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Measuring the development of French labelled funds and their contribution to sustainable financing of the economy[1]

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[1] This presentation was prepared for the conference. The views expressed are those of the author and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the event.

Measuring the development of French labeled funds and their contribution to sustainable financing of the economy

David Nefzi, Banque de France[1]

Abstract

The paper describes the development of labeled mutual funds in France. Our approach consists in taking an overview of the French market, based on data from the two main French public labels for investment funds (*Greenfin* and *ISR*). After a presentation of indicators for monitoring this market (subscription rate, performance), we develop a sectoral indicator to estimate the carbon footprint of the labeled funds compared to two other category of funds (ESG self-declared and non-ESG) and we provide a comparative analysis of their portfolio structures. Ultimately, we assess the "green content" of the funds by using a proxy: the share of economic activities covered by the technical screening criteria of the European Union green taxonomy and the share of green bonds in funds' portfolios. Finally, using econometric methods, we estimate a "label effect".

Keywords: Sustainable investment funds, green finance, socially responsible investment

JEL classification: G10, G11, G20, G23

[1] The views expressed in this paper do not represent the opinion of the Banque de France or the Eurosystem. For their help, their comments and discussions, I thank Emilie Candus, Corinne Devillers, François Mouriaux, Franck Sedillot and Pierre Bui Quang.

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Introduction

For several years, climate change mitigation has been the subject of targeted and crosscutting public policies. The Grantham Research Institute at London School of Economics and the Sabin Center at Columbia Law School have built a database covering climate and climate-related laws, as well as laws and policies promoting low carbon transitions[2]. The database lists 2,319 laws and policies in more than 164 countries. In parallel, the World Bank Group has built a dashboard on carbon pricing initiatives[3] – emissions trading systems and carbon taxes. It shows that in 2021, 64 carbon-pricing initiatives, covering 45 national jurisdictions and representing about 22% of global greenhouse gas emissions (GHG), have been implemented.

Aside from general legislation and carbon pricing initiatives, climate change mitigation policies can rely on targeted measures such as labelling rules and requirements for consumer products, including on financial products. In theory, a label aims to promote environmental excellence in a category of products and/or services. This label will therefore be awarded to products and services meeting high environmental standards.

Sustainable finance standards and labels are part of this approach. In 2019, Novethic (2019) published a study listing sustainable finance standards and labels available in Europe. The study shows that, between 2004 and 2019, about 10 specialized, public and private, labels have been created across Europe. The labels serve as a guarantee to investors regarding the allocation of assets in the portfolios. So far, the existing European labels cover a wide range of practices and methods ranging from the integration of ESG criteria in the asset management strategy to thematic green finance funds.

The development of these labels suggests that sustainable investment strategy is more-and-more a criterion for individual investors (AMF, 2019). It is also to meet this increased demand that the supply of investment vehicles has developed accordingly.

Incorporating sustainable criteria into investment strategies takes multiple forms:

- The *opt-out approach* consists of excluding a list of companies or sectors deemed incompatible with sustainable development;
- The *best in class or best in universe approach* consists of evaluating companies according to Environmental, Social and Governance (ESG) criteria and to invest only in those which have obtained the best evaluation within their class of activity;
- It can also take the form of thematic funds.

Of course, these criteria can be more or less weighted within the investment strategy of the funds. In some cases, the ESG approach implemented by funds' managers has a limited or even very limited impact on the investment strategy, and could lead to ESG-washing or greenwashing.

[2] https://climate-laws.org/

[3] https://carbonpricingdashboard.worldbank.org/

Given the integration of robust extra-financial criteria in the investment strategies of labeled funds, sometimes verified through a preliminary audit and an annual review carried out by independent third-party organizations, in theory labeled funds should have better environmental performances than self-declared ESG funds and, a fortiori, non-ESG funds. This paper aims to assess this assumption based on French labeled funds.

The paper is organized as follows: section 1 provide a quick overview of the French labeled funds market. Section 2 presents the data. Section 3 is dedicated, on the one hand, to the construction of a sectoral carbon intensity indicator and, on the other hand, it aims at estimating the carbon footprint of different categories of French mutual funds. Section 4 measures the share of securities issued by NACE sectors covered by the technical screening criteria established by European Commission green taxonomy (TEG, 2020). Section 5 measures the share of Green Bonds (GB) in the different categories of mutual funds' portfolios. Section 6 estimates a potential label effect. Section 7 concludes.

1. The French labeled funds market

In order to allow French savers to identify mutual funds incorporating robust extra-financial criteria in their investment strategies, quality standards, via labelling procedure, have gradually been established. In 1997, the *Finansol* label was created with the aim of promoting solidarity savings products. The trend accelerated from 2015 with the creation of two new labels:

- The *Investissement Socialement Responsable* (*ISR*) label, created in January 2016, supported by the Ministry of the Economy and Finance, and
- The *Greenfin* label, created in December 2015, supported by the Ministry of Ecological Transition.

In March 2021, the assets under management of 564 *ISR* labeled funds was about 383 billion euros. The assets under management was about 16 billion euros for 26 *Greenfin* labeled funds (Novethic, 2021).

Candus & Le Goff (2020) suggest that the labels attract numerous investors. One way to assess the investors' appetite for sustainable investment is to look at the subscription rates of labeled funds compare to the average market subscription rates.

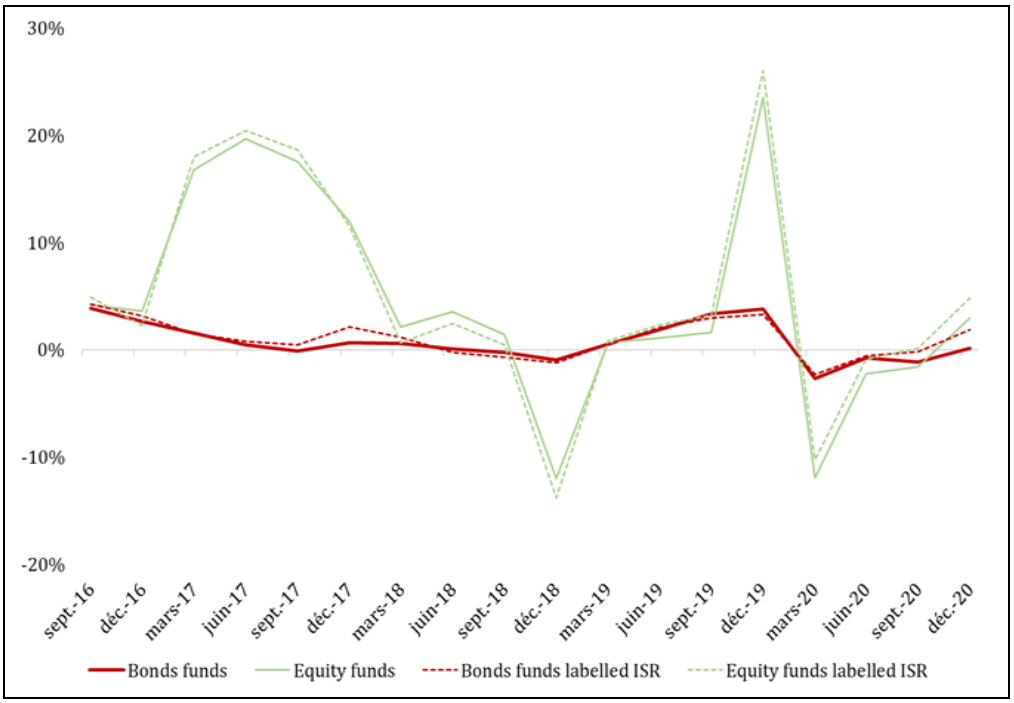
Figure 1 shows that on average French *ISR* labeled funds have higher subscription rates, irrespective of the funds' characteristics, than the average market subscription rates. For *Greenfin* labeled funds since the sample is small the comparison is not representative.

Fig. 1 - Subscription rates of French *ISR* funds compare to the average market subscription rates

Source: Banque de France, author' calculations

Investors' appetite for sustainable label funds appears to be uncorrelated with the financial performance of the funds. Figure 2 shows that on average French *ISR* labeled funds have comparable performance rates, irrespective of the funds' characteristics, than the average market performance rates.

Fig. 2 - Performance rates of French *ISR* funds compare to the average market Performance rates



Source: Banque de France, authors' calculations

The *ISR* label encompasses four categories of criteria:

- Environmental (carbon footprint, greenhouse gas emissions (GHG), electricity consumption, water and waste management, etc.);
- Social (training of employees, equal pay for men and women, place of women in the management of the company, employment of disabled people, etc.);
- Governance (transparency on executive compensation, place of women on the board of directors, fight against corruption, etc.);
- Respect for human rights (fight against poverty, for example).

The *ISR* label follows a *best in class approach*. Indeed, funds applying for the label have to provide evidences of the sustainable quality of their investments by demonstrating that they are, at all times, better than their benchmark index or their investment universe on at least two ESG indicators. For example, an equity funds investing in French stocks, and opting for the environmental criterion, will have to demonstrate to savers that its portfolio consists in French listed companies that have a better environmental rating than all French listed companies.

The *Greenfin* label however follows an *opt-out approach*: the label exclude funds that invest in companies operating in the nuclear and fossil fuels sectors. In addition, partial sectoral exclusions are also defined. Furthermore, labelling implies that the investment strategy complies with a nomenclature of eligible activities (energy, building, waste management and pollution control, industry, clean transport, information and communication technologies, agriculture and forest and adaptation

to climate change). A majority share of the funds' portfolio is dedicated to these activities.

2. Data

To explore the behaviour of labeled funds we use a Banque de France's internal database covering the balance sheets of all the mutual funds licensed and registered in France. To obtain the details of securities-by-securities of the funds' balance sheets, we merge this database with a database of the European System of Central Banks (ESCB): the Centralized Securities Database (CSDB). The CSDB is a security-by-security reference database that contains, among others, data on instruments, issuers and prices for debt securities, equity instruments and investment fund shares issued by residents of euro area Member States, but also the securities likely to be held and transacted in by euro area residents; and securities denominated in euro, whoever the issuer is and wherever they are held. Thanks to this database, we have monthly data ranging from June 2011 to March 2021.

First, we define three types of funds samples. The first one corresponds to *ISR* and *Greenfin* labeled funds. The identification of these funds is made possible via their ISIN codes, which are public and available on the respective websites of the aforementioned labels[4]. Hereinafter we call this sample "Labeled funds". For the *Greenfin* labeled funds we obtain balance sheet information for 18 funds, which represents 79,207 observations about the securities detained from June 2011 to March 2021. For the *ISR* labeled funds we obtain balance sheet information for 424 funds, which represents 1,620,149 observations about the securities detained from June 2011 to March 2021.

The second sample relates to mutual funds that use in their names a word related to the sustainability lexical field but which are not labeled. The appendix provides the list of the word used to characterize our sample: it is the same list used in a previous paper of the Autorité des Marchés Financiers (AMF) (Darpeix & Mosson, 2021). Below a world-cloud diagram exhibits the 30 words with the highest occurrence in the name of the funds. Hereinafter we call this sample "Self-declared funds". For this sample, we obtain balance sheet information for 656 funds, which represents 2,685,159 observations about the securities detained from June 2011 to March 2021.

[4] https://www.ecologie.gouv.fr/label-greenfin

https://www.lelabelisr.fr/

Fig. 3 – Word-cloud of the 30 words with the highest occurrence

Source: Banque de France

The last sample corresponds to all the other funds, unlabeled and without any word related to the sustainability lexical field in their names. Hereinafter we call this sample "Non-ESG funds".

In addition, we use a Bloomberg database on Green Bonds. "Bloomberg's definition of what constitutes a market-accepted 'green' bond is based on the 2018 edition of the Green Bond Principles (GBP). The GBP are a voluntary set of guidelines established by the International Capital Markets Association to provide transparency, consistency and integrity in the green bond market. The GBP require bonds to satisfy four core pillars of the principles for them to be considered fully aligned. Bloomberg does not necessarily require full alignment to all four pillars for a Bloomberg Green Bond designation" (Bloomberg, 2020).

3. Measurement of portfolios' carbon footprint

To assess the carbon footprint of the funds' portfolios, we first construct an absolute score of carbon intensity by level-1 NACE sector (NACE Rev. 2 classification[5]).

First, we use Eurostat air emissions accounts by level-1 NACE sector database for the European Union (EU-28)[6]. It provides GHG emissions – expressed in CO_2 equivalent[7] – by economic sectors within the EU-28 from 2008 to 2019.

[5] The NACE Rev. 2 classification has a four layers structure with a first level based on alphabetical code, a second level based on a two-digit numerical code, a third level based on three-digit numerical code and finally a fourth level based on a four-digit numerical code.

