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Sustainability Funds Hardly Direct Capital Towards Sustainability

A Statistical Evaluation of Sustainability Funds in Switzerland and Luxembourg

Zurich, Switzerland, 3 May 2021

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Editorial Information

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Content

Summary

Aim and scope of the study

This study elaborates on whether or not sustainable investments[1] have a positive capital allocation effect on investment portfolios, and which framework conditions are needed for an effective capital allocation. The research questions are as follows:

1. Are sustainability retail funds in Switzerland and Luxembourg able to effectively *channel capital* into sustainable economic activities? To what extent are they still invested in activities that are problematic from a sustainability perspective?
2. How effective is the application of different *sustainability approaches* (best-in-class, exclusions, ESG[2] integration, engagement, etc.) by asset managers for achieving a positive capital allocation?
3. What *framework conditions* are needed for an effective capital allocation? What could the current EU regulatory framework contribute in this regard?

For research questions one and two, we conducted a statistical evaluation of a sample of retail funds available in Switzerland and Luxembourg. The elaboration of the third research question is based on the results of the statistical evaluation, literature review, and expert knowledge.

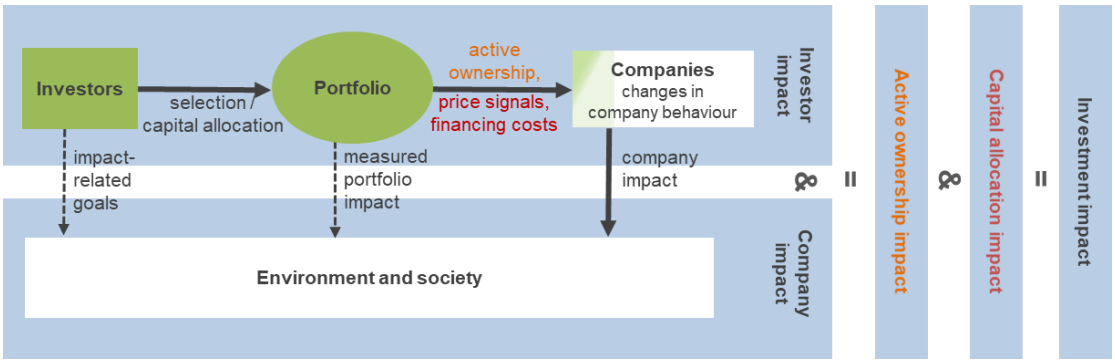
Conceptual framework

Investments can contribute to sustainable development – create a positive "investment impact" on the environment and society – in the following way (see Figure 1):

- *Investor impact:* Firstly, investments influence company behaviour in the economy by changing or enforcing certain company activities (see upper part of Figure 1).
- *Company impact:* Then, secondly, the different company behaviour and potentially further systemic effects in the economy in sum have a positive "company impact" on the environment and society (see lower part of Figure 1).

[1] Sustainable investments are defined as investments in which environmental, social and governance (ESG) factors are integrated into investment decisions, see SSF 2020.
[2] "ESG" stands for environmental, social and governance factors.

Figure 1: Capital allocation impact and active ownership impact



This figure shows that investment impact can be achieved via *capital allocation impact* – where capital allocation changes financial market prices and/or financing costs and, this way, improves company impact – and / or *active ownership impact* – where engagement or (proxy) voting improves company impact over time. Further indirect investment impacts are not included in the figure.

Source: Inrate 2021, based on Kölbel et al. 2019.

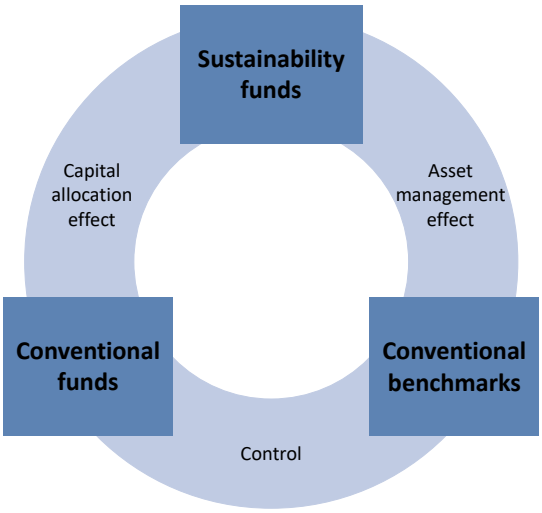
Investors can influence company behaviour and achieve positive *investor impact* mainly by using the following levers (see Figure 1):

- *Capital allocation:* Capital allocation resp. selection steers capital away from certain investments (shares, bonds, real estate, etc.) with a negative impact – via divesting or underweighting – towards investments with a positive impact – via investing or overweighting. Such selection improves the "*portfolio impact*", i.e. the impact of invested companies (or other assets such as real estate) on the environment and society.
  Provided that the market power of sustainable investors is large enough, capital allocation increases the relative share and/or bond prices of sustainable companies. Such a *price signal* strengthens the competitiveness of sustainable companies and enables them to expand their activities relative to their competitors and, this way, drives structural change towards a more sustainable economy.
- *Active ownership:* With engagement or (proxy) voting, investors aim to advance incremental improvements in company operations and, this way, to improve company impact. Thus, active ownership does not necessarily result in a better portfolio impact right away, but usually in incremental portfolio impact improvements over time.

Scope of the empirical analysis

Figure 2 provides an overview of the three types of comparisons that we performed to attain a comprehensive picture concerning the capital allocation effect on portfolio impact:

Figure 2: Statistical comparisons

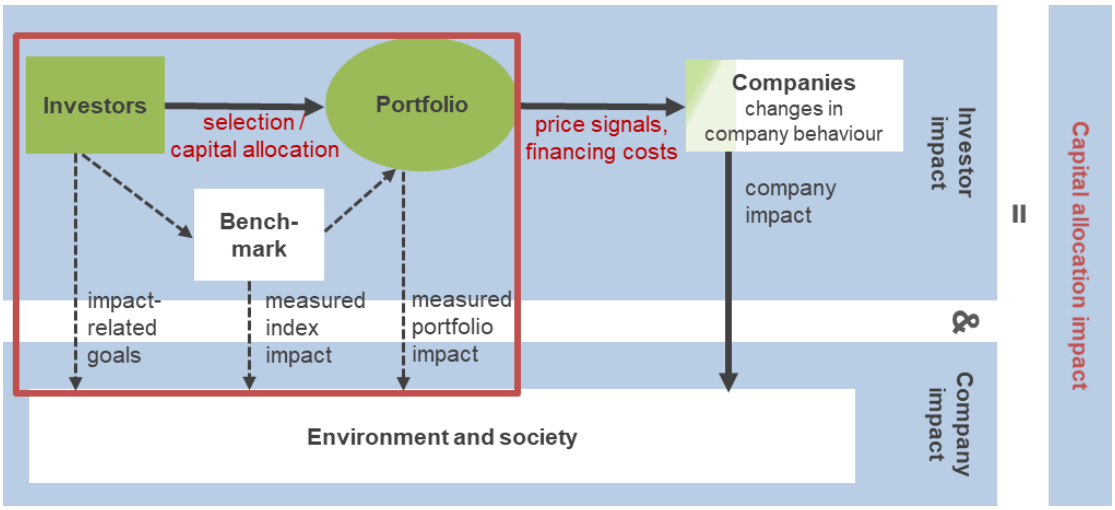


Source: Inrate.

- *Capital allocation effect on portfolios*[3]*:* Firstly, to investigate whether sustainability funds are able to actually allocate capital into sustainable activities, we compared the group of sustainability funds with the group of conventional funds in our sample. To do so, we focused on whether sustainability funds have a positive capital allocation effect on portfolios ("*portfolio impact*"), i.e. if and how far sustainability funds are invested in portfolios with a significantly better impact than conventional funds. With this we cover the first part of the entire capital allocation impact (Figure 3).[4]
- *Asset management effect on portfolios*[5]*:* Secondly, we made a pairwise comparison between each sustainability fund that used a conventional index as benchmark with its respective benchmark. This way we measured how asset managers influenced the impact of the sustainability fund as compared to the index impact of its conventional benchmark.[6] It helped to better understand why a certain capital allocation effect was (not) occurring.
- Thirdly, we compared the group of conventional funds with the group of conventional benchmarks used by the sustainability funds in our sample as a *control*.

[3] In the following, we use "*capital allocation effect*" as an abbreviation, implying that we mean the capital allocation effect on portfolio impact, not the entire capital allocation impact.
[4] With this study design, we could not measure the capital allocation effect of engagement and (proxy) voting, which aims at generating a positive company impact over time.
[5] In the following, we use "*asset management effect*" as an abbreviation, implying that we again mean asset manager's effect on portfolio impact, not on company impact.
[6] Fund managers usually base their investment decisions on indices. Often, a large proportion of fund assets is taken from these indices, and the indices serve as benchmarks for measuring the fund managers' investment performance. The actively managed sustainability funds in our sample were mostly (28 out of 31 actively management sustainability funds) based on conventional benchmarks, e.g. the MSCI world, while all of the passively managed sustainability funds – the ETFs – replicated sustainability indices, e.g. the MSCI world SRI.

Figure 3: Capital allocation impact and study focus



This figure shows the capital allocation impact of investments via capital allocation and price signals resp. changes in financing costs (in red). This study focuses on assessing the *capital allocation effect of sustainability funds on portfolios* (red rectangle), i.e. whether sustainability funds have a significantly better portfolio impact than conventional funds. Due to the importance of benchmarks for asset management decisions, we also investigate if sustainability funds using conventional indices as benchmarks have a significantly better portfolio impact than their respective conventional benchmark.

Source: Inrate 2021, based on Kölbel et al. 2019.

Finally, we used a regression analysis to investigate if the application of *sustainability approaches* (best-in-class, exclusions, ESG integration, engagement, etc.) significantly contributes to a positive capital allocation. Here, we controlled for the benchmark type – conventional vs. sustainable vs. no or unknown benchmark – as well as for commonly used parameters: the regional investment focus, portfolio concentration and tracking error.

To assess the portfolio impact of the funds and benchmarks, we used the four sustainability impact measurements as *dependent variables*[7]:

- The weighted average *ESG Impact* score, based on the Inrate ESG Impact score [0; 1]. For descriptive reasons we transferred these into ESG Impact grades [D-; A+].[8]
- The weighted average *carbon intensity* (WACI), based on the carbon intensity in tCO_2/million USD revenue.

[7] To calculate the dependent impact variables of the funds, we aggregate the sustainability impact of the holdings according to the weights in the respective fund.
[8] An ESG Impact score of zero corresponds to a very negative net impact on environment and society, a score of one to a very positive net impact. ESG Impact grades from A+ to B- show a positive net impact, grades from C+ to D- a negative net impact.

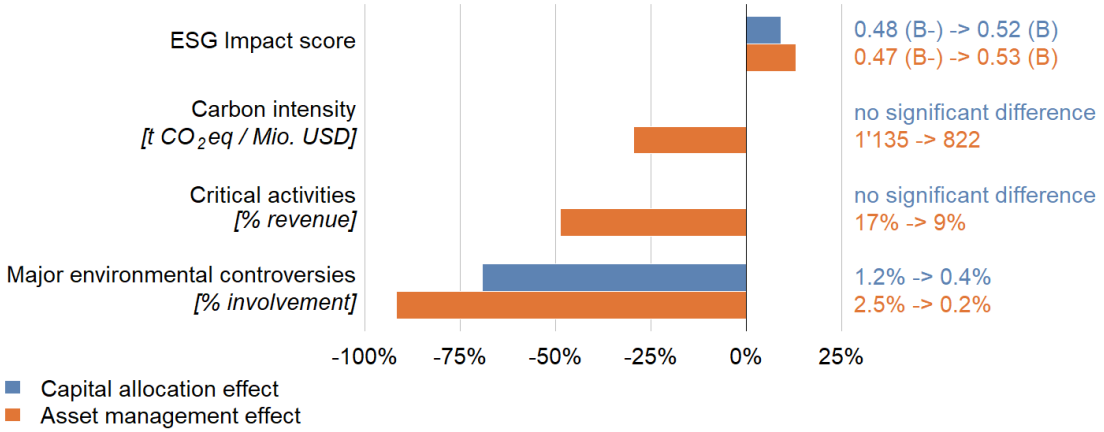
- The weighted percentage of revenues derived from *critical economic activities*[9], based on the revenue share (in %) derived with critical economic activities of invested companies.
- The weighted involvement in *major environmental controversies*, based on the share of companies (in %) in a portfolio being involved or not involved [yes; no].

These impact variables are based on Inrate impact data as of October 2020. The conceptual basis are extra-financial assessments of external effects that, due to market failures, are not internalized into market prices. Each of these impact measures considers the encompassing impact along entire value chains (scope 1, 2 and 3).

Results of the empirical analysis

In this chapter, we discuss the main empirical findings, summarized in Figure 4.

Figure 4: Main results



This figure displays in blue the mean difference between sustainability funds and conventional funds (as a measure of the capital allocation effect) in percentage of the mean of the conventional funds, and in orange the mean difference between sustainability funds and their respective conventional benchmarks (as a measure of the asset management effect) in percentage of the mean of the benchmarks.

Source: Inrate ESG Impact data and Climate Impact data as of October 2020.

Capital allocation effect hardly existent

Figure 4 reveals that, so far, sustainability funds in Switzerland and Luxembourg have hardly been able to steer capital towards portfolios containing (more) sustainable economic activities.

[9] The following economic activities were labelled as critical due to their detrimental impact on the environment and society: agricultural industry and fishing (meat, dairy/eggs, seafood/fish, fertilizer & pesticides), defence industry, fossil fuels, mining and production of metal, nuclear energy, production of cement, transportation industry (road transportation, excl. public transport, and air transportation).

The capital allocation effect comparing sustainability funds with conventional funds was only partially significant and thus demonstrable: The involvement in major environmental controversies was quite effectively reduced by 0.8 percentage points on average, i.e. by more than two thirds (or 69%). The improvement of the overall ESG Impact on the environment and society was also significant, but, in contrast, hardly relevant. It improved only slightly by 9% resp. 0.04 and thus by half a notch, i.e. half the difference between the ESG Impact grades C- and C.

Our study did not reveal any significant capital allocation effect in terms of climate impact (encompassing scope 1-3). Furthermore, we discovered no significant capital allocation effect for the overall involvement in problematic economic activities.

It appears that significant and relevant portfolio impact improvements of sustainable funds compared to conventional funds were revealed only for a few individual issues: for major environmental controversies, cement production (minus 0.2 percentage points resp. 69%) and defence (minus 0.3 percentage points resp. 50%). This suggests that the sustainability funds did not effectively shift capital towards a climate-neutral and overall (more) sustainable economy. A small ESG Impact improvement of half a notch is certainly not enough to bring about effective structural change through capital allocation.

Asset management effect present, but of limited relevance

To better understand the reasons for the lack of an effective capital allocation, we examined whether asset managers improved the impact of the sustainability funds as compared to their respective conventional benchmarks. Whereas the capital allocation effect (above) determines the actual capital flows, the asset management effect is a purely arithmetical effect. It provides insight into important factors influencing asset management decisions, as the aims and the success of asset management decisions are usually defined and assessed in relation to the benchmark used.

In contrast to the capital allocation effect, which was hardly visible and only relevant to a very limited extent, we were able to find a highly significant asset management effect, see Figure 4. We consider the effect to be partly relevant: The ESG impact was improved at least slightly: on average by 0.06 or +13%, i.e. by three quarters of the distance e.g. from C- to C. The carbon impact was improved by 313 tCO_2/million USD resp. 30% and the involvements in critical activities by 8.1 percentage points resp. 49% and in major environmental controversies by 2.3 percentage points, i.e. almost entirely (by 92%).

The results concerning the asset management effect suggest that asset managers were indeed noticeably selecting assets in the sustainability funds studied according to sustainability considerations, thus improving the portfolio impact compared to their own conventional benchmarks. However, this improvement was still hardly relevant in terms of overall impacts

on the environment and society, measured with the ESG Impact, and, thus, effective contributions to the SDGs. Relevant portfolio impact improvements compared to the benchmarks were nevertheless visible for more specific impact indicators - climate impact and even more so for involvements in problematic economic activities and major environmental controversies.

Sustainability approaches mostly without steering effect

Surprisingly, the regression analysis showed that the application of the studied sustainability approaches – best-in-class, engagement, ESG integration, exclusion, impact-investment, positive selection, sustainable thematic approach – did not significantly influence the portfolio impact. We only found two very specific exemptions: Thematic approaches improved the ESG Impact on average by 0.04 or half a notch, i.e. half the distance from e.g. C- to C. Positive selection approaches significantly reduced the involvement in major environmental activities by 0.9 percentage points. None of the other sustainability approaches had a significant effect on any of the dependent impact variables, and thematic approaches and positive selection each improved only one out of four dependent impact indicators. This shows that the application of sustainability approaches made mostly no or, in the case of thematic and positive selection approaches, hardly any difference for the funds studied.

This is quite remarkable because sustainability approaches have been the primary focus of attention in the sustainable investment industry to date. Our results raise the question of whether their importance and/or effectiveness have been overestimated. Even sustainability approaches that implicitly or explicitly signal a steering effect – best-in-class, exclusion, impact-investment, positive selection, and sustainable thematic approaches[10] – did not develop such an effect in our sample.

Interpretation: Possible causes

Asset managers more concerned with specific rather than encompassing sustainability issues

Our results concerning the asset management effect suggest: The more specific the impact indicator, the more selective asset managers were. Selectivity was highest for major environmental controversies (reduced by 92%), lower for involvements in problematic economic activities (reduced by 49%) and climate impact (reduced by 30%) and lowest for ESG Impact (improved by 13%).

[10] These approaches suggest short-term improvements of the portfolio impact through rule-based selection. For instance, thematic funds may aim to be invested in companies contributing to a sustainable energy transition, exclusion approaches at not being invested in companies infringing upon the UN Global Compact standards.

The selection concerning specific critical economic activities could mean that significant capital selection took place primarily concerning issues with higher reputation or transitional risks and/or concerning issues that are rather easy to measure (cement production, fossil fuels, critical means of transportation). By contrast, nuclear energy, genetic engineering, agribusiness & fisheries, and mining & metal production were not significantly reduced by asset managers in comparison to their benchmarks.

The overall portfolio impact on the environment and society along entire value chains as measured by the ESG Impact was hardly improved by asset managers. The reasons for this could have been:

- The ESG data used did not reflect such comprehensive impact (sufficiently). Most ESG data on the market do not reflect the comprehensive impact reliably, as to do so, holistic and scientific-based definitions, concepts, and data models are needed. Instead, ESG ratings mostly focus on management-related data, and/or apply simple equal weightings of indicators or sustainability issues. Impact assessments often do not cover entire value chains (scope 1-3).
- Asset managers deliberately did not improve the overall portfolio impact much to limit deviations from the benchmark and minimize tracking error.
- No clear and measurable goals were set and controlled for concerning the overall portfolio impact on the environment and society.
- Awareness and education concerning impact and useful data were lacking.

The role of benchmarks

The following two findings, in particular, shed light on the importance of the benchmarks used: (a) The asset management effect, despite its significance, was hardly relevant for the overall ESG Impact. (b) Despite the significant asset management effect, there was hardly any capital allocation effect. In other words: Asset managers apparently achieved a significant improvement in the portfolio impact of the sustainable funds studied compared to their specific conventional benchmark, but not overall compared to the group of conventional funds.

Our results suggest the following possible reasons: The orientation by means of conventional benchmarks led to asset managers deviating from the benchmark concerning specific sustainability issues, but hardly regarding the overall impact on the environment and society, measured with the ESG Impact. Therefore, even for sustainability funds, conventional benchmarks might restrict asset managers' freedom of action too much. This thesis is supported by the finding that, with increasing concentration, the portfolio impact of funds significantly improved: the ESG impact significantly increased and both the carbon impact and the share of critical economic activities were significantly reduced.

Therefore, it seems advisable for asset management to (a) either accept larger deviations from the conventional benchmark for a significant and relevant improvement of the portfolio impact, or (b) to apply sustainability benchmarks that also deviate to a large extent from broad market benchmarks. In the first option (a), asset managers receive a higher risk budget resp. tolerance to deviate from a conventional, broad market benchmark in order to improve the sustainability characteristics of the portfolio. In the second option (b), the index providers implement sustainability aspects in the indices, and asset owners decide on the sustainability index used as benchmark and control for its sustainability characteristics.

For both options, our research revealed another important finding: Assessing and controlling the sustainability characteristics of a portfolio (option a) or a sustainability benchmark (option b) merely in comparison with a conventional benchmark can be misleading and entail significant reputation risks. A – merely arithmetical – portfolio impact improvement compared to the conventional benchmark might not correspond to positive capital allocation in the comparison with conventional funds and, accordingly, might not contribute to improving company impact.

Sustainability approaches lack effectiveness or are inconsistently applied

Sustainability approaches are the basis for ESG-related investment rules. Our regression analysis revealed that the application of sustainability approaches had mostly no significant effect on the portfolio impact. This raises the question whether the importance and effectiveness of sustainability approaches have been overestimated. The following examples are particularly striking:

- Exclusions did not significantly reduce investments in critical economic activities or major environmental controversies.
- Best-in-class and positive selection did not significantly improve the ESG impact, climate impact, or involvements in critical economic activities.
- The thematic funds studied – despite their focus on environment, climate or sustainable energy – neither reduced the climate impact nor involvements in critical economic activities or major environmental controversies.

The only two exemptions were: (a) Positive selection approaches significantly reduced the involvement in major environmental activities by 0.9 percentage points. However, for all other broader dependent impact variables, no significant improvements could be found. (b) Thematic approaches improved the ESG Impact score significantly, but only to a small extent, i.e. by 0.04. For the more specific dependent impact variables, however, no significant improvements could be revealed for thematic approaches.

This shows that – in the short term – sustainability approaches mostly failed at allocating capital towards companies with a positive impact both significantly and relevantly.[11] As a possible cause for this, we would rule out the missing implicit or explicit claim for a short-term capital allocation: None of the sustainability funds assessed in this study exclusively applied ESG integration or engagement. Almost all sustainability funds applied exclusions, many used positive selection, and some also best-in-class approaches.

Therefore, for the non-existent or insufficient effect on capital allocation towards sustainable economic activities and, thus, on improving the portfolio impact, we principally see the following causes:

- *Lack of effectiveness*: Sustainability approaches may lack effectiveness if they are not strict enough or if the data used for selection is inappropriate, esp. by not reflecting the encompassing impact along entire life cycles.
- *Lack of consistency*: Sustainability approaches may not be consistently applied to all assets, but just to a share of assets within a portfolio.

Conclusions and consequences

The sustainability funds assessed in this study hardly channelled capital towards sustainable economic activities. It seemed that, overall, sustainability funds are only effective when it comes to divesting from companies involved in major environmental controversies, but not effective in terms of climate and sustainability portfolio impact improvements. This suggests that the funds' contribution to achieving the SDGs and the Paris climate target is not yet sufficient.

Our empirical research results suggest that the missing intention for short-term capital shifting was not the reason, as all of the assessed sustainability funds applied sustainability approaches that – implicitly or explicitly – aimed at short-term capital allocation. Therefore, we suspect that the following necessary prerequisites for effective capital allocation were not (fully) given[12]:

- Methods and data used for portfolio selection may not have reflected the actual and encompassing impact of a portfolio on the environment and society.
- So far, investee companies do not fully report relevant, encompassing and reliable data. Therefore, for an encompassing impact assessment, expert-based assumptions are necessary. So, possibly, an encompassing impact measurement may have been difficult.
- During our desk research of the fund documentations, we saw that sustainability funds lacked the necessary transparency, esp. concerning measurable impact-related goals, clear

[11] We want to stress again (a) that we did not assess in our study if, by active ownership activities with invested companies, portfolio impact could be improved over time, and (b) that ESG integration does not aim at improving the portfolio impact.
[12] The new sustainable finance EU regulations signify steps into the right direction.

investment rules, the actual ESG portfolio impact, the method and data used to assess this impact, and the effects of impact-related investment strategies on financial risk-return.

- Sufficient and clear standards – in terms of transparency, methodologies and minimum impact-related standards for sustainable investments – were basically lacking. Existing labels are still very diverse, and the different standards of these can be challenging to understand, esp. for retail clients. Here, the EU regulations might partly help closing the gap.
- Last but not least, we suspect that another reason, also for the points listed above, might have been an insufficient sustainability-related education in the financial system.

The consequences are not only the already mentioned insufficient capital allocation effect and contribution to a sustainable development. Financial actors themselves can be affected negatively: (a) Due to the lack of credibility of financial ESG products, the market potential cannot fully be exploited.[13] (b) Most sustainability funds implicitly or explicitly signal improved portfolio impacts. Not fulfilling this promise poses reputational risks and legal risks due to greenwashing and decreases client loyalty.[14]

Current regulations point into the right direction but have major shortcomings

The EU has recently brought about major regulatory changes related to sustainable finance, in particular the EU Taxonomy, the Sustainability-related Disclosure in the Financial Services Sector Regulation (SFDR), amendments to the benchmarking regulations, the Non-Financial Reporting Directive (NFRD) and the Markets in Financial Instruments Directive (MiFID II).

These regulations are quite far-reaching with regard to their focus on sustainability impacts of investments and on the economic activities being financed, as well as their extensive reporting and transparency requirements by various actors in the investment chain. This way, they might serve as game-changers in the market for responsible investments.

However, it is also important to emphasise that the regulatory framework has gaps and shortcomings. Some of them are quite crucial and must be overcome to deliver the desired results – namely to channel financial flows into sustainable environmental activities and to prevent greenwashing. For further details, see the recommendations below.

Recommendations

Based on our study results, we derive the following set of recommendations for asset owners and managers as well as regulators:

[13] See also Federal Office for the Environment (FOEN) 2016.
[14] See also Federal Office for the Environment (FOEN) 2016.

Asset owners and managers

Stop defining sustainability resp. "ESG" through merely naming certain norms or loosely applying sustainability approaches. Investors should deliberately take the following decisions and steps:

- *Impact-related goals:* Set both short-term and longer-term impact-related goals, e.g. to reduce the climate-intensity of the investment portfolio by 20% in two years in accordance with the investor's overall market and sustainability strategy in place. Identify and solve potential trade-offs with other goals such as diversification of risk characteristics of investments and portfolios.
- *Benchmark:* Choose a conventional market benchmark or a sustainability benchmark; define a risk budget allowing for a certain deviation tolerance in relation to the benchmark.
- *Investment rules:* Set and implement investment rules concerning selection, engagement and voting activities that are appropriate to reach the goals. Investment rules might or might not relate to the sustainability approaches in place. If the set goals are ambitious, the investment rules will have to be strict enough and applied consistently.
- *Impact-related controlling and reporting:* Measure, control and report the portfolio impact, using the appropriate encompassing and reliable ESG impact data. Adjust investment rules or goals, if necessary. This ensures that selection and active ownership can be directed both effectively and efficiently toward reaching the set goals.
- *Awareness and education:* Build up and maintain awareness and up-to-date knowledge of the relevant actors, esp. asset managers, institutional investors and client advisors.

Such a systematic approach is generally advisable, both for private and institutional investors and well as for all asset classes.

Regulators in the EU

- It is crucial that the EU Taxonomy is exclusively based on science, leaving aside political interests.
- As planned, the Taxonomy should be extended to include the other relevant environmental goals such as biodiversity and ecosystems, the protection of water and marine resources, pollution and circular economy.
- Should the Taxonomy prove to be useful in practice, the following developments could be advisable: (a) move beyond a mere "green" Taxonomy towards a "sustainable" Taxonomy by including social and, if applicable, governance goals; (b) in addition to a taxonomy with sustainable economic activities, elaborate a corresponding taxonomy with economic activities

that have negative impacts ("Dirty Taxonomy"). This could be a way to fix the current blind spots concerning the sectors that are not yet covered by the Taxonomy.

