figure 1. Distribution of weights of controversial stocks in funds



Note: the sample is made of the 50 funds holding controversial stocks.

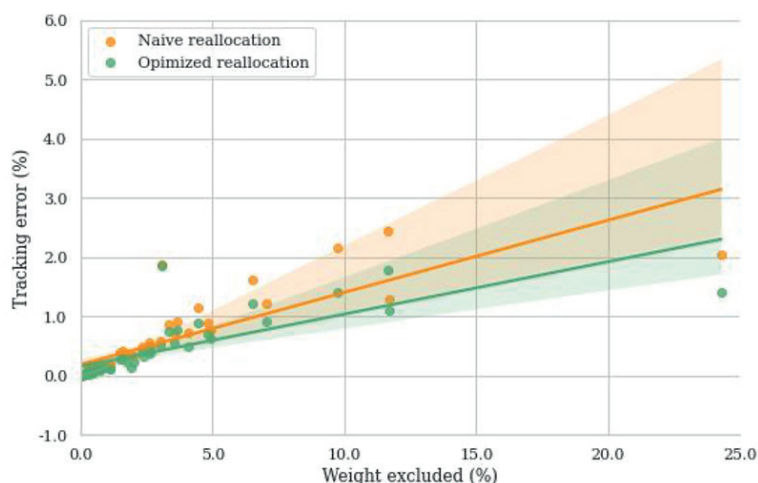
Effects of Exclusion on Tracking Error

Excluding stocks with a naive reallocation leads to a relative tracking error (between the fund after exclusion and the fund before exclusion) of 0.53% on average (the median is 0.32%), which is low. The reallocation technique based on tracking error minimization slightly reduces this number, with an

4. Results

average ex-post relative tracking error of 0.40% (the median is 0.23%). As expected, the tracking error is on average proportional to the total weight of excluded stocks. This is why some funds that contain many controversial stocks would induce a tracking error above 1.00% (Figure 2) to exclude them. In these cases, the optimized reallocation method is particularly efficient, as it produces much lower tracking errors than the naive method. It thus mitigates the consequences of excluding controversial stock in cases where their weight in the portfolio is above average. Similarly, when we look at the tracking error relative their regional benchmarks¹⁹, the changes remain small: on average the tracking error is 4.74% before exclusion (the median is 3.87%). With a naive reallocation, the tracking error rises on average by 0.09%. However, for 50% of the funds, the increase is less than 0.03% and this figure is even reduced with optimization (Appendix, Figure 6). This is because exclusions potentially increase or decrease the proximity of the fund with the regional benchmark, hence resulting in a small impact overall.

Figure 2. Effects of exclusion on tracking error



Note: the sample is made of the 50 funds holding controversial stocks. The two lines represent the linear regression model between the weight excluded and the tracking error, while the colored areas represent the 95% confidence intervals for the regressions.

Effects of Exclusion on Sector Allocation

Consistent with the sector breakdown of controversial stocks presented above, the exclusion mainly leads to sector allocation deviations in the Energy and Utilities sector (absolute deviations of respectively - 0.72% and - 0.65%, Figure 3b). The result for the Industrials sector is less intuitive, as the average deviation is close to 0% while the sector is the one highly represented in excluded stocks (23/60). For most of the funds holding controversial stocks in this sector (aviation), this is due to a compensation effect: aviation, which represents a small share of this sector is excluded but the remaining allocation to the Industrials sector increases during the reallocation process as the sector represents an important share of the initial allocation (Figure 3a).