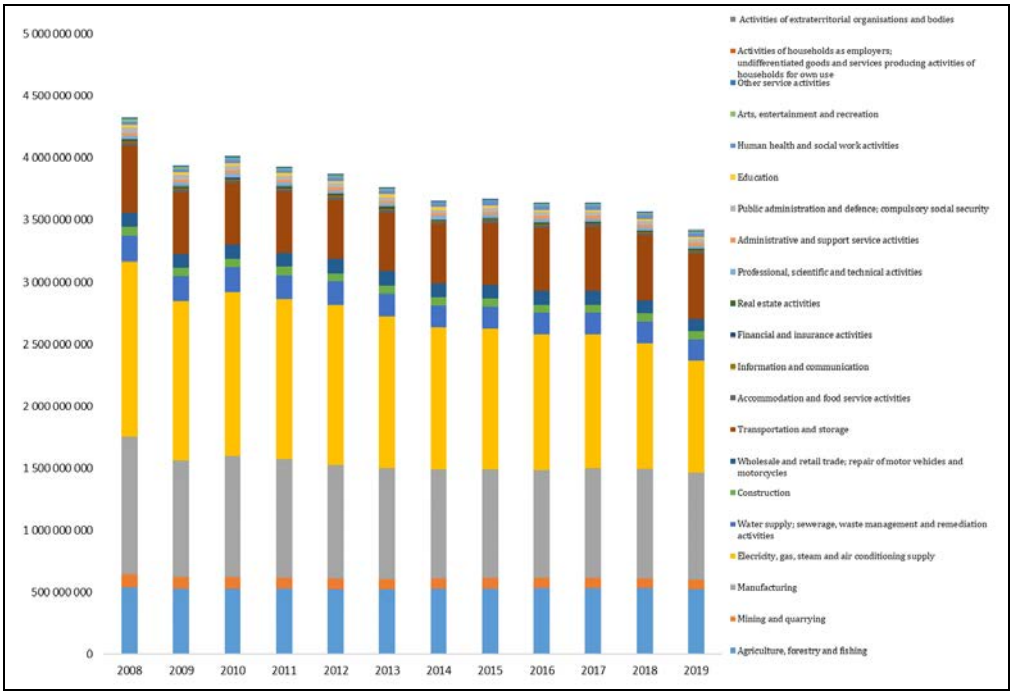
See: https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF

[6] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_air_gge&lang=en

[7] CO_2-eq is a metric measure used to compare the emissions from various GHG on the basis of their global-warming potential, by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential.

Figure 4 below exhibits the tons of CO2-equivalent emissions per level-1 NACE sectors, in the EU-28, from 2008 to 2019. During that time span, the overall level of emissions decreases by 21%. However, the contribution of each NACE sectors remains fairly stable (e.g. the contribution of the "Elecricity, gas, steam and air conditioning supply" sector is about 33% in 2008 and about 28% in 2019, while the "Transportation and storage" sector is about 13% in 2008 and about 15% in 2019 and the "Manufacturing" sector is about 26% in 2008 and about 25% in 2019).

Fig.4 – EU-28 tons of CO_2-equivalent emissions per level-1 NACE sectors



Source: Eurostat

Second, we use the National accounts aggregates by industry database[8]. It allows to obtain the gross value added (in volume) per level-1 NACE sectors for the EU-28.

Thus by linking the GHG emissions by level-1 NACE sectors to the corresponding value added, we estimate carbon intensity metrics by economic sector that expresses the average amount of CO_2-eq needed to produce a unit of value added.

To construct the score, we proceeded as follows:

$$Score_i = \frac{\left(\sum_{t=2008}^{2019} \frac{CO_2eq_{i,t}}{\left(\sum_{i=1}^{n} CO_2eq_{i,t}\right)}\right)}{\left(\sum_{t=2008}^{2019} \frac{VA_{i,t}}{\left(\sum_{i=1}^{n} VA_{i,t}\right)}\right)} \times 10 \qquad (1)$$

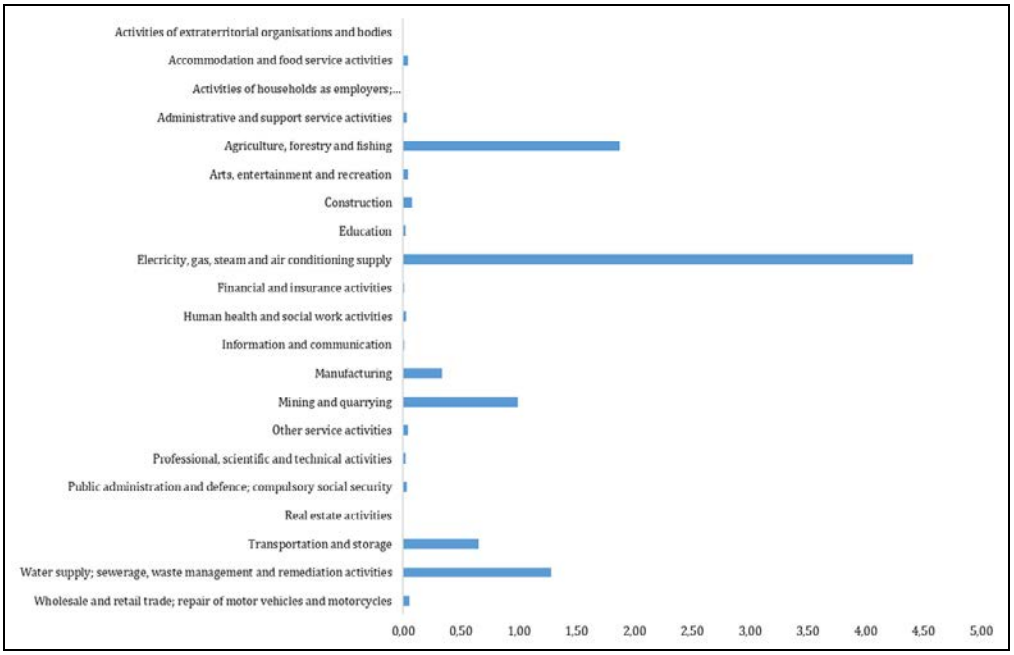
[8] https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a64&lang=en

Where $CO_2eq_{i,t}$ corresponds to CO_2-eq of the i-th NACE sector at the date t.

Where $VA_{i,t}$ corresponds to value added of the i-th NACE sector at the date t.

Thanks to this method, we obtain an ordinal scale of level-1 NACE sectors according to their carbon intensity[9]. Figure 5 below shows this classification.

Fig.5 – Carbon intensity score per level-1 NACE sectors



Source: Eurostat

Appendix provides a table of the carbon intensity score per NACE sector.

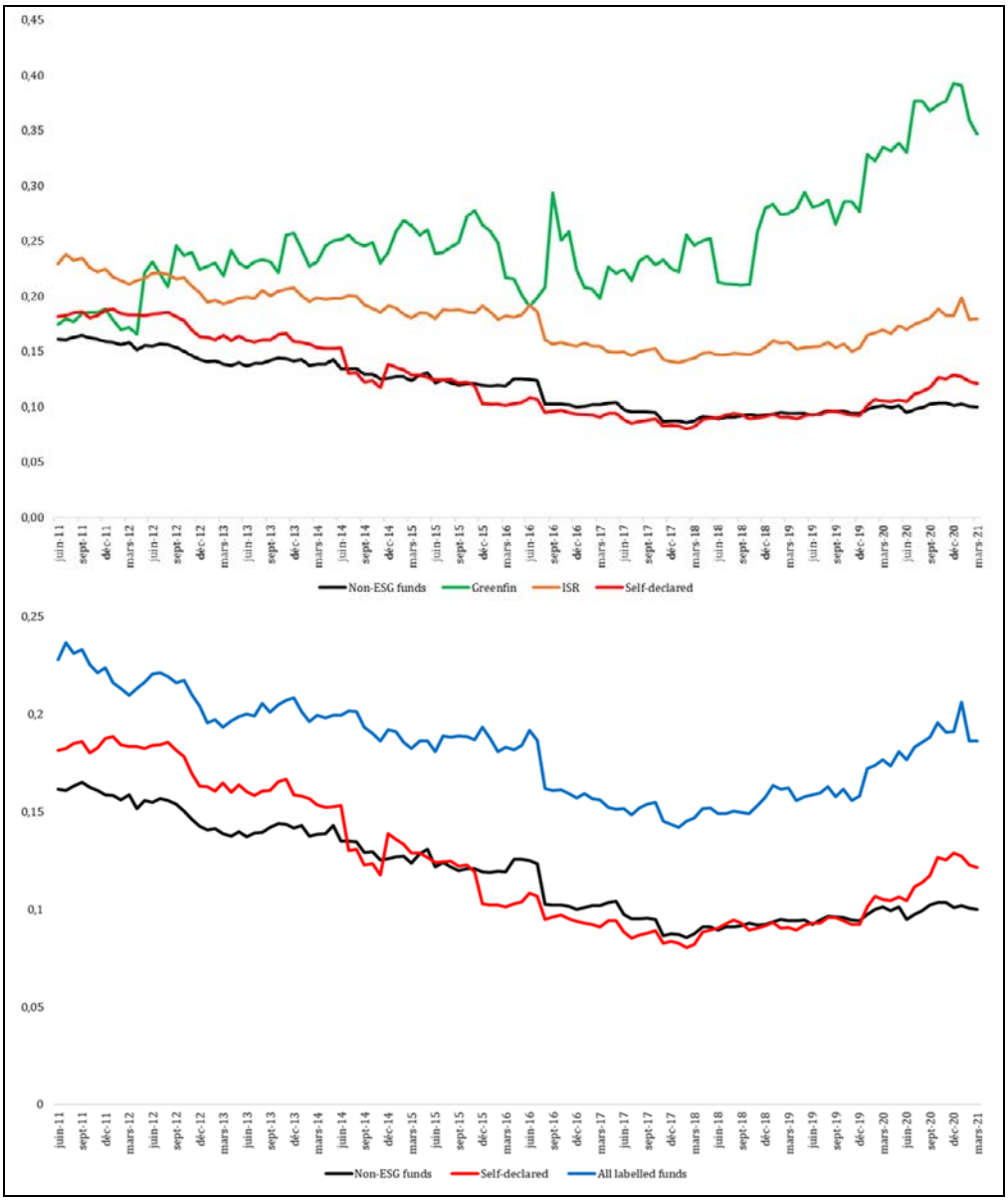
Second, since we have the issuer's level-1 NACE sector information for most securities, we can associate an absolute score to each security, if the issuer's NACE sector is known. Ultimately, to obtain a carbon footprint score for a fund's portfolio at each period, we associate for each security the score corresponding to the issuer NACE sector, then we weight the score of each security by the relative weight of the security in the fund's net assets. We calculate the weighted score as follow:

$$Weighted\ portfolio\ score_{i,t} = Score_i \times \left(\frac{security_{i,t}}{total\ net\ assets_{i,t}} \right) \qquad (2)$$

[9] To test the robustness of our method, we construct a carbon footprint score by level-1 NACE sectors based not on the carbon intensity metric but only the CO_2-eq by NACE sectors. The results we find are not significantly different from the method developed above.

For each category of funds, we take the average of the funds' carbon footprint score. The figures 6 below show the score of the different category of funds from June 2011 to March 2021.