- The ESG-related KPIs to be reported according to the SFDR and the amendments to the benchmark regulations should generally include entire value chains, if applicable.
- In our opinion, it could make sense for the EU Ecolabel to define different impact-related quality levels, e.g. bronze, silver, and gold. A corresponding label for positive sustainability impacts, including environmental and social impact, would also be important.
- Financial actors can only readily apply the Taxonomy and perform impact assessments when the informational prerequisites are created. A first best alternative, in our opinion, would be that invested companies get legally obliged to publish the relevant sustainability-related information.[15] A review of the core information – both on the part of investors and invested companies – should be made mandatory and carried out by credible, i.e. independent and competent bodies. The other alternative represents the current situation and seems merely second best: The legislator waits and sees whether the market creates a corresponding offer via investor demand. Here, the risk remains that published data stays incomplete and both the quality and comparability questionable.
- In any case, there should be regular reviews of whether the EU regulations are proving themselves, i.e. whether they are effective, practical and pragmatic enough. If necessary, the regulations should be adapted or further developed according to the review results.

Regulators in Switzerland

The EU regulations already now have an impact on Switzerland. Particularly financial actors with subsidiaries in the EU, EU products or EU clients need to be on top of the regulations. Other financial actors follow the developments closely because of market pressure and reputation.

Nevertheless, in order to improve the capital allocation effect of Swiss sustainable investments and to ensure that the Swiss financial system remains competitive and at the forefront of sustainable finance, the Swiss regulator should also take regulatory measures. These regulations should take into account the developments in the EU, but also the shortcomings mentioned in this report (see chapter 7.2).

Certain provisions in EU regulations could immediately find their way into Swiss regulations, particularly aspects of the EU regulations that require increased reporting and the provision of reliable data, e.g. on the indicators in the SFDR and the benchmark regulations or on the economic activities and thresholds according to guidelines of the NFRD. This would allow to

[15] See also proposal by the European Commission in April 2021 for a Sustainability Reporting Directive.

have relevant information at hand for market actors to improve sustainability assessments and measure the overall impact of investments.

Other aspects of EU regulations might need more extensive assessments. For example, while the EU Taxonomy certainly provides valuable methodological foundations, its suitability in practice should be further analyzed. Instead of a complete adoption of the EU Taxonomy, Swiss regulation might instead focus on implementing certain principles such as the inclusion of economic activities in impact measurements.

1. Aim and Scope of the Study

Aim and structure

The aim of this study is to contribute to the discussion on whether so-called "sustainable investments" actually generate a positive investment impact. To do so, it elaborates on whether or not sustainable investments[16] have a positive capital allocation effect on investment portfolios, and which framework conditions are needed for an effective capital allocation.

The study is structured as follows: This chapter outlines the aim and scope of the study. Chapter 2 explains the background of the research questions and sets the theoretical framework and definitions. The methods and data used for the empirical analysis are described in chapter 3, an overview of the main results is given in chapter 4. Chapter 5 then elaborates on the framework conditions that are needed for an effective capital allocation towards sustainability. Based on the empirical results and the necessary framework conditions, chapter 6 discusses the study results in more detail. Finally, chapter 7 summarises the main conclusions and derives recommendations for asset owners, asset managers and regulators.

Research questions

The research questions of this study are as follows:

4. Are sustainability retail funds in Switzerland and Luxembourg able to effectively *channel capital* into sustainable economic activities? To what extent are they still invested in activities that are problematic from a sustainability perspective?
5. How effective is the application of different *sustainability approaches* (best-in-class, exclusions, ESG[17] integration, engagement, etc.) by asset managers for achieving a positive capital allocation?
6. What *framework conditions* are needed for an effective capital allocation? What could the current EU regulatory framework contribute in this regard?

Research methods

For research questions one and two, we conducted a statistical evaluation of a sample of retail funds available in Switzerland and Luxembourg. The results are illustrated by two case studies, among others. The elaboration of the third research question is based on the results of the statistical evaluation, literature review, and expert knowledge.

[16] Sustainable investments are defined as investments in which environmental, social and governance (ESG) factors are integrated into investment decisions, see SSF 2020. They can also be referred to as responsible, social, ethical, or socially responsible investments. We treat these terms as synonymous, since the differences are not relevant to the research question.
[17] "ESG" stands for environmental, social and governance factors.

2. Background and Conception

2.1. Investments not yet aligned with sustainability

The global economy and society are facing severe environmental problems. Long-term over-consumption of natural resources – Humanity's Ecological Footprint currently surpasses the planet's biocapacity by 56%[18] – has led to planetary boundaries being exceeded.[19] Climate change, the massive extinction of species[20], and natural resources crises are at the top of the list of major and urgent challenges. They also rank among today's main global economic and financial risks.[21]

The world community has set clear societal goals at the global level, especially in the Paris Agreement in 2015 and the United Nations' Agenda 2030 for Sustainable Development with its 17 Sustainable Development Goals (SDGs). National and regional goals have followed, aiming at net zero CO_2 emissions and climate-neutrality by 2050 respectively. These goals are specified for instance in the EU strategy as part of the European Green Deal[22] and in Switzerland's long-term climate strategy.[23] In all of these conventions, goals, and strategies, the financial industry explicitly plays a key role in realizing them, especially by aligning financial flows with sustainable development.[24] Aligning financial flows means redirecting them toward business activities that are aligned with the future sustainability requirements.

Investors and asset managers are among the main actors here: With their investments, they enable or thwart sustainable or unsustainable economic activities, as the case may be. Thus, they have an essential influence on whether and when societal sustainability goals are achieved. At the same time, investors themselves are affected by sustainability risks: the impact of investment portfolios (invested companies, real estate, etc.) on the environment and society can have repercussions on investors, mainly in the form of so-called transition risks. These could be reputation risks, market risks, technology risks, policy or legal risks, etc.[25] It is widely assumed that financial market prices do not adequately reflect these risks.[26]

[18] Source: WWF 2020. For further details, see Wackernagel et al. 2014.
[19] Rockström 2009 and Steffen et al. 2015.
[20] The global Living Planet Index shows that vertebrates included in the index have declined by 68% from 1970 to 2016. The Living Planet Index (LPI) includes 20'811 vertebrate populations from around the world - mammals, birds, fish, reptiles, amphibians. Observations and long-term studies in Western Europe and North America show that insect numbers and their biomass are declining at an alarmingly rapid and steady rate. See WWF 2020.
[21] World Economic Forum 2021.
[22] European Commission 2019.
[23] Swiss Federal Council 2021.
[24] Paris Agreement 2015, Article 2.1c; Swiss Federal Council 2021, chapter 8.6; European Commission 2019, pp. 16f.
[25] TCFD 2017.
[26] See e.g. Campiglio et al. 2019, NGFS 2019, p. 4, Martinez-Diaz 2020.

At first sight, it seems that investors are well on the way. So-called "sustainable investments"[27] – defined as investments in which environmental, social, and governance (ESG) factors are integrated into investment decisions[28] – have grown fast and recently entered mass markets. In Switzerland, the market share of sustainability mutual funds more than doubled from 2018 and reached 38% in 2019.[29] In the US, sustainable investments accounted for a share of 33% of total US assets under professional management in 2020.[30] In Luxembourg, however, despite being the main European hub for responsibility investment funds and despite dynamic growth rates, the market share of sustainability funds was around 4% of assets under management (AuM) in 2018 and, therefore, still a niche.[31]

On a global level, financing gaps for structural change towards a sustainable economy remain huge. Despite the promising market trends in the asset management industry, studies provide indications that investors have not yet adequately integrated sustainability into investment decisions. For reaching the SDGs, for instance, UNCTAD (United Nations Conference on Trade and Development) identified in 2014 an annual investment gap in developing countries of 2.5 trillion USD. Even though total investments are increasing in six out of ten important sectors – transport infrastructure, telecommunication, food and agriculture, climate change mitigation, ecosystems and biodiversity, and health – international private investments in these sectors are stagnating or even declining. Investments in the other four important sectors – power (excluding renewables), climate change, education as well as water and sanitation – are stagnating or even declining, both in total and specifically from the private sector.[32]

This finding is also reflected at fund level. For instance, an assessment of 80% of investment portfolios in Swiss financial markets showed that, overall, investments are still not aligned with the Paris Agreement goals, despite improvements from 2017 to 2020.[33] Another study suggests that the 100 largest Luxembourg funds are financing carbon emissions that could drive global warming to more than 4°C, i.e. twice the limit set in the Paris Agreement. Furthermore, it revealed that two of the three sustainability funds included in the study sample were heavily invested in climate-damaging assets.[34]

[27] Sustainable investments are also referred to as responsible, social, ethical, or socially responsible investments. We treat these terms as synonymous, since the differences are not relevant to the research question.
[28] SSF 2020.
[29] Forum Nachhaltige Geldanlagen (FNG) 2020.
[30] Nason 2020 and US SIF Foundation 2021.
[31] In 2018, 35% of all European responsible investment fund assets were managed in Luxembourg (KPMG Luxembourg 2019). According to KPMG Luxembourg 2019, responsible investment funds managed in Luxembourg reached a total of 173.6 billion EUR of AuM, whereas the Luxembourg fund industry managed a total of 4'064 Mrd. EUR net assets in 2018 (Statista 2020).
[32] UNCTAD 2020.
[33] 2°Investing Initiative / Wüest Partner 2020.
[34] One of the three sustainability funds had the highest share of economic activities with a high climate intensity ("brown share") in the entire study sample, exceeding the value of the MSCI World index by 58%. Another sustainability fund had the third highest share of climate-intensive assets (54% above the benchmark). See Nextra Consulting 2021.

The suspicion has become stronger in recent years: Not only assets in general, but also so-called “sustainable investments” presumably do not generate a significant positive investment impact on the environment and society, as the name of the definition might lead to believe. Even though not all sustainable investment approaches are aimed at generating a positive investment impact in the first place (see chapter 3.2.4), it is often explicitly or implicitly suggested in the fund name or documents. This is why the accusations of “greenwashing” have become louder in connection with sustainable investments.

According to the EU Sustainable Finance Action Plan, greenwashing is “the use of marketing to portray an organisation's products, activities or policies as environmentally friendly when they are not.”[35] Greenwashing in the context of financial markets can be misleading claims about environmental products, performances, and practices in order to attract capital. It “refers to a wide variety of practices that range from mis-labelling to mis-representation and mis-selling of financial products”.[36] Meanwhile, both the Swiss government[37] and the Swiss Financial Market Supervisory Authority FINMA have also drawn attention to problems related to greenwashing. FINMA, as part of its strategic sustainability goal for the years 2021 to 2024, will pay special attention to greenwashing risks and, if necessary, take the necessary action.[38]

Both greenwashing and the substantial amount of private capital to help finance a transition towards a sustainable economy have driven fast and effective political action during the last five years. Particularly noteworthy is the EU Sustainable Finance Action Plan[39] which, to a large extent, has already been cast into far-reaching regulations (see chapter 5.2.1). The Swiss Federal Council has so far focused on voluntary actions by the market, but just recently indicated that new regulations might be necessary to achieve the goal of financial flows becoming Paris-compatible by 2050.[40] The Federal Council furthermore stated that Switzerland would be guided by international developments, particularly in the EU, in addressing the challenges (see chapter 5.2.2).[41]

2.2. How investments can contribute to sustainability

Against this backdrop, this study aims to help shed light on whether or not the current, rapidly growing "sustainable investments" are effectively contributing to sustainability goals. To do this, it is first necessary to clarify how investors can contribute to sustainability in the first place in order to understand where the problems currently are, and how they can be solved.

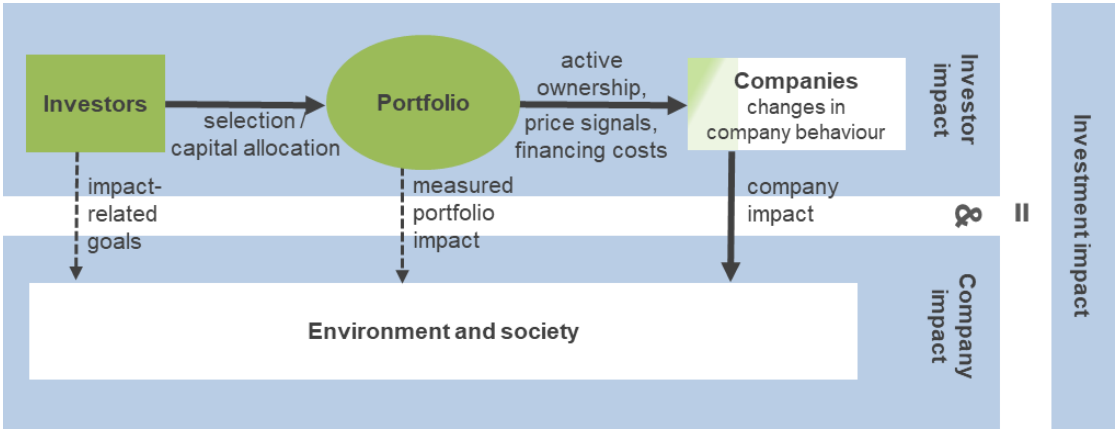
[35] European Commission 2018.
[36] Maijoor 2020.
[37] Swiss Federal Council 2021.
[38] FINMA 2020.
[39] European Commission 2018.
[40] Article 1 of the Swiss CO_2 Act also makes a reference to the Paris Agreement Article 2c, see BBI 2020 and, for further details, chapter 5.2.2.
[41] Swiss Federal Council 2021.

Investment impact

Investments can contribute to sustainable development – create a positive "investment impact" on the environment and society – in the following way (see Figure 5):

- *Investor impact:* Firstly, investments influence company behaviour in the economy by changing or enforcing certain company activities (see upper part of Figure 5).
- *Company impact:* Then, secondly, the different company behaviour and potentially further systemic effects in the economy in sum have a positive "company impact" on the environment and society (see lower part of Figure 5).

Figure 5: Investment impact



This figure shows that investments can contribute to sustainable development resp. have a positive investment impact on the environment and society, only if investors change company behaviour in a positive way (investor impact) AND if this behaviour change has a positive physical company impact on the environment and society (company impact).

Source: Inrate 2021, based on Kölbel et al. 2019.

Investors can influence company behaviour and achieve positive *investor impact* by using the following levers (see Figure 6):

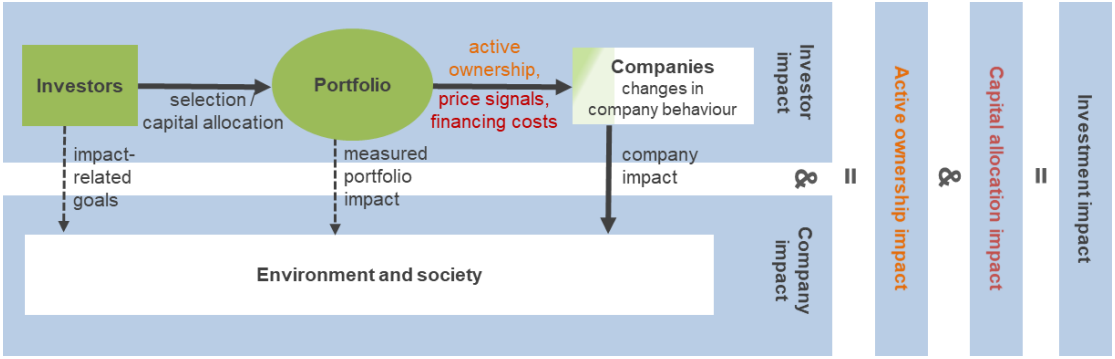
- *Capital allocation:* Capital allocation resp. selection steers capital away from certain investments (shares, bonds, real estate, etc.) with a negative impact – via divesting or underweighting – towards investments with a positive impact – via investing or overweighting. Investments with a positive impact can for instance be shares of companies with innovative, sustainability-oriented business models. Such selection improves the "*portfolio impact*", i.e. the impact of invested companies (or other assets such as real estate) on the environment and society.

  Provided that the market power of sustainable investors is large enough, capital allocation increases the relative share and/or bond prices of sustainable companies. If this turns out to be consistent across economic activities – i.e. concerning the demand of specific shares and

bonds – as well as over time, it could systematically influence financial market prices. Such a *price signal* strengthens the competitiveness of sustainable companies and enables them to expand their activities relative to their competitors and, this way, drives structural change towards a more sustainable economy.

- *Active ownership:* With engagement or (proxy) voting, investors aim to advance incremental improvements in company operations and, this way, to improve company impact. Thus, active ownership does not necessarily result in a better portfolio impact right away, but usually in incremental portfolio impact improvements over time.
- *Indirect effects:* In addition to capital allocation and engagement, sustainable investors can also have positive indirect effects on the economy and its impact. For instance, ESG ratings demanded by sustainable investors can encourage and help companies to improve their operations based on such ratings. A positive ESG rating can also strengthen company reputation and thus financial resilience in times of crisis. For the sake of clarity, these indirect effects are not shown in Figure 5 and Figure 6, as they were not the focus of this study.

Figure 6: Capital allocation impact and active ownership impact



This figure shows that investment impact can be achieved via *capital allocation impact* – where capital allocation changes financial market prices and/or financing costs and, this way, improves company impact – and / or *active ownership impact* – where engagement or (proxy) voting improves company impact over time. Further indirect investment impacts are not included in the figure.

Source: Inrate 2021, based on Kölbel et al. 2019.

To deliberately achieve a positive investor impact, investors ideally take the following steps:

- Set *impact-related goals*, e.g. to reduce the climate-intensity of the investment portfolio by 20% within two years;
- Apply the two levers of capital allocation and active ownership impact to reach these goals:
  - *Selecting* certain investments by to deliberately investing in or overweighting of investments in companies, divesting and/or underweighting, in order to improve the investment portfolio's impact;

- *Engaging & voting* (further described below) to change company activities and, this way, improve the portfolio's impact over time.

- Measure and control the *portfolio impact*. This ensures that selection and active ownership can be directed both effectively and efficiently toward reaching the set goals.

Figure 1 and Figure 6 also reveal where the potential problems lie: For a positive investment impact to materialize, both an investor impact and a company impact are required:

- *Investor impact:* Corporate behaviour must be influenced *effectively* AND
- *Company impact:* Corporate behaviour must be influenced in the *right direction* so that a positive company impact on the environment and society is actually achieved and societal goals can be reached.

Effective investor impact

This study does not intend to take part in the current discussion about which of the above levers is more effective for investor impact: capital allocation or active ownership. Both strategies can potentially change company behaviour and, by doing so, generate a positive company impact. Thus, both capital allocation and active ownership can be used and promoted. Indirect effects can also have a positive investor impact, as our practice as a rating agency for sustainable investments continuously shows.

Nevertheless, the focus of this study is on capital allocation for the following reasons:

- Recent changes in international and national regulatory frameworks focus on strengthening capital allocation (see chapter 5.2).
- Capital allocation has the potential to drive structural change towards a sustainable economy in due time. This is the case, even if a "*capital allocation impact*" (see Figure 6) has so far only rarely been empirically observed in direct connection with sustainable investments.[42] However, it could be shown that investors' "non-financial tastes" – potentially also sustainability-related preferences – actually influenced asset prices. The size of this effect depends on the market resp. wealth share of sustainable investors,[43] and it is stronger due to herding behaviour by passive investors if benchmarks increasingly comprise sustainable equities or bonds.[44]

[42] According to Kölbel et al. 2019, the following papers show this effect: Fama and French 2007, Beltratti 2005; Heinkel et al. 2001, and Luo et al. 2017.

[43] In a thorough literature review, Kölbel et al. 2019 have found only few studies investigating capital allocation impact: Whereas Hong and Kacperczyk 2009 have found a positive impact on share prices, Teoh, Welch, and Wazzan 1996 did not find any discernible effect on asset prices. However, several studies show that, for green bonds, there is a tangible effect, a negative yield premium. Baker et al. 2018, Zerbib 2019 and Hachenberg and Schiereck 2018.

[44] Kölbel et al. 2019, p. 10, with numerous studies.

- It seems very likely that capital allocation impact will become easier to empirically demonstrate in the near future, given the following conditions: high growth rates and increasing market shares of sustainable investments, the new EU standards steering the thrust of capital allocation more consistently towards sustainable economic activities (see chapter 5.2.1), and the increasing number and AuM share of sustainability Exchange Traded Funds (ETFs) on the market that often select their underlying assets in relation to sustainability benchmarks.[45]

Effective company impact

Capital allocation or active ownership are only effective if they actually improve the company impact on society and the environment. For a positive company impact, the following prerequisites are required:

- *Right direction:* Capital allocation and active ownership need to be impact-oriented to achieve a positive *portfolio impact*. Capital must be allocated to companies with a substantially better impact on the environment and society. Engagement has to change corporate behaviour in a targeted manner where it substantially improves the impact of the invested company.
- *Knowing where to go:* For impact-oriented capital allocation and engagement, it is indispensable to measure the impact of invested companies (portfolio impact) on the environment and society comprehensively and reliably. Such an impact measurement is necessary for setting impact-related goals, allocating capital to the "right" companies, directing engagement and voting to the essential activities of a company, and for controlling impact. Also, companies improving themselves based on sustainability ratings rely on thorough impact ratings to be most effective.
- *Company impact as the result of systemic effects:* Company impact is usually not (or not only) the direct result of an investor impact on the behaviour of invested or disinvested companies, but usually the result of systemic effects in the economy. These might neutralize a positive portfolio impact or create an additional positive company impact:
  - *Capital allocation:* In the case of capital allocation towards shares and bonds of sustainable companies on secondary markets, for instance, company impact is the indirect result of a price or capital cost effect, if the market share of sustainable investors for these shares or bonds is high enough. If sustainable investors have a low market share, however, unsustainable investors might decrease or even neutralize the price effect by buying the shares of unsustainable companies. On the other hand, if a sustainable company

[45] The number of ESG ETFs increased from 39 in December 2009 to 221 in June 2019, with a growth rate in 2018 of 47.5%. Similarly, the AuM of ESG ETFs have grown significantly by 15.8% p.a. since 2009. From 2015 to June 2019, AuM even quadrupled from 6 billion to 25 billion USD. UNCTAD 2020a.

is included in a well-known sustainability fund, the company's reputation and competitiveness might improve, which increases the positive company impact.

- *Engagement:* In the case of engagement, improved reporting on greenhouse gas (GHG) emissions, for instance, does not directly improve the portfolio impact. However, transparency allows customers to deliberately choose climate-friendly products and, this way, create a positive company impact. Or if a company, as the result of active ownership pressure, improves its climate intensity by merely selling an energy-intensive production facility, the portfolio impact improves, but not the resulting company impact.

This shows that, firstly, impact assessment and impact-orientation is a prerequisite for a positive investment impact, regardless of the lever chosen for investor impact – be it capital allocation or active ownership. Secondly, systemic effects must be considered to achieve a positive company impact. They must be deliberately included into active ownership processes and into the impact assessment of related activities. In the case of capital allocation, a considerable market power is needed to maintain the price effect.

2.3. How to assess capital allocation contributions to sustainability

To assess the capital allocation effect of sustainability funds we used impact assessments as dependent variables instead of other alternative measurements for the following reasons:

Impact assessments

In our opinion, impact assessments are best suited to the question of whether capital is being channelled into economic activities that make an effective contribution to sustainable development. Impact assessments reliably reveal whether investee companies have future-oriented business models and processes in place. By including strategies, goals, programmes and structures into the impact assessments, impact assessments also show if companies are continuously improving in terms of sustainability and are therefore on the right track.

Suitable impact assessments should fulfil the following requirements (see chapter 5.1.1 for further details): (a) The underlying approach must be reliable. This means that it must have a sound conceptual and scientific basis and evaluate the contribution of companies to sustainable development in a holistic way. (b) Impact assessments must be comprehensive, i.e. cover entire product life cycles and economic sectors or economic activities in the economy, and (c) pragmatic, i.e. the impact assessment must be possible despite the limited existing publicly available data.

SDG impact

Currently, so-called SDG mappings or SDG impact data are often used for an impact assessment of companies and portfolios. In principle, SDG mappings are well suited to highlighting issue-specific or SDG-specific strengths and weaknesses of portfolios and thus trade-offs between investments and portfolios that perform better concerning some SDGs and worse concerning others. A prerequisite this usefulness is that they are based on a reliable and scientifically based concept and can thus measure the effective positive and negative target contributions. Often, however, SDG mappings are largely marketing information, in which individual – actual or supposed – positive SDG contributions are picked out and communicated.

Even a reliable assessment of SDG impacts, however, is hardly suitable for the question at hand concerning effective capital allocation. SDG mappings leave investors alone with trade-offs between individual SDGs, so that a comparison of two portfolios that perform differently on individual SDGs becomes very difficult. Only a scientifically based aggregation of the various SDG impacts into an overall sustainability impact assessment allows portfolio impacts to be compared.

Traditional ESG ratings

Traditional ESG ratings are mostly based on companies' corporate social responsibility (CSR) management systems and practices. Such CSR ratings show the readiness and capabilities of companies to improve their sustainability impacts over time. However, companies operating in sectors with high negative impacts such as coal or oil are more likely to have highly professional CSR management systems.[46] Consequently, they might get a good ESG grade despite significant negative impacts on the environment and society. Thus, using traditional ESG ratings to assess the capital allocation effect would be both insufficient and misleading (for more details see chapter 5.1.1).

EU Taxonomy compliance

In the near future, investors in the EU will have to report the share of assets in a portfolio that is Taxonomy-compliant (see chapters 5.2.1 and 7.2 for further details). Currently, however, the Taxonomy only covers climate mitigation and adaptation fully[47]. Additionally, data requirements are extensive and, so far, not met by issuing companies. Thus, the application of the Taxonomy is currently quite complex and, to a large extent, requires expert-based

[46] E.g. Crane et al. 2017.

[47] The current list of economic activities solely refers to climate mitigation and adaptation. The other four environmental objectives (sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, protection and restoration of biodiversity and ecosystems) are so for only considered as in terms of minimum requirements (doing no significant harm).

assumptions. Therefore, the share of Taxonomy compliance could not be used to assess the sustainability impacts of portfolios in this study.

Once these shortcomings are eliminated, further serious drawbacks will remain:

(a) The EU Taxonomy is by design purely dichotomous – an economic activity is either defined as "green" or as "not green". This means that, for the purpose of capital allocation, a Taxonomy-compliance indicator will always be inferior to an impact assessment which allows for more accurate assessments on a continuum, i.e. on a cardinal or at least ordinal scale. Such a scale is a compulsory requirement to actually measure portfolio impact, which then allows to compare the impact of different investments and portfolios and to assess changes in impact over time.

(b) It is planned, as part of the current regulation, that the Taxonomy will provide lists of economic activities and technical thresholds for each of the six environmental goals, as is already the case for the climate mitigation and adaptation targets. According to current discussions, lists of economic activities for social and, if applicable, governance-related goals might follow. This poses major practical challenges: The lists of economic activities for the two climate goals are already very extensive and complex and make high demands on transparency. Therefore, applying the complete Taxonomy will be extremely difficult and time-consuming.

All in all, the Taxonomy-compliance indicator will not be suitable for impact assessments. If the above-mentioned practical and conceptual challenges can be overcome, however, the indicator may, according its purpose, serve as compliance indicators to prevent greenwashing.

Sustainability risk analyses

Sustainability risk analyses, such as scenario-based analyses, are sometimes used as proxies for assessing capital allocation effects. However, risk analyses per definition do not focus on the impact of a company or portfolio on the environment and society, but either on transition-related risks, i.e. on the repercussions of such an impact on the financial risk-return, or on risks that are not related to a company's or portfolio's impact at all, such as physical climate risks. Thus, transition-related risk indicators are only weak indicators for impact, while for instance physical climate risk indicators are not suitable for impact assessments at all.

Presumably the most wide-spread sustainability risk analyses carried out by investors are scenario-based climate risk analyses. These are strongly recommended by the Task Force on Climate-related Financial Disclosures[48] and play an important role in the new amendments to the EU Benchmark Regulation (see chapter 5.2.1). In principle, scenario-based analyses are important and valuable in sensitising investors to make a stronger contribution to achieving climate goals.

[48] TCFD 2017.