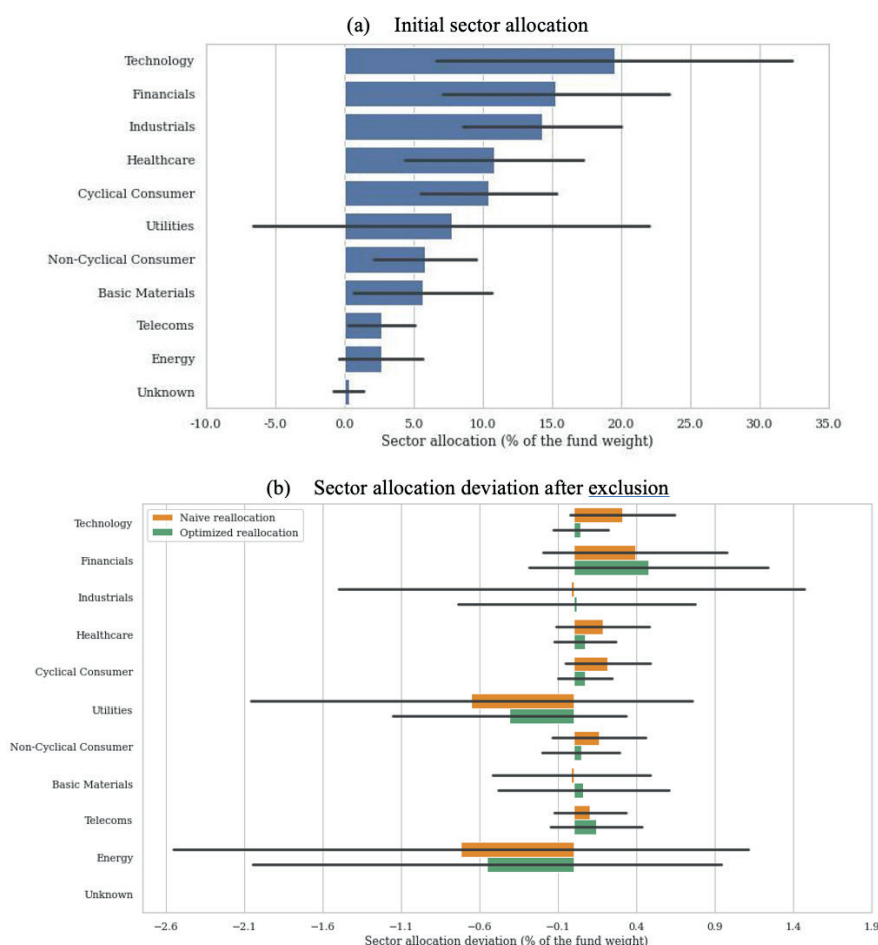
Compared to the initial allocation, the most important relative deviation concerns the Energy sector with the sector weight falling on average from 2.66% to 1.94% (which represents a relative deviation

19 - Regional benchmarks are capitalization-weighted indices for the 4 regions: North America, Developed Europe, Asia-Pacific ex Japan and Developed Global for other developed countries. They are allocated according to the fund's region as provided by Morningstar, or according to the fund's composition in case of missing data.

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of 27%). However, the initial average allocation to this sector is significantly lower than the regional benchmarks for (Appendix, Figure 5). The optimization does not reduce overall sector deviations: the reduction of deviation for the Energy and Utilities sectors is compensated by an increase in deviation for Financials, Telecoms and Basic materials sectors.

Figure 3. Effects of exclusion on sector allocation



Note: the sample is made of the 50 funds holding controversial stocks. The colored bars represent cross-sectional averages while the horizontal grey lines represent cross-sectional standard deviations.

Effects of Exclusion on Exposure to Risk Factors

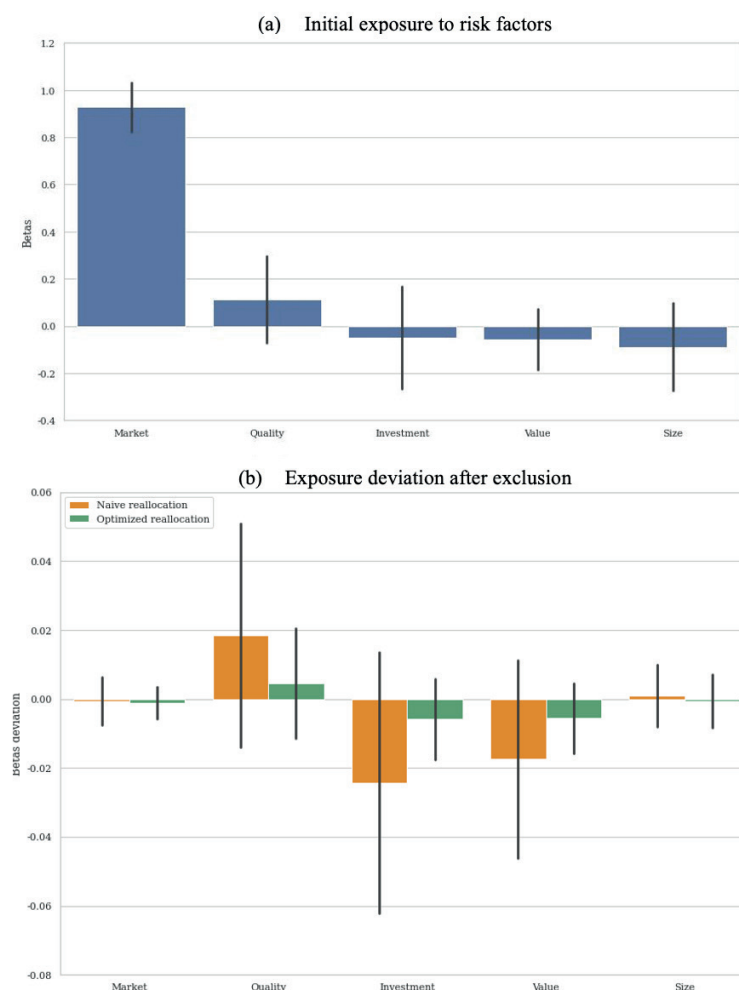
The exclusion with naive reallocation increases funds average exposure to the Quality (RMW) factor (from 0.11 to 0.13) and decreases average exposure to the Investment (CMA) and Value (HML) factors from -0.05 to -0.07 (Figure 4). These results can be explained by the factor exposure of the controversial stocks and their sectors. The 18 companies involved in 'oil and gas activities' and the 21 companies involved in 'aviation' (see above) have for example a strong negative exposure to the Quality factor. Excluding these companies therefore leads to an increased exposure of funds to this factor. Similarly,