Fig. 6 – Average portfolios carbon intensity score



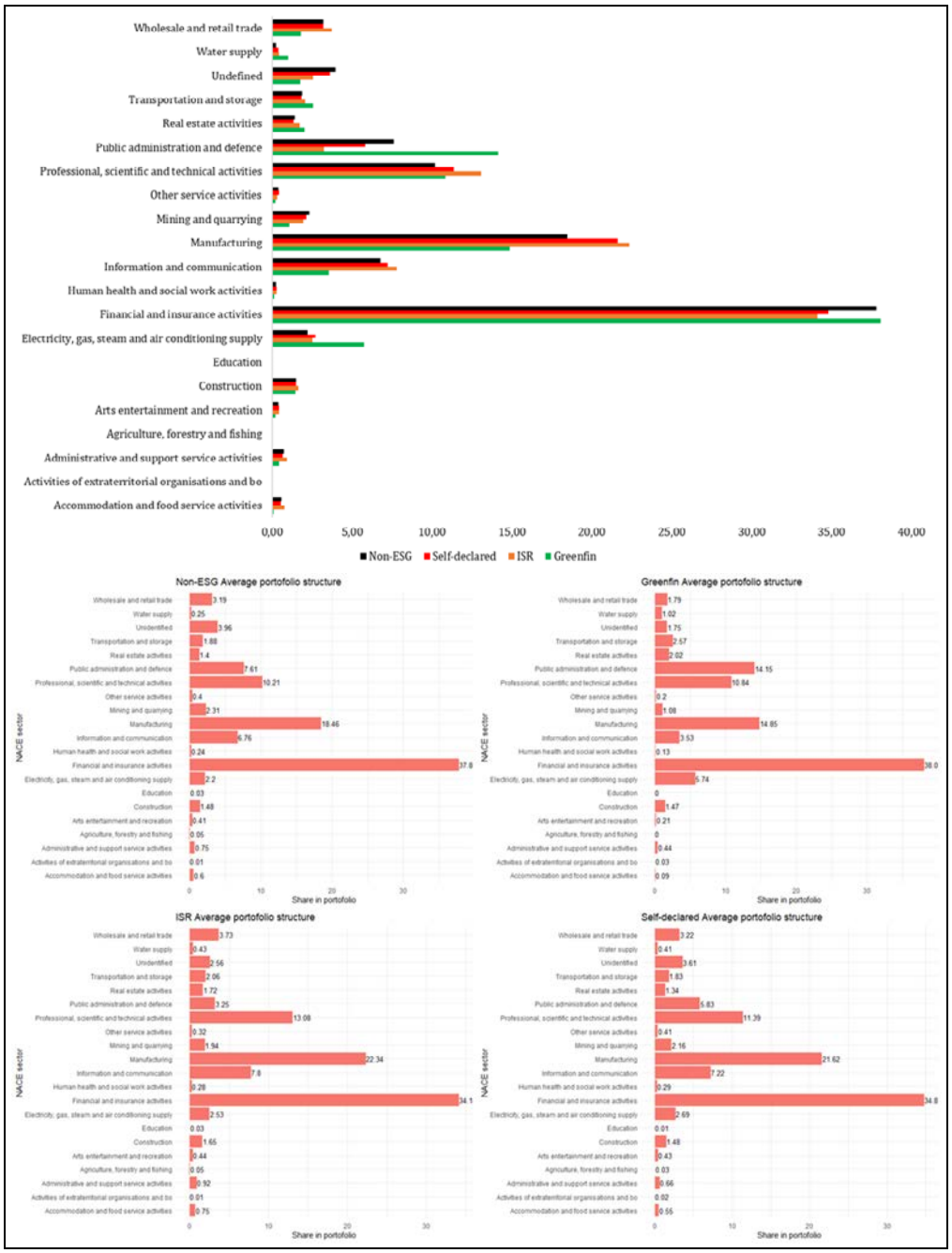
Source: Centralised Securities Database (CSDB), Banque de France, authors' calculations

The results we find are counterintuitive. Indeed, with our method labeled funds have, on average, a higher carbon score than the two other samples. To analyse more precisely these results we breakdown the average structure of the different categories of funds.

A quick look at the structure of the portfolios explain the counterintuitive results. The diagrams 7 below breakdown the share of securities by NACE sector. We see that *Greenfin* funds invest more in securities issued by the "Electricity, gas, steam and air

conditioning supply" and "Water supply" sectors; which have high scores. *ISR* labeled funds, compared to Non-ESG and Self-declared funds, have relatively more securities issued by the "Manufacturing" "Wholesale and retail" sectors and less securities issued by sectors having low score (e.g. "Public administration).

Fig. 7 – Average portfolios structure per category of funds



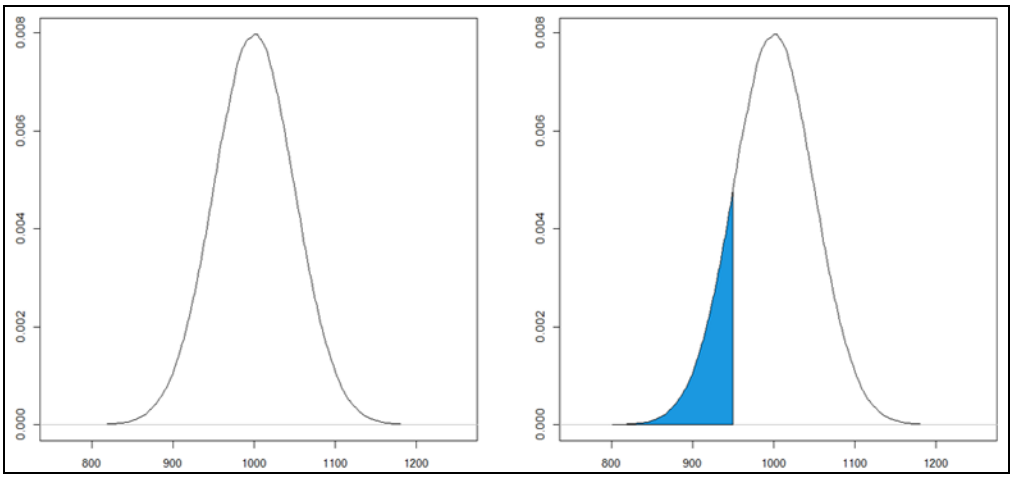
Source: Centralised Securities Database (CSDB), Banque de France, authors' calculations

The average portfolios structure per categories of funds explain partly the counterintuitive results. Around 35% of the securities are related to the "Financial and assurance activities" sector, so that we cannot identify the end use of financial flows.

The counterintuitive results also arise from an intrinsic bias of our method, specifically from the lack of granularity of the NACE sectors. For example, the "Electricity, gas, steam and air conditioning supply" sector includes sectors that produce completely carbon-free energy, such as the photovoltaic or wind sector, and extremely carbon-intensive sectors, such as coal, petroleum or natural gas.

Therefore, it does not allow taking into account the *opt-out or best in class* approaches of the labeled funds. Indeed, in theory, these approaches imply that the labeled funds following *best in class or best in universe* approach will choose in the statistical distribution function of GHG emitted by companies within a NACE sector, companies that are the less carbon intensive. Concerning funds following an *opt-out* approach, insofar as certain sectors are de facto excluded, the statistical distribution function by NACE sectors is not identical to the one without exclusions. However, with our method, the score is constructed "as if" the labeled funds chose companies in the mean of a standard statistical distribution function. Consequently, the score is upward biased. Figure 8 below offers a theoretical example of the bias.

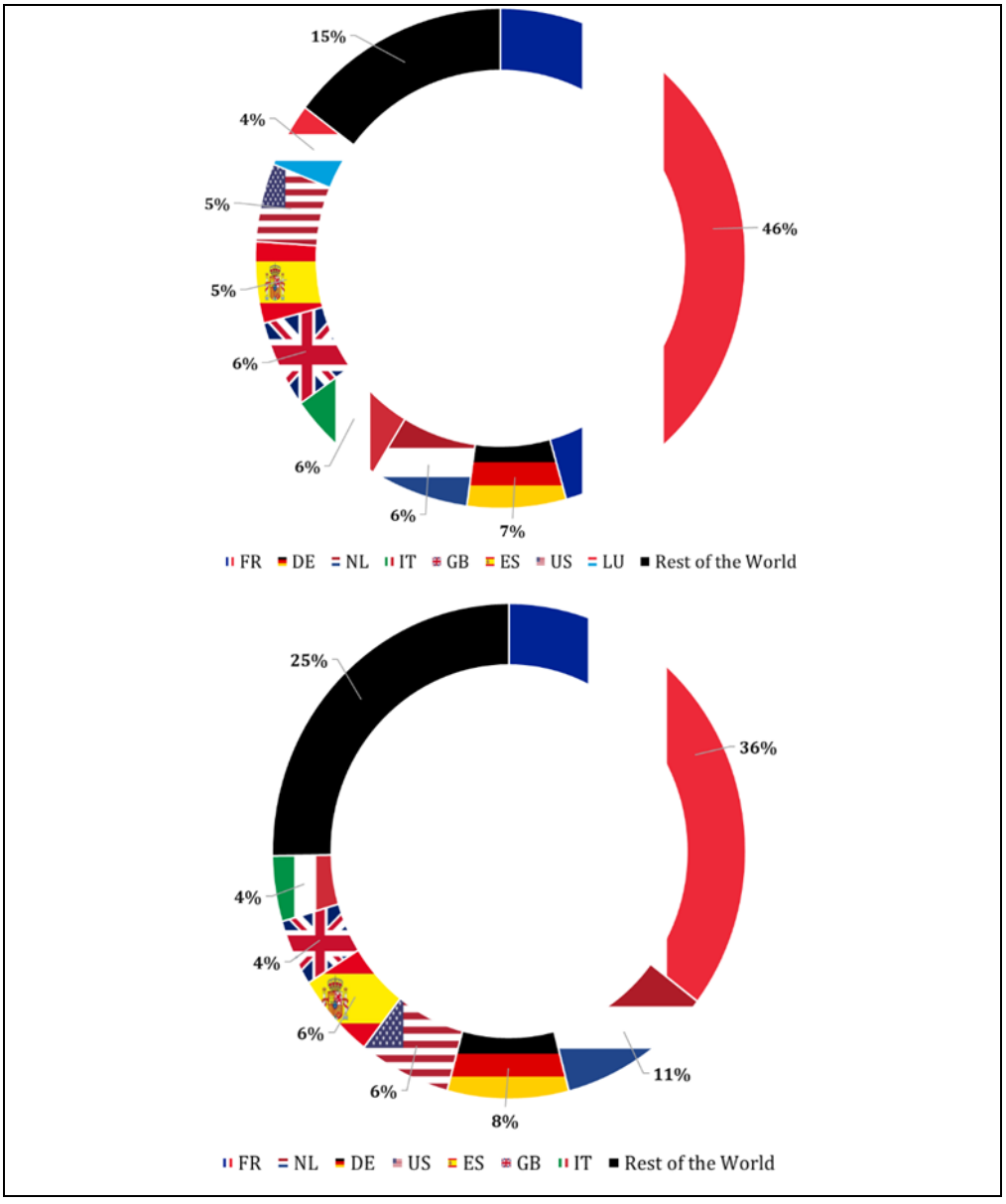
Fig. 8 – Theoretical standard statistical distribution function and *best in class* approach function



Notes: The left-hand side plot is the standard statistical distribution function of GHG emitted by companies within a NACE sector. The right-hand side represents the same function, but the blue area encompass companies that funds following a *best in class* approach invest in.

In addition, another drawback of the score is that it is inherently biased as it is constructed on GHG emissions and value-added by NACE sectors from EU-28. Nevertheless, as the method produces an ordinal ranking the effect is marginal, as the order between sectors that results from the construction of the score seems theoretically to be similar across the different regions of the world, the relative weight of GHG emissions by sector and the value-added per sectors may vary, however. This geographical bias must be qualified insofar as around four fifth of the securities detained by labeled funds come from EU issuers (see figures below).

Fig. 9 – *ISR* and *Greenfin* funds securities per country



Source: Centralised Securities Database (CSDB), Banque de France, authors' calculations

Finally, the weighted score can change according to valuation effects.

Considering all the biases of our ad hoc method and the counterintuitive results it yields, this suggests it is not robust enough. Indeed, the level-1 NACE sector appears to be too broad a level of analysis to be used to precisely assess the carbon footprint of mutual funds' portfolios.