Nevertheless, it did not seem sensible to use these analyses for the present research question. One reason already mentioned above was that transition-related risk indicators do not directly assess impact. Another substantial disadvantage are the far-reaching assumptions that are basically necessary for future forecasts: Assumptions are required with regard to the longer-term development of technologies, markets and policy measures, as well as with regard to the development of the company itself. This means that the results of such analyses are subject to a very high degree of uncertainty. This is particularly true for the climate crisis, which requires disruptive social and economic changes to be tackled and the effects of which cannot be mapped by merely extrapolating current trends. In addition, scenario analyses often do not cover all economic sectors that are relevant for climate protection and therefore have substantial "blind spots".

At least for the research question in this study, it therefore seemed neither sensible nor necessary to accept these uncertainties and conceptual weaknesses with regard to impact assessment. The impact assessments used here, based on the Inrate impact data, seemed both meaningful and sufficient, especially for the following reasons:

- The technical solutions needed for climate stabilisation at below 2°C are already largely in place. For a steering effect through capital shifting, it therefore makes more sense in our opinion to direct capital towards companies that are already innovative and widely climate-compatible today, and this way to strengthen their competitiveness, than directing capital to companies that might or might not be climate-compatible in the longer term.
- Most economic sectors have direct or indirect climate relevance, e.g. the financial sector by financing fossil fuels. Therefore, a climate impact analysis should be complete by covering entire supply chains and all economic sectors in order not to distort the results.

3. Methods for the Empirical Analysis

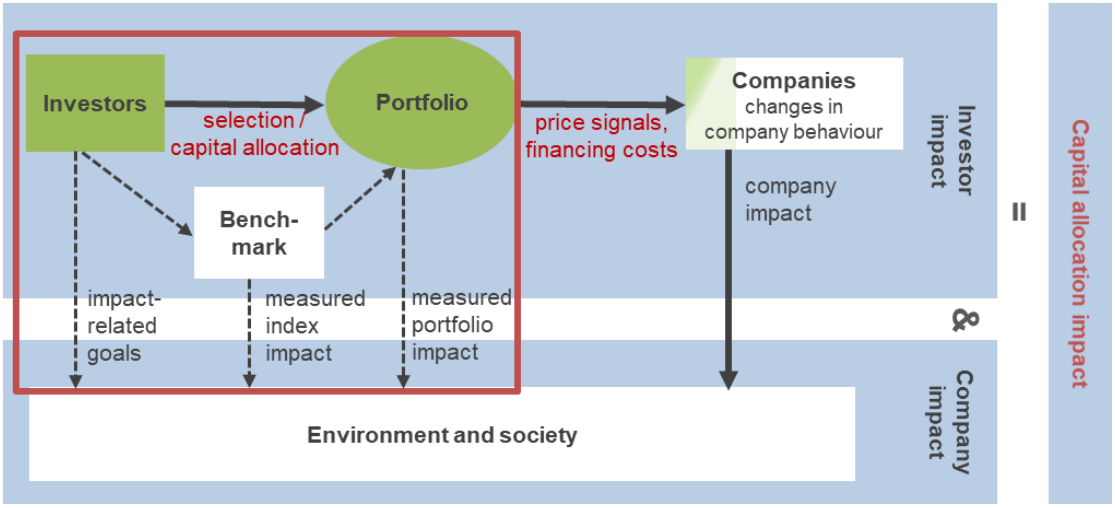
3.1. Scope

In this study, we firstly assess whether sustainability funds effectively channel capital into sustainable economic activities, and to what extent they are still invested in activities that are problematic from a sustainability perspective. Secondly, we examine if the application of different sustainability approaches (best-in-class, exclusions, ESG integration, engagement, etc.) by asset managers significantly contributes to a positive capital allocation.

Therefore, the focus is on whether sustainability funds have a positive *capital allocation effect on portfolios*, i.e. if and how far sustainability funds are invested in portfolios with a significantly better impact than conventional funds. Due to their importance for asset

management decisions, we also investigated the role of benchmarks by assessing if sustainability funds have a significantly better portfolio impact than their specific conventional benchmarks. With this focus we cover the first part of the entire capital allocation impact (Figure 7). Researching the entire capital allocation effect in the economy would have to also include assessing the existence of price effects due to capital allocation and their effects on company behaviour. This would require other research frameworks and has been researched before, see chapter 2.2.

Figure 7: Capital allocation impact and study focus



This figure shows the capital allocation impact of investments via capital allocation and price signals resp. changes in financing costs (in red). This study focuses on assessing the *capital allocation effect of sustainability funds on portfolios* (red rectangle), i.e. whether sustainability funds have a significantly better portfolio impact than conventional funds resp. if they are invested in companies with a better impact on environment and society. Due to the importance of benchmarks for asset management decisions, we also investigate if sustainability funds using conventional indices as benchmarks have a significantly better portfolio impact than their respective conventional benchmark.

Source: Inrate 2021, based on Kölbel et al. 2019.

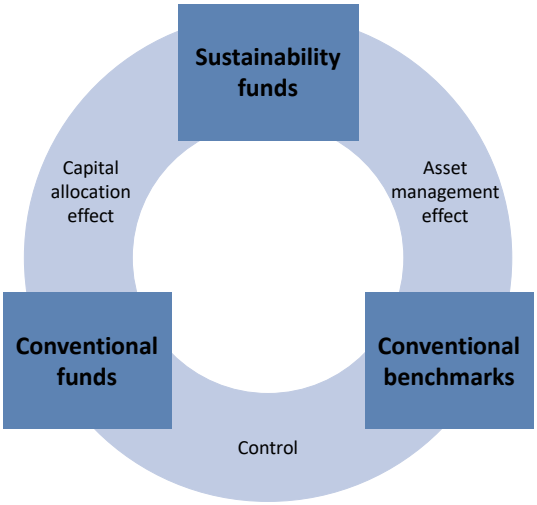
Figure 8 provides an overview of the three types of comparisons that we performed to attain a comprehensive picture concerning the capital allocation effect on portfolio impact:

- Firstly, to investigate whether sustainability funds are able to *allocate capital* into sustainable activities, we compared the group of sustainability funds with the group of conventional funds in our sample.
- Secondly, we made a pairwise comparison between each sustainability fund that used a conventional index as benchmark with its respective conventional benchmark. This allowed us

to measure how *asset managers* influenced the sustainability impact of the fund as compared to the index impact of its conventional benchmark.[49]

- Thirdly, we compared the group of conventional funds with the group of conventional benchmarks used by the sustainability funds in our sample as a *control*.

Figure 8: Statistical comparison



Source: Inrate.

Main definitions and measurements

For the above-mentioned comparisons, we applied the following main definitions and measurements:

- *Capital allocation effect on portfolios:* The targeted capital allocation effect on portfolios occurs if sustainability fund assets comprise significantly more sustainable economic activities than conventional fund assets. This is measured by comparing the sustainability funds' impact (the "portfolio impact" resp. the invested companies' impact) on the environment and society with the conventional funds' impact. In the following, we use "*capital allocation effect*" as an abbreviation, implying that we mean the capital allocation effect on portfolio impact, not the entire capital allocation impact.
- *Asset management effect on portfolios:* An asset management effect on portfolios occurs if an asset manager allocates a sustainability fund's assets to significantly more sustainable economic activities than the constituents of the conventional index used as benchmark. This

[49] Fund managers usually base their investment decisions on indices. Often, a large proportion of fund assets is taken from these indices, and the indices serve as benchmarks for measuring the fund managers' investment performance. The actively managed sustainability funds in our sample were mostly (28 out of 31 actively management sustainability funds) based on conventional benchmarks, e.g. the MSCI world, while all of the passively managed sustainability funds – the ETFs – replicated sustainability indices, e.g. the MSCI world SRI.

effect allows us to better understand why a certain capital allocation effect is (not) occurring.

The asset management effect on portfolios is measured by pairwise comparing the sustainability fund's portfolio impact with the impact of the conventional index used as benchmark. In the following, we use "*asset management effect*" as an abbreviation, implying that we again mean asset manager's effect on portfolio impact, not on company impact.

In this study, the fund and benchmark portfolios were evaluated according to four sustainability impact measurements (see chapter 3.2.2):

- weighted average ESG Impact score,
- weighted average carbon intensity (WACI),
- weighted percentage of revenues derived from critical activities,
- weighted involvement in major environmental controversies.

We further investigated the effects of different sustainability approaches (exclusions, best-in-class, etc.) applied by the sustainability funds in order to investigate the effectiveness of the different approaches to enhance the impact of an investment portfolio. We performed this analysis to better understand the role of sustainability approaches for capital allocation. In this analysis, we controlled for the benchmark type – conventional vs. sustainable vs. no or unknown benchmark – as well as for commonly used parameters: the regional investment focus, portfolio concentration and tracking error.

We focused our investigation on retail investment funds for the following reasons: Sustainable investments have a relatively high market share on fund markets, as compared to other asset classes. Therefore, the empirical basis was quite broad. Furthermore, the level of transparency needed to perform portfolio impact assessments was high enough, as fund holdings are frequently published and ESG approaches applied by sustainability funds are usually shown in the fund factsheets.[50]

By investigating a sample of retail funds in Luxembourg and Switzerland, we cover two important European financial centres:

- Luxembourg was ranked 12th on the Global Financial Centres Index in 2020.[51] With total fund assets of more than 4.6 trillion EUR, Luxembourg is the largest fund location in Europe in

[50] Credit business, for instance, is generally not transparent enough to perform an impact assessment of credit portfolios. Additionally, the market shares of sustainable credits seem to be significantly lower than for sustainable investment funds, see for example Schwegler/Amstutz 2017.
[51] Z/Yen 2020.

terms of net assets and number of funds by the end of Q2 2020[52], and the second largest in the world.[53]

- Switzerland is among the main financial centres globally as well, Zurich ranks 10th and Geneva 14th.[54] With 714 billion EUR of fund assets by the end of Q2 2020, Switzerland ranks 7th in Europe in terms of net assets and 12th in terms of the number of funds.[55]

In contrast to the studies cited above (chapter 2.1), we focused explicitly on the capital allocation effect resp. portfolio impact improvements of sustainability retail funds. As impact assessment methods we applied impact variables that are encompassing, as they consistently include impacts over entire life cycles (scope 1, 2 and 3[56]) and cover all economic sectors.

3.2. Data set

3.2.1. Fund Sample

The data set for this study consisted of 51 sustainability funds, their respective benchmarks and 25 conventional funds. Eleven of the sustainability funds were thematic products. The sustainability funds were selected from the 582 retail sustainability funds listed in Stüttgen & Mattman (2019), which were available for investment in Switzerland. The authors identified these 582 sustainability funds on the basis of all 9'207 retail funds available in Switzerland in 2019 with filters on

- secondary markets: equity, bond and real estate funds;
- sustainability positioning: funds that explicitly and transparently indicated to consciously pursue a sustainability concern, either by explicitly positioning themselves as sustainability funds, or by defining sustainability as a strong constitutive element of their positioning.[57]

For this study, we included only sustainability and conventional funds that were available in Switzerland and Luxembourg. Furthermore, we focused on equity funds with an investment focus on developed markets, i.e. we excluded bonds, real estate, money market, charity funds or mixed funds. We also excluded funds with a regional focus other than global, USA/North America or EU/EMU/Europe, e.g. we excluded funds with a focus on emerging markets. This resulted

[52] EFAMA 2020a.
[53] EFAMA 2020b.
[54] Z/Yen 2020.
[55] EFAMA 2020a.
[56] Scope 1 emissions are direct GHG emissions caused by a company's activities, e.g. emissions generated by a company's gas boilers or vans. Scope 2 emissions are indirect GHG emissions due to the consumption of purchased electricity, steam, heat and cooling. Scope 3 emissions are indirect GHG emissions e.g. from business travel, purchased goods and services (upstream) or from the use or procession of sold products (downstream). See WRI & WBCSD 2004.
[57] Stüttgen/Mattman 2019. The funds' explicit sustainability positioning was researched based on the funds' (self-) description. Information sources were (a) the fund titles, screened for 60 predefined sustainability-related terms such as SRI, ESG, SDG, responsible, sustainable, etc. in different languages; and (b) listings as "sustainable" by external data providers, e.g. Bloomberg, morningstar.ch, yourSRI.com; see Stüttgen & Mattman 2019.

in 127 equity funds from which we drew our sample. We chose 11 thematic products and 40 non-thematic products based on the following criteria:

- Large size (fund capital as of 30th December 2019),
- Each of the sustainability approaches was applied by at least 10 funds in our sample (excl. impact investments for which we were only able to include five funds),
- No bias in the sample distribution of regional investment focus compared to the sustainable equity funds available in Switzerland, i.e. a representative sample in terms of regional investment focus,
- Impact data coverage of more than 50% across all four sustainability impact measurements.

For the sample of 25 conventional funds, we focused on the same fund types resp. applied the same filters. The sample was drawn randomly, but we controlled for a match in the distribution of regional investment focus and fund size with the sustainability funds, and we excluded funds with an Inrate Impact data coverage lower than 50%.

3.2.2. Dependent impact variables

The dependent impact variables used in this study are the following fund-level variables:

- Weighted average ESG Impact score
- Weighted average carbon intensity (WACI)
- Weighted % of revenue derived from critical activities
- Weighted involvement in major environmental controversies

To calculate the dependent impact variables of the funds, we aggregate the sustainability impact of the holdings according to the weights in the respective fund. We used the following measurements to assess the sustainability impact of investee companies:[58]

- ESG Impact: score [0; 1]
- Climate Impact: carbon intensity in tCO_2/million USD revenue
- Critical activities: % of revenue derived
- Major environmental controversies: involvement [yes/no]

Each of these impact variables is based on Inrate data as of October 2020, which are outcomes of Inrate impact measures. The conceptual basis are extra-financial assessments of external effects that, due to market failures, are not internalized into market prices. The Inrate impact measurements are in line with the Task Force on Climate-related Financial Disclosures[59]

[58] The impact variables are further explained below.
[59] TCFD 2017.

(climate intensity) and, from its principal structure, with the EU Taxonomy (ESG Impact, critical activities, major environmental controversies). As compared to the EU Taxonomy, the ESG Impact and critical activities assessments are

- encompassing: they cover all important environmental impacts as well as social impacts along entire life cycles and apply them to all economic business activities resp. sectors;
- pragmatic and have been successfully used for many years.

Weighted average ESG Impact

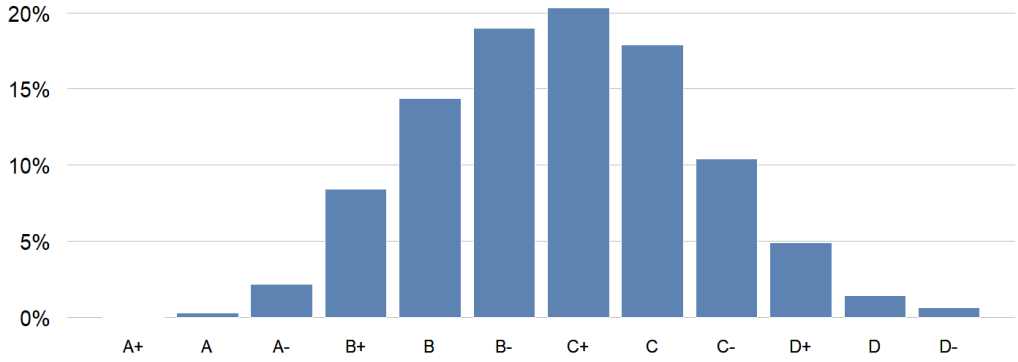
The weighted average ESG Impact score of a fund is based on the Inrate ESG Impact score (see Annex A.1 in more detail) of its holdings. The ESG Impact assesses the encompassing sustainability impacts of companies on the environment and society. The assessment is based on the following components:[60]

- *Product Assessment:* Impact of products and services on society and environment along entire product life cycles as the main focus of the impact assessment.
- *CSR Assessment:* Systematic assessment of management & operation practices concerning Corporate Social Responsibility (CSR).
- *Controversial practices* and their impact on society and environment are included in the assessments.
- *Sector-specific* indicators and weights to account for sector-specific sustainability issues.

The ESG Impact is normalized on a scale from 0 to 1 for the ESG Impact score (zero corresponding to a very negative net impact, one to a very positive net impact), which is translated into ESG Impact grades from A+ to D- (see Table 12). The grades from A+ to B- show a positive net impact, the grades from C+ to D- a negative net impact.[61] For the statistical analyses, we used the ESG Impact score and, for visualisation purposes, the ESG Impact grades. The distribution of ESG Impact grades is roughly bell-shaped (Figure 9).

[60] Schwegler 2018.
[61] Schwegler 2018.

Figure 9: Distribution of companies over the ESG Impact grades



A+ corresponds to a very positive net impact, D- to a very negative net impact.

Source: Inrate ESG Impact ratings as of October 2020, based on a universe of 3'638 companies.

The statistical analyses were performed on fund level as opposed to the company level, to assess the portfolio impact. The portfolio impact is based on the company level ESG Impact scores of the fund positions and their weightings and is calculated as the weighted average ESG Impact score for each fund. To correct for a bias between the funds due to differences in coverage, we divided this weighted average ESG Impact score by the proportion of entities covered.

Weighted average carbon intensity (WACI)

The WACI of a fund is based on the carbon intensities (tonnes CO_2eq/million USD revenue) of its holdings. Inrate measures the carbon intensity of companies by allocating carbon intensities for scope 1, 2 and 3 emissions to business activities, based on the Inrate Climate Impact Model (see Table 1 for example carbon intensities).

The Inrate Climate Impact Model is a quantitative model that estimates the GHG intensity of business activities, measured in tons of CO_2 equivalent (tCO_{2eq}) per million USD revenue. The model accounts for direct GHG emissions resulting from in-house production processes (scope 1), indirect emissions associated with the purchase of energy (scope 2) as well as indirect emissions associated with the purchase of goods and services from suppliers (including disposal, scope 3 upstream) and emissions associated with the intermediate or final use of the output of the production processes (scope 3 downstream).

The GHG intensities derived in the Inrate Climate Impact Model are based on an economic input-output life-cycle assessment (EIO LCA). Input-output analysis is based on the monetary flows induced by an economic activity across the entire supply, use and disposal chain, based

on official statistical data. In combination with environmental data it allows to quantify GHG emissions along entire value chains that are linked to these monetary transactions. The result are generic emission intensities for economic activities, based on global averages. For more details on the Inrate Climate Impact measure, see Annex A.2.

The Inrate climate intensities are reliable and comparable and, thus, well suited to assess and compare the climate impact of portfolios and to shed light on the capital allocation effect:

- The Inrate model-based climate intensities are the best currently available standard for climate-related asset selection between sectors, esp. by fully covering entire value chains in a consistent way.
- The Inrate climate intensities are also fully reliable for selecting among companies within the high-intensity energy and utilities sectors. For these sectors, Inrate researches the physical energy consumption of each company, broken down by energy source, and determines the climate intensity using IPCC emission factors. This physical data complements the model-based climate intensity data for these sectors.
- For selecting between companies within sectors other than the energy and utilities sectors, the Inrate climate intensities are partly reliable:
  - The intensity data allows to assess and compare differing product portfolios of companies within the same sector (e.g. dairy products vs. vegetable and fruit farming within the nutrition sector, or automobiles vs. light trucks within the transportation sector). For companies with similar products and services, the climate intensity data does not distinguish between (a) differing brand values of products, (b) product technologies (e.g. different car propulsion technologies for automobiles) or (c) in-house processes (including offsetting practices), or between different purchased electricity mixes. This has both advantages and disadvantages:
    (a) The blind spot concerning brand values is an important advantage. It avoids that luxury brands receive lower climate intensities due to higher product prices, even if fuel consumption and GHG emissions per kilometre might in fact be higher.
    (b) & (c) Not distinguishing between different product technologies and inhouse-processes can be considered a disadvantage compared to reported GHG data. However, this inaccuracy is hardly relevant for the assessment and comparison of portfolio impacts and can therefore be considered as rather small. In principle, it would be possible to supplement the model data for scope 1 and 2 with reported data. However, reported data are often not comparable and partly incorrect, so that the added value of reported data is doubtful.

Table 1: Examples of activities with their respective carbon intensities (scope 1-3)

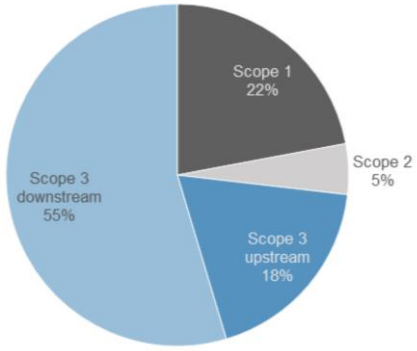
Economic activity	Carbon intensity (tCO_2/Mio. USD revenue)
Hospitals, postal service, uranium mining, Retail of self-generated nuclear electric power	250
Fishing, Retail of self-generated solar electric power	400
Gold ore mining, Clothes & apparel, Soft drinks/Breweries/Wineries	500
Chocolate, Refrigerators & Freezers	800
Metal processing	900
Automobiles, Aircraft, Cosmetics, Pesticides, Water supply & sewage treatment	1'000
Cruise ships, Stone & mineral products, Grain & seed farming	2'500
Oil extraction, cement	5'000
Retail of self-generated electric power from coal	6'000
Cattle ranching & farming, Wholesale of self-generated electric power from Coal	10'000
Coal mining	15'000
Steam & thermal energy supply (based mainly on coal, oil, gas)	30'000

Source: Climate Impact data 2020.

The Inrate Carbon Impact data shows that indirect GHG emissions associated with the purchase of goods and services including disposal (scope 3 upstream) account for 18% of total GHG emissions of an average company in the Inrate universe (Figure 10).[62] Moreover, 55% are caused during product usage (scope 3 downstream). This emphasizes the necessity to evaluate the entire value chains of a company's products and services for a comprehensive picture of a portfolio's climate impact.

[62] Schäppi et al. 2020.

Figure 10: Contribution of the different scopes to total GHG emissions



Source: Inrate Climate Impact as of 2020.

In this study, the encompassing climate intensity (scope 1-3) is used as one of the main dependent variables. However, we also used the partial climate intensity scope 1 and 2 as control, as, presumably, most of the climate intensity data used by asset managers does not or not fully include scope 3 emissions. The reason for this being that scope 3 emissions are rarely reported and have to be modelled. We do not present the details of the analyses with the control measurement (scope 1 and 2) because the statistical analysis revealed that their direction and significance did not differ from the main analysis (scope 1, 2 and 3).[63]

With the fund positions and their weightings, we calculated the weighted average carbon intensity (WACI) for each fund. To correct for a bias between the funds due to differences in coverage, we divided this WACI by the proportion of entities covered.

Weighted percentage of revenue derived from critical activities

A fund's weighted percentage of revenue derived from critical activities is based on the involvement of its holdings in certain critical activities (in % of revenue). A company's involvement in critical activities can be extracted from the ESG Impact Product Assessment, which is an important part of the ESG Impact assessment of companies. For the Product Assessment, Inrate investigates a company's business activities as well as the share of revenues derived from these activities (see Annex A.1).

For the purpose of this study, we labelled the activities in the following categories as critical according to their detrimental impacts on the environment and society:

- Agricultural industry and fishing (meat, dairy/eggs, seafood/fish, fertilizer & pesticides)
- Defence industry

[63] This could mean that asset managers did not optimize their scope 1 & 2 climate impact either, or that our model data did not reveal portfolio impact improvements made by selecting companies with lower climate intensities of in-house processes, product technologies, or purchased electricity mixes.

- Fossil fuels (oil, coal, natural gas)
- Mining and production of metal
- Nuclear energy
- Production of cement
- Transportation industry (road transportation, excl. public transport, and air transportation)

For each of these critical activities, we covered entire value chains. For instance, air traffic includes the production of airplanes and their components as well as activities from airlines and airports.

We calculated the weighted percentage of revenue derived from each of these activities per fund on the basis of the fund positions and their weightings. To correct for a bias between the funds due to differences in coverage, we divided this weighted percentage of revenue derived from each activity by the proportion of entities covered. We investigated the involvement in critical activities separately and as a combined measurement for which we used the sum over all critical activities.

In this study, genetic engineering is also considered a critical activity. We did not estimate the share of revenue because most companies involved conduct research without directly generating revenue. Inrate, therefore, determines whether companies are involved in critical activities related to genetic engineering or not. Critical activities include genetic modifications of plants (e.g. production of genetically modified seeds) or animals (e.g. creation of genetically modified animals or production of drugs or other substances by use of genetically modified animals, i.e. gene pharming). For this reason, we did not include genetic engineering in the combined measurement with the other critical activities, measured in share of revenue, but reported this topic in the separate results.

Weighted involvement in major environmental controversies

We also investigated the involvement in major environmental controversies. A fund's weighted involvement in major environmental controversies is based on the number of holdings that are involved in major environmental controversies and their weights in the fund. Inrate evaluates the ESG Impact of a company based among other things (see above and Annex A.1) on controversies from different categories, e.g. governance practices, working conditions, legal compliance, impact on local communities or environmental damages.

For each controversial event, an impact assessment is carried out, taking into account the severity of the event, the company's involvement in the event and event credibility[64]. This

[64] For example, a controversial event, such as a corruption case, has high credibility after a court conviction. During the investigation and without such a court verdict, the credibility of the event may be questionable.

impact assessment results in event scores from 1 (highest negative impact) to zero (no negative impact). All controversial event scores corresponding to one category are then aggregated and converted into a controversy indicator score per company, again from 1 (highest involvement) to zero (no involvement). In this study, companies with one or more environmental controversy indicator scores exceeding a threshold of 0.5 were considered to have a major involvement.

For each fund and benchmark, we calculated the weighted involvement of companies in major environmental controversies using the fund positions and their weightings. To correct for a bias between the funds due to differences in coverage, we divided this weighted percentage of involvement by the proportion of holdings covered.

3.2.3. Portfolio positions and their weightings

The positions and their weightings of the sustainability and conventional funds were assessed on 31.12.2019 or the closest available date on Thompson Reuters or Bloomberg. The same procedure was applied to the benchmark positions. Where benchmark constituents and their weightings were not available, we estimated them via corresponding ETFs either on the website of the asset manager or Bloomberg.

3.2.4. Independent variables 1: Sustainability approach

For every sustainability fund, we allocated the applied sustainability approach or combination of approaches. To do this, we performed our own desk research based on publicly available information, mainly fund factsheets and fund provider publications. For the statistical analysis we differentiated between the following seven sustainability approaches as listed in Table 2.

The distinction of sustainability approaches in our study mostly aligns with these general market definitions, with the following exceptions:

- *Exclusion*: Here, we combined value-based and norm-based exclusions resp. screenings due to the high similarity of the approaches and thematic overlaps.
- *Positive selection*: As best-in-class is a specific positive selection approach, “positive selection” was only taken into account in this study if a fund did not use the best-in-class approach.
- *Thematic sustainability investments:* In this study, we only included thematic funds with a focus on environment, climate or sustainable energy.

Table 2: Definitions of sustainability approaches

Sustainability approach	Definition
Best-in-class	Approach in which a company's or issuer's ESG performance is compared with the ESG performance of its peers (i.e. of the same sector or category) based on a sustainability rating. All companies or issuers with a rating above a defined threshold are considered as investable.
Engagement	Engagement is an activity performed by shareholders with the goal of convincing management to take ESG criteria into account. This dialogue includes communicating with senior management and/or boards of companies and filing or co-filing shareholder proposals. Successful engagement can lead to changes in a company's strategy and processes so as to improve its ESG performance and reduce risks.
ESG integration	The explicit inclusion by investors of ESG risks and opportunities into traditional financial analysis and investment decisions based on a systematic process and appropriate research sources.
Exclusion	An approach excluding companies, countries or other issuers based on activities considered not investable. Exclusion criteria (based on norms and values) can refer to product categories (e.g. weapons, tobacco), activities (e.g. animal testing) or business practices (e.g. severe violation of human rights, corruption).
Impact investments	Investments intended to generate a measurable, beneficial social and environmental impact alongside a financial return. Impact investments (…) target a range of returns from below-market to above-market rates, depending upon the circumstances. Swiss Sustainable Finance (SSF) considers impact investments as those having three main characteristics: intentionality, management and measurability.
Positive selection	Investment objects are chosen that fulfil ethical, ecological, social or governance criteria particularly well.
Thematic sustainability products	Investment in businesses contributing to sustainable solutions, in the environmental or social domain. In the environmental segment, this includes investments in renewable energy, energy efficiency, clean technology, low-carbon transportation infrastructure, water treatment and resource efficiency. In the social segment, this includes investments in education, health systems, poverty reduction and solutions for an ageing society.