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the companies involved in the three controversial activities have a strong positive exposure to the Investment and Value factors, therefore leading to a decreased exposure of funds to these factors after exclusion. Compared to regional benchmarks, exclusions tend to reinforce certain biases existing in the funds (before exclusion), in particular to the Quality factor whose initial exposure is on average higher than that of the benchmark (for the North America and Global regions).

From a risk management perspective, these deviations are not trivial. However, the optimization approach significantly limits the exposure deviation to these factors (Figure 4b). This is a result of the optimization technique objective, which is to reduce the differences between the risk profile of the original and new portfolio.

Figure 4. Effects of exclusion on exposure to risk factors



Note: the sample is made of the 50 funds holding controversial stocks. The colored bars represent cross-sectional averages while the horizontal grey lines represent cross-sectional standard deviations.



Conclusion

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This article contributes to the literature on the effects of excluding controversial stocks on the funds' financial performance (Henriques and Sadorsky 2018; Trinks et al. 2018 and Hunt and Weber 2019). In order to be closer to the asset managers' concerns and constraints, we propose to shift our focus from performance to risk metrics. We seek to understand whether fiduciary liability might explain why asset managers have chosen to hold these controversial stocks in their sustainable portfolios.

Following the 2022 investigation published by a consortium of a dozen of European media, we analyse for 161 funds that have a 'sustainable investment objective' according to the European sustainable financial disclosure regulation (Article 9) the effects of excluding stocks involved in coal, fossil fuels and aviation on the funds' tracking error, sector allocation and exposure to the Fama and French (2015) five factors.

As of 2023, we show that over 161 funds that have a 'sustainable investment objective' according to the European sustainable financial disclosure regulation (Article 9), fifty still contain stocks of companies involved in coal, oil and gas or aviation despite the 2022 wave of reclassification from Article 9 to Article 8.

The exclusion of these stocks even with a naive reallocation has a limited effect on the tracking error and sector diversification of the funds. These results are in line with those Trinks et al (2018)'s long-term analysis that the average impact on the tracking error of excluding climate-related stocks²⁰ is small but increases with the weight of excluded stocks. In some cases, we show that exclusion causes nontrivial deviations in exposure to the Quality, Investment and Value risk factors. However, we show that a simple risk minimization technique significantly reduces these deviations.

Finally, our results suggest that holding these stocks in sustainable funds is not justified from a risk perspective. In order to guarantee the credibility of these funds, it therefore seems essential that asset managers justify the holding of these stocks, either by differences on the assessment of their belonging to controversial sectors (data discrepancy), or by a shareholder engagement policy aimed at improving the practices of the underlying companies.

However, these results should not be generalized to all exclusion practices and to all funds: they concern specific climate-related criteria as well as funds claiming a sustainable objective. One avenue of research could be to extend the analysis of the effects of exclusion on risk metrics to other exclusion criteria, including social and governance issues on a broader universe of funds. In these cases, it will be particularly interesting to disentangle the impact on the tracking error due to the weight of excluded stocks - which is likely to be higher - from deviations in exposure to factors linked to exclusion, and from changes in the proportion of unexplained risk.