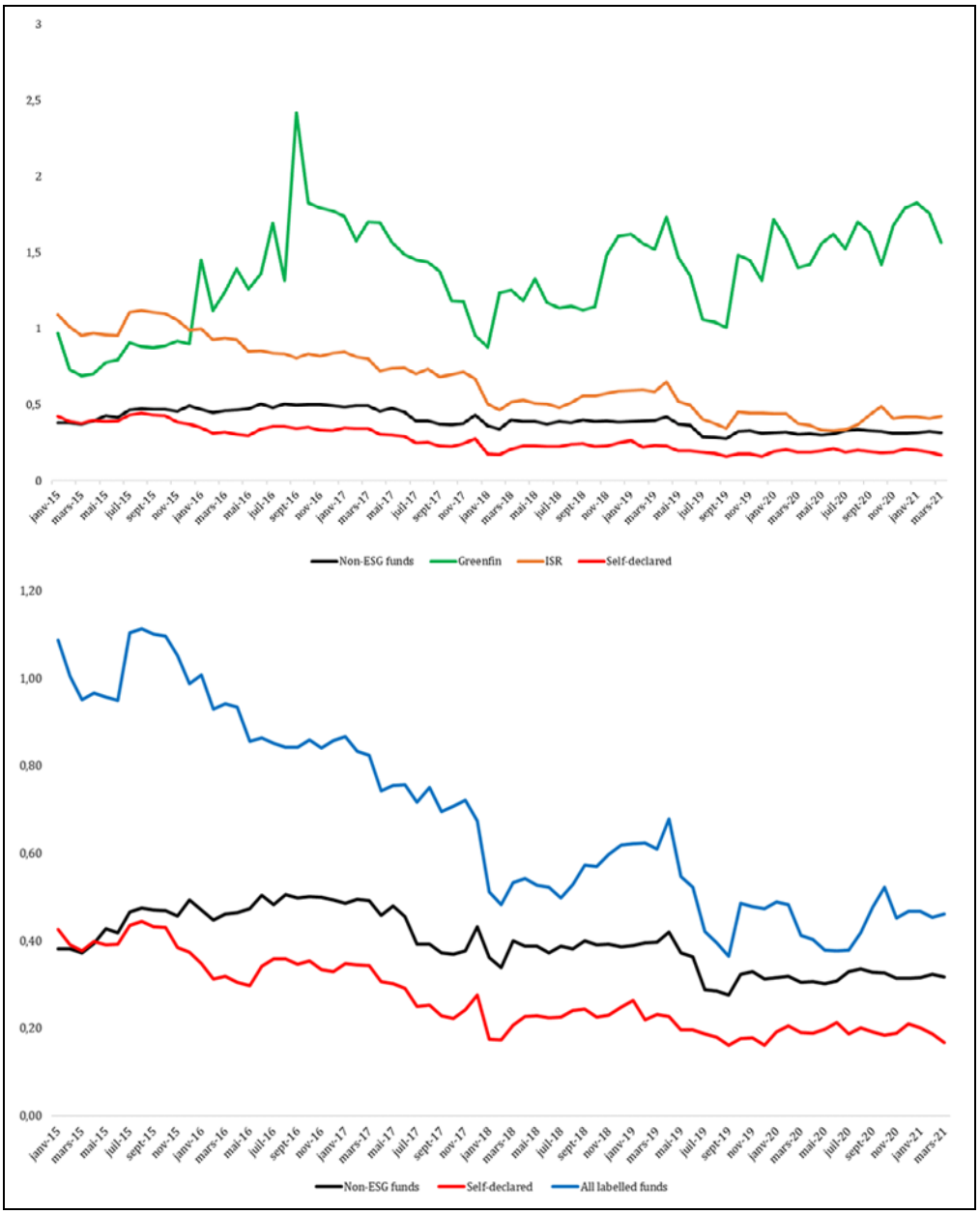
4. Share of securities issued by NACE sectors identified by the European green taxonomy

Given the shortfalls of the carbon footprint score method, we use a proxy to assess not the portfolios' carbon footprint but their "green content". We use the report of European Commission's Technical Expert Group (TEG) on Sustainable Finance to measure the share of securities issued by NACE sectors covered by the green taxonomy (see appendix). The taxonomy is based on a list of economic activities covered by technical screening criteria.

Precisely the TEG report states: "The Taxonomy sets performance thresholds (referred to as 'technical screening criteria') for economic activities which:

- Make a substantive contribution to one of six environmental objectives;
- Do no significant harm (DNSH) to the other five, where relevant;
- Meet minimum safeguards (e.g., OECD Guidelines on Multinational Enterprises and the UN Guiding Principles on Business and Human Rights)." (TEG, 2020).

Fig. 10 – Average share of securities issued by NACE sector covered by the EU taxonomy



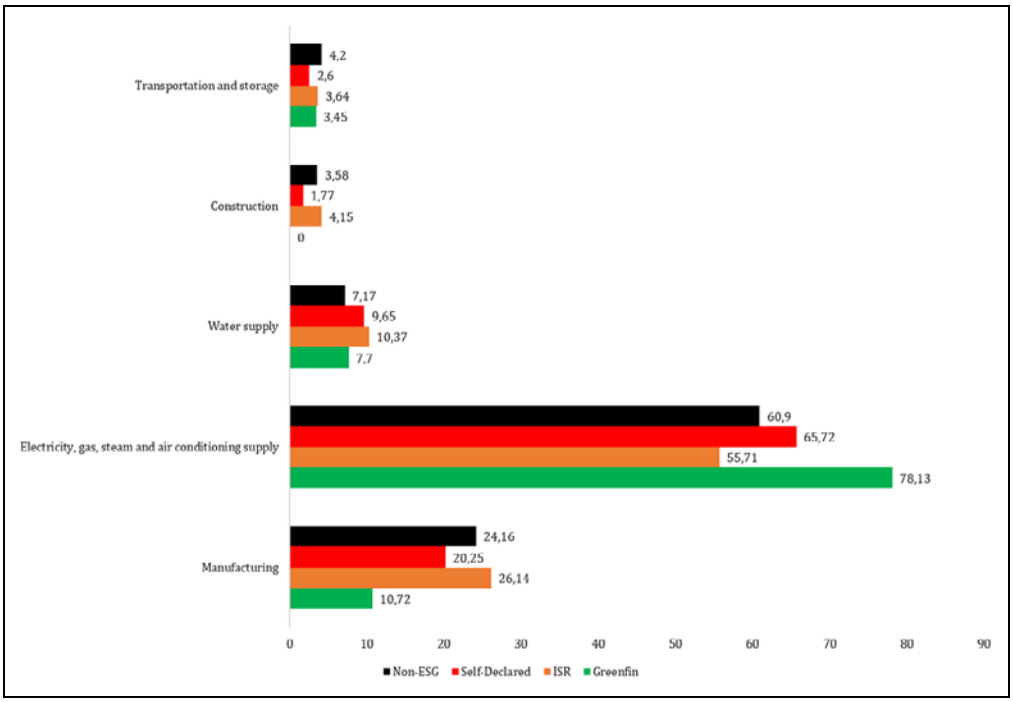
Source: Centralised Securities Database (CSDB), Banque de France, authors' calculations

Even though our results show that labeled funds have a higher share of securities issued by NACE sectors covered by the green taxonomy in their portfolios, these findings cannot be easily interpretable given the low share of securities in the funds' portfolios. Indeed, the figures above show that only *Greenfin* labeled funds exceed a share of 2%.

If we look at the average distribution of NACE sectors covered by the EU taxonomy in funds' portfolios (see figure 11), we notice an over-representation of the sector "Electricity, gas, steam and air conditioning supply", while it represents a small share in the overall portfolios' structures (see figures 7). The case is similar for the

sectors "Transportation and storage", "Construction" and "Water supply". The "Manufacturing" sector represents a larger share in the overall funds portfolios' structure but it represents between a quarter and a fifth of the total share of securities issued by NACE sectors covered by the green taxonomy. In addition, our analysis is based on level-2 NACE sectors, which reduces scope of the titles included in the analysis.

Fig. 11 - Average distribution of NACE sectors covered by the EU taxonomy in portfolios



Source: Centralised Securities Database (CSDB), Banque de France, authors' calculations

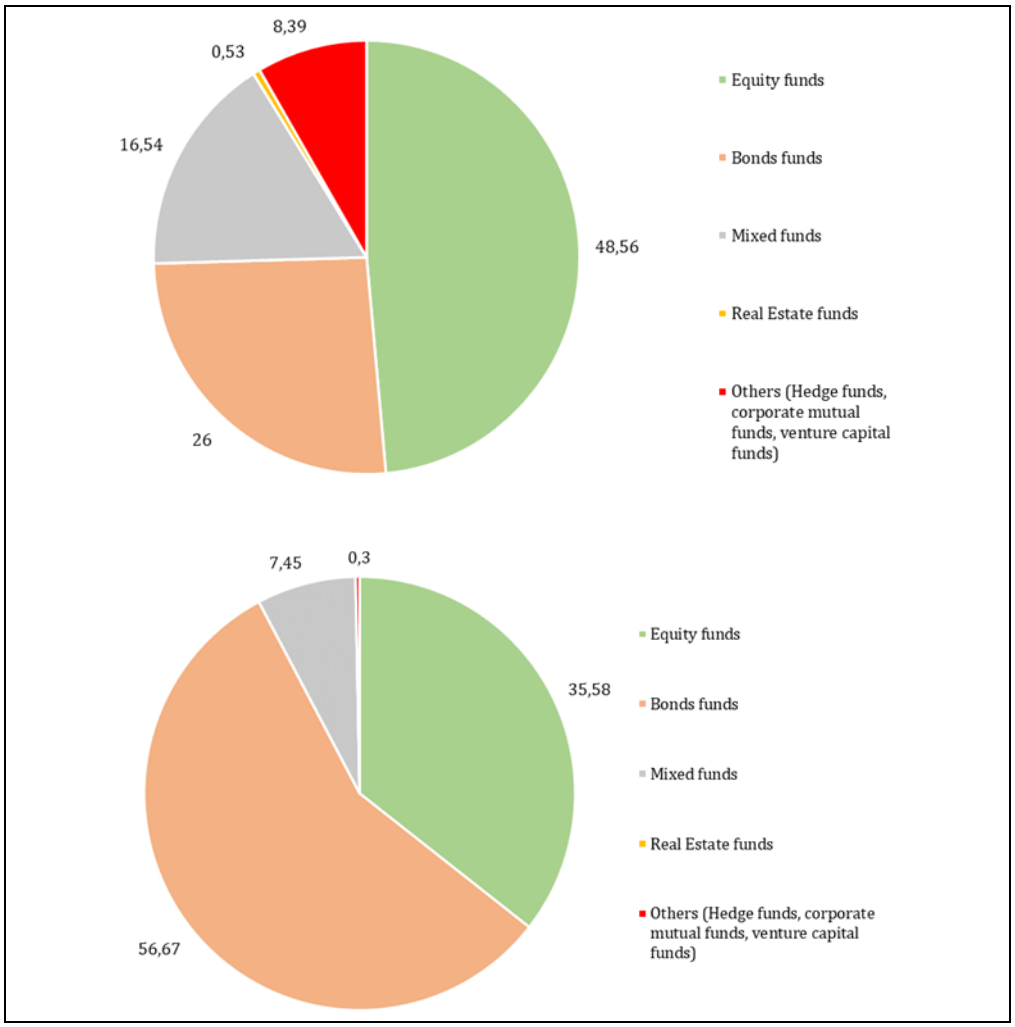
The shortcoming we face when using the list of NACE sectors covered by the EU taxonomy is equivalent to the one we faced in the previous section. The average portfolios' structure makes opaque the end use of financial flows due to the around 35% of the securities are related to the "Financial and assurance activities" sector. To overcome this shortfall it is necessary to look at another proxy that allows to identify the final use of financial flows.

5. Share of Green Bonds in portfolios

Another proxy to assess the "green content" of funds' portfolios, is to look at the share of GB. Let us say right off the bat that this method allows to overcome the shortfalls of the carbon footprint's score because it allows to capture the final destination of the financial flows. However, it creates at the same time a sampling bias, because it excludes from the analysis the equity and real estate's funds (see figures 12).

However, since we are comparing the average share of Green Bonds in fund portfolios, the average includes equity funds. This leads to the reduction of the average in level. On the other hand, the slope of the trend is only determined by bond funds and mixed funds that hold Green Bonds.