Source: Definitions are based on SSF 2020.

We did not include ESG-related voting in the study, as, with our study design, we were not able to assess the company impact of active ownership practices. Engagement was included anyhow to control if active ownership might deliberately lead to investments in activities with a negative company impact with the goal to improve impact over time.

3.2.5. Independent variables 2: Control variables

As control variables, we used the benchmark type, the coverage and three widely used metrics for portfolios: investment focus, concentration and tracking error.

Benchmark type

We differentiated between funds with a conventional or a sustainable benchmark. For some funds, Bloomberg and fund factsheets did not provide a benchmark. We categorised them as funds without a (known) benchmark.

- Sustainability benchmarks were applied by 13 passively managed funds and three actively managed funds,
- Conventional benchmarks were applied by 31 actively managed funds,
- Unknown or no benchmarks were found for four actively managed funds.

Coverage

The coverage measures the weighted proportion of the fund holdings to which we were able to allocate a company-level sustainability impact measurement. Even though we corrected final, fund-level dependent variables for this coverage, we included the coverage in our regression analysis as a control variable.

The average Inrate Impact data coverage over the different sustainability impact measurements in our data set was 92% (min. 60%, max. 100%) per fund. Overall, we evaluated 4'109 different companies.

Investment focus by region

Historically, sustainability reporting varied greatly between regions.[65] It stands to reason that the regional investment focus of a fund might affect the sustainability impact of a fund. For instance, portfolios with a focus on emerging markets tend to have lower sustainability impacts than portfolios with a focus on developed markets.[66] To control for potential effects on a finer scale, we differentiated between the following regions:

- Global
- USA or North America
- EU, EMU (Economic and Monetary Union) or Europe

[65] Kolk 2005.

[66] Average ESG Impact score per company: developed markets (N=2169): ⌀ 0.449; emerging markets (N=1185): ⌀ 0.368. Source: ESG Impact data as of October 2020.

Table 3: Distribution of regional investment focus

Regional focus of sustainability funds*	Switzerland (N=127)	Sample sustainability funds (N=51)	Sample conventional funds (N=25)
Global	51%	63%	64%
USA or North America	20%	16%	16%
EU, EMU or Europe	28%	22%	20%

Based on the full 127 sustainability funds in Switzerland that fulfilled our criteria (see chapter 3.2.1).
Source: Bloomberg.

Concentration (Herfindahl-Hirschmann index)

The Herfindahl-Hirschman Index (HHI) is a commonly accepted measure for portfolio concentration[67] or portfolio diversification[68]. It is calculated by squaring the share of each company in the portfolio and then summing the resulting numbers. It can range from close to zero to 1. The average concentration in our data set was 0.02 (min. <0.01, max. 0.14).

Tracking error

Tracking error is the divergence between the performance of a fund and the performance of its benchmark. Therefore, the tracking error is an indicator of how actively a fund is managed and its risk level[69]. For our study, we used the one-year tracking errors reported by Bloomberg with a target date of 31.12.2019.

3.3. Statistical analyses

Graphs and statistical analyses were all performed with the R programming language, R 4.0.3[70], using the *base* package for plots and the *stats* package for statistical models as well as statistical tests. P-values were evaluated at a 5%-threshold, i.e. p-values of <0.05 were considered as significant. A p-value of 0.05 means that there is a 5% likelihood of committing a type I error (false positive)[71]. A p-value between 0.1 and 0.05 with a respective likelihood between 10% and 5% was considered a trend. A p-value <0.001 corresponding to a 0.1% likelihood was considered highly significant.

To investigate the *capital allocation effect on portfolios* (see chapter 3.1), we compared the group of sustainability funds with the group of conventional funds by using *Welch two-*

[67] Lovett 1988.
[68] Woerheide & Persson 1993.
[69] Chen 2020.
[70] R Core Team 2020.
[71] A type I error means that the null hypothesis was falsely rejected. The null hypothesis stated that there is no difference between the two groups being compared (e.g. the group of sustainability funds vs. the group of conventional funds).

sample t-tests (two-sided, un-paired)[72]. Furthermore, we performed two-sided *paired* t-tests[73] to investigate whether sustainability funds differ from their specific conventional benchmarks as a measure of the *asset management effect*. Due to this pairwise comparison, we included benchmarks multiple times if several sustainability funds had the same benchmark. As a control, we also tested the difference between conventional funds and the conventional benchmarks of the sustainability funds by means of Welch two-sample t-tests (two-sided). In this group-wise comparison, we naturally included each benchmark only once.

Finally, we performed regression analyses. We specifically used linear models (LM) with Gaussian family distribution to analyse the effect of the different sustainability approaches on the dependent sustainability impact variables of the funds. As control variables, we used the investment focus by region, the benchmark type, the portfolio concentration as well as the tracking error (see chapter 3.2.5).

3.4. Limits of this analysis

In this chapter, we summarise the limits of our analysis.

1. The study focused on the *capital allocation effect on portfolio impact* (see chapter 3.1). By doing so, we did not cover the following topics:

- We did not assess greenwashing. To do this, it would have been necessary to assess a sustainability fund's explicit intention, marketing material, and consulting practices.
- Evaluating the capital allocation effect on portfolio impact, as we did in this study, does not cover the entire capital allocation impact of a sustainability fund. As explained in chapter 2.2, sufficiently large market power is required in particular for capital allocation to generate an overall investment impact on the environment and society.
- Capital allocation is not the only lever to achieve a positive investment impact. Our research design did not allow us to assess the impact of ESG-related active ownership, i.e. engagement or (proxy) voting. These approaches might imply that a fund is deliberately invested in economic activities with an adverse impact that the investor is working on to improve incrementally. To address the investment impact of engagement or (proxy) voting, we would have needed a radically different study design. However, the decision not to focus on these approaches did not reflect any views on whether they have a positive investment impact.

[72] A two-sample t-test is a statistical hypothesis test. The test is used to determine whether the means of two groups of datapoints are significantly different from each other.

[73] A paired t-test is based on two groups of matched pairs as opposed to a t-test based on two independent groups. It is often used for comparisons of repeated measures, e.g. before vs. after patients receive a drug in clinical tests. Here, we basically compare before vs. after application of sustainability approaches.

2. So far, there is no generally accepted *sustainability impact measurement* that could be used to assess the capital allocation effect. The EU has just set up standards for impact assessments in the EU Taxonomy, the Sustainability-related Disclosure in the Financial Services Sector and the amendments to the benchmarking regulation, which have yet to be implemented and are still incomplete (see chapter 5.2.1). In the absence thereof, this study is based on the sustainability impact measurements by Inrate as shown and described in chapter 3.2.2.

These impact measurements are, in our opinion, the best currently available impact measurements (see chapter 2.3 in more detail). They are in line with the TCFD (climate impact) and, from its principal structure, with the EU Taxonomy (ESG Impact, critical activities, major environmental controversies). As compared to the EU Taxonomy, the ESG Impact and critical activities assessments are

- *Encompassing*: they cover all important environmental impacts along entire life cycles as well as social impacts and apply them to all economic business activities;
- *Pragmatic* and have been successfully used for many years.

The *climate intensities* of holdings and portfolios are calculated based on the Inrate Climate Impact Model and, as such, are comparable and highly reliable (see chapter 3.2.2 for more details). The only limits refer to comparing companies with similar products and services. Here, the climate intensity data does not distinguish between differing product technologies (e.g. different car propulsion technologies for automobiles) or in-house processes (including offsetting practices), or between different purchased electricity mixes. However, this inaccuracy is hardly relevant for the assessment and comparison of portfolio impacts and can therefore be considered as rather small. In principle, it would be possible to supplement the model data for scope 1 and 2 with reported data. However, reported data are often not comparable and partly incorrect, so that the added value of mixing modelled data with reported data is doubtful.

3. Not all sustainability funds and sustainability approaches applied have the explicit goal to contribute to a positive company impact, and not all of them aim at allocating capital towards (more) sustainable economic activities. This concerns especially:

- *ESG integration*: no investment impact effect intended.
- *Voting and engagement*: positive investment impact intended, but no short-term improvement of the portfolio impact. It is possible that asset managers invest in unsustainable economic activities “on purpose”. Portfolio impact improvement is intended over time.

However, all sustainability funds investigated in this study that used engagement or ESG integration as sustainability approaches also used other approaches that implied a capital allocation effect, such as exclusion or best-in-class. Furthermore, we did not find a negative capital allocation effect for engagement (see chapter 4.3).

4. In our study, we had to deal with the following *lack of transparency*:

- Sustainability approaches: For our study we performed desk research based on publicly available information to identify the sustainability approaches applied by the sustainability funds.[74] We were not able to perform a survey with the providers within the scope of this study. This is also one of the reasons why the empirical analysis stays anonymous. Therefore, where sustainability approaches were not explicitly mentioned or clearly explained, we needed to make assumptions.[75]

  Also due to the limited scope of the study and a lack of transparency we could not include further variables into the study: (a) the strictness of the sustainability approaches applied in a fund (for instance if a fund excluded companies only after exceeding a high threshold or already after exceeding a low threshold) and (b) how consistently the sustainability approaches were applied by the fund managers - for all fund assets or for just a share of assets. In the latter case, a thematic climate fund may still be invested in coal.
- Intention: Furthermore, we did not evaluate whether funds actually intended a capital allocation effect or not.

5. Our results are anonymized because the aim of the study was *not to evaluate or rank* individual providers or funds. Instead, we intended to draw attention to a highly relevant issue and to

[74] As information sources we mainly used fund factsheets and, if applicable, ESG investment policies and internal regulations of fund providers, if we found explicit or rather strong indications that these policies and internal regulations also applied to the specific fund. For passively managed sustainability funds, we also researched the respective documents of the index provider that the fund replicated.

[75] In principle, we made the following assumptions: (a) 'Integration of ESG factors into investment decisions' was not interpreted as a specific sustainability approach, especially not as "ESG Integration", where ESG factors are integrated into financial analysis. (b) The intention of achieving a positive impact, for instance via statements like 'the fund is invested in companies that are having a real impact on global warming' was not interpreted as impact investing, unless some information was given about impact measurement. (c) Applying ESG aspects as risk-return and reputational factors in investment decisions was interpreted as "ESG integration". Assessing contributions to the SDGs was regarded as a means for impact assessment. (d) Applying the UN SDGs and the UN PRI were not regarded as norms in terms of norm-based exclusions. (e) 'Investing in different clean technologies and energies to achieve an optimal risk spread' was not interpreted as "ESG Integration", as ESG factors were not interpreted as risk factors, but as a general risk diversification. (f) 'The aim is to invest in market leaders within each segment' was not interpreted as best-in-class, if the 'market leaders' were defined in terms of financial success and not in terms of sustainability. (g) 'The fund is engaged in companies contributing to climate mitigation' was not interpreted as ESG-related engagement, but as a thematic investment focus. (h) 'We target companies that pursue a policy of sustainable development' or 'exhibit a minimum level of ESG performance' or 'have a higher ESG score than the benchmark' was regarded as "positive selection". (i) Best-in-class was only chosen if the fund chose the best companies concerning ESG factors within one or more class(es) resp. group(s) of companies, e.g. industries or an index. (j) Over-weighting of sustainable and under-weighting of unsustainable companies was interpreted as positive selection.

provide empirical evidence for it. Moreover, where publicly available information on the sustainability approaches of sustainability funds was incomplete or unclear, we were not able to check with the fund companies to corroborate our assumptions.

6. The sample of sustainability funds in this study was selected to be *representative* for the Swiss market with regards to sample size (we examined 51 out of 127 funds) and the regional focus. The sample of conventional funds was matched to the sustainability funds (for details see chapter 3.2.1). Therefore, the sample of conventional funds is not representative for all conventional funds. However, the matching guarantees that there is no bias when comparing the sample of conventional funds with the sample of sustainability funds.[76] Moreover, the samples of sustainability and conventional funds are sufficiently large to detect relevant differences via the t-tests that we used to identify capital allocation and asset management effects.

In terms of the regression analysis examining the influence of sustainability approaches on portfolio impact, the statistical representativity is uncertain. The reasons are the following: Due to the lack of transparency and clarity in the fund documentations, determining the sustainability approaches applied by a fund via desk research was very time-consuming. Therefore, we were only able to include a limited number of sustainability funds applying a specific sustainability approach. As we did not know the total number of sustainability funds applying a certain sustainability approach, we do not know whether we reached the necessary amount of sustainability funds for each approach that would be necessary to reach representativity.

However, we did try to include a minimum amount of 10 funds per approach. This was successful apart from the "impact investment" approach. This enabled us to gain an overall impression whether some sustainability approaches consistently improved sustainability impact or not.

Concerning the control variables in the regression analysis, our samples were not designed to be representative across benchmark type, concentration or tracking error. We did, however, used them as control variables in case they influenced the dependent impact variables.

4. Empirical Results

In this chapter, we describe the empirical results of the statistical analyses. For the interpretation of the results, see chapter 6.

[76] Hypothetically, if the conventional funds sample were representative to the Swiss market of conventional funds but had e.g. 60% regional focus on Europe and we compared it to a sustainability funds sample with only 40% regional focus on Europe, the discrepancy in regional focus might bias the results.

4.1. Overview

As mentioned before, we performed three types of comparisons:

- Sustainability funds vs. conventional funds to assess the *capital allocation effect* of sustainability funds,
- Sustainability funds vs. their conventional benchmarks to measure how *asset managers* influence the portfolio impact of the fund as compared to the benchmark.
- Conventional funds vs. the conventional benchmarks of the sustainability funds as a *control*.

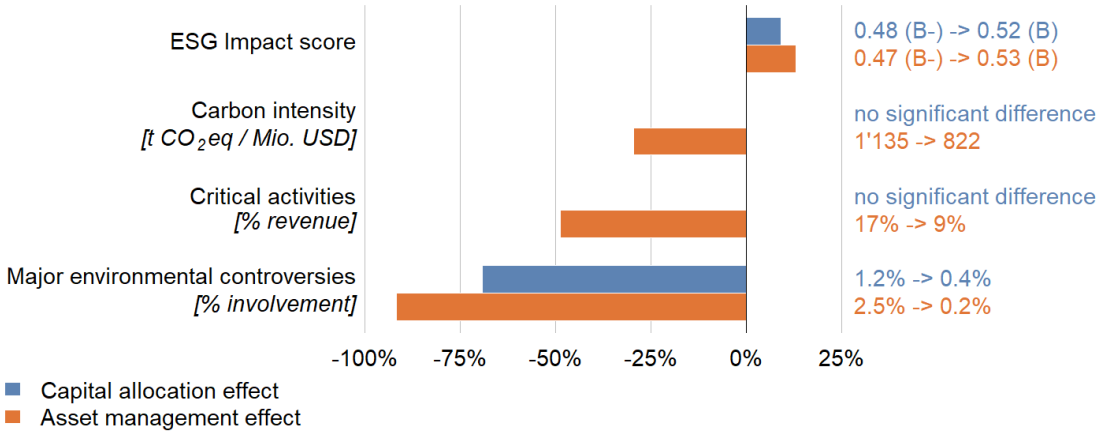
For the portfolio impact assessment of funds and benchmarks, we used the four sustainability measurements as listed in chapter 3.2.2. In terms of the capital allocation effect, we found that the ESG Impact scores of the sustainability funds were significantly higher than those of the conventional funds (Figure 11). While being significant, the difference of 0.04 resp. 9% is barely enough to improve the ESG Impact grade, halfway for instance from C- to C. Furthermore, neither carbon intensities nor the share of critical activities of the sustainability funds were significantly reduced compared to the conventional funds. The sustainability funds, however, showed significantly reduced involvements in major environmental controversies compared to the conventional funds (by 69%).

The analysis for the asset management effect shows that all sustainability measurements of the sustainability funds were significantly improved compared to their conventional benchmarks: the ESG Impact scores of the sustainability funds were significantly higher by 13%. At the same time, carbon intensities as well as the share of critical activities and involvements in major environmental controversies were significantly reduced (by 49% for carbon intensities, by 30% for critical activities and by 92% for involvements in major environmental controversies).

There were no significant differences between any of the sustainability measurements for the control, i.e. the comparison between conventional funds and the conventional benchmarks of the sustainability funds. Therefore, we did not include this comparison in Figure 11.

The results of the regression analysis show that the sustainability approaches hardly affected the dependent variables. In fact, only thematic products influenced the ESG Impact score. Amongst the control variables, the concentration significantly affected ESG Impact scores, carbon intensities and critical activities, whereas the regional investment focus and coverage significantly affected the ESG Impact score.

Figure 11: Main results



This figure displays in blue the mean difference between sustainability funds and conventional funds (as a measure of the capital allocation effect) in percentage of the mean of the conventional funds, and in orange the mean difference between sustainability funds and their respective conventional benchmarks (as a measure of the asset management effect) in percentage of the mean of the benchmarks.

Source: Inrate ESG Impact data and Climate Impact data as of October 2020.

4.2. Comparisons

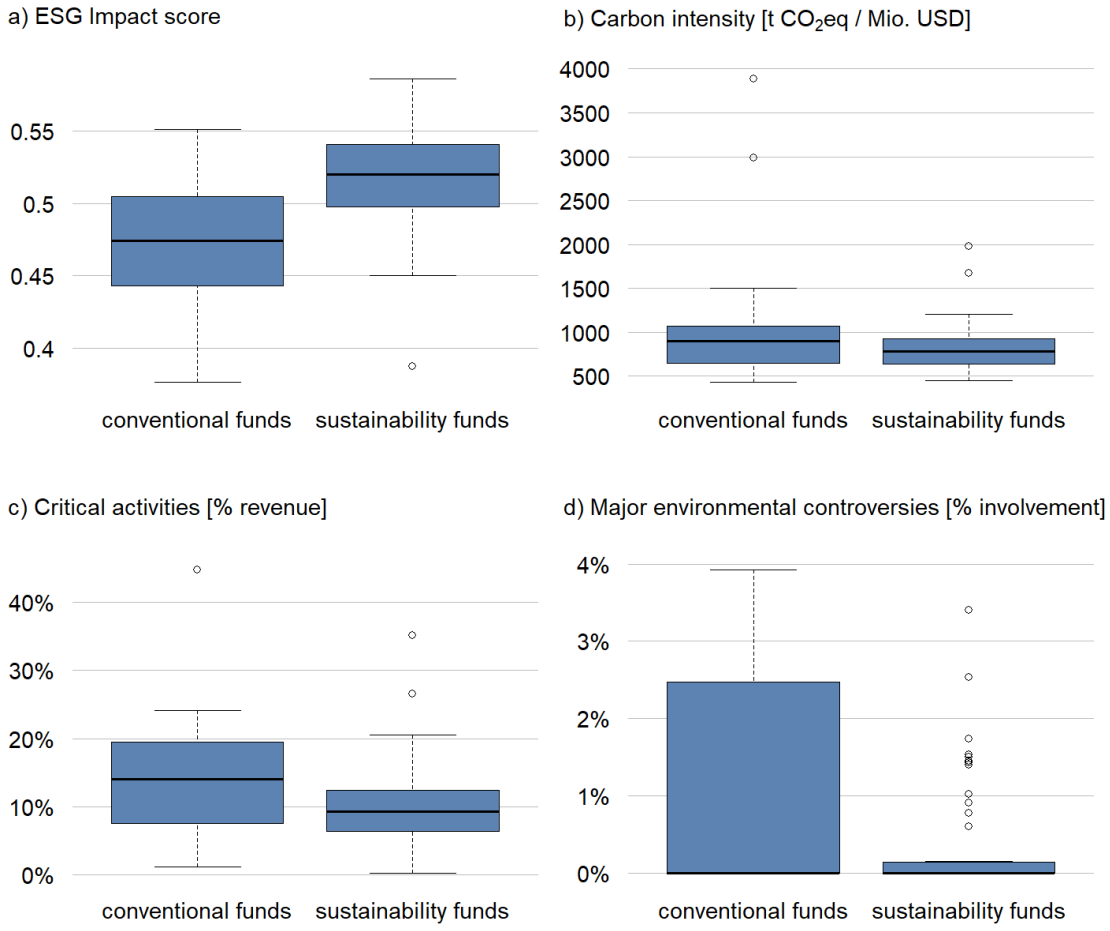
4.2.1. Capital allocation effect: Sustainability funds vs. conventional funds

With the comparison between sustainability funds (N=51) and conventional funds (N=25), we investigated whether sustainability funds actually allocated capital towards activities with a better sustainability impact. The raw data shows that the interquartile ranges (IQR, i.e. the range between the first and third quartile) of the two groups were at least partly overlapping for all of the four dependent impact variables (Figure 12). Furthermore, there were several outliers, especially when it came to the involvement in major environmental controversies.

The results of the t-tests are summarised in Table 4. With regards to the ESG Impact score, sustainability funds indeed had a significantly higher score by 0.04, i.e. a 9%[77] increase (p-value < 0.001). Compared to the conventional funds, the sustainability funds had a significant reduction in the involvement in major environmental controversies by 0.8 percentage points, which corresponds to a 69% reduction (p-value = 0.01). However, we neither found a significant difference for carbon intensity, nor for critical activities.

[77] This percentage was calculated as follows: 100*(average for conventional funds - average for sustainability funds)/ average for conventional funds; in this case the average concerns the ESG Impact score (see Table 4).

Figure 12: Boxplots of raw data comparing sustainability and conventional funds



Distribution of the raw data of the conventional and sustainability funds for a) the weighted average ESG Impact score, b) the WACI, c) the weighted percentage of revenue derived from critical activities and d) the weighted involvement in major environmental controversies.
A boxplot summarises five numbers from the data set: The median is the line dividing the box, the upper and lower quartiles of the data define the ends of the box. The minimum and maximum data points are drawn as points (if outliers are present) or as the ends of the lines (whiskers) extending from the box. Outliers are defined as points that are further away from the ends of the box than 1.5 times of the height of the box.

Source: Inrate ESG Impact data and Climate Impact data as of October 2020.

Table 4: Results of t-tests comparing sustainability and conventional funds

	ESG Impact [A+; D-] resp. [1; 0]	Carbon Intensity (tCO_2eq / mUSD revenue)	Critical activities (% revenue)	Major environmental controversies (% involvement)
p-value	<0.001***	*0.144, not sign.*	*0.070, not sign.*	0.010**
Ø sustainability funds	0.52	822	10%	0.4%
Ø conventional funds	0.48	1061	14%	1.2%

* significant at 0.05-level, ** significant at 0.01-level, *** significant at 0.001-level

Source: Inrate ESG Impact data as and Climate Impact data as of October 2020.

Taking a closer look at the categories of critical activities separately, there was no significant difference between conventional and sustainability funds for six out of the eight categories (Table 5). Only the share of revenues derived from the production of cement was significantly reduced by 0.22 percentage points (69%, p-value = 0.026) in sustainability funds and from the defence industry by 0.3 percentage points (50%, p-value = 0.026).

Table 5: Results of t-tests comparing the share of critical activities in sustainability and conventional funds

	Agriculture & fishing	Mining & metal production	Fossil fuels	Cement production	Transportation	Defence	Nuclear energy	Genetic engineering
p-value	*0.386, not sign.*	*0.822, not sign.*	*0.146, not sign.*	0.026*	*0.211, not sign.*	0.026*	*0.559, not sign.*	*0.118, not sign.*
Ø sustainability funds	1.2%	1.6%	4.0%	0.1%	2.5%	0.3%	0.5%	1.0%
Ø conventional funds	1.5%	1.5%	6.4%	0.3%	3.2%	0.7%	0.4%	1.8%

* significant at 0.05-level, ** significant at 0.01-level, *** significant at 0.001-level

Source: Inrate ESG Impact data as of October 2020.

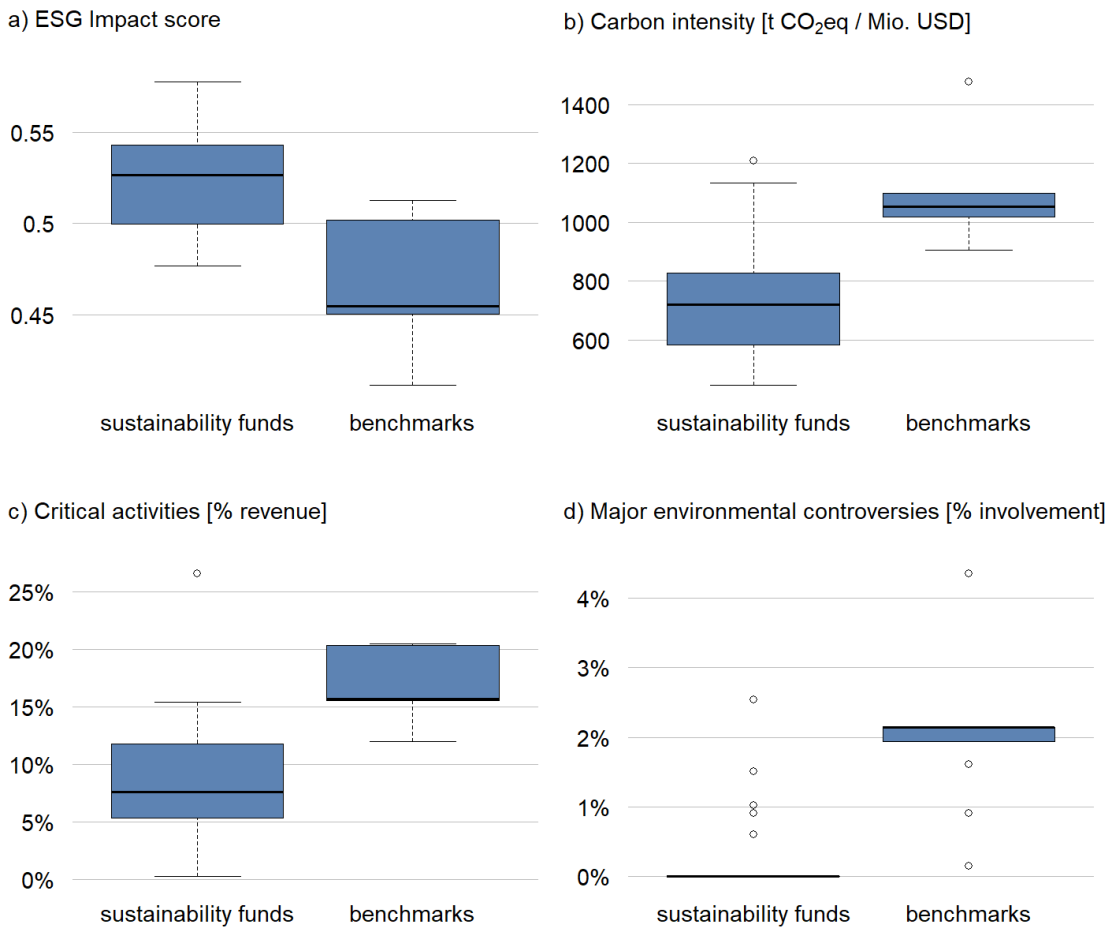
4.2.2. Asset management effect: Sustainability funds vs. their conventional benchmarks

We analysed how asset managers influenced the sustainability impact of the funds by a pairwise comparison between each sustainability fund (N=32) and its respective conventional benchmark (N=32). Across the four dependent impact variables, the interquartile ranges (IQR) of the two groups were not overlapping at all or only very slightly (Figure 13). Furthermore,

there were several outliers, especially when it came to the involvement in major environmental controversies.