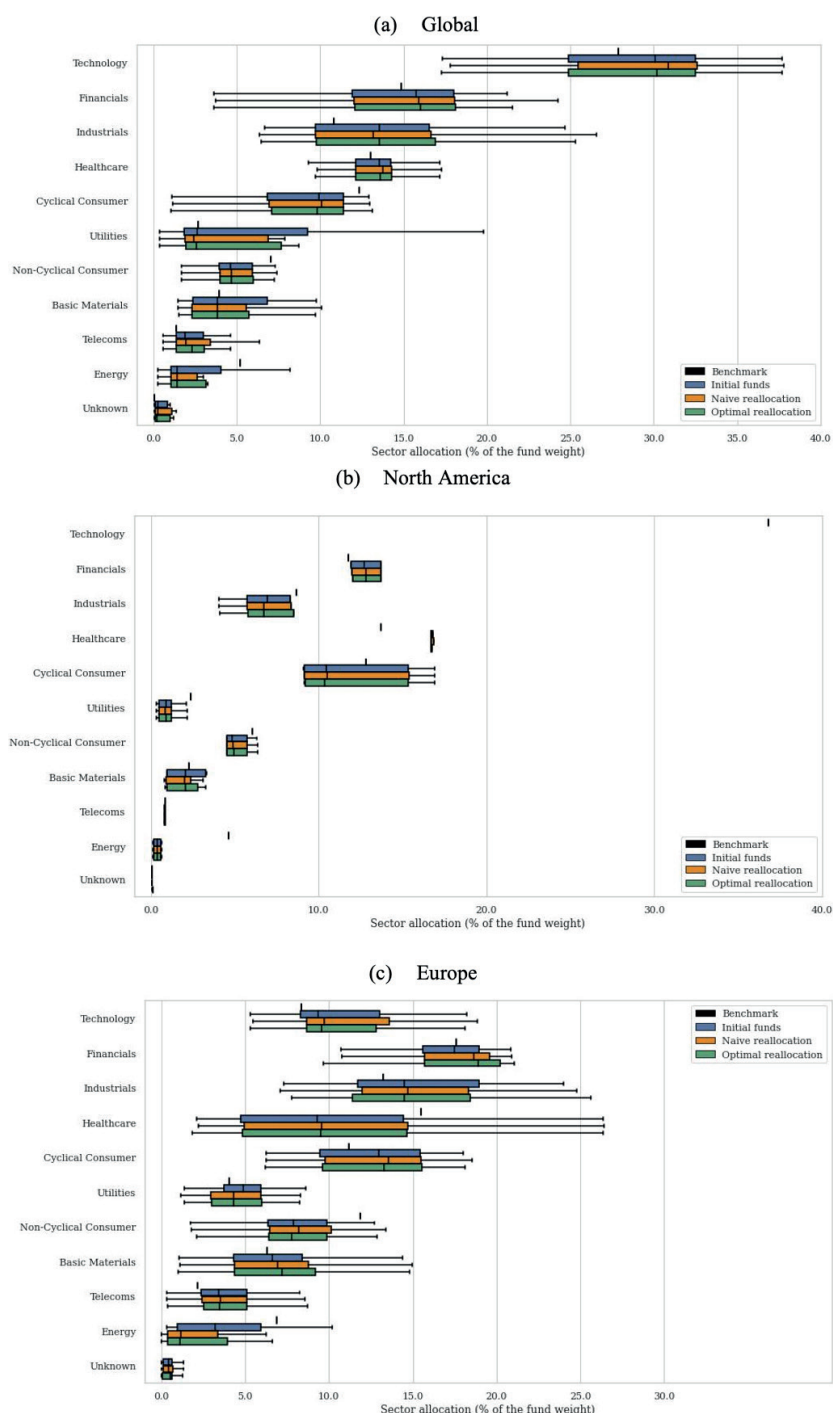
20 - Trinks et al. (2018) consider "Coal", "Oil and gas" and "All fossil fuels" but not "Aviation".



Appendix

Appendix

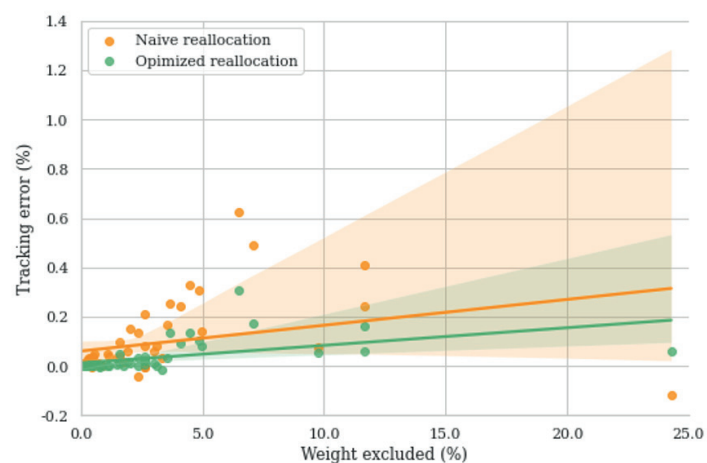
Figure 5. Effects of exclusion on sectors repartition by region



Note: In this figure, we compare for each region the share of sectors (The Refinitiv Business Classification) in the regional benchmark (blue) with the share in our sample of 50 funds holding controversial stocks (before exclusion in blue, after exclusion and naive reallocation in orange, and after exclusion and optimized reallocation in green). Note that the sample of funds from North America constitutes only five funds.

Appendix

Figure 6. Difference of tracking error between screened funds and initial funds



Note: the sample is made of the 50 funds holding controversial stocks. The two lines represent the linear regression model between the weight excluded and the tracking error, while the colored areas represent the 95% confidence intervals for the regressions.

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