Fig. 12 – *ISR* and *Greenfin* funds per category of funds

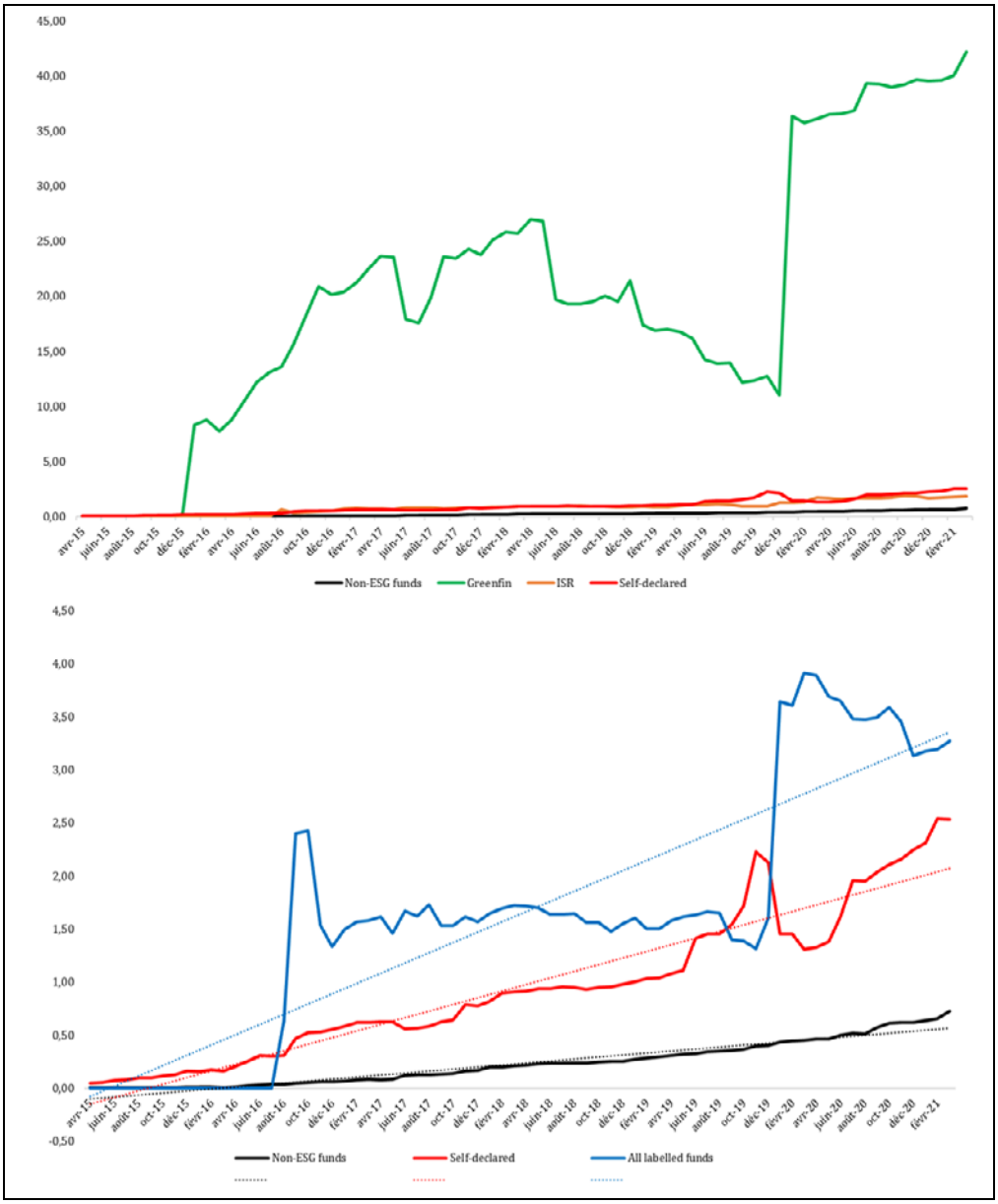


Source: Centralised Securities Database (CSDB), Banque de France, authors' calculations

To get accurate results let us precise that we include the funds in the sample of "labeled funds" only at the date of obtaining the label. Prior to the labelling, the funds not yet labeled are included in the sample "Self-declared".

The figures 13 below exhibit the average share of GB in funds' portfolios per category of funds.

Fig.13 – Average share of Green Bonds in portfolios



Source: Centralised Securities Database (CSDB), Banque de France, authors' calculations

If we aggregate both *Greenfin* and *ISR* funds and compare the average sample to our two other samples, the results suggest that the labeled funds have more, on average, GB in their portfolios than Self-declared funds, and the latter have more GB than the Non-ESG funds. These results also suggest that the trend is steeper for labeled funds than for Self-declared funds and that the trend of the latter is steeper than the Non-ESG funds.

Second, we regress the share of GB of labeled and Self-declared in funds' portfolios on time, on a dummy variable that takes the value of 1 if the fund is labeled and 0 otherwise, and on an interaction term of time and the dummy. Regressing the

share of GB in funds' portfolios on time, implies a deterministic trend which can implicitly capture the growing share of GB in the total outstanding amounts of bonds.

This specification is written below:

$$Share\ of\ GB_{i,t} = \beta_0 + \beta_1 Labelled_i + \beta_2 Time_t + \beta_3 Labelled_i \times Time_t + \varepsilon_{i,t} (3)$$

Where the subscript i corresponds to category of funds (labeled or unlabelled).

Table 1 reports the result of equation (3). This method makes it possible to obtain the expression of two regressions. That of the regression of the GB share of self-declared funds over time $\left(Share\ of\ GB_{i,t} = \beta_0 + \beta_2 Time_t + \varepsilon_{i,t}\right)$ and that of the regression of the GB share of labeled funds over time $\left(Share\ of\ GB_{i,t} = (\beta_0 + \beta_1) Labelled_i + (\beta_2 + \beta_3) Time_t + \varepsilon_{i,t}\right)$. β_3 captures the difference in slope between self-declared and labeled funds. The coefficient is statistically significant at a 1% risk level.

If one agrees that the average share of GB in funds' portfolios is a good proxy to measure the "green content" of the investment strategy, this result suggests that there could be a label effect.

Linear Regression with interaction term

Table 1

Labeled	0.033 (0.152) [1]
Time	0.031*** (0.002)
Labeled x Time	0.017*** (0.004)
Constant	–0.202* (0.108)
Observations	146
R^2	0.807
Adjusted R^2	0.803
Residual Std. Error	0.455 (df = 142)
F Statistic	198.006*** (df = 3; 142)

[1] Values in brackets are the standard errors. signif. codes: 0.01*** 0.05** 0.1*

6. Is there a label effect?

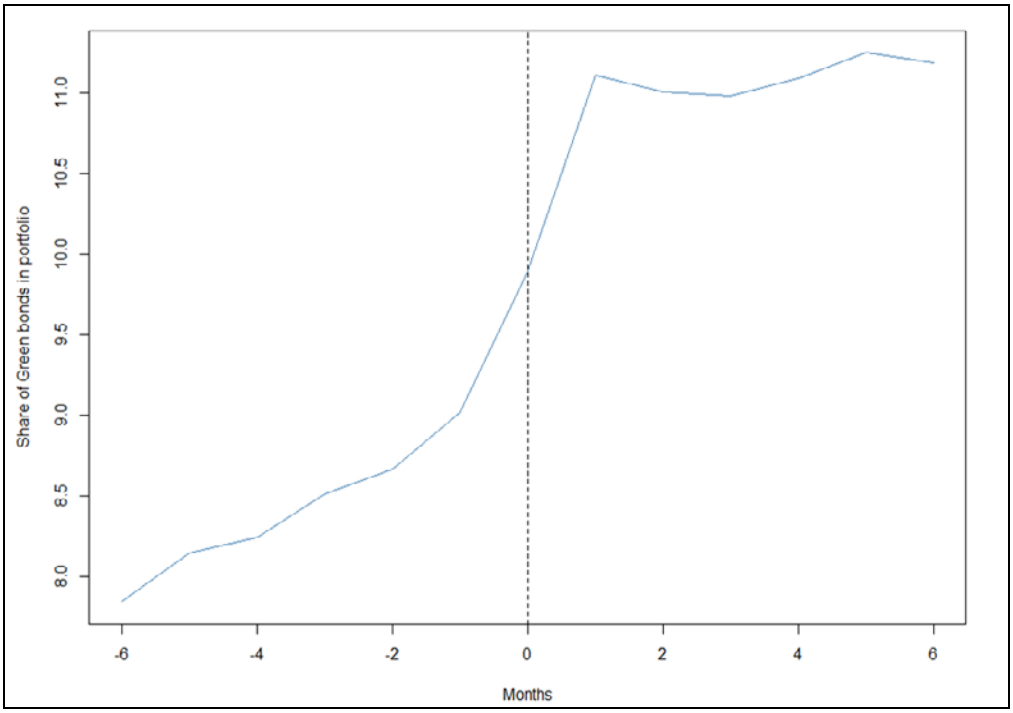
In this section, we measure a potential "label effect". The "label effect" can imply that the labelling can either produce an ex-post modification in funds' investment

behaviour or if conversely labelling acts as a reward (or a signal effect) to an ex-ante green investment policy, or even a combination of these two effects.

To measure this potential effect, we can use an econometric method to assess the impact of an event on a variable of interest. It can be used to measure the dynamic of the variable of interest before and after the event. Ideally, if there are no systematic changes over time except for the event, difference can be interpreted as causal. In our case, we compare the structure of the portfolios in this regard between labeled and non-labeled funds.

Figure 14 below shows the average of the labeled funds up to 6 months before and until 6 months after the labelling.

Fig. 14 – Average share of Green Bonds in portfolios before after the labelling



On a population, the average effect of the event on the variable of interest can be estimated by comparing the change in the mean up to t-periods after and t-periods before the event. Let us denote $Y_{i,2}$ the variable of interest after the event and $Y_{i,1}$ the variable of interest before the event, then the average effect can be estimated as follows:

$$\frac{1}{n}\sum_{i=1}^{n}\left(Y_{i,2} - Y_{i,1}\right) \quad (4)$$

(4) can be estimated via the following regression, it is the equivalent of β:

$$Y_{i,t} = \beta \times Event_t + u_{i,t} \quad (5)$$

The dummy variable $Event_t$ takes the value of 1 after the occurring of the event, and 0 otherwise.

Model (5) is not totally convincing because it implies that the labelling process explain all the variation of the share of GB, but one may suspect that it only tells part of the story. Other unobserved characteristics can also be correlated with the variations of the variable of interest ($Y_{i,t}$), and possibly with the explanatory variable. If the error term is not orthogonal to our explanatory variable[10], the parameters will be biased. Therefore, to get consistent estimators suppose that the error term $u_{i,t}$ includes a component specific to individual characteristics, and a random term specific to the considered observation, so that it can be rewrite as follows:

$$u_{i,t} = \alpha_i + \varepsilon_{i,t} \quad (6)$$

Consequently (5) can rewritten as follows:

$$Y_{i,t} = \beta \times Event_t + \alpha_i + \varepsilon_{i,t} \quad (7)$$

Where α_i capture the unobserved heterogeneity, invariant over time, in other words it captures the unobserved individual characteristics. In our case, it is relevant to include such individual fixed effects.

One might also want to account for unobserved heterogeneity, constant across entities, but varying over time. In other words, it can account for observed differences between treatment and control periods. To do so time fixed effects should be included in (7), so that it should be rewritten as follows:

$$Y_{i,t} = \beta \times Event_t + \alpha_i + \delta_t + \varepsilon_{i,t} \quad (8)$$

Hence, model (8) allows to eliminate biases from unobservable variables that vary over time but are invariant across funds, it also eliminate biases for unobservable variables that vary across funds but are invariant over time.

The specification (7) and (8) are estimated in the table below. The coefficient β indicates by how much the share of GB changes over time, on average, once the funds have been labeled. The average effect of the event is statistically significant: the change in the mean after and before the event is of 2.5 pp with the specification with individual fixed effects and of 3.3 pp with the specification with individual and time fixed effects.

The results suggest that there is a label effect. They show that during the 6 months after the labelling there is on average more GB in newly labeled funds' portfolios than 6 months before their labelling. A quick look at the figure 12 shows that before the labelling, the share of GB in funds' portfolios is steadily growing, but the trend becomes less steep once the funds is labeled. One might interpret the label effect as follows: the labelling requires the funds to cope with constraints that imply to follow a certain investment policy. That change occurs, on average, around the labelling process and seems to remains stable after the labelling.

[10] $Cov(After_t, u_{i,t}) \neq 0$

Panel Data Regression

Table 2

	Individual fixed effects	Individual and time fixed effects
Event	2.526*** (0.305)[1]	3.344*** (0.778)
Observations	1,014	1,014
R^2	0.959	0.959
Adjusted R^2	0.956	0.955
Residual Std. Error	4.849 (df = 937)	4.859 (df = 926)
F Statistic	284.292*** (df = 77; 937)	247.819*** (df = 88; 926)

[1] Values in brackets are the standard errors. signif. codes: 0.01*** 0.05** 0.1*

Concluding remarks

In this paper, we took a brief overview of the French mutual funds market, based on data from the two main French public labels for investment funds (*Greenfin* and *ISR*). After a presentation of indicators for monitoring this market (subscription rate, performance rate), we tried to estimate the carbon footprint, using only official statistics, of the labeled funds compared to two other category of funds (ESG self-declared and non-ESG) and we provided a comparative analysis of their portfolio structures. We conclude that the use of the carbon score at the NACE sectors level is not a satisfactory indicator, to get accurate estimates of the carbon content of the mutual funds' portfolios.

To get robust results, micro data at the entity level should have been used. Unfortunately, these type of data are not available, particularly at the level of GHG emissions at least for public-listed companies, but also the average level of GHG emissions per economic sector.

Because of the shortcomings of the score method, we then assessed the "green" orientation of the funds by using a proxy: the share economic activities covered by the technical screening criteria of the European green taxonomy. This method also revealed its limit given the average structure of funds' portfolios that makes opaque the end use of financial flows due to the around 35% of the securities are related to the "Financial and assurance activities" sector.