According to all four paired t-tests, there were highly significant differences (p-values <0.001) between sustainability funds and their conventional benchmarks (Table 6). Sustainability funds had significantly higher ESG Impact scores by 0.06 (13%), and significantly lower carbon intensities by 313 tCO_2/Mio. USD (30%). Moreover, critical activities and involvements in major environmental controversies were significantly reduced by 8.1 percentage points (49%) and 2.3 percentage points (92%), respectively.

Figure 13: Boxplots of raw data comparing sustainable funds and their respective conventional benchmarks



Distribution of the raw data of the sustainability funds and their conventional benchmarks for a) the weighted average ESG Impact score, b) the WACI, c) the weighted percentage of revenue derived from critical activities and d) the weighted involvement in major environmental controversies.
For a description of how to read boxplots, see Figure 12.

Source: Inrate ESG Impact data as and Climate Impact data as of October 2020.

Table 6: Results of paired t-tests comparing sustainability funds and their respective conventional benchmarks

	ESG Impact [A+; D-] resp. [1; 0]	Carbon intensity (tCO_2eq / mUSD revenue)	Critical activities (% revenue)	Major environmental controversies (% involvement)
p-value	<0.001***	<0.001***	<0.001***	<0.001***
Ø sustainability funds	0.53	744	8.5%	0.2%
Ø conventional benchmarks	0.46	1057	16.7%	2.5%

* significant at 0.05-level, ** significant at 0.01-level, *** significant at 0.001-level

Source: Inrate ESG Impact data as and Climate Impact data as of October 2020.

The more detailed analysis of the critical economic activities shows that only some of them are significantly reduced in sustainability funds compared to their conventional benchmarks (p-values <0.001), namely fossil fuels, production of cement, transportation industry and defence industry (Table 7). There is no difference in the agricultural industry and fishing, mining industry, nuclear energy and genetic engineering.

Table 7: Results of paired t-tests comparing the percentage of critical activities in sustainability funds and their respective conventional benchmarks

	Agriculture & fishing	Mining & metal production	Fossil fuels	Cement production	Transportation	Defence	Nuclear energy	Genetic engineering
p-value	*0.338, not sign.*	*0.467, not sign.*	<0.001***	<0.001***	<0.001***	<0.001***	*0.206, not sign.*	*0.075, not sign.*
Ø sustainability funds	1.4%	1.5%	2.6%	<0.1%	2.3%	0.3%	0.4%	1.1%
Ø conventional benchmarks	1.1%	1.7%	7.4%	0.2%	4.6%	1.0%	0.5%	1.6%

* significant at 0.05-level, ** significant at 0.01-level, *** significant at 0.001-level

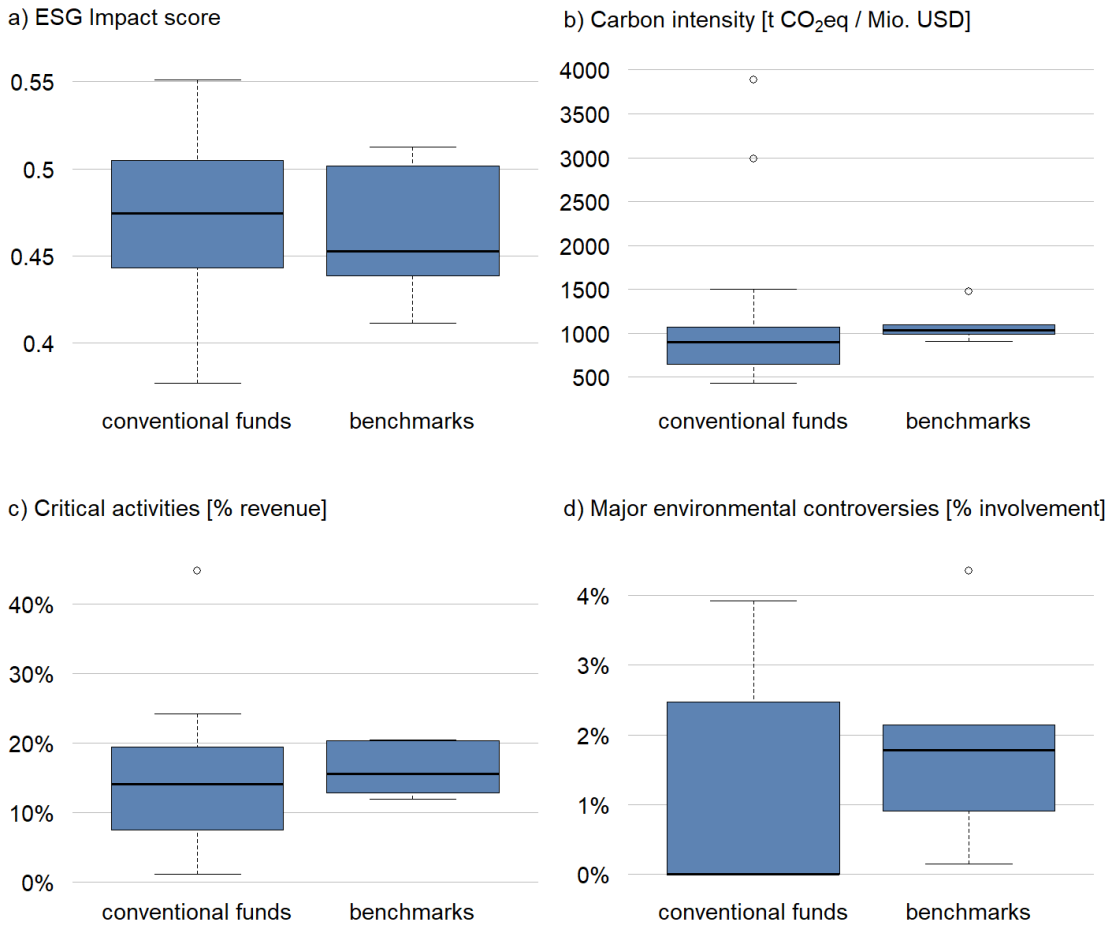
Source: Inrate ESG Impact data as of October 2020.

4.2.3. Control: conventional funds vs. conventional benchmarks of sustainability funds

As a control, we also compared the conventional funds with the conventional benchmarks of the sustainability funds. The IQR of the two groups highly overlap in the raw data for all of the dependent impact variables (Figure 14). Not surprisingly, we found no significant differences

for any of the dependent impact variables (Table 8). The same holds true for the separate analysis on each of the critical activity (Table 9).

Figure 14: Boxplots of raw data comparing the group of conventional funds and the group of conventional benchmarks used by the sustainability funds



Distribution of the raw data of the conventional funds and the conventional benchmarks of the sustainability funds for a) the weighted average ESG Impact score, b) the WACI, c) the weighted percentage of revenue derived from critical activities and d) the weighted involvement in major environmental controversies.
For a description of how to read boxplots, see Figure 12.

Source: Inrate ESG Impact data as of October 2020 and Climate Impact data as of October 2020.

Table 8: Results of t-tests comparing conventional funds and the conventional benchmarks of the sustainability funds

	ESG Impact [A+; D-] resp. [1; 0]	Carbon intensity (tCO_2eq / mUSD revenue)	Critical activities (% revenue)	Major environmental controversies (% involvement)
p-value	*0.459, not sign.*	*0.871, not. sign.*	*0.370, not. sign.*	*0.358, not sign.*
Ø conventional funds	0.48	1061	14%	1.2%
Ø benchmarks	0.46	1090	16%	1.8%

* significant at 0.05-level, ** significant at 0.01-level, *** significant at 0.001-level

Source: Inrate ESG Impact data as of October 2020 and Climate Impact data as of October 2020.

Table 9: Results of t-tests comparing the percentage of critical activities in conventional funds and the conventional benchmarks of the sustainability funds

	Agriculture & fishing	Mining & metal production	Fossil fuels	Cement production	Transportation	Defence	Nuclear energy	Genetic engineering
p-value	*0.213, not sign.*	*0.936, not sign.*	*0.652, not sign.*	*0.581, not sign.*	*0.209, not sign.*	*0.192, not sign.*	*0.245, not sign.*	*0.906, not sign.*
Ø conventional funds	1.5%	1.5%	6.4%	0.3%	3.2%	0.7%	0.4%	1.8%
Ø conventional benchmarks	1.0%	1.5%	7.1%	0.3%	4.8%	1.0%	0.6%	1.9%

* significant at 0.05-level, ** significant at 0.01-level, *** significant at 0.001-level

Source: Inrate ESG Impact data as of October 2020.

4.3. Regression: effects of sustainability approaches on the funds' portfolio impact

We investigated the effects of seven sustainability approaches (best-in-class, engagement, ESG integration, exclusion, impact investment, positive selection, thematic sustainability approach) on the portfolio impact of sustainability funds, compared to the portfolio impact of conventional funds. The impact was measured with the four dependent impact variables (see chapter 3.2.2). This way we could examine if the application of a sustainability approach effectively enhanced the sustainability impact of a portfolio. As a control, we included the regional investment focus, the benchmark type, portfolio concentration and tracking error in the regression models.

Amongst the sustainability approaches, positive selection and thematic sustainability approaches each significantly improved one of the dependent impact variables (Table 10):

Thematic sustainability approaches significantly increased the ESG Impact score by 0.04. Positive selection approaches significantly reduced the involvement in major environmental activities by 0.9 percentage points. None of the other sustainability approaches had a significant effect on any of the dependent impact variables.

The regional investment focus had a significant effect on the on ESG Impact score: funds with a global focus or a focus on USA/North America had a significantly worse ESG Impact score than funds with a focus on EU/EMU/Europe (global: -0.02; USA/North America: -0.06). With regards to major environmental controversies, funds with a focus on USA/North America had a significantly higher involvement than funds with a focus on EU/EMU/Europe by 1.1 percentage points.

Three dependent impact variables – ESG Impact score, carbon intensity and share of critical economic activities – were significantly influenced by the concentration. The higher the concentration, the higher the ESG Impact score, the lower the carbon intensity and the lower the share of critical activities.

Last but not least, the ESG Impact score was significantly affected by the coverage. With increasing coverage, the score also increased. However, neither benchmark type nor tracking error had a significant influence on any of the dependent impact variables.

Table 10: Effects of sustainability approaches and control variables

Variable	ESG Impact [A+; D-] resp. [1; 0]	Carbon intensity (tCO_2eq / mUSD revenue)	Critical economic activities (% revenue)	Major environmental controversies (% involvement)
Best-in-class (n=16)	*no sig. influence*	*no sig. influence*	*no sig. influence*	*no sig. influence*
Engagement (n=23)	*no sig. influence*	*no sig. influence*	*no sig. influence*	*no sig. influence*
ESG integration (n=19)	*no sig. influence*	*no sig. influence*	*no sig. influence*	*no sig. influence*
Exclusion (n=42)	*no sig. influence*	*no sig. influence*	*no sig. influence*	*no sig. influence*
Impact investment (n=5)	*no sig. influence*	*no sig. influence*	*no sig. influence*	*no sig. influence*
Positive selection (n=27)	*no sig. influence*	*no sig. influence*	*no sig. influence*	-0.9% p-value=0.020 *
Thematic products (n=11)	+0.04 p-value=0.002 **	*no sig. influence*	*no sig. influence*	*no sig. influence*
Regional investment focus	Global: -0.02 p-value<0.001 *** USA/N-America: -0.06 p-value<0.001 ***	*no sig. influence*	*no sig. influence*	USA/N-America: +1.1% p-value=0.017 *
Benchmark type	*no sig. influence*	*no sig. influence*	*no sig. influence*	*no sig. influence*
Concentration	conc. +0.01 → +0.005 p-value=0.025 *	conc. +0.01 → -58 p-value=0.027 *	conc. +0.01 → -1% p-value=0.003 **	*no sig. influence*
Tracking error	*no sig. influence*	*no sig. influence*	*no sig. influence*	*no sig. influence*
Coverage	cov. +0.01 → +0.001 p-value=0.026 *	*no sig. influence*	*no sig. influence*	*no sig. influence*

This table summarises the results from the four regression models. We report estimates and p-values of significant variables.
* significant at 0.05-level, ** significant at 0.01-level, *** significant at 0.001-level

Source: Inrate ESG Impact data and Climate Impact data as of October 2020.

4.4. Case studies

4.4.1. Case study 1: ESG fund

The fund we examine in this case study is an example of a fund that included "ESG" in its name but failed quite clearly to deliver on this premise. The fund was passively managed, i.e. aimed to replicate the performance of its sustainability benchmark, which had a regional focus on the USA.

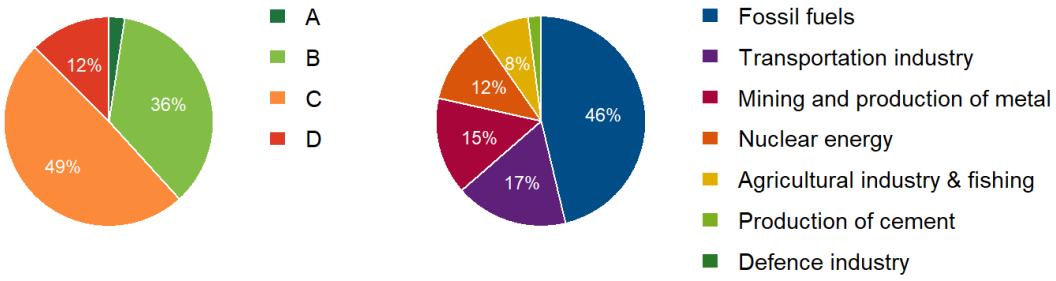
The sustainability approaches used in the company selection for the benchmark were exclusion criteria and best-in-class. In this case, we knew that the exclusion was focused on

controversial weapons, controversies (not further specified) and compliance (including ethical standards).

Quite strikingly, 12% of this fund's volume was invested in companies that had an ESG Impact in the D range (D+, D or D-, Figure 15). In total, over 60% had an ESG Impact in the C or D ranges resulting in an overall ESG Impact score of 0.39. Over a third of the fund's capital (35%) was invested in critical activities (Figure 15), which was more than double the average share amongst the conventional funds. Most of the critical activities that the sustainability fund was invested in were fossil fuels (16%, half of which were derived from coal and oil), climate-intensive transportation (6%) as well as mining and production of metal (5%).

It turns out that the mere application of exclusion and best-in-class approaches does not necessarily lead to a positive portfolio impact. This does not mean that these approaches should not be used. The missing portfolio impact could be due to missing strictness of the approaches or the lack of consistency in their application.

Figure 15: Categorisation of the fund holdings



Left: This pie chart shows the shares of weighted ESG Impact scores of invested companies in the ranges A (A+, A, A-), B (B+, B, B-), C (C+, C, C-) and D (D+, D, D-).
Right: The fund had a weighted percentage revenue derived from critical activities of 35%. This pie chart displays how these 35% were split into the seven categories of critical activities.

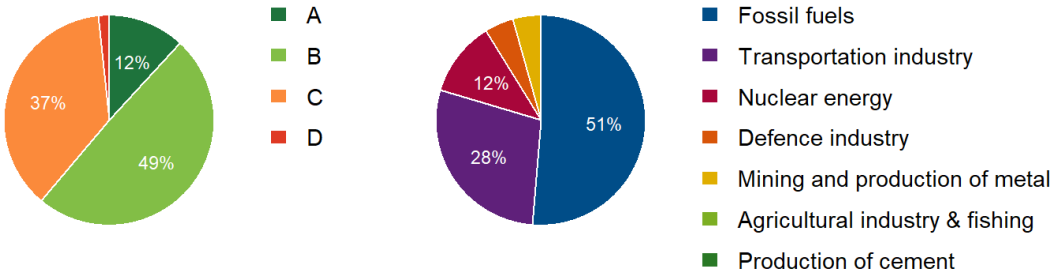
Source: Inrate ESG Impact data as of October 2020, Bloomberg data as of 31.12.2019.

4.4.2. Case study 2: Thematic fund

In the second case study, we take a look at a thematic sustainability fund. The fund was actively managed and had a global investment focus. ESG integration, positive selection, engagement as well as impact investment were the sustainability approaches applied. There was a clear and explicit intent stated that investing into this fund should help improve the climate impact of the portfolio. However, according to the fund factsheet, these sustainability approaches were not applied to the entire fund.

Only 2% of the fund had an ESG Impact in the D range (D+, D, D-) and over 60% are in the A or B ranges (Figure 16). The fund's focus specifically lied on reducing carbon emissions. The climate impact portfolio assessment showed, however, that this claim was clearly not met: The fund's carbon intensity was 1'208 tCO_2/mUSD in revenue, which was about 150 tCO_2/mUSD higher than the average conventional fund or conventional benchmark investigated, and about 400 tCO_2/mUSD higher than the average sustainability fund in this study. Furthermore, 27% of the fund assets were invested in critical activities, about half of which (14%) in fossil fuels (Figure 16), although most of this comprised natural gas (10%). The fund had a share of 8% of its assets invested in the transportation sector, specifically road transportation, which was about 2.5 times higher than the average share of the conventional funds.

Figure 16: Categorisation of the fund holdings



Left: This pie chart shows the weighted percentage of companies in the fund with an ESG Impact score relating to the ranges A (A+, A, A-), B (B+, B, B-), C (C+, C, C-) and D (D+, D, D-).
Right: The fund had a weighted percentage revenue derived from critical activities of 27%. This pie chart displays how these 27% were split into the seven categories of critical activities.

Source: Inrate ESG Impact data as of October 2020, Bloomberg data as of 31.12.2019.

5. Framework Conditions for Effective Capital Allocation

At first, the following chapter provides an overview of necessary prerequisites for effective capital allocation. In the second sub-chapter, current regulatory processes and changes relevant to the EU – and therefore also for Luxembourg as a member of the EU – and Switzerland are described and discussed as to whether they might serve to establish these prerequisites.

5.1. General prerequisites for effective capital allocation

The following prerequisites for effective capital allocation focus on enabling investors and other financial market participants to effectively allocate capital toward sustainable economic activities. These prerequisites are second-best options that primarily focus on the financial system. They assume that first-best solutions – eliminating market failures in the economy – are still not (fully) realizable.

5.1.1. Impact: Measuring the right thing in the right way

For effective capital allocation, investors need to know the impact of their portfolios on the environment and society. Relevant, reliable and, thus, comparable impact assessments need to fulfil the following requirements:

- *Assessing external effects:* Some positive or negative impacts are fully or largely internalised into market prices, such as remuneration of labour in a functioning labour market. Due to market failures, however, other impacts are not sufficiently internalised, such as the global warming effect of GHG emissions. As a consequence, market participants such as companies, consumers or financial actors do not adequately take them into account. Relevant impact assessments, therefore, need to measure these external resp. "extra-financial" effects that occur due to market failures.
- *Encompassing entire value chains:* Complete impact assessments require the consideration of entire value chains. This is because relevant impacts often arise along the value chain outside a company. For example, main impacts in the food sector usually arise in the supply chain, or in the transport and housing sector during product use.
- *Benefits as reference values:* Assessing a company impact is more than just assessing physical carbon or water footprints, hazardous waste ratios, gender pay gaps or number of accidents at work. A company's impact is positive if it contributes to reducing market failures, or negative if it contributes to maintaining or even increasing market failures in an overall systemic perspective. This is evaluated by using the societal benefits of companies' products and services as reference values for evaluating physical environmental or social footprints. The main question to be asked is: Can a certain societal need, e.g. for housing, nutrition, transportation, energy, etc. be fulfilled with better physical footprints? Renewable energy, for instance, uses scarce resources and causes emissions. However, as it allows substituting fossil or nuclear energy, the overall systemic impact is positive. Energy-efficient machines and devices contribute to saving energy and, thus, have an even more positive impact in terms of climate change or resource usage. This kind of impact assessment – with benefits provided as reference values – is necessary to evaluate companies' impacts in terms of

mitigating climate change, conserving biodiversity, sustainable resource usage (water, forests, ecosystems, etc.), ensuring equality, and so forth.

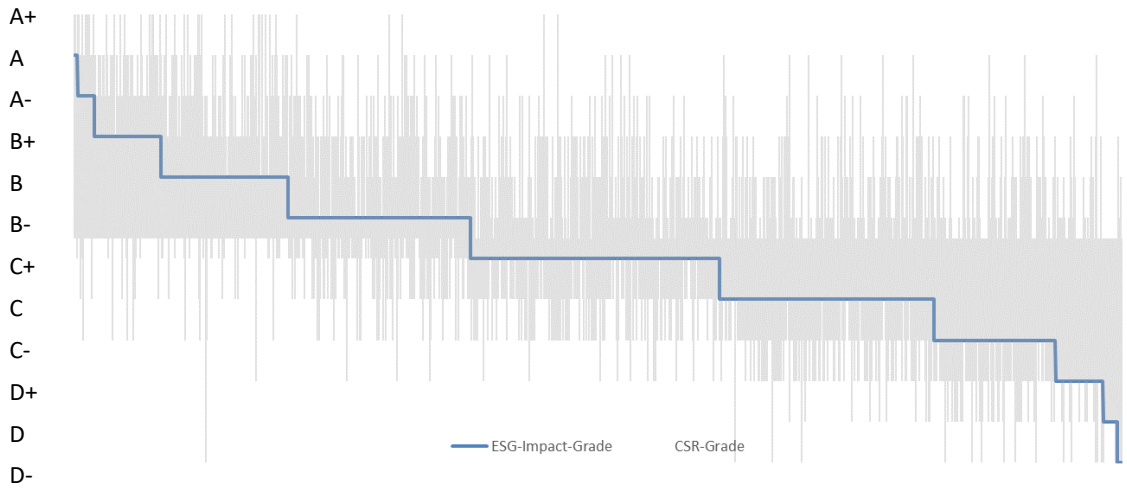
- *Aggregating impacts:* For effective capital allocation, it is finally necessary to normalize and aggregate the various impacts, e.g. on climate, biodiversity, water, equality, etc. Without such an aggregation, investors are left alone with trade-offs for instance between saving GHG emissions at the expense of greater land usage. On the portfolio level, these trade-offs can be revealed through so-called SDG mappings, displaying contributions to individual SDGs.[78] Viable ways for normalizing and aggregating impacts can be semi-quantitative ratings such as the Inrate ESG Impact rating presented on a scale from A+ to D- (see chapter 3.2.2), or the monetization of external effects.

Most impact or ESG data resp. assessments used in investment decisions do not meet these requirements yet. Currently, there is a multitude of ESG data and ratings from various providers, with considerable divergence in ESG ratings.[79] This can lead to some companies or countries rated positive by one data supplier and negative by another. Interestingly, the disagreement in ESG ratings tend to be higher for companies with greater disclosure, as a recent study showed.[80] This undermines that ESG rating methodologies used in ESG assessments vary considerably. Another challenge for investors is that many providers do not sufficiently disclose the assessment methodologies being used. Therefore, transparency on assessment methodologies for ESG ratings and impact data is necessary.

The main causes for the high divergence between ESG ratings are that (a) most assessment methods are not scientifically founded, but, for instance, merely weigh a set of ESG indicators equally; (b) ESG ratings are mostly based on companies' corporate social responsibility (CSR) management systems and practices. Such CSR ratings show the readiness and capabilities of companies to improve their sustainability impacts over time. However, companies operating in sectors with high negative impacts such as coal or oil are more likely to have highly professional CSR management systems.[81] Consequently, they might get a good ESG grade despite significant negative impacts on the environment and society. The following Figure 17 shows how ESG ratings based on CSR management assessments significantly differ from those based on encompassing impact assessments. It reveals that assessing CSR is not enough to direct capital into sustainable economic activities.

[78] See for example Inrate 2019.
[79] See for example Dimson et al. 2020.
[80] Christensen et al. 2019.
[81] E.g. Crane et al. 2017.

Figure 17: Companies' ESG Impact and their CSR quality



On the x-axis, companies are sorted from left to right according to their Inrate ESG Impact grades from A+ to D- (blue line). In comparison, the grey columns display the companies' CSR quality – a sub-rating of the Inrate ESG Impact rating – also on a scale from A+ to D- (see Annex A.1). Grades from A+ to B- stand for an overall positive net impact, grades from C+ to D- for an overall negative net impact. The graph shows that many companies with a positive impact have negative CSR ratings and many companies with a negative impact have positive CSR ratings.

Source: Inrate 2020b.

5.1.2. Investee company data availability

Impact assessments, as described above, require both relevant and reliable company data.

The following data is needed for impact assessments and therefore relevant:

- Companies' products and services and their physical footprints on the environment and society along entire value chains. Here, for example, it is not only necessary to know that a company produces cement, but also the amount of GHG emissions per tonne of cement produced.
- CSR management systems, to assess companies' readiness and capabilities of improving their impact over time.

Companies' data disclosure, apart from being relevant, also needs to be reliable in terms of adhering to the same standards, using comparable balance sheet boundaries and units of measure.

To ensure the availability of both relevant and reliable data, disclosure requirements are needed. These should (a) be consistent across the entire investment chain,[82] from private or institutional investors to fund managers, financial product providers, and invested companies;

[82] Maijoor, Steven 2020.

and (b) address investee companies directly – instead of indirectly via the financial industry – and at best annual reports.

Currently, data gaps and inconsistencies in reporting the relevant data make it difficult for investors, customers, policy makers and other stakeholders to assess the ESG impact of companies. For example, a recent paper showed that from a randomly selected sample of 50 large publicly listed companies across a variety of sectors, there were 20 different ways that these companies reported their employee health and safety data.[83]

The main cause for the lack of relevant and reliable data is that the major reporting standards applied today do not cover all relevant data and/or do not use uniform standards. Widespread reporting guidelines for non-financial information are the GRI Standard, the UN Global Compact, the OECD guidelines for multinational enterprises, ISO 26000, or the EU guidelines on non-financial reporting or reporting climate-related information.[84] Most of these guidelines and standards, however, focus on CSR management systems and do not sufficiently require data that could be used to evaluate the impact of economic activities or products along entire value chains. Furthermore, the standards and guidelines often use different terminologies and units of measure, or they leave considerable leeway to companies in terms of their reporting, at the expense of data comparability.[85] Last, but not least, using non-financial reporting guidelines and standards is not mandatory for all companies, so that some company reporting does not adhere to any standards at all.

5.1.3. Transparency of financial products

For effective capital allocation, the following information is needed on financial product level in a clear, easy to understand and standardised way for investors to take informed decisions:

- Impact-related investment strategy: impact-related goals set, investment rules applied to assure goal achievement, how goal achievement is being measured, data providers used;
- ESG impact of financial products;
- Effects of impact-related investment strategies on financial risk-return.

Currently, transparency on a financial product level is still insufficient. Diverging disclosure standards and market practices make it very difficult to understand the sustainability goals to be reached, the approaches chosen and, thus, to compare financial products.[86]

Often no information on sustainability impacts is provided, or misleading information limited to CSR management systems or impact data not covering entire value chains. Impact goals

[83] Kotsantonis and Serafeim 2019.
[84] European Commission 2021.
[85] Taktkomm 2020.
[86] European Union 2019.

are often not clearly stated. Investment approaches are not sufficiently described, e.g. what criteria are being used, the strictness of their application (e.g. exclusion thresholds), and the consistency of their application (to all assets or just a share of assets within a portfolio). In addition, data sources for measuring the attainment of goals are often not provided.

Information on effects of impact-related targets or approaches on risk-return is usually provided only in a very general, qualitative way. The quantification of impact-related financial risks is usually missing. The main reason for this might be the fact that most risk assessment methods are currently incomplete and hardly comparable.[87]

Indices are special financial products that are highly relevant for investments and can be used in a variety of ways. Actively managed funds use established indices as benchmarks to measure the performance of the funds. Passively managed Exchange-traded funds (ETFs) seek to replicate and track a benchmark index. Since conventional benchmarks are not ideal to measure the performance of sustainable investment strategies, ESG benchmarks have been designed over the last decade to measure the performance of sustainable investments.[88] However, the lack of product-related transparency described above also applies to both conventional and ESG indices. Thus, increasing transparency and minimum standards are also needed for indices.[89] They are prerequisites so that actively managed portfolios can be effectively and reliably compared with their benchmarks, and that passively managed sustainability portfolios have a reliable, high standard.

5.1.4. Standards and labels

Credible standards and labels can increase transparency and make it easier for investors, particularly retail investors, to compare products. They serve to understand at a glance if an investment or financial product has a positive sustainability impact or meets specific environmental, social or governance characteristics. Standards and labels should transparently provide a definition and set minimum standards of sustainability impacts and have processes in place for inspection and approval. As a research paper in 2020 showed, mutual funds with a newly introduced climate-focused label significantly increased attraction of investors and provided incentives for other funds to allocate their holdings towards more climate-friendly firms.[90]

A comparison of European sustainable finance labels by novethic (2020) provides an overview of nine labels with an ESG and/or environmental focus, of which three are awarded by

[87] For an overview of climate-related risk assessments, see Zimmermann et al. 2019.
[88] EU Technical Expert Group on Sustainable Finance 2019.
[89] European Commission 2018.
[90] Ceccarelli et al. 2020.

LuxFLAG. It shows that an ESG analysis of portfolio assets is mandatory for all labels.[91] However, as outlined above (see section 5.1.1), available ESG data often focuses on CSR management systems and not necessarily on impacts on the environment and society. Many labels exclude fossil fuels and particularly coal, but differ in terms of strictness. While most prescribe thresholds of 5%, some still allow for 10% or 30% of coal. Interestingly, some ecolabels actually apply their own taxonomies of eco-activities and define a minimum share of green activities that a labelled portfolio should include.[92]

Overall, the comparison shows that existing labels differed considerably in their interpretation of sustainable investments and apply different methodologies and approaches. Therefore, esp. for retail clients it can be challenging to understand the different standards offered by existing labels and to judge which of these are reliable and align with their own ESG preferences.

5.1.5. ESG education and awareness

Financial service providers need the necessary awareness, capacities and competencies for providing sustainable financial products and services that allow for effective capital allocation.[93] It is thus necessary that asset managers, institutional investors and client advisors receive relevant training. For example, the lack of conviction on the part of client advisors is still seen as an important barrier to the further increase in sustainable investments according to the Swiss Sustainable Investment Market Study 2020.[94] Training could be provided in-house or through external academic and professional education programs by public or private actors.

Beside training for financial professionals, it is necessary that clients also have the necessary competencies and awareness to formulate their ESG-related preferences as well as ask for and understand the corresponding financial products and services.[95] This could be achieved through awareness-raising programs and initiatives by public actors, e.g. states, schools, universities, and private actors, e.g. NGOs, media or financial institutions, with client advisors systematically informing and sensitizing clients on how to develop and meet their sustainability-related portfolio preferences.

[91] novethic 2020.
[92] novethic 2020.
[93] FOEN 2016.
[94] Swiss Sustainable Finance and Center for Sustainable Finance & Private Wealth of the University of Zurich 2020.
[95] FOEN 2016.

5.2. Current regulatory changes supporting effective capital allocation

Particularly in the EU, regulatory changes in the financial sector are currently being implemented or planned that support effective capital allocation. The first sub-chapter will provide an overview of these changes. Despite the fact that the regulatory pace in Switzerland is slower, there are still discussions related to regulations on sustainable finance, which will be introduced in the second sub-chapter.[96] A critical discussion of these regulatory activities in the EU and Switzerland follows in chapter 7.2.

5.2.1. EU regulations

In March 2018, the European Commission published an Action Plan[97] on financing sustainable growth. The three aims of the Action Plan are to (a) reorient capital flows towards sustainable investment, (b) manage financial risks stemming from environmental and social issues and (c) foster transparency and long-termism in financial and economic activity.[98] The Action Plan contains ten actions addressing most of the prerequisites as discussed above. Based on this Action Plan, several far-reaching regulatory changes have been developed that have the potential to strengthen capital allocation considerably. They are directly relevant for EU members such as Luxembourg but are likely to have effects beyond the EU market.

EU Taxonomy and related regulations

Central to the Action Plan is the EU Taxonomy, a classification system that intends to help investors make informed investment decisions. It lists environmentally friendly economic activities and respective technical minimum requirements. Providers of financial products are required to disclose information on the degree of alignment with the Taxonomy by the end of 2021.[99]

The focus of the EU Taxonomy is on environmental aspects. Actually, the EU Taxonomy currently focuses on climate change mitigation and adaptation, but an extension is foreseen to include four other environmental topics: water and marine resources, circular economy,

[96] The following description focuses on political action, mainly addressing the pre-requisite as described in chapter 5.1. In addition to these, regulators could also promote capital allocation by applying prohibitions of certain unsustainable financial practices or providing support for sustainable ones, e.g. through tax reliefs for sustainable financial products.
[97] European Commission 2018
[98] European Commission 2018.
[99] By 31 December 2021, the application of the Taxonomy with regard to climate mitigation and adaptation is required. By 31 December 2022, the application of the Taxonomy with regard to the other four environmental objectives (sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, protection and restoration of biodiversity and ecosystems) is required.

pollution prevention and control, biodiversity and ecosystems.[100] Minimum safeguards related to social and governance aspects have to be fulfilled. The EU Taxonomy does, however, not classify economic activities based on their social impact.

The EU Taxonomy will need to be taken into account when developing standards and labels for sustainable finance products. This also concerns the development of an EU Green Bond Standard, which was the subject of a public consultation in 2020, and the development of EU Ecolabel criteria for green financial products. Both aim at allocating capital effectively towards investments with positive environmental impacts.

Sustainability-related Disclosure in the Financial Services Sector Regulation

The EU Regulation on Sustainability-related Disclosure in the Financial Services Sector (SFDR) has extensive implications for sustainable financial products. For all financial products, financial market participants are required to provide information on sustainability risks and impacts: They need to show how sustainability risks affect financial returns of investments and what the principal adverse impacts of investments are on people and the planet.

For financial products marketed as "sustainable", there are minimum standards and disclosure requirements to adhere to. "Sustainable investments" are investments in economic activities that contribute to environmental or social objectives, provided that such investments do no significant harm to any of those objectives and that investee companies follow good governance practices. There are also minimum standards and disclosure requirements for products that do not qualify as sustainable, but as "promoting certain environmental or social characteristics".

These new definitions will, at least in the EU, replace current definitions for "sustainable investments". Our empirical findings (chapter 4.3) suggest that most of the current sustainability funds do not qualify as "sustainable investments". Thus, these new EU standards might prove to be gamechangers. The indicators relevant for assessing the principal adverse impacts on people and the planet could become a standard for disclosure by listed companies in order to become more attractive to capital providers and to be included in financial products.

Some of the requirements of the SFDR came into effect in March 2021. The pre-contractual disclosure on principal adverse impacts of financial products is required by the end of 2022.

Benchmark Regulation

The amendments to the Benchmark Regulation entered into force in December 2019. They created two new categories of benchmarks, the Climate Transition Benchmarks (CTBs) and the

[100] The other four environmental topics have to be considered as of now, but in less detail: Currently, an economic activity only qualifies as environmentally sustainable if it contributes substantially to climate change mitigation and/or adaptation and does not significantly harm (DNSH) any of the other environmental objectives.

Paris-aligned Benchmarks (PABs). In addition, the regulation requires all benchmark administrators to disclose whether ESG factors have been taken into account. If this is the case, further details on mandatory and voluntary ESG indicators need to resp. might be provided.

Non-Financial Reporting Directive (NFRD)

In order to improve the data basis for the increasing transparency requirements related to financial products, disclosure requirements for companies are also expanded. According to the Non-financial Reporting Directive (NFRD), large public-interest companies are required to provide information about their policies in relation to environmental protection, social responsibility and other ESG themes. New guidelines specifying the requirements recommend companies to disclose the proportion of their turnover from Taxonomy-compliant products and services as well as the proportion of Taxonomy-compliant capital expenditures (OpEx and CapEx). While not mandatory, there might be a certain market pressure on listed companies to disclose such information in order to become more attractive to capital providers and to be included in financial products showing Taxonomy alignment. In April 2021, the European Commission published a proposal for a Sustainability Reporting Directive to revise the NFRD.[101] This proposal suggests to expand the general sustainability-related publication requirements to all large companies and all listed companies (except for listed micro-enterprises). In addition, mandatory EU sustainability reporting standards are suggested that do not only cover relevant information required for the EU Taxonomy but also for the SFDR. Finally, the proposal requires the audit of reported information.

Markets in Financial Instruments Directive (MiFID II)

In addition to pre-contractual information requirements for financial products generally and sustainable products in particular, the revised Markets in Financial Instruments Directive (MiFID II) requires that the sustainability preferences of private investors must be inquired about and taken into account during investment advice.

5.2.2. Regulation in Switzerland

Differently from the EU, Swiss policy on sustainable finance has been based on the primacy of market-based solutions, the subsidiarity of government action and the role of transparency and long-term orientation.[102] Thus, the Swiss Federal Council (national government of Switzerland) currently relies on the financial industry's self-governance and voluntary measures.[103]

[101] European Commission 2021.
[102] Swiss Federal Council 2020b.
[103] Swiss Federal Council 2021.

Nevertheless, since many Swiss financial market players do business in the EU and offer financial products, the EU rules discussed in the previous section are also relevant for Switzerland. It is remarkable that even some market players doing business only within Switzerland – especially but not only sustainability pioneers – are preparing to adhere to EU regulations. The motives may be reputational resp. credibility reasons and/or anticipation of Swiss regulations following EU regulations.

Meanwhile, in December 2020, the Swiss Federal Council decided to work on a proposal for "necessary amendments to financial market legislation to prevent so-called greenwashing".[104] International developments, especially in the EU, are to be taken into account to ensure that Swiss financial products remain exportable. Besides making an effective contribution to sustainability, an important goal of the government is to maintain the competitiveness of the Swiss financial centre. In addition, the completely revised CO_2 Act, which is still to be submitted to a vote of the people due to a referendum, stipulates that financial flows are to be aligned in a climate-compatible manner.[105] End of January 2021, Switzerland's Long-Term Climate Strategy was published. It contains the following 2050 target for the financial market: "Switzerland's financial flows are to be made consistent with a pathway towards low greenhouse gas emissions and climate-resilient development by 2050 in accordance with the target of the Paris Agreement."[106] Consequently, regulatory activities are also increasing in Switzerland, albeit at a somewhat slower pace.

6. Discussion of Results

In this chapter, we discuss the results of the empirical research (chapter 4) in greater depth. The more detailed empirical results (data and figures) are to be found in chapter 4 and Annex B. With the discussion of results, we provide inside into research questions one and two (as described in chapter 1) as follows:

- In chapter 6.1 we set out the results for the investigated *capital allocation effect*. This sheds light into whether sustainability retail funds in Switzerland and Luxembourg effectively *channelled capital* into sustainable economic activities, respectively to what extent they were still invested in problematic activities (first research question).
- In chapter 6.2 we describe the findings concerning the *asset management effect*. In contrast to the capital allocation effect, which determines the actual capital flows, the asset

[104] Swiss Federal Council 2020a.
[105] BBl 2020: CO_2-Gesetz.
[106] Swiss Federal Council 2021.

management effect is a purely arithmetical effect. It provides insight into important factors influencing asset management decisions, as the aims and the success of asset management decisions are defined and assessed in relation to the benchmark used. As such, the asset management effect contributes to the first research question.

- In chapter 6.3 we show whether the application of different *sustainability approaches* (best-in-class, exclusions, ESG[107] integration, engagement, etc.) had an effect on achieving a positive capital allocation (second research question).
- In chapter 6.4 we then discuss *possible causes* for the different findings concerning research questions one and two.

The third research question posed in chapter 1 – what framework conditions are needed for an effective capital allocation, and what the current EU framework could contribute in this regard – is answered in chapters 5 and 7.2.

6.1. Capital allocation effect hardly existent

The results of our statistical analysis indicate that, so far, sustainability funds in Switzerland and Luxembourg have hardly been able to steer capital towards portfolios containing sustainable economic activities. The capital allocation effect comparing sustainability funds with conventional funds was only partially significant and thus demonstrable: The involvement in major environmental controversies was quite effectively reduced by 0.8 percentage points on average, i.e. by more than two thirds (or 69%[108]). The improvement of the overall ESG Impact on the environment and society was also significant, but, in contrast, hardly relevant. It improved only slightly by 9%[109] resp. 0.04 and thus by half a notch, i.e. half the difference between the ESG Impact grades C- and C.

Our study did not reveal any significant capital allocation effect in terms of climate impact (encompassing scope 1-3). To see if a cause for this was that asset managers merely focused on scope 1 & 2 and left out all or most of scope 3, we also assessed for scope 1 & 2 climate impact, which comprises roughly a quarter of the entire climate impact.[110] However, we found no significant improvement for the partial climate impact scope 1 & 2 either. This could mean that asset managers did not optimize their scope 1 & 2 climate impact, or that our model data did

[107] "ESG" stands for environmental, social and governance factors.
[108] This percentage was calculated as follows: 100*(average for conventional funds - average for sustainability funds)/ (average for conventional funds); in this case, the average concerns the % involvement in major environmental controversies (see Table 4).
[109] This percentage was calculated from the average ESG Impact score (see Table 4).
[110] Inrate Climate Impact data as of 2020, see chapter 3.2.2 for further details.

not reveal portfolio impact improvements made by selecting companies with lower climate intensities of in-house processes, product technologies, or purchased electricity mixes.[111]

Furthermore, we discovered no significant capital allocation effect for the overall involvement in problematic economic activities. For most of these activities – fossil fuels, nuclear energy, agribusiness & fisheries, transport, mining & metals production, and genetic engineering – no significant allocation effect was shown. However, we found a significant and quite relevant capital allocation with respect to cement production (minus 0.2 percentage points resp. 69%[112]) and defence (minus 0.3 percentage points resp. 50%[113]).

Therefore, it appears that significant and relevant portfolio impact improvements of sustainable funds compared to conventional funds were revealed only for a few individual issues: for major environmental controversies, cement production and defence. This suggests that the sustainability funds did not effectively shift capital towards a climate-neutral and overall (more) sustainable economy. A small ESG Impact improvement of half a notch is certainly not enough to bring about effective structural change through capital allocation.

6.2. Asset management effect present, but of limited relevance

In contrast to the capital allocation effect, which was hardly visible and only relevant to a very limited extent, we were able to find a highly significant asset management effect. We consider the effect to be partly relevant.

The asset management effect was examined by comparing 31 actively managed funds with their respective conventional benchmarks.[114] Fund managers usually base their investment decisions on indices. Generally, all or a large proportion of fund assets are taken to map important factors from these indices such as distributions by sectors, regions, countries, etc., as the indices serve as benchmarks for measuring the fund managers' investment performance. Thus, the asset management effect reflects how asset managers applied ESG factors in their capital selection decisions, as compared to the conventional index used as a starting and reference point.

[111] Also for scope 1 & 2, we used model-based generic data and the revenue share of invested companies' economic activities (see chapter 3.2.2). By doing so, we revealed if asset managers improved the portfolio climate impact by selecting climate-friendly sectors or companies with climate-friendly products and services within a sector (e.g. dairy products vs. vegetable and fruit farming, or automobiles vs. light trucks). For companies with the same products and services, we could not distinguish between different climate intensities of product technologies (e.g. different car propulsion technologies for automobiles) and of in-house processes, or for differences in the purchased electricity mix.

[112] This percentage was calculated from the average % involvement in cement production (see Table 5).

[113] This percentage was calculated from the average % involvement in defence (see Table 5).

[114] 31 out of the 38 actively managed sustainability funds in our sample were based on conventional benchmarks, 3 used sustainability indices and 4 applied no (known) benchmarks. The 13 passively managed sustainability funds replicated sustainability indices.

Our research results show that the asset managers of the 31 investigated sustainability funds significantly and partially relevantly improved the portfolio impact as compared to their conventional benchmarks. The ESG impact was improved at least slightly: on average by 0.06 or +13%[115], i.e. by three quarters of the distance e.g. from C- to C. The carbon impact was improved by 313 tCO_2/million USD resp. 30%[116] and the involvements in critical activities by 8.1 percentage points resp. 49%[117] and in major environmental controversies by 2.3 percentage points, i.e. almost entirely (by 92%[118]).

A closer look at the specific problematic economic activities shows that involvements in cement production (minus 0.2 percentage points resp. 95%[119]), defence (minus 0.6 percentage points resp. 63%[120]), fossil fuels (minus 5 percentage points resp. 66%[121]) and transportation (minus 2.4 percentage points resp. 52%[122]) were reduced quite effectively. In contrast, involvements in nuclear energy, genetic engineering, agribusiness & fisheries, and mining & metal production were not significantly reduced.

To better understand the reduction of involvements in critical transportation activities, we checked whether companies involved in critical transportation were excluded in the sustainability funds due to involvements in major environmental controversies such as the emissions scandal. However, this does not seem to be the case: The overwhelming majority[123] of companies generating more than half of their turnover with critical transport activities were not involved in a major environmental controversy.

The results concerning the asset management effect suggest that asset managers were indeed noticeably selecting assets in the sustainability funds studied according to sustainability considerations, thus improving the portfolio impact compared to their own conventional benchmarks. However, this improvement was still hardly relevant in terms of overall impacts on the environment and society and, thus, effective contributions to the SDGs. Relevant portfolio impact improvements compared to the benchmarks were nevertheless visible for more specific impact indicators - climate impact and even more so for involvements in problematic economic activities and major environmental controversies.

[115] This percentage was calculated from the average ESG Impact score (see Table 6).
[116] This percentage was calculated from the average carbon intensity (see Table 6).
[117] This percentage was calculated from the average % involvement in critical activities (see Table 6).
[118] This percentage was calculated from the average % involvement in major environmental controversies (see Table 6).
[119] This percentage was calculated from the average % involvement in cement production (see Table 7).
[120] This percentage was calculated from the average % involvement in defence (see Table 7).
[121] This percentage was calculated from the average % involvement in fossil fuels (see Table 7).
[122] This percentage was calculated from the average % involvement in transportation (see Table 7Table 6).
[123] 180 out of 183 companies of the MSCI World Index.

6.3. Sustainability approaches mostly without steering effect

Surprisingly, the regression analysis showed that the application of the studied sustainability approaches – best-in-class, engagement, ESG integration, exclusion, impact-investment, positive selection, sustainable thematic approach – did not significantly influence the portfolio impact. We only found two very specific exemptions: Thematic approaches improved the ESG Impact on average by 0.04 or half a notch, i.e. half the distance from e.g. C- to C. Positive selection approaches significantly reduced the involvement in major environmental activities by 0.9 percentage points. None of the other sustainability approaches had a significant effect on any of the dependent impact variables, and thematic approaches and positive selection each improved only one out of four dependent impact indicators. This shows that the application of sustainability approaches made mostly no or, in the case of thematic and positive selection approaches, hardly any difference for the funds studied.

This is quite remarkable as sustainability approaches have been the primary focus of attention in the sustainable investment industry to date. Our results raise the question of whether their importance and/or effectiveness have been overestimated. Even sustainability approaches that implicitly or explicitly signal a steering effect did not develop such an effect in our sample (see chapter 6.4).

6.4. Interpretation: Possible causes

Asset managers more concerned with specific rather than encompassing sustainability issues

Our results concerning the asset management effect suggest: The more specific the impact indicator, the more selective asset managers were. Selectivity was highest for major environmental controversies (reduced by 92%), lower for involvements in problematic economic activities (reduced by 49%) and climate impact (reduced by 30%) and lowest for ESG Impact (improved by 13%).

The selection concerning specific critical economic activities could mean that significant capital selection took place primarily concerning issues with higher reputation or transitional risks and/or concerning issues that are rather easy to measure: Involvements in cement production were reduced by 95%, in defence by 63%, in fossil fuels by 66% and in transportation by 52%. Cement production, in particular, seems a good example where asset managers might exclude an economic activity because its climate footprint is easy to measure – relevant GHG emissions are direct resp. scope 1 emissions – and might be seen as a good way to achieve GHG emission reductions of their portfolios.

By contrast, nuclear energy, genetic engineering, agribusiness & fisheries, and mining & metal production were not significantly reduced by asset managers in comparison to their

benchmarks. The reasons could have been lower perceived reputation or transitional risks, or because the actual impact on the environment and society is difficult to assess (such as for genetic engineering and nuclear energy, where the societal risks are highly difficult to assess). This would also make it harder to communicate and sell these topics as relevant factors considered in a sustainability fund. If this interpretation is correct, especially the case of nuclear energy might have been misjudged by asset managers. Even though nuclear energy is by some experts seen as a valid technology to combat climate change, it is important to realize that nuclear energy is clearly not sustainable – external costs[124] of nuclear energy are regarded at least as high as the external costs of lignite[125] – and that it entails considerable financial risks[126].

The overall portfolio impact on the environment and society along entire value chains as measured by the ESG Impact was hardly improved by asset managers. The reasons for this could have been:

- The ESG data used did not reflect such comprehensive impact (sufficiently). Most ESG data on the market do not reflect the comprehensive impact reliably, as to do so, holistic and scientific-based definitions, concepts, and data models are needed. Instead, ESG ratings mostly focus on management-related data, and/or apply simple equal weightings of indicators or sustainability issues. Impact assessments often do not cover entire value chains (full scope 1-3) (see chapter 5.1.1).
- Asset managers deliberately did not improve the overall portfolio impact much to limit deviations from the benchmark and minimize tracking error.
- No clear and measurable goals were set and controlled for concerning the overall portfolio impact on the environment and society.
- Awareness and education concerning impact and useful data were lacking.

The role of benchmarks

The following two findings, in particular, shed light on the importance of the benchmarks used: (a) The asset management effect, despite its significance, was hardly relevant for the overall ESG Impact. (b) Despite the significant asset management effect, there was hardly any capital allocation effect. In other words: Asset managers apparently achieved a significant improvement in the portfolio impact of the sustainable funds studied compared to their specific conventional benchmark, but not overall compared to the group of conventional funds.

[124] External costs are costs carried by the society and environment that are not internalized into market prices due to market failure. External costs are a pecuniary measure of impact on the environment and society.
[125] Federal Environment Agency Germany 2019.
[126] Schweizerische Energie-Stiftung SES 2013.

In order to explore possible reasons for these results, the function of benchmarks has to be kept in mind. Fund portfolios are compared to benchmarks (indices), and the majority of asset managers controls the portfolios in close comparison to indices. Often, a large proportion of fund assets is taken from these indices, and the indices serve as benchmarks for measuring the fund managers' investment performance. In principle, the choice of the benchmark is a question of the overall risk management, where sustainability is only one among other core elements.

The actively managed sustainability funds in our sample were mostly based on conventional benchmarks (31 out of the 38 actively managed sustainability funds), while all of the 13 passively managed sustainability funds – the ETFs – replicated sustainability indices. So, in simple terms, both actively managed sustainability and conventional funds may choose their assets from the same conventional benchmark, but for sustainability funds, additional ESG criteria are applied (in contrast to conventional funds).

When looking for reasonable explanations as to why there was a significant asset management effect but hardly any capital allocation effect, the first idea that might come to mind is that the conventional funds studied also had a significantly better portfolio impact than the conventional benchmarks used. This would imply that the portfolio impact was to some extent already internalized and "automatically" taken care of via financial criteria[127], which would be a contradiction to the definition of the Inrate impact measurements as being a measure of external effects not being internalized into market prices (see chapter 3.2.2). However, this was not the case. The control comparison between the group of conventional funds and the group of conventional benchmarks used by the sustainability funds did not show any significant portfolio impact deviations (chapter 4.2.3). What seems counter-intuitive at first sight can be attributed to the fact that the different comparisons were based on different totals in terms of funds and benchmarks:

- For the asset management effect, only the actively managed sustainability funds using a conventional benchmark were compared in pairs with their respective benchmark. So conventional benchmarks that were used by several sustainability funds were also included several times in the comparison.
- For the capital allocation effect, on the other hand, the group of all sustainability funds - i.e. also the sustainability funds that used a sustainable or no (known) benchmark – were compared with the group of conventional funds.
- For the control comparison between the group of conventional funds and the group of conventional benchmarks used by the sustainability funds, only the conventional benchmarks

[127] Financial criteria comprise all aspects relevant for portfolio construction based on asset prices or valuation.

were considered and each of these only once, even if they were used by several sustainability funds.

Our results concerning the asset management and capital allocation effects suggest the following possible reasons: The orientation by means of conventional benchmarks led to asset managers deviating from the benchmark concerning specific sustainability issues, but hardly regarding the overall impact on the environment and society, measured with the ESG Impact. Therefore, even for sustainability funds, conventional benchmarks might restrict asset managers' freedom of action too much.

This thesis is supported by the finding that, with increasing concentration, the portfolio impact of funds significantly improved: the ESG impact significantly increased and both the carbon impact and the share of critical economic activities were significantly reduced. Concentration measures a fund's composition. A higher concentration could, therefore, be interpreted as more room to deviate from the benchmark and/or to apply sustainability approaches stricter or more consistently.[128] Both options can probably be regarded as two sides of the same medal and underline the following fact: Selection to improve the sustainability impact of a portfolio tendentially increases the concentration as compared to a broad market benchmark.

Therefore, it seems advisable for asset management to either accept larger deviations from the conventional benchmark for a significant and relevant improvement of the portfolio impact, or to apply sustainability benchmarks that also deviate to a large extent from broad market benchmarks. In the first option, asset managers receive a higher risk budget resp. tolerance to deviate from a conventional, broad market benchmark, and they are in charge of implementing sustainability aspects in the portfolio and of controlling for the sustainability characteristics of the portfolio. In the second option, the index providers implement sustainability aspects in the indices, and asset owners decide on the sustainability index used as benchmark and control for its sustainability characteristics.

For both options, our research results show that assessing and controlling the sustainability characteristics of a portfolio (in the first option) or a sustainability benchmark (in the second option) merely in comparison with a conventional benchmark can be misleading and, thus, could entail reputation risks: A portfolio impact improvement compared to the conventional benchmark might vanish in the comparison with conventional funds.

Furthermore, our findings suggest that it may not be enough to simply replace conventional benchmarks with sustainability benchmarks. In our sample, the benchmark type -

[128] An alternative interpretation would be that the benchmarks used by the funds were already highly concentrated, which would imply that a higher concentration was not equivalent with benchmark deviation. However, even if this were the case for some of the funds investigated, we assume that it was not the only influencing factor and that the above interpretations still apply.

sustainable vs. conventional vs. no (known) benchmark – had no significant effect on the portfolio impact of sustainability funds compared to conventional funds. However, the reliability of this result is limited because only a few sustainability benchmarks were used in our fund sample. We still want to stress, though, that the impact-related quality of sustainability benchmarks has to be controlled for, as demanded by the EU Technical Expert Group (see chapter 5.1.3). Therefore, high-quality sustainability benchmarks can play an important role for actively managed sustainability funds as appropriate benchmarks to improve the portfolio impact. For "passively"[129] managed sustainability funds, it is obvious anyway that the sustainability fund can only be as good as the benchmark itself.

Sustainability approaches lack effectiveness or are inconsistently applied

Sustainability approaches are the basis for ESG-related investment rules. Our regression analysis revealed that the application of sustainability approaches had mostly no significant effect on the portfolio impact. This raises the question whether the importance and effectiveness of sustainability approaches have been overestimated. This is quite surprising, as most approaches implicitly or explicitly aim at improving portfolio impact:

- Short-term impact improvements: Best-in-class, exclusion, impact-investment, positive selection, and sustainable thematic approaches suggest short-term improvements of the portfolio impact through rule-based selection. For instance, thematic funds may aim to be invested in companies contributing to a sustainable energy transition, exclusion approaches at not being invested in companies infringing upon the UN Global Compact standards.
- Longer-term impact improvements: Engagement aims at portfolio impact improvements over time.
- No impact improvements: ESG integration approaches do not aim at improving the portfolio impact.

Our findings suggest that investment guidelines based on sustainability approaches mostly had a random effect on impact-related selection. The following examples are particularly striking:

- Exclusions did not significantly reduce investments in critical economic activities or major environmental controversies.
- Best-in-class and positive selection did not significantly improve the ESG impact, climate impact, or involvements in critical economic activities.