Finally, to overcome this shortfall we look at another proxy that allows to identify the final use of financial flows: the share of green bonds in funds' portfolios. It allows to measures a statistically significant "greener" orientation of labeled funds. Thanks to that this proxy, we are able to estimate a "label effect". Indeed, our findings show that, all things being equal, during the 6 months after the labelling there is on average more GB in newly labeled funds' portfolios than 6 months before their labelling,

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Appendix

1 List of words used to identify "Self-declared" funds

Theme	**Words**
SRI/ESG	- ISR - SRI - ESG
Sustainability	- Durable / Durables - Sustainable / Sustainability - SDG (« Sustainable Development Goals ») - Responsable - Responsible / Responsibility
Energy	- New energy - Alternative energy - Energy evolution - Energies renouvelables - Energy solution / solutions - Nouvelles énergies - Energy innovators

	- Energy transition - Smart energy - Clean energy - Carbon - Active solar
Water	- Sustainable water - Sustainable global water - Eco fund water - Eco CSOB water - Or bleu
Planet	- Planète - Planet
Environment	- Environnement - Environment / Environmental - Green - Renewable - Transition - Climat / Climatique - Climate - Terreneuve - Ecotrends - Ecology - Clean economy - Clean world - Eco solutions - Impact - Circular economy - Positive economy
Social	- Social - Faim - Fonds de partage - Investissement et partage - Partage sos - Solidaire / Solidaires / Solidarité - Solidarity - Humain - Human - Emploi - Happy - Shared Growth - Ethique / Ethiques - Ethical - Gender equality - Insertion - Engagement - Women empowerment

	- Valeurs féminines - Women leaders - Well-being - Gender diversity

2 Absolute carbon intensity score per level-1 NACE sectors

NACE sector	Score
Accommodation and food service activities	0,00
Activities of extraterritorial organizations and bodies	0,05
Activities of households as employers	0,00
Administrative and support service activities	0,03
Agriculture, forestry and fishing	1,87
Arts entertainment and recreation	0,05
Construction	0,08
Education	0,02
Electricity, gas, steam and air conditioning supply	4,41
Financial and insurance activities	0,01
Human health and social work activities	0,03
Information and communication	0,01
Manufacturing	0,34
Mining and quarrying	0,99
Other service activities	0,05
Professional, scientific and technical activities	0,02
Public administration and defence	0,03
Real estate activities	0,00
Transportation and storage	0,65
Water supply	1,28
Wholesale and retail trade	0,06

3 EU TEG Green Taxonomy

NACE Macro-Sector	Activity	Level 2	Level 3	Level 4
A - Agriculture, forestry and fishing	Afforestation	A2		
A - Agriculture, forestry and fishing	Conservation forest	A2		
A - Agriculture, forestry and fishing	Existing forest management	A2		
A - Agriculture, forestry and fishing	Growing of non-perennial crops	A1	A1.1	
A - Agriculture, forestry and fishing	Growing of perennial crops	A1	A1.2	
A - Agriculture, forestry and fishing	Livestock production	A2	A1.4	

A - Agriculture, forestry and fishing	Reforestation	A2		
A - Agriculture, forestry and fishing	Rehabilitation, Reforestation	A2		
C - Manufacturing	Manufacture of Aluminum	C24	C24.4	C24.4.2
C - Manufacturing	Manufacture of Cement	C23	C23.5	C23.5.1
C - Manufacturing	Manufacture of fertilizers and nitrogen compounds	C20	C20.1	C20.1.5
C - Manufacturing	Manufacture of Hydrogen	C20	C20.1	C20.1.1
C - Manufacturing	Manufacture of Iron and Steel	C24	C24.1 C24.2 C24.3 C24.5	C24.5.1 C24.5.2
C - Manufacturing	Manufacture of low carbon technologies			
C - Manufacturing	Manufacture of other inorganic basic chemicals - Manufacture of carbon black	C20	C20.1	C20.1.3
C - Manufacturing	Manufacture of other inorganic basic chemicals - Manufacture of chlorine	C22	C20.3	C20.1.5
C - Manufacturing	Manufacture of other inorganic basic chemicals - Manufacture of disodium carbonate (soda ash)	C21	C20.2	C20.1.4
C - Manufacturing	Manufacture of other organic basic chemicals	C20	C20.1	C20.1.4
C - Manufacturing	Manufacture of plastics in primary form	C21	C20.1	C20.1.6
D - Electricity, gas, steam and air conditioning supply	Cogeneration of Heat/Cool and Power from Bioenergy (Biomass, Biogas, Biofuels)	D35	D35.1 D35.3	D35.1.1 D35.3.0
D - Electricity, gas, steam and air conditioning supply	Cogeneration of Heat/cool and Power from Concentrated Solar Power	D35	D35.1 D35.3	D35.1.1 D35.3.0
D - Electricity, gas, steam and air conditioning supply	Cogeneration of Heat/Cool and Power from Gas (not exclusive to natural gas)	D35	D35.1 D35.3	D35.1.1 D35.1
D - Electricity, gas, steam and air conditioning supply	Cogeneration of Heat/Cool and Power from Geothermal Energy	D35	D35.1 D35.3	D35.1.1 D35.1
D - Electricity, gas, steam and air conditioning supply	District Heating/Cooling Distribution	D35	D35.3	D35.3.0
D - Electricity, gas, steam and air conditioning supply	Installation and operation of Electric Heat Pumps	D35	D35.3	D35.3.0
D - Electricity, gas, steam and air conditioning supply	Manufacture of Biogas or Biofuels	D35	D35.2	D35.2.1
D - Electricity, gas, steam and air conditioning supply	Production of Electricity from Bioenergy (Biomass, Biogas and Biofuels)	D35	D35.1	D35.1.1
D - Electricity, gas, steam and air conditioning supply	Production of Electricity from Concentrated Solar Power	D35	D35.1	D35.1.1
D - Electricity, gas, steam and air conditioning supply	Production of Electricity from Gas (not exclusive to natural gas)	D35	D35.1	D35.1.1

D - Electricity, gas, steam and air conditioning supply	Production of Electricity from Geothermal	D35	D35.1	D35.1.1
D - Electricity, gas, steam and air conditioning supply	Production of Electricity from Hydropower	D35	D35.1	D35.1.1
D - Electricity, gas, steam and air conditioning supply	Production of Electricity from Ocean Energy	D35	D35.1	D35.1.1
D - Electricity, gas, steam and air conditioning supply	Production of Electricity from Solar PV	D35	D35.1	D35.1.1
D - Electricity, gas, steam and air conditioning supply	Production of Electricity from Wind Power	D35	D35.1	D35.1.1
D - Electricity, gas, steam and air conditioning supply	Production of Heat/cool from Bioenergy (Biomass, Biogas, Biofuels)	D35	D35.3	D35.3.0
D - Electricity, gas, steam and air conditioning supply	Production of Heat/cool from Concentrated Solar Power	D35	D35.3	D35.3.0
D - Electricity, gas, steam and air conditioning supply	Production of Heat/Cool from Gas (not exclusive to natural gas)	D35	D35.3	D35.3.0
D - Electricity, gas, steam and air conditioning supply	Production of Heat/cool from Geothermal	D35	D35.3	D35.3.0
D - Electricity, gas, steam and air conditioning supply	Production of Heat/cool using Waste Heat	D35	D35.3	D35.3.0
D - Electricity, Gas, Steam and Air Conditioning Supply	Storage of Electricity			
D - Electricity, Gas, Steam and Air Conditioning Supply	Storage of Hydrogen			
D - Electricity, Gas, Steam and Air Conditioning Supply	Storage of Thermal Energy			
D - Electricity, gas, steam and air conditioning supply	Transmission and Distribution of Electricity	D35	D35.1	D35.1.2 D35.1.3
D - Electricity, gas, steam and air conditioning supply H - Transporting and storage	Retrofit of Gas Transmission and Distribution Networks	D35 H49	D35.2 H49.5	D35.2.1 H49.5.0
E - Water Supply; sewerage, waste management and remediation activities	Anaerobic digestion of bio-waste	E38	E38.2	E38.2.1
E - Water Supply; sewerage, waste management and remediation activities	Anaerobic digestion of sewage sludge	E37	E37.0	E37.0.0

E - Water Supply; sewerage, waste management and remediation activities	Capture of anthropogenic emissions	E39	E39.0	E39.0.0
E - Water Supply; sewerage, waste management and remediation activities	Centralized wastewater treatment	E37	E37.0	E37.0.0
E - Water Supply; sewerage, waste management and remediation activities	Composting of bio-waste	E38	E38.2	E38.2.1
E - Water Supply; sewerage, waste management and remediation activities	Direct Air Capture of CO2	E39	E39.0	E39.0.0
E - Water Supply; sewerage, waste management and remediation activities	Landfill gas capture and utilization	E39	E39.0	E39.0.0
E - Water Supply; sewerage, waste management and remediation activities	Material recovery from non-hazardous waste	E38	E38.3	E38.3.2
E - Water Supply; sewerage, waste management and remediation activities	Permanent Sequestration of captured CO2	E39	E39.0	E39.0.0
E - Water Supply; sewerage, waste management and remediation activities	Separate collection and transport of non-hazardous waste in source segregated fractions	E38	E38.1	E38.1.1
E - Water Supply; sewerage, waste management and remediation activities	Transport of CO2	E39	E39.0	E39.0.0
E - Water Supply; sewerage, waste management and remediation activities	Water collection, treatment and supply	E36	E36.0	E36.0.0
F - Construction	Building renovation	F41 F43	F41.1 F41.2	
F - Construction	Construction of new buildings	F41 F43	F41.1 F41.2	
F - Construction	Infrastructure for low carbon transport (land transport)	F42	F42.1	F42.1.1 F42.1.2 F42.1.3
F - Construction	Infrastructure for low carbon transport (water transport)	F42	F42.9	F42.9.1
F - Construction M - Professional, scientific and technical activities	Individual renovation measures, installation of renewables on-site and professional, scientific and technical activities	F41 F43	F41.2	
H - Transporting and storage	Freight Rail Transport	H49	H49.2	H49.2.0

H - Transporting and storage	Freight transport services by road	H49	H49.4	H49.4.1
H - Transporting and storage	Inland freight water transport	H50	H50.4	H50.4.0
H - Transporting and storage	Inland passenger water transport	H50	H50.3	H50.3.0
H - Transporting and storage	Interurban scheduled road transport	H49	H49.3	H49.3.9
H - Transporting and storage	Passenger cars and commercial vehicles	Not defined		
H - Transporting and storage	Passenger Rail Transport (Interurban)	H49	H49.1	H49.1.0
H - Transporting and storage	Public transport	H49	H49.3	H49.3.1
J - Information and communication	Data processing, hosting and related activities	J63	J63.1	J63.1.1
J - Information and communication	Data-driven climate change monitoring solutions	J61 J62 J63	J63.1	J63.1.1
L - Real estate activities	Acquisition and ownership of buildings	L68		

Measuring the development of French labeled funds and their contribution to the sustainable financing of the economy

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Motivation

- Are labeled funds more "environmentally-friendly" than non-labeled funds ?
- In France, two labels created in 2015: the *Investissement Socialement Responsable (ISR)* (best in class approach), and *Greenfin* (opt-out approach).
- In March 2021, the assets under management of the french labeled funds was about 399 billions euros

Overview

Data

Internal Banque de France database covering the balance sheets of all UCITS licensed and registered in France.

ESCB securities-by-securities database: the Centralized Securities Database (CSDB).

Three samples corresponding to different types of funds.