[129] Applying a sustainability index as a benchmark that, by nature, deviates from large and broad market indices, is already an active decision. It implies a sustainability-based pre-selection of shares and bonds.

- The thematic funds studied – despite their focus on environment, climate or sustainable energy – neither reduced the climate impact nor involvements in critical economic activities or major environmental controversies.

The only two exemptions were: (a) Positive selection approaches significantly reduced the involvement in major environmental activities by 0.9 percentage points. However, for all other broader dependent impact variables, no significant improvements could be found. (b) Thematic approaches improved the ESG Impact score significantly, but only to a small extent, i.e. by 0.04. For the more specific dependent impact variables, however, no significant improvements could be revealed for thematic approaches.

This shows that – in the short term – sustainability approaches mostly failed at allocating capital towards companies with a positive impact both significantly and relevantly.[130] As a possible cause for this, we would rule out the missing implicit or explicit claim for a short-term capital allocation: None of the sustainability funds assessed in this study exclusively applied ESG integration or engagement. Almost all sustainability funds applied exclusions, many used positive selection, and some also best-in-class approaches.

Therefore, for the non-existent or insufficient effect on capital allocation towards sustainable economic activities and, thus, on improving the portfolio impact, we principally see the following causes:

- *Lack of effectiveness*: Sustainability approaches may lack effectiveness if they are not strict enough or if the data used for selection is inappropriate, esp. by not reflecting the encompassing impact along entire life cycles.
- *Lack of consistency*: Sustainability approaches may not be consistently applied to all assets, but just to a share of assets within a portfolio.

Judging from our experience, both causes are probably prevalent in practice. Especially the limited effectiveness of sustainability approaches seems an important issue, given the vast heterogeneity of existing sustainability approaches that are predominant in the investment industry. In terms of strictness for instance, some exclusion-based funds only apply a limited number of criteria, e.g. excluding coal mines or weapons, whereas others apply encompassing sets of environmental and social exclusion criteria. Some approaches set 5% revenue exclusion thresholds, others 10% or higher thresholds. In terms of using appropriate data, most best-in-class approaches are practically best-in-industry approaches that are based on traditional ESG ratings assessing management systems. These funds often remain invested in companies

[130] We want to stress again (a) that we did not assess in our study if, by active ownership activities with invested companies, portfolio impact could be improved over time, and (b) that ESG integration does not aim at improving the portfolio impact.

operating in sectors with negative environmental or social impact, for instance in oil, nuclear energy or air traffic. In contrast, other best-in-class approaches such as the Inrate Best-in-Service approach (see Annex A.1) are based on encompassing impact assessments. The consistent and strict application of such approaches results in divesting from problematic companies and in investing in companies fulfilling societal needs with innovative and sustainable products and services.

7. Conclusions and Recommendations

7.1. Conclusions and consequences

The sustainability funds assessed in this study hardly channelled capital towards sustainable economic activities. It seemed that, overall, sustainability funds are only effective when it comes to divesting from companies involved in major environmental controversies, but not effective in terms of climate and sustainability portfolio impact improvements. This suggests that the funds' contribution to achieving the SDGs and the Paris climate target is not yet sufficient.

Our empirical research results suggest that the missing intention for short-term capital shifting was not the reason, as all of the assessed sustainability funds applied sustainability approaches that – implicitly or explicitly – aimed at short-term capital allocation (see chapter 6.3). Therefore, we suspect, also based on our desk research and own experience with and perception of the market, that the necessary prerequisites for effective capital allocation, as described in chapter 5.1, were not fully given[131]:

- Methods and data used for portfolio selection may not have reflected the actual and encompassing impact of a portfolio on the environment and society.
- So far, investee companies do not fully report relevant, encompassing and reliable data. Therefore, for an encompassing impact assessment, expert-based assumptions are necessary. So, possibly, an encompassing impact measurement may have been difficult.
- During our desk research of the fund documentations, we saw that sustainability funds lacked the necessary transparency, esp. concerning measurable impact-related goals, clear investment rules, the actual ESG portfolio impact, the method and data used to assess this impact, and the effects of impact-related investment strategies on financial risk-return.
- Sufficient and clear standards – in terms of transparency, methodologies and minimum impact-related standards for sustainable investments – were basically lacking. Existing labels are still very diverse, and the different standards of these can be challenging to understand,

[131] The new EU regulations signify steps into the right direction, see chapter 5.2.1.

esp. for retail clients. Here, the EU regulations might partly help closing the gap (see chapter 7.2).

- Last but not least, we suspect that another reason, also for the points listed above, might have been an insufficient sustainability-related education in the financial system.

The consequences are not only the already mentioned insufficient capital allocation effect and contribution to a sustainable development. Financial actors themselves can be affected negatively: (a) Due to the lack of credibility of financial ESG products, the market potential cannot fully be exploited.[132] (b) Most sustainability funds implicitly or explicitly signal improved portfolio impacts. Not fulfilling this promise poses reputational risks due to greenwashing and decreases client loyalty.[133] The US Securities and Exchange Commission (SEC), for instance, just recently published several concrete cases of potentially misleading ESG-related claims.[134] Meanwhile, greenwashing has become a legal risk too: In April 2021, France passed the first legal sanctions in the world that are explicitly directed against greenwashing.[135] In Germany, a court proceeding against DekaBank is currently pending for allegedly misleading information about the environmental and social impacts of one of its funds.[136]

7.2. Current regulations point into the right direction but have major shortcomings

The new EU regulations, as described in chapter 5.2.1, bring about improvements with regard to all of the above-mentioned necessary prerequisites for effective capital allocation, in part even substantially. However, they should only be regarded as first, albeit valuable steps in the right direction. For all necessary prerequisites for effective capital allocation (chapter 5.1), considerable and partly crucial shortcomings and gaps remain. Both the contributions and the remaining gaps of the new regulations are summarized in Table 11.

Table 11: EU regulations for effective capital allocation and their shortcomings and gaps

Relevant EU regulations (selected)	Contributions to effective capital allocation	Remaining shortcomings and gaps
EU Taxonomy	*Impact measurement*: The classification system of the Taxonomy lists economic activities with a positive impact on	The EU Taxonomy is yet incomplete. It focuses on environmental impacts, not social impacts. While it is intended that the Taxonomy is further developed, it currently incorporates merely climate change mitigation and adaptation

[132] See also Federal Office for the Environment (FOEN) 2016.
[133] See also Federal Office for the Environment (FOEN) 2016.
[134] Azizuddin 2021. For further information, see SEC Division of Examinations 2021.
[135] Fines could be up to 80% of the cost of the false promotional campaign. See Wheelan, Murray 2021.
[136] See Webb 2021.

	climate mitigation or adaptation. This way, it directs the focus to the impacts of economic activities along entire value chains.	comprehensively and covers only a selection of economic sectors. Current discussions, e.g. about including nuclear energy and natural gas into the Taxonomy, raise concerns that political interests undermine the scientific claim of the Taxonomy. The current criteria in the Taxonomy concerning forestry and bioenergy are also criticised as weak or incomplete.[137] The Taxonomy's simple dichotomy of "green" and "not green" is a major methodological shortcoming. As such, it neither provides a definition of "impact" nor a commonly agreed measurement for the overall impact on people and planet. It does not do justice to the complex reality in which there are conflicting goals. For example, the Taxonomy cannot adequately represent a product that is energy efficient but water intensive. Furthermore, the Taxonomy is very imprecise. It does not indicate whether an economic activity is just below resp. just above the technical threshold, or far below resp. far above it. Improvements on the part of invested companies as well as portfolios towards sustainability are usually made stepwise. Here, the Taxonomy will only reflect an improvement if the technical threshold is exceeded. The Taxonomy is not very pragmatic, requires far-reaching transparency and, therefore, is difficult to implement. All the more so when the remining environmental goals and, potentially, social and governance goals are also included. External verification of the quality of disclosure is not mandatory.
NFRD	*Investee company data availability*: The NFRD requires large public interest entities with over 500 employees to provide non-financial transparency. It furthermore recommends Taxonomy-based reporting.	The NFRD sets no requirements for smaller public interest entities. It also allows for considerable flexibility in non-financial reporting, and the publication of information for effective capital allocation remains voluntary. The European Commission published a proposal for a Sustainability Reporting Directive to revise the NFRD.[138] This proposal suggests expanding the general sustainability-related publication requirements to all large companies and all listed companies (except for listed micro-enterprises). In addition, mandatory EU sustainability reporting standards are suggested that do not only cover relevant information required for the EU Taxonomy but also for the SFDR. Finally, the proposal requires the audit of reported information.
SFDR; Benchmark (BM) Regulation	*Transparency of financial products*: Both the SFDR and BM Regulation set reporting requirements for ESG-related quantitative and qualitative key performance indicators (KPIs). The SFDR sets binding	The SFDR and BM Regulations are quite far-reaching and require extensive information on ESG key performance indicators (KPI). However, the required KPIs do not cover entire value chains (except for carbon emissions). The regulations also do not provide a definition and metrics for impact assessment that would allow aggregating the various KPIs to obtain an overall impact.

[137] See e.g. Hay 2021.
[138] European Commission 2021.

	standards for "sustainable investments" as opposed to investments merely "promoting certain environmental or social characteristics".	
EU Green Bond Standard and EU Ecolabel	*Standards and labels*: The criteria for both the EU Green Bond Standard and the EU Ecolabel will be based on the Taxonomy and aim at allocating capital towards investments with positive environmental impacts. The EU Ecolabel might prove to be an immensely valuable minimum standard for high-quality environmentally friendly investments.	The focus of the EU Green Bond Standard and Ecolabel is on environmental impact, not social impact. The current proposal for an ecolabel allows for the inclusion of companies investing in polluting activities such as fossil fuels and for equity funds that devote less than 50% to green activities.
MiFID II	*ESG education and awareness*: MiFID II sets pre-contractual information requirements for financial products generally and sustainable products in particular. Since its revision, the regulation also requires that the sustainability preferences of private investors must be inquired about and be taken into account during investment advice.	Apart from MIFID, the EU Action Plan on Sustainable Finance does not foresee measures and strategies related to education.

Source: Inrate, based on our own analysis of EU regulations.

Some of gaps and shortcomings outlined above are quite crucial and must be overcome to deliver the desired results – namely to channel financial flows into sustainable environmental activities and to prevent greenwashing. Furthermore, especially for some of the weaker transparency requirements, it will take time to set factual improvements in motion in the financial industry.[139]

A recent publication that analysed the three indices DAX, CAC 40 and EURO STOXX 50 showed that only 1-2% of total revenue is estimated to be fully taxonomy-aligned.[140] Reasons

[139] Since March 2021, for instance, the SFDR requires financial market participants to disclose their policies related to principal adverse impacts (comply or explain) and sustainability risks (comply). So far, some of the fund manager's statements are rather vague and reveal a rather low standard. However, this transparency is a necessary prerequisite for competition within the financial industry towards higher sustainability standards over time.
[140] García et al. 2020.

for this low alignment include a high-carbon economy[141], the limited set of economic activities covered by the Taxonomy as well as inadequate current reporting practices by invested companies. This underlines the challenges in implementing the current regulatory requirements.

7.3. Recommendations

Based on our study results and desk research, we derive the following set of recommendations for asset owners and managers as well as regulators:

Asset owners and managers

Stop defining sustainability resp. "ESG" through merely naming certain norms or loosely applying sustainability approaches. Investors should in any case deliberately take the following decisions and steps:

- *Impact-related goals:* Set both short-term and longer-term impact-related goals, e.g. to reduce the climate-intensity of the investment portfolio by 20% in two years in accordance with the investor's overall market and sustainability strategy in place. Identify and solve potential trade-offs with other goals such as diversification of risk characteristics of investments and portfolios.
- *Benchmark:* Choose a conventional market benchmark or a sustainability benchmark; define the risk budget allowing for a certain deviation tolerance in the relation to the benchmark.
- *Investment rules:* Set and implement investment rules concerning selection, engagement and voting activities that are appropriate to reach the goals. Investment rules might or might not relate to the sustainability approaches in place. If the set goals are ambitious, the investment rules will have to be strict enough and applied consistently.
- *Impact-related controlling and reporting:* Measure, control and report the portfolio impact, using the appropriate encompassing and reliable ESG impact data (see chapter 5.1.1). Adjust investment rules or goals, if necessary. This ensures that selection and active ownership can be directed both effectively and efficiently toward reaching the set goals.
- *Awareness and education:* Build up and maintain awareness and up-to-date knowledge of the relevant actors, esp. asset managers, institutional investors and client advisors.

Such a systematic approach is generally advisable, both for private and institutional investors and well as for all asset classes.

[141] D'Aprile et al. 2020 developed a decarbonization pathway for the EU that would allow reducing GHG emissions until 2030 by 55%. According to the study, about half of the investments necessary to get on such a pathway do not represent positive investments cases. For these, interventions would be required such as direct public financings, price measures such a carbon prices or emission trading systems, or commercial de-risking measures, for instance by extending financing models to include ESG risks.

Regulators in the EU

- It is crucial that the EU Taxonomy is exclusively based on science, leaving aside political interests.
- As planned, the Taxonomy should be extended to include the other relevant environmental goals such as biodiversity and ecosystems, the protection of water and marine resources, pollution and circular economy.
- Should the Taxonomy prove to be useful in practice, the following developments could be advisable: (a) move beyond a mere “green” Taxonomy towards a “sustainable” Taxonomy by including social and, if applicable, governance goals; (b) in addition to a taxonomy with sustainable economic activities, elaborate a corresponding taxonomy with economic activities that have negative impacts ("Dirty Taxonomy"). This could be a way to fix the current blind spots concerning the sectors that are not yet covered by the Taxonomy.
- The ESG-related KPIs to be reported according to the SFDR and the amendments to the benchmark regulations should generally include entire value chains, if applicable.
- In our opinion, it could make sense for the EU Ecolabel to define different impact-related quality levels, e.g. bronze, silver, and gold. A corresponding label for positive sustainability impacts, including environmental and social impact, would also be important.
- Financial actors can only readily apply the Taxonomy and perform impact assessments when the informational prerequisites are created. A first best alternative, in our opinion, would be that invested companies get legally obliged to publish the relevant sustainability-related information.[142] A review of the core information – both on the part of investors and invested companies – should be made mandatory and carried out by credible, i.e. independent and competent bodies. The other alternative represents the current situation and seems merely second best: The legislator waits and sees whether the market creates a corresponding offer via investor demand. Here, the risk remains that published data stays incomplete and both the quality and comparability questionable.
- In any case, there should be regular reviews of whether the EU regulations are proving themselves, i.e. whether they are effective, practical and pragmatic enough. If necessary, the regulations should be adapted or further developed according to the review results.

Regulators in Switzerland

The EU regulations already now have an impact on Switzerland. Particularly financial actors with subsidiaries in the EU, EU products or EU clients need to be on top of the regulations. Other financial actors follow the developments closely because of market pressure and reputation.

[142] See also proposal by the European Commission in April 2021 for a Sustainability Reporting Directive.

Nevertheless, in order to improve the capital allocation effect of Swiss sustainable investments and to ensure that the Swiss financial system remains competitive and at the forefront of sustainable finance, the Swiss regulator should also take regulatory measures. These regulations should take into account the developments in the EU, but also the shortcomings mentioned in this report (see chapter 7.2).

Certain provisions in EU regulations could immediately find their way into Swiss regulations, particularly aspects of the EU regulations that require increased reporting and the provision of reliable data, e.g. on the indicators in the SFDR and the benchmark regulations or on the economic activities and thresholds according to guidelines of the NFRD. This would allow to have relevant information at hand for market actors to improve sustainability assessments and measure the overall impact of investments.

Other aspects of EU regulations might need more extensive assessments. For example, while the EU Taxonomy certainly provides valuable methodological foundations, its suitability in practice should be further analyzed. Instead of a complete adoption of the EU Taxonomy, Swiss regulation might instead focus on implementing certain principles such as the inclusion of economic activities in impact measurements.

Annex

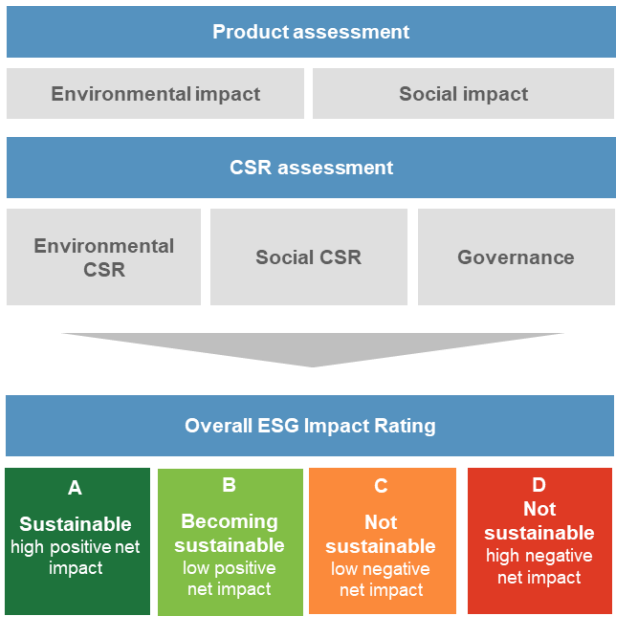
A.1 Inrate ESG Impact

Overview

The Inrate ESG Impact assesses the encompassing sustainability impacts of companies on the environment and society. The assessment is based on the following components:[143]

- *Product Assessment*: Impact of products and services on society and environment along entire product life cycles as main focus of the impact assessment.
- *CSR Assessment*: Systematic assessment of management & operation practices concerning corporate social responsibility (CSR).
- *Controversial practices* and their impact on society and environment are included in the assessments.
- *Sector-specific* indicators and weights to account for sector specific sustainability issues.
- The ESG Impact rating result is normalized on an *absolute scale* from A+ to D-.

Figure 18: Overview of the Inrate ESG Impact method



Source: Inrate ESG Impact Methodology 2018.

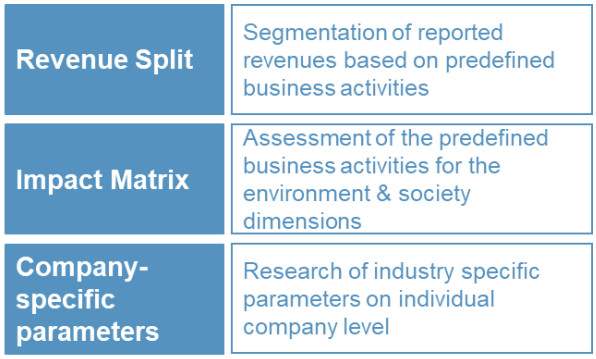
[143] Schwegler 2018.

1. Impact assessment of products and services

The Product Assessment – impact assessment of products and services along entire life cycles – is based on a detailed assessment of a company's business activities (see Figure 19):

- At first the company revenue is split into 440 standard business activities of the Inrate Business Activity Classification (IBAC). The IBAC is built around two standard classifications: the sectors of the US input-output table, and the North American Industry Classification System (NAICS).
- To each business activity the Inrate Impact Matrix[144] assigns the impact on environment (total greenhouse gas emissions and other environmental impacts[145]) as well as the impact on society (consumers & labour and other stakeholders).
- Additionally, industry-specific parameters are used to differentiate the impact assessments for individual companies.

Figure 19: Product impact assessment based on the Inrate Impact Matrix



Source: Inrate ESG Impact Methodology 2018.

2. CSR management assessment

The CSR management assessment shows how effectively a company works on improving its impacts. This assessment corresponds to a classic ESG assessment. It is divided into the sustainability aspects of environment, labour (employees and suppliers), society and governance.

3. Impact assessment of controversial business practices

The impact assessment of controversial business practices is used to supplement and correct the overall assessment. The different cases of controversial business practices involving

[144] The underlying methodological concepts are those of market failures such as external effects, or merit or demerit goods, the data basis are eco-balances, studies and expert judgements.
[145] Such as water and land usage, biodiversity loss, emissions, etc.

companies are categorised and assessed according to their severity, based on the following aspects:

- The negative impact on the environment and society;
- The company's involvement in the impact in question;
- Whether the company is taking action to improve the impact or prevent it in the future;
- The credibility of a controversial case.

4. Weighting and normalization and of criteria

The rating criteria are weighted according to their importance to the company's sustainability impact assessment. The relative importance of the environmental, social, and governance aspects differs between the various sectors of industry. Consequently, in the sense of a utility analysis, the weightings that are given to those aspects reflect the importance of specific sustainability issues and impacts to a given industrial sector. Environmental criteria are particularly relevant for impact assessments in the oil and gas sector, for example. That is why the environmental aspect of sustainability carries a 50% weighting in the overall rating.

The ESG Impact is finally normalized on a scale from 0 to 1 for the ESG Impact score (zero corresponding to a very negative net impact, one to a very positive net impact), which is translated into the ESG Impact grades from A+ to D- (see Table 12). The grades from A+ to B- show a positive net impact, the grades from C+ to D- a negative net impact (see Figure 20).[146] This factors in whether or not, overall (i.e. on a net basis), companies satisfy basic social needs in a more – or less – sustainable way.

[146] Schwegler 2018.

Table 12: Translation of ESG Impact scores into grades

Grade	Minimum (score > min)	Maximum (score ≤ max)
D-	0	0.0727
D	0.0727	0.1455
D+	0.1455	0.2182
C-	0.2182	0.2909
C	0.2909	0.3636
C+	0.3636	0.4364
B-	0.4364	0.5091
B	0.5091	0.5818
B+	0.5818	0.6545
A-	0.6545	0.7273
A	0.7273	0.8
A+	0.8	1

Grade category A: sustainable or helping transition towards sustainability.
Grade category B: on the path to sustainability.
Grade category C: not sustainable, but with diminished impact.
Grade category D: not sustainable.

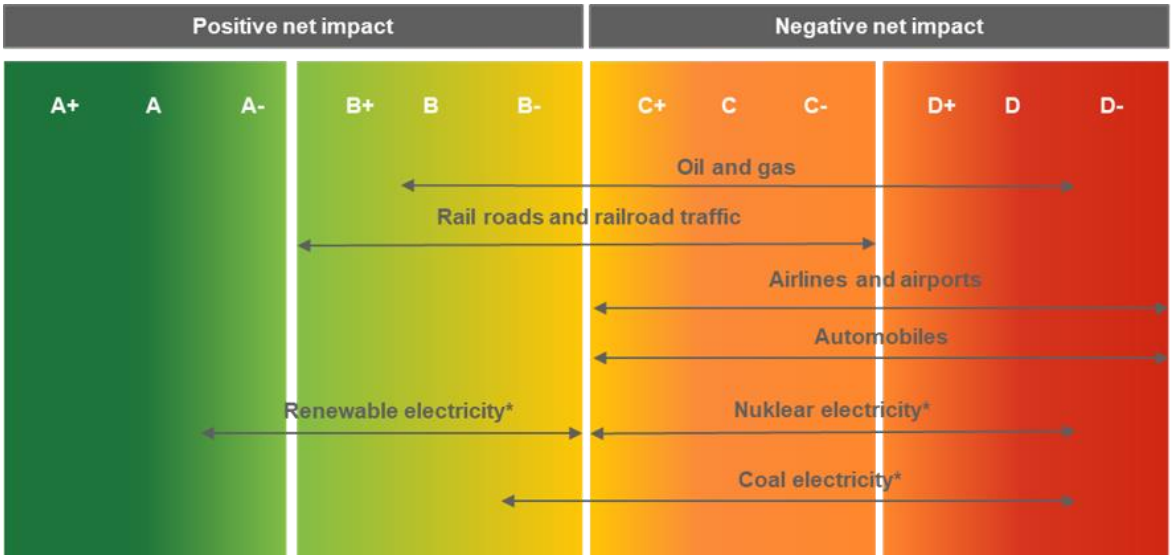
Source: Inrate ESG Impact Methodology 2018.

Figure 20: ESG Impact Rating scale

Source: Inrate 2018.

The ESG Impact Rating provides an *absolute measure* of a corporation's impacts on sustainability. It thus permits reliable assessments of and comparisons between companies from different sectors and regions, as well as entire portfolios (see Figure 21). The ESG Impact reveals, for instance, that renewable energy has a better impact than coal-fired electricity. A coal power producer with advanced technologies, targets, programmes etc. has a better ESG impact than other coal power producers – but not a better one than a renewable energy producer. As such, the ESG Impact provides a reliable basis for shifting capital towards sustainable economic activities.

Figure 21: ESG Impact comparisons



ESG Imp ESG Impact Assessments allow for comparisons within and across industries and customer needs (e.g. for transportation, nutrition, housing, communication, etc.).
* * Energy producers subsumed in these categories generate at least 25% of their turnover with the stated energy source.

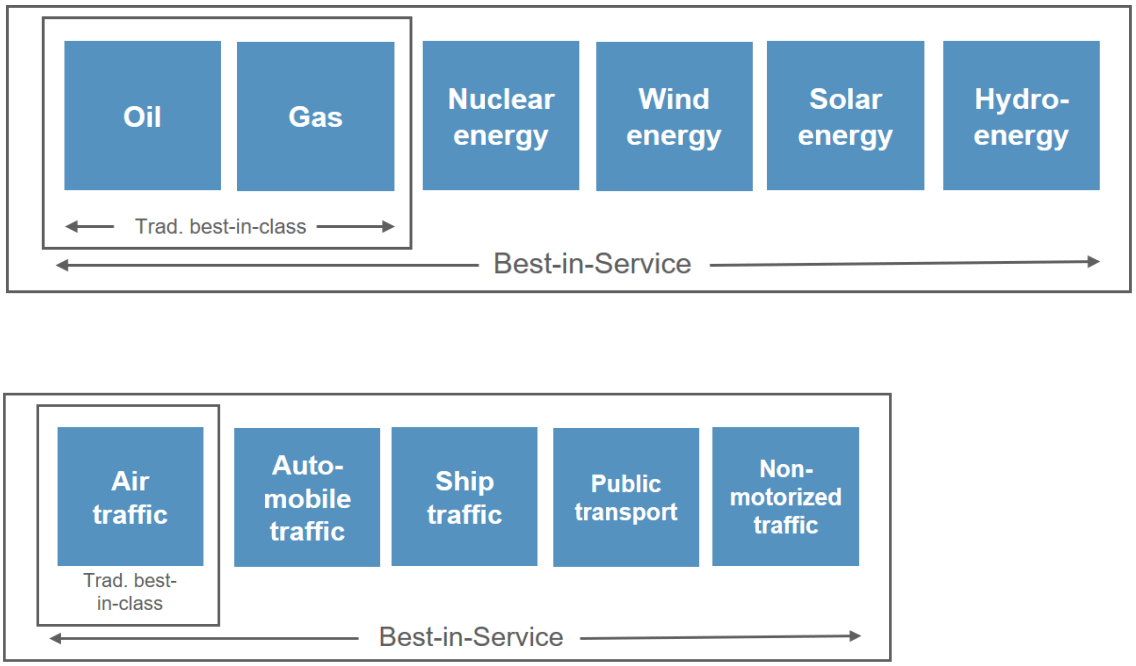
Source: Inrate 2018.

The ESG Impact assessment can be used for different benchmarking systems. Inrate's *Best-in-Service* approach groups companies on the basis of Inrate-defined service sectors. Incorporating a number of industries, these service sectors encompass companies that satisfy a specific basic social need. Key service sectors include Nutrition, Housing, Transportation, Communications, Retail & Distribution, Security, Financial Services, Energy, Water, Resources, Disposal & Recycling, etc.

Within these service sectors, the Best-in-Service approach ultimately selects those companies with the best ESG Impact Ratings. It thus identifies those companies which satisfy certain social needs with a better overall sustainability impact than their peers.

Consequently, Best-in-Service benchmarking is significantly broader than the traditional best-in-class benchmarking, which compares companies within a given industrial sector. For example, in the Energy service sector the Best-in-Service approach allows a comparison not only between oil and gas companies, but also between oil and gas, and nuclear, wind, solar, and hydroelectric energy companies[147]. Meanwhile, in the Transportation sector, companies from the vehicle manufacturing, aviation, shipping, public, and non-motorized[148] transportation segments all compete together.

Figure 22: Best-in-Service vs. traditional best-in-class in the Energy and Transportation sectors



Source: Inrate ESG Impact Methodology 2018.

Since they have an absolute scale of ratings from A+ to D-, ESG Impact Ratings also permit the use of *traditional best-in-class approaches*, thereby identifying the most sustainable companies in each sector of industry. The Best-in-Service rating, however, makes it easier to pinpoint the sustainability-related opportunities and risks attached to a portfolio.

Forward-looking elements in the ESG Impact assessment

First of all, forward-looking elements such as company goals, strategies and investment programmes are an explicit part of the CSR assessment and, as such, of the ESG Impact

[147] Coal companies are allocated to the Inrate Resources service sector.
[148] Non-motorized transportation refers to mobility on foot and by bicycle.

assessment. However, they are not the main forward-looking element. The reason for this being that goals and commitments should not be overrated: It is fundamentally uncertain whether they are actually fulfilled ("advance praise"). Moreover, companies can already act sustainably today and produce renewable energies, for example.

The main forward-looking element in the ESG Impact assessment is the Product Assessment, as described above. It allows to assess to which extent a company actually contributes to sustainability with its products and services. Due to the Product Assessment, the ESG Impact assessment and, even more so, the Best-in-Service benchmarking, are fairly good indicators for sustainability-related transition risks. They reveal how well (in terms of environmental and social impact) a company meets a particular basic need in society compared to their competitors.

A.2 Inrate Climate Impact

Despite important initiatives such as the CDP (formerly Carbon Disclosure Project) and TCFD, only few companies publish complete, consistent and comparable GHG emission data encompassing Scope 1, 2 and 3. Therefore, investors willing to factor in carbon impact and risks into their investment decisions, rely on model-based data.[149]

The Climate Impact Model offers a complete and consistent assessment of climate intensities and ensures comparability across companies. Therefore, it enables investors to evaluate the GHG exposure of portfolios, derive climate-related risks, identify low emission industries and construct GHG-optimized portfolios. To analyse and compare portfolios, Inrate calculates the globally used key figure weighted average carbon intensity (WACI).

Model overview and data source

The Inrate Climate Impact Model is a quantitative model that estimates the GHG intensity of business activities. The model accounts for direct GHG emissions resulting from in-house production processes (Scope 1), indirect emissions associated with the purchase of energy (Scope 2) as well as indirect emissions associated with the purchase of goods and services from suppliers (including disposal, Scope 3 upstream) and emissions associated with the intermediate or final use of the output of the production processes (Scope 3 downstream). The model parameters consist of GHG emission intensities, measured in tons of CO_2 equivalent (tCO_{2eq}) per million USD revenue.

The GHG intensities derived in the Inrate Climate Impact Model are based on an economic input-output life-cycle assessment (EIO LCA). Input-output analysis is based on the monetary flows induced by an economic activity across the entire supply, use and disposal chain. In

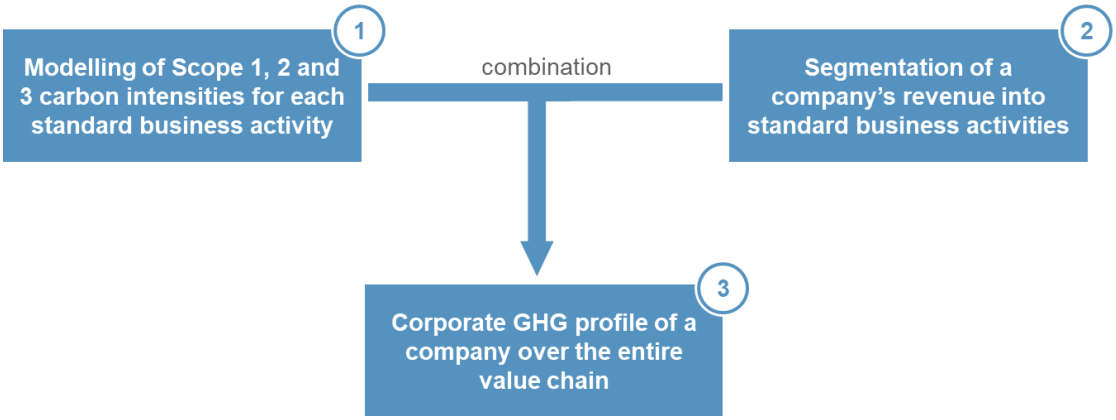
[149] For the description of the Inrate Climate Impact see Schäppi et al. 2020.

combination with environmental data it allows to quantify GHG emissions that are linked to these monetary transactions. It allows to trace total GHG emissions embodied in goods and services used as direct or indirect input for an economic activity ("upstream emissions") as well as GHG emissions linked to the use of its direct and indirect outputs from that activity ("downstream emissions"). Environmentally extended multiregional input-output (EE MRIO) databases provide the necessary economic and environmental information for the EIO LCA.

Calculation of scope 1-3 emission intensities

The company-specific GHG intensities are derived based on three major steps.

Figure 23: The Climate Impact research process



Source: Schäppi et al. 2020.

Step 1: Assessing GHG intensity of activities

Scope 1, 2 and 3 GHG intensities of economic activities are assessed based on the Climate Impact Model as described above. For companies in the two most GHG intensive sectors (Energy and Utilities), the modelled emission data are replaced or complemented with values derived from bottom-up research on physical data: energy and fossil fuel production volumes, electricity production volumes, purchased electricity volumes and corresponding emission factors.

Step 2: Revenue segmentation into standard business activities

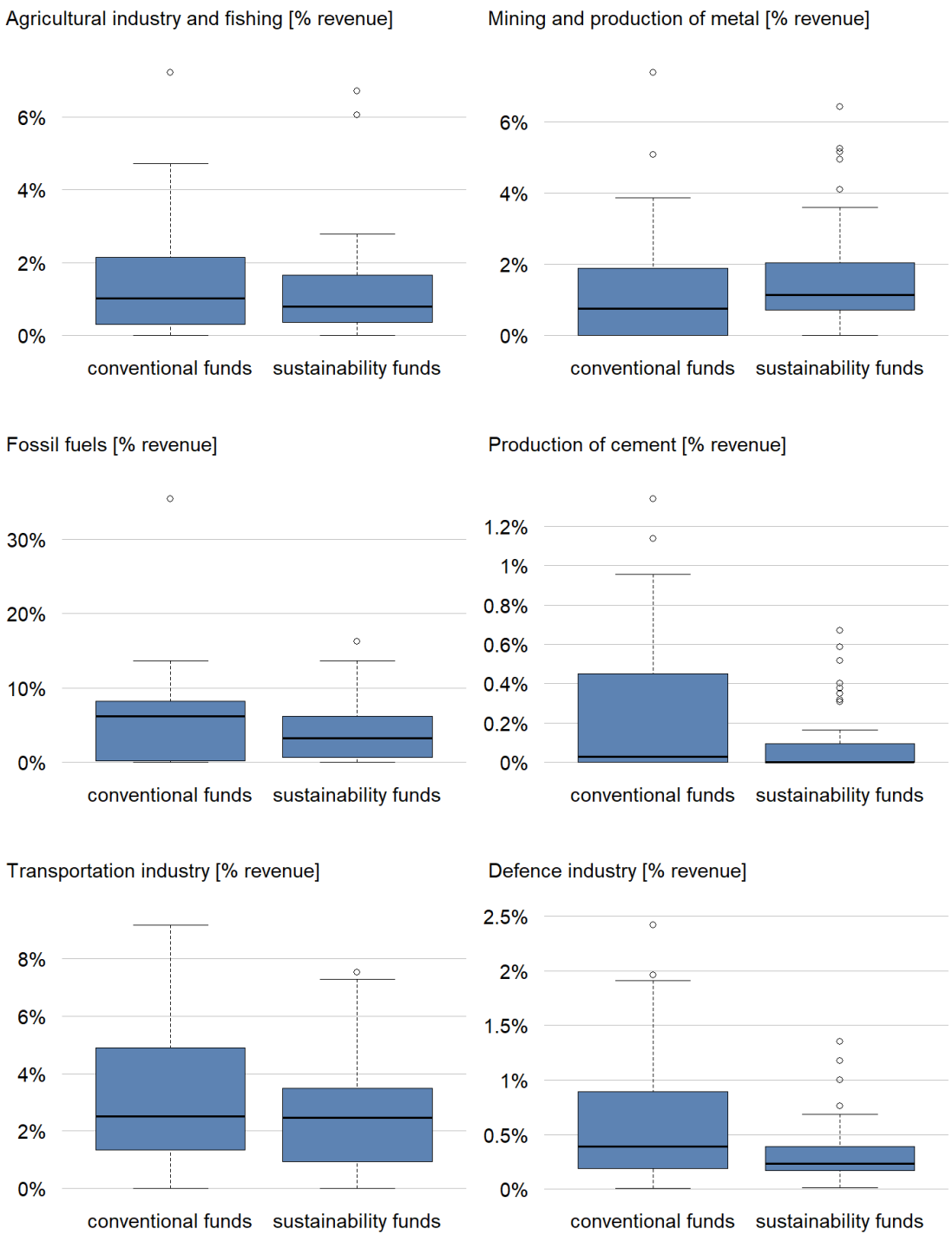
The revenue of each company in the Inrate coverage is divided into the standardized Inrate Business Activities. These are based on the Inrate Business Activity Classification (IBAC), comprising around 330 activities and 110 sub activities. The segmentation of a company's revenues is based on its annual segmental reporting (see Product Assessment in Annex A.1).

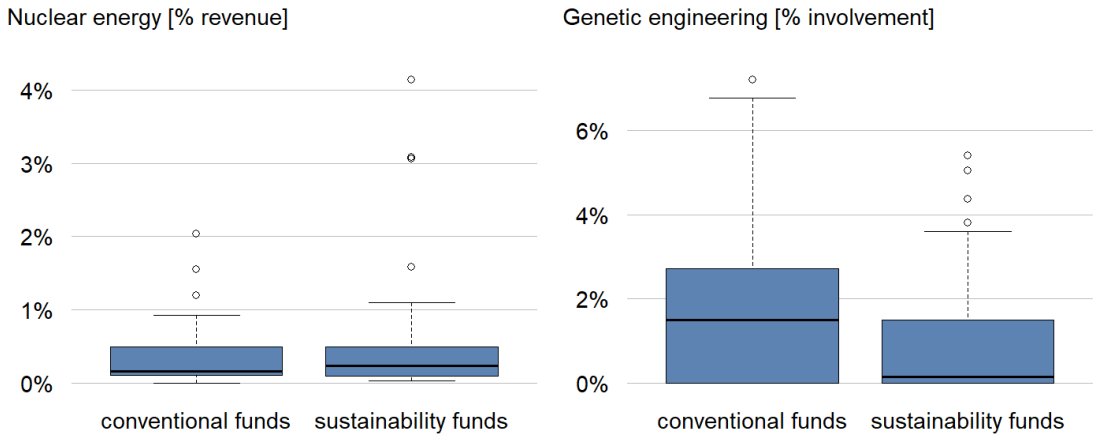
Step 3: Corporate GHG intensity and footprint calculation

This last step derives corporate GHG intensities and footprints by multiplying GHG intensities derived in step 1 – the Inrate Climate Impact Model – and revenues derived in step 2. The GHG intensities derived from the Exiobase dataset are matched with the corresponding Inrate Standard Business Activities.

B. Further Evaluations

Figure 24: Capital allocation effect across the different critical economic activities

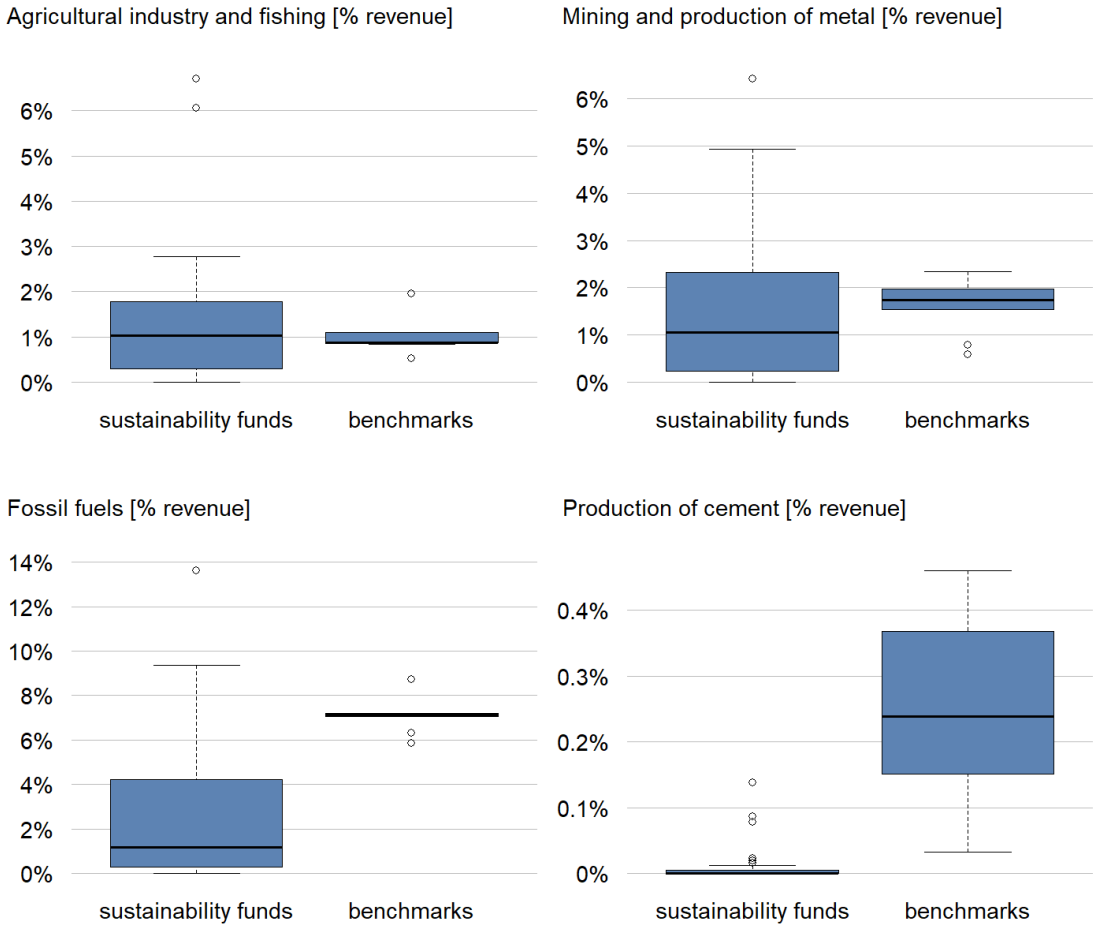


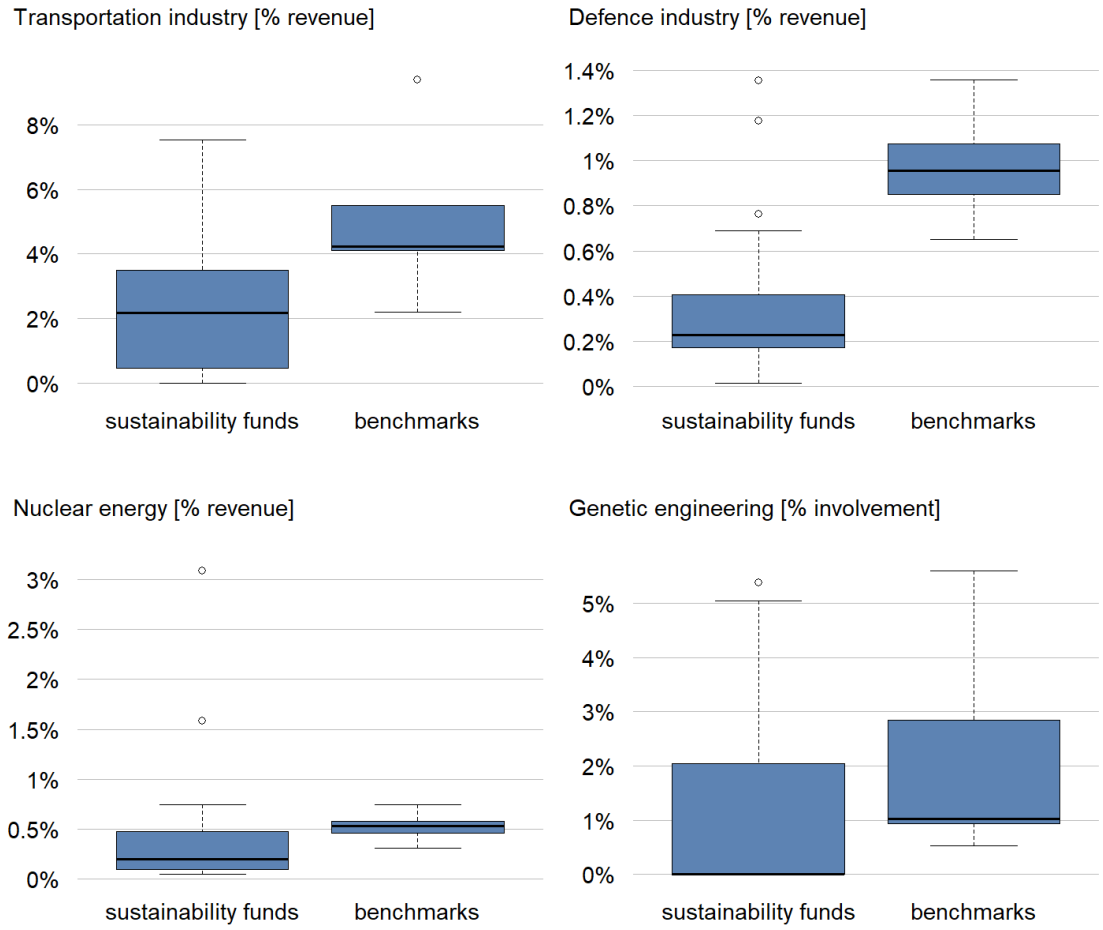


Distribution of the raw data of the conventional and sustainability funds for the eight different types of critical activities. For a description of how to read boxplots, see Figure 12.

Source: Inrate ESG Impact data as of October 2020

Figure 25: Asset management effect across the different critical economic activities

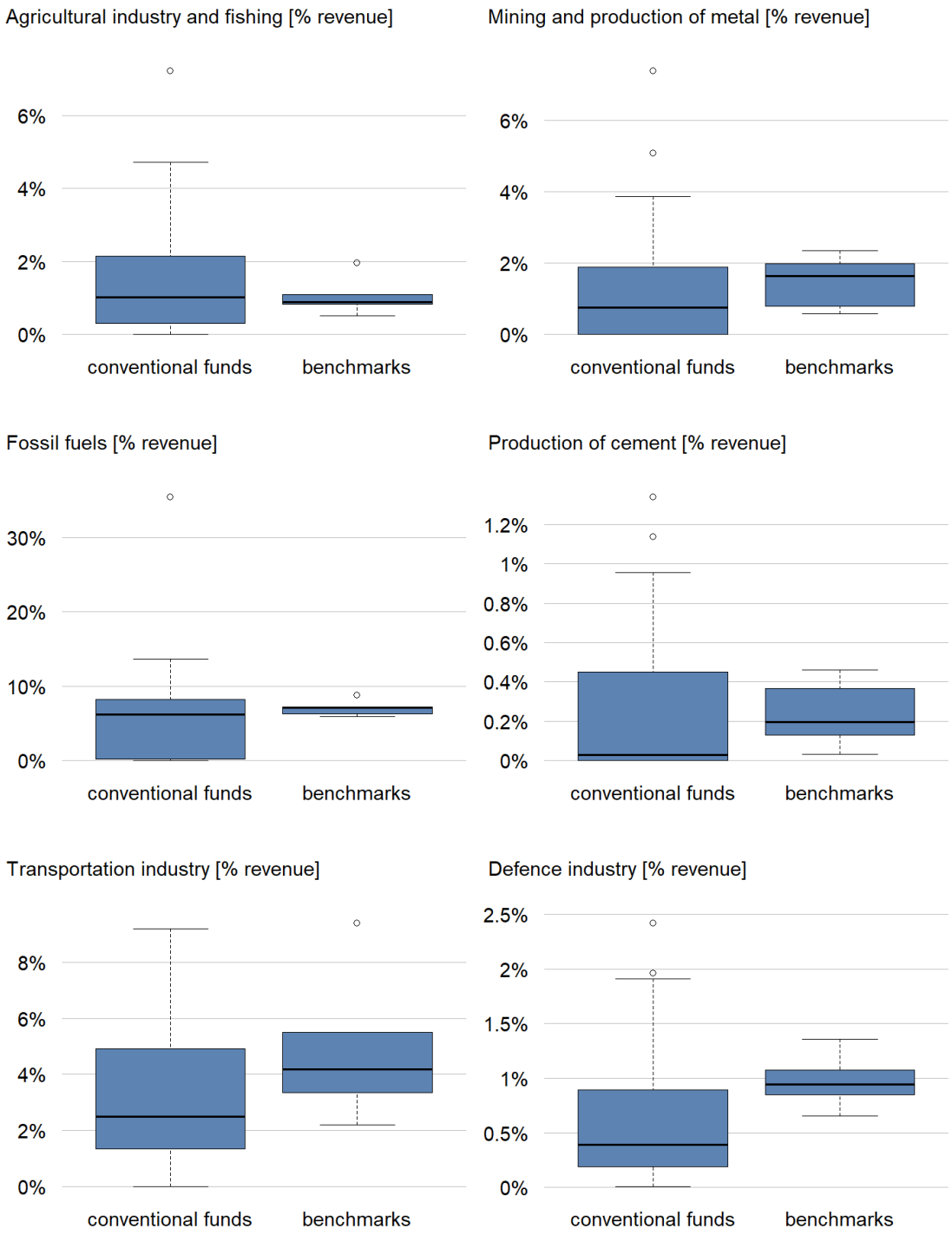


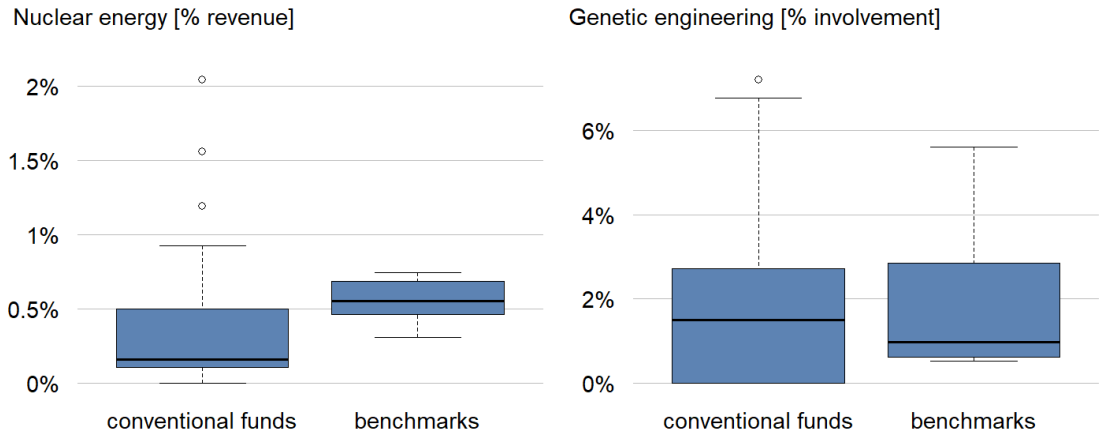


Distribution of the raw data of the sustainability funds and their conventional benchmarks for the eight different types of critical activities.
For a description of how to read boxplots, see Figure 12.

Source: Inrate ESG Impact data as of October 2020

Figure 26: Conventional funds compared to the conventional benchmarks of the sustainability funds (control) across the different critical economic activities





Distribution of the raw data of the sustainability funds and their conventional benchmarks for the eight different types of critical activities.
For a description of how to read boxplots, see Figure 12.

Source: Inrate ESG Impact data as of October 2020

Table 13: Effects of sustainability approaches and control variables

Variable	ESG Impact [A+; D-] resp. [1; 0]	Carbon intensity (tCO_2eq / mUSD revenue)	Critical activities (% revenue)	Major environmental controversies (% involvement)
Best-in-class (n=16)	*+0.02* *p-value=0.054 not sign.*	*+4* *p-value=0.978 not sign.*	*+0.7%* *p-value=0.752 not sign.*	*-0.05* *p-value=0.242 not sign.*
Engagement (n=23)	*+0.01* *p-value=0.442 not sign.*	*+7* *p-value=0.970 not sign.*	*-0.3%* *p-value=0.172 not sign.*	*+0.06%* *p-value=0.922 not sign.*
ESG integration (n=19)	*-0.01* *p-value=0.607 not sign.*	*-17* *p-value=0.925 not sign.*	*-2.7%* *p-value=0.367 not sign.*	*-0.2%* *p-value=0.744 not sign.*
Exclusion (n=42)	*+0.02* *p-value=0.057 not sign.*	*-145* *p-value=0.301 not sign.*	*-3.2%* *p-value=0.183 not sign.*	*-0.1%* *p-value=0.813 not sign.*
Impact investment (n=5)	*-0.02* *p-value=0.173 not sign.*	*+49* *p-value=0.794 not sign.*	*+3.3%* *p-value=0.293 not sign.*	*+0.2%* *p-value=0.690 not sign.*
Positive selection (n=27)	*+0.01* *p-value=0.221 not sign.*	*-138* *p-value=0.286 not sign.*	*-2.9%* *p-value=0.172 not sign.*	-0.9% p-value=0.020 *
Thematic products (n=11)	+0.04 p-value=0.002 **	*+256* *p-value=0.132 not sign.*	*+4.9%* *p-value=0.082 not sign.*	*-0.3%* *p-value=0.524 not sign.*
Regional investment focus	Global: -0.02 p-value<0.001 *** USA/N-America: -0.06 p-value<0.001 ***	*Global: -128* *p-value=0.277 not sign.* *USA/N-America: -2* *p-value=0.991 not sign.*	*Global: -2.2%* *p-value=0.275 not sign.* *USA/N-America: -0.2%* *p-value=0.945 not sign.*	*Global: +0.5%* *p-value=0.141 not sign.* USA/N-America: +1.1% p-value=0.017 *
Benchmark type	*Sustainability: -0.01* *p-value=0.548 not sign.* *No benchmark: -0.03* *p-value=0.138 not sign.*	*Sustainability: +92* *p-value=0.570 not sign.* *No benchmark: +405* *p-value=0.168 not sign.*	*Sustainability: +2.2%* *p-value=0.416 not sign.* *No benchmark: +6.3%* *p-value=0.200 not sign.*	*Sustainability: +0.1%* *p-value=0.877 not sign.* *No benchmark: +0.04%* *p-value=0.959 not sign.*
Concentration	conc. +0.01 → +0.005 p-value=0.025 *	conc. +0.01 → -58 p-value=0.027 *	conc. +0.01 → -1.4% p-value=0.003 **	*conc. +0.01 → -0.15%* *p-value=0.054 not sign.*
Tracking error	*te. +1 → +0.03* *p-value=0.585 not sign.*	*te. +1 → +1041* *p-value=0.203 not sign.*	*te. +1 → -7.6%* *p-value=0.578 not sign.*	*te. +1 → -0.1%* *p-value=0.958 not sign.*
Coverage	cov. +0.01 → +0.001 p-value=0.026 *	*cov. +0.01 → -0.24* *p-value=0.967*	*cov. +0.01 → -0.08%* *p-value=0.518 not sign.*	*cov. +0.01 → -0.03%* *p-value=0.182 not sign.*

This table summarises the results from the four regression models. We report estimates and p-values. * significant at 0.05-level, ** significant at 0.01-level, *** significant at 0.001-level

Source: Inrate ESG Impact data and Climate Impact data as of October 2020.

Figures

Tables

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