- The first one corresponds to the labeled funds.
- The second sample relates to unlabeled mutual funds using in their names a word related to the sustainability lexical field.
- The last sample corresponds to all the other funds, unlabeled and without any word related to the sustainability lexical field in their names

Portfolios' carbon footprint score

Carbon intensity score by portfolios at each period:

$$Portfolio\ score_{i,t} = score_i \times \frac{security_{i,t}}{total\ net\ assets_{i,t}} \tag{1}$$

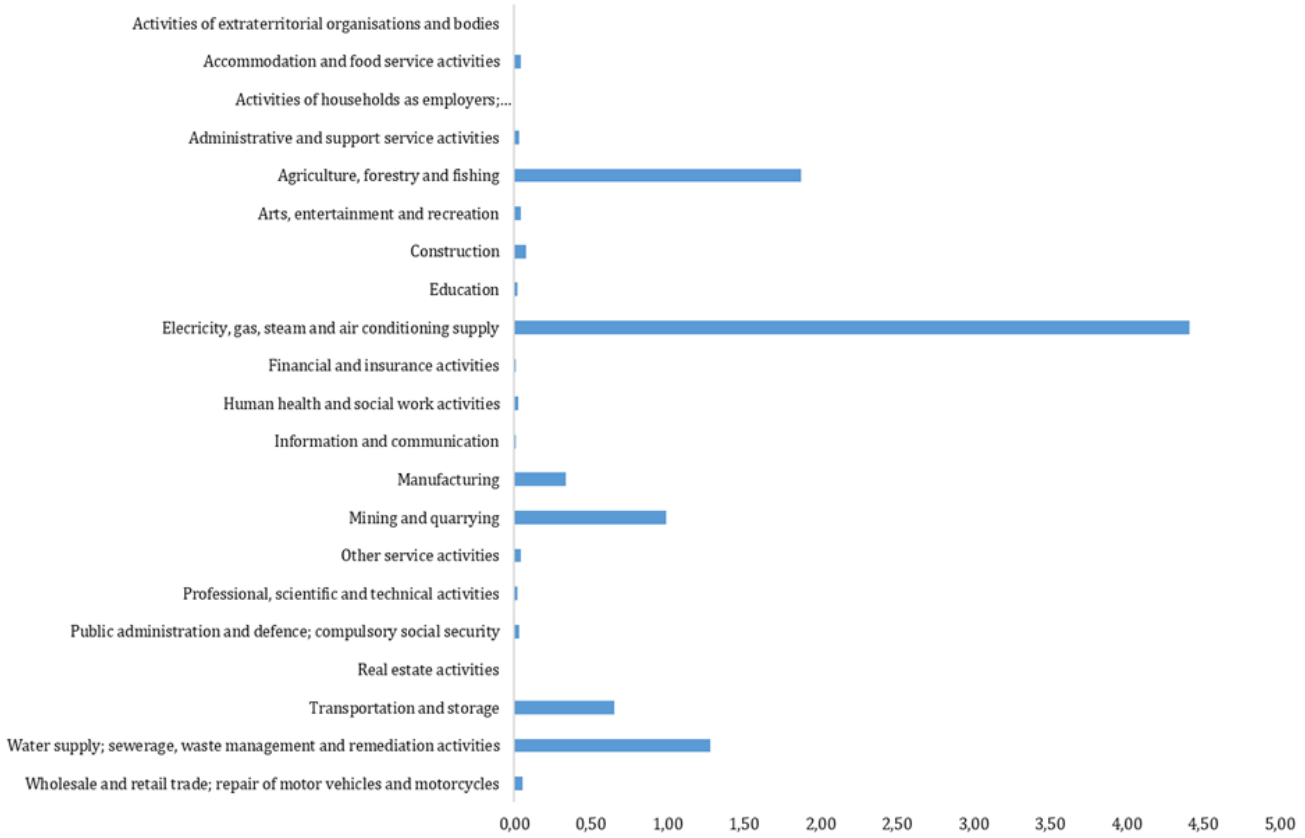
To construct an absolute score of carbon intensity by level-1 NACE sector.

- GHG emissions – expressed in CO_2 equivalent – by level-1 NACE sectors within the EU-28 from 2008 to 2019.
- Second, gross value added (in volume) per level-1 NACE sectors for the EU-28.
- Carbon intensity metrics by economic sector: expresses the average amount of CO_2-eq needed to produce a unit of value added.

$$Score_i = \frac{\left(\sum_{t=2008}^{2019} \frac{CO_2eq_{i,t}}{(\sum_{i=1}^{n} CO_2eq_{i,t})}\right)}{\left(\sum_{t=2008}^{2019} \frac{VA_{i,t}}{(\sum_{i=1}^{n} VA_{i,t})}\right)} \times 10 \tag{2}$$

Portfolios' carbon footprint score

Thanks to this method, we obtain an ordinal scale of level-1 NACE sectors according to their carbon intensity.



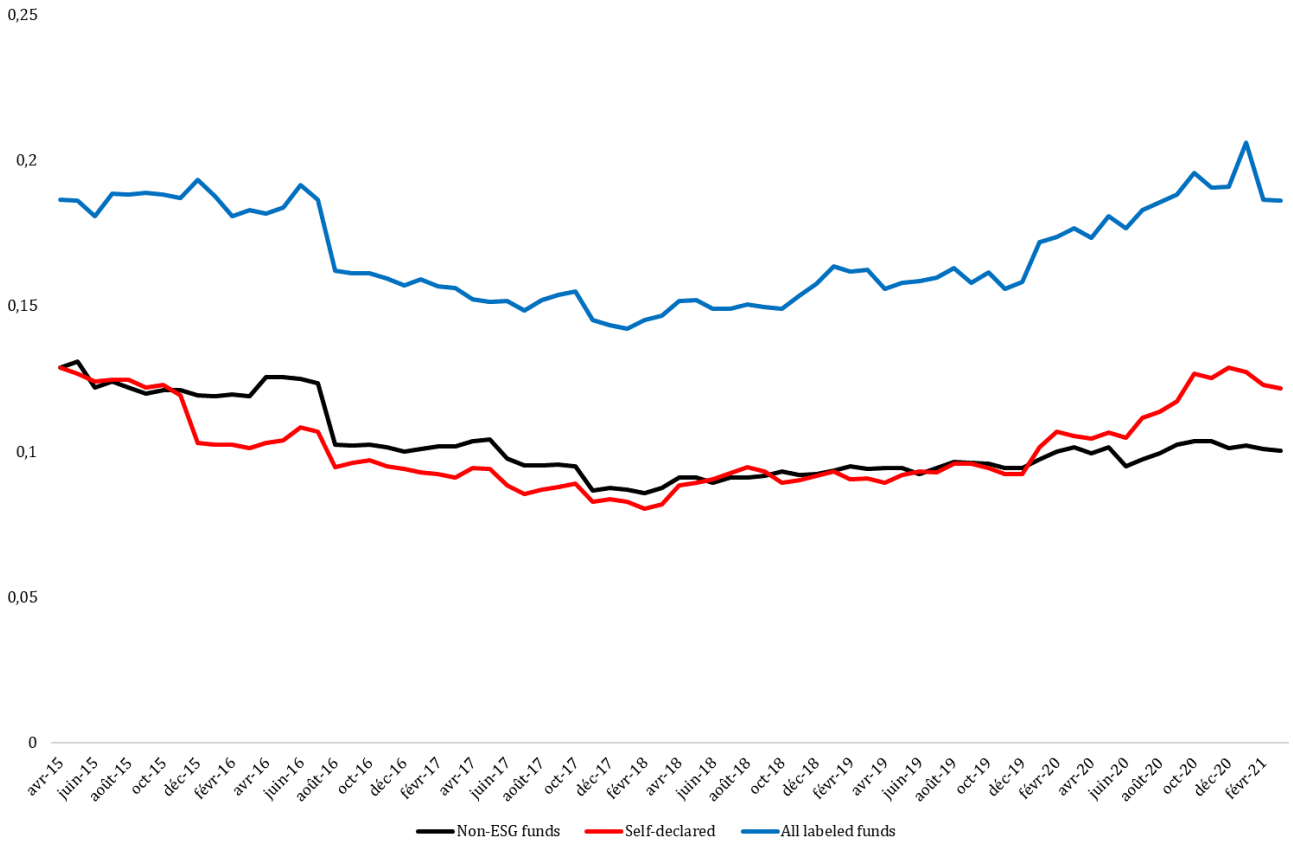
Green content of portfolios

To assess the green content of funds portfolios we use two different proxies:

- First, we use the share of securities issued by NACE sectors covered by the green taxonomy.
- Another proxy to assess the green content of portfolios, is to look at the share of GB. This method captures the final destination of the financial flows. However, it creates at the same time a sampling bias.

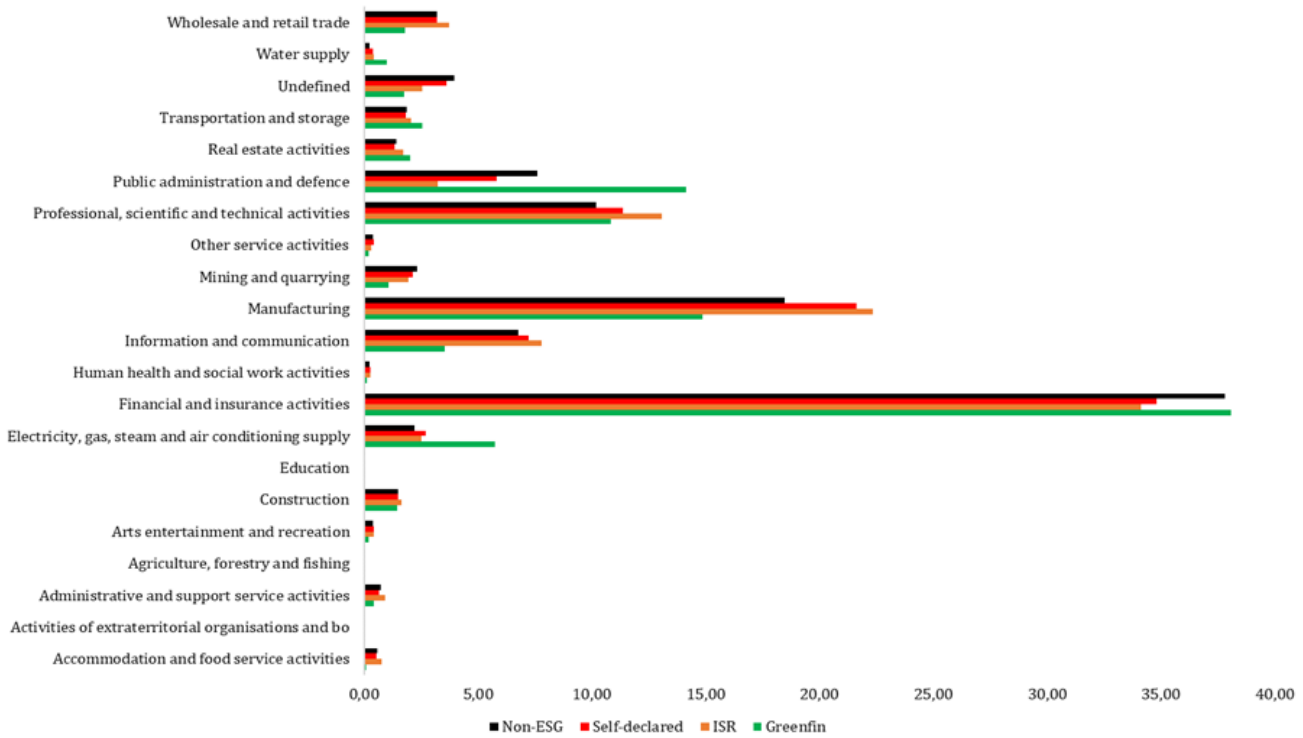
Portfolios' carbon footprint score

Labeled funds have, on average, a higher carbon footprint than the two other samples.



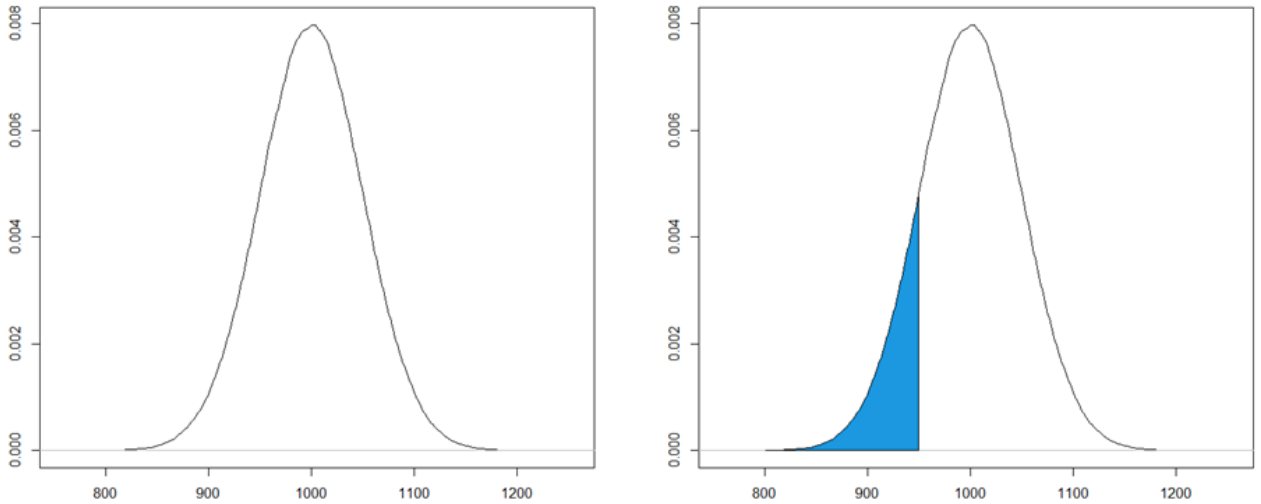
Portfolios' structure

The average portfolios structure per categories of funds explain partly the counter-intuitive results.



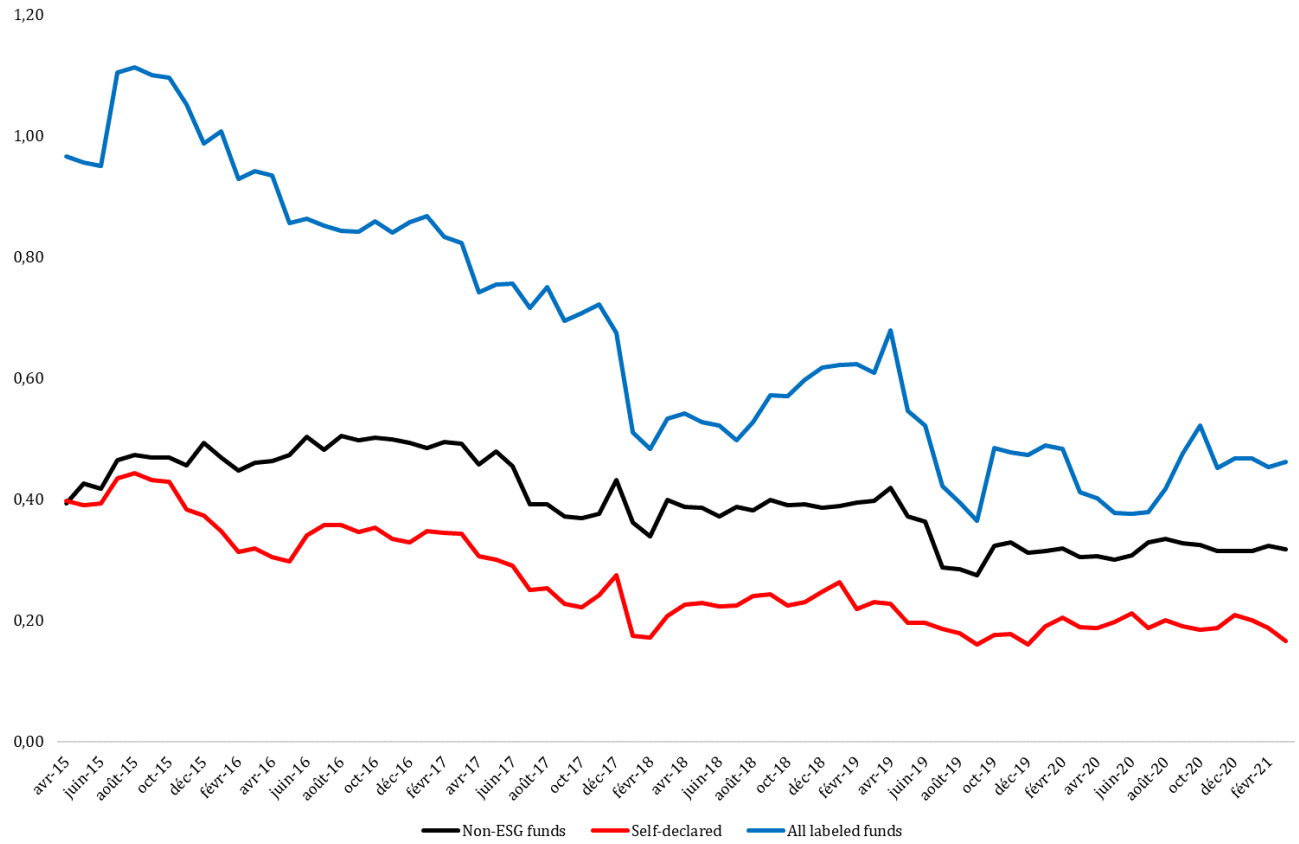
The shortcomings of the carbon footprint score

The counter-intuitive results also arise from an intrinsic bias of our method, specifically the lack of granularity of the NACE sectors does not allow taking into account the opt-out or best in class or best in universe approaches of the labeled funds.



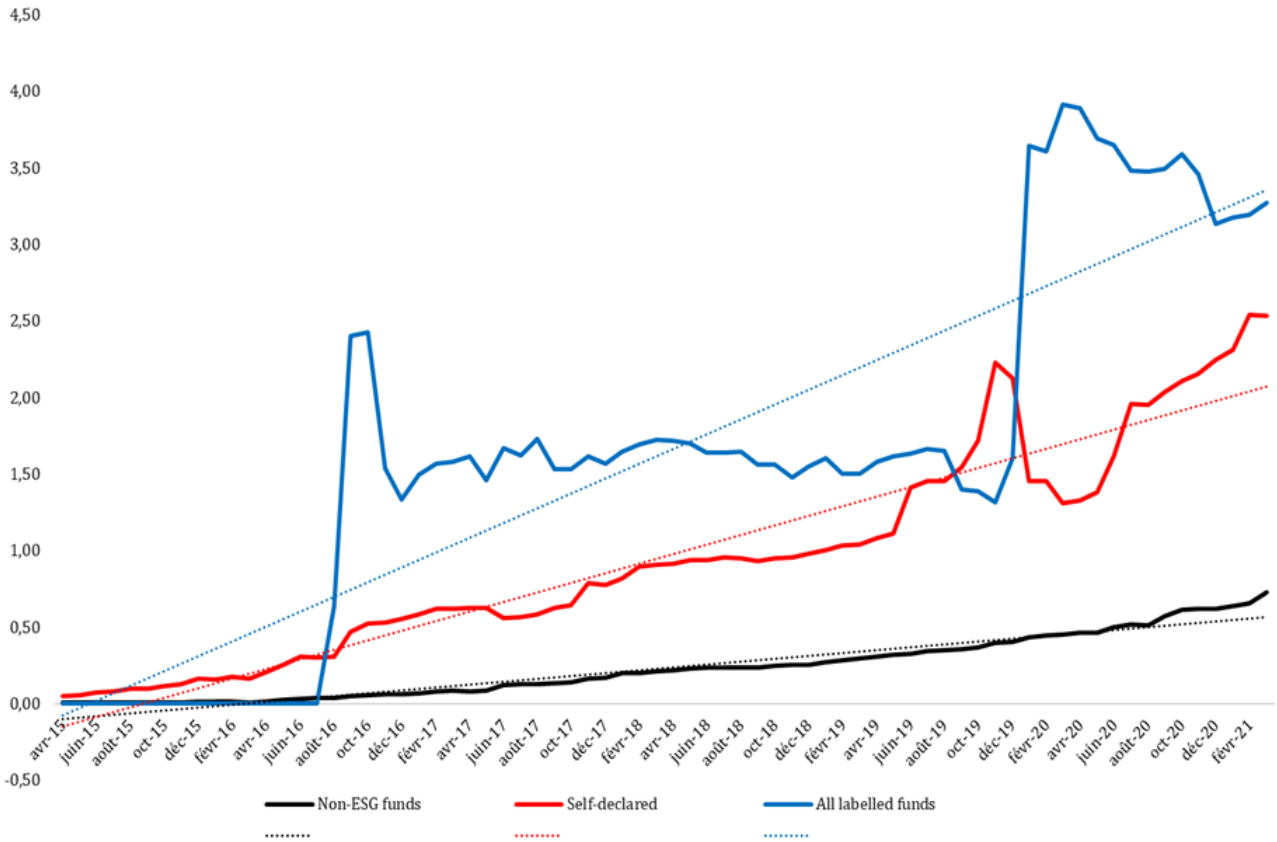
Share of securities by sectors covered by the EU taxonomy

Labeled funds have a higher share in the their portfolios of securities issued by sectors covered by the taxonomy; difficult to interpret given the low share of securities in portfolios.



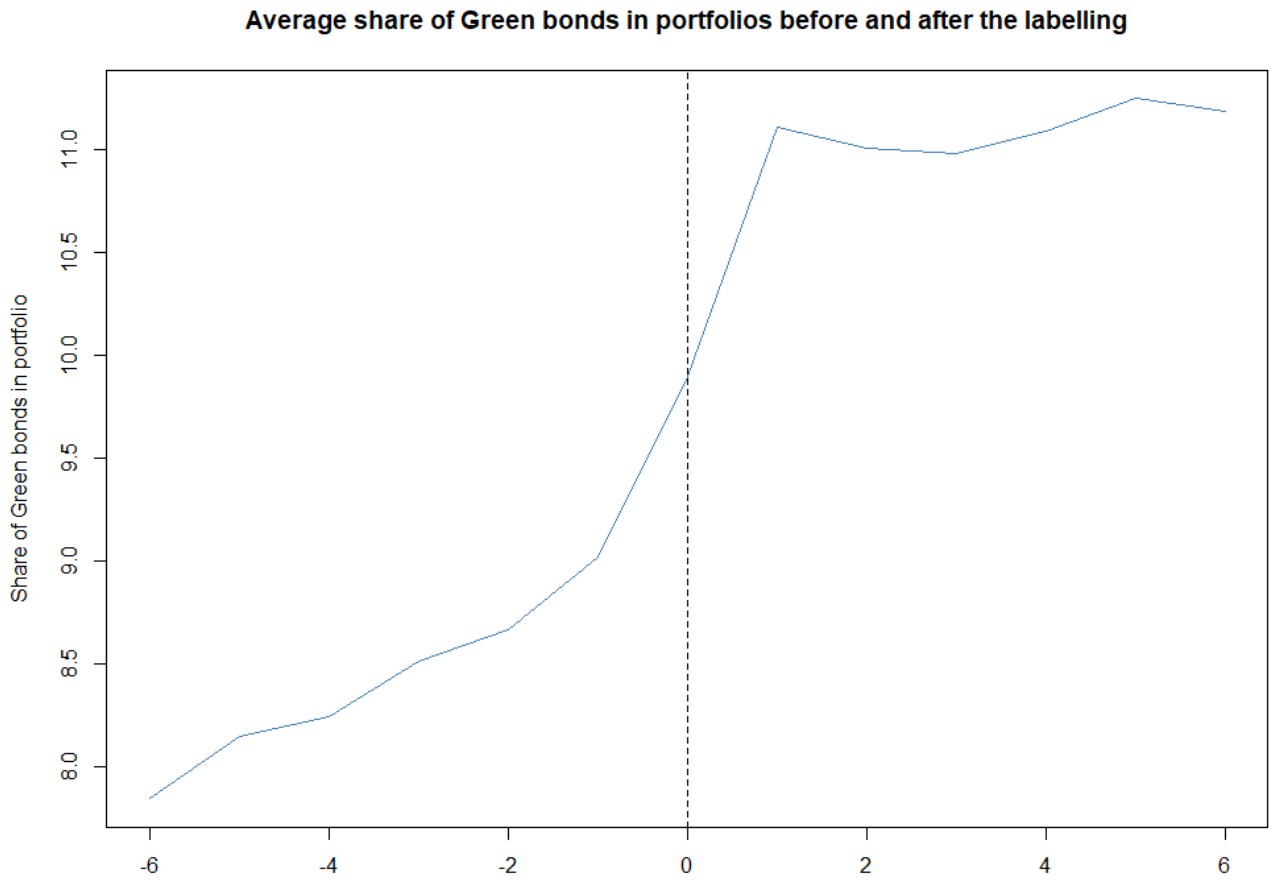
Share of Green Bonds in portfolios

Labeled funds have more, on average, GB in their portfolios than self-declared funds, and the latter have more GB than the Non-ESG funds. The trend is steeper for labeled funds than for self-declared funds and the trend of the latter is steeper than the Non-ESG funds.



Is there a label effect?

Up to 6 months before the labeling the share of GB in funds' portfolios is steadily growing, but the trend becomes less steep once the funds is labeled. There is on average more GB in newly labeled funds portfolios than before the labeling.



Is there a label effect?

We estimate the specifications (3) and (4). The coefficient β indicates by how much the share of GB changes, on average, once the funds have been labeled.

$$Y_{i,t} = \beta \times Event_{i,t} + \alpha_i + \varepsilon_t \tag{3}$$

$$Y_{i,t} = \beta \times Event_{i,t} + \alpha_i + \delta_t + \varepsilon_t \tag{4}$$

Table 2: Panel Data Regression

	Individual fixed effects	Individual and time fixed effects
Event	2.526***	3.344***
	(0.305)	(0.778)
Observations	1,014	1,014
R^2	0.959	0.959
Adjusted R^2	0.956	0.955
Residual Std. Error	4.849 (df = 937)	4.859 (df = 926)
F Statistic	284.292*** (df = 77; 937)	247.819*** (df = 88; 926)

Notes: Values in brackets are the standard errors. signif. codes: 0.01 *** 0.05 **0.1 *.

Concluding remarks

- The findings of this paper on French mutual funds suggest that level-1 NACE appears to be too broad a level of analysis to be used to precisely assess the carbon footprint of mutual funds' portfolios.
- Our work highlights the needs for granular data at the entity-level to precisely estimate not only the carbon footprint of financial institutions, but also the effectiveness of public policies contributing to climate change mitigation.
- Meanwhile, our work suggest that using granular data at the securities level allows to overcome some aforementioned shortcomings. In our opinion, looking at the GB share in portfolios is a good proxy to assess the green content of an investment strategy.

Thank you for your attention