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Research Initiative Sustainable Finance & Responsible Investment

How can finance serve the environmental transition?

With Milo Bianchi, Patricia Crifo, Olivier Gossner, Sébastien Pouget, Nicolas Treich

Institut Louis Bachelier

Toulouse School of Economics

AFG

École Polytechnique

Institut Polytechnique de Paris

Editorial

The FDIR Research Initiative brings together researchers and practitioners to advance and disseminate knowledge in sustainable finance. Its remarkable longevity is due to the loyal commitment of its partners and the quality and variety of the scientific teams involved.

Every three years, FDIR members, assisted by a Scientific Orientation Committee, define priority projects with the aim of addressing the concerns of the financial industry while meeting academic research standards. This booklet summarizes the work carried out during the period 2022-2025.

To understand how finance can contribute to the sustainable development of our economies, we need to look at the triptych of individuals/financial industry/companies.

Firstly, what motivates individuals to invest in responsible companies? Milo Bianchi studies the influence of life experiences on individual investment decisions.

Secondly, how can the financial management industry be organized to promote socially responsible investment? Olivier Gossner looks at the impact of management fees on the industry's ability to support long-term investment. Patricia Crifo analyzes the role of SRI labels in alerting investors to companies' actions.

Finally, what tools are available to sustain responsible companies' actions? Sébastien Pouget assesses the impact of green patents on companies' financial and environmental performance. Patricia Crifo looks at the links between wage policy and CSR. Nicolas Treich, whose interview opens this issue, discusses the specific difficulties involved in defining a strategy to protect biodiversity.

Enjoy your reading!

Catherine Casamatta

Professor of Finance at Toulouse School of Economics (TSE)
and Toulouse School of Management (TSM), Université Toulouse Capitole.

FDIR Research Initiative

Created in 2007, the Sustainable Finance and Responsible Investment (FDIR*) Research Initiative aims to develop new valuation models that take into account the long-term environmental and social consequences of corporate behavior.

3 main research themes:

- Long-term ESG performance and risk assessment
- Corporate governance
- Shareholder engagement

Co-directed by:

Patricia Crifo for Ecole Polytechnique, Catherine Casamatta and Sébastien Pouget for Toulouse School of Economics (TSE).

4 institutional partners:

Two leading academic institutions, Toulouse School of Economics (TSE) and Ecole Polytechnique, jointly lead this Research Initiative, which mobilizes researchers affiliated to both institutions. The Research Initiative benefits from the support of the Association Française de la Gestion Financière (AFG) and the Institut Louis Bachelier (ILB).

9 sponsors:

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*FDIR: French acronym for 'Finance Durable et Investissement Responsable'

Scientific contributions

Is food the main sector responsible for global biodiversity loss?

Since 1994, Conferences of the Parties (COPs) to the Convention on Biological Diversity have been held every two years. The last one took place in November 2024 in Cali, Colombia. Yet biodiversity has long remained a neglected political, economic and environmental issue. The subject is particularly complex to grasp, as it lies at the crossroads of multiple disciplines such as biology, ecology and economics. Today, the preservation of living species and their ecosystems is beginning to take center stage in public debate, although it often takes a back seat to the issue of climate change. To better understand the concept of biodiversity, Nicolas Treich shares his expertise on this essential issue for the future of our planet.

ILB: ***Why is preserving biodiversity important?***

Nicolas Treich: In fact, we could talk more generally about preserving nature. Nature is obviously the basis of everything: it provides us with a multitude of essential services, often referred to as ecosystem services. It provides us with food, wood and medicines, purifies air and water, pollinates crops and plays a crucial role in carbon storage.

What is the link between biodiversity and climate change?

NT: The links between biodiversity and climate change are close and complex. On the one hand, climate change strongly affects biodiversity, modifying natural habitats, disrupting ecosystems and increasing pressure on many species. On the other hand, appropriate management of nature can mitigate the impacts of climate change, thanks in particular to the role of ecosystems in storing carbon and regulating natural cycles.

The parallels between these two threats are striking. Both are global challenges, and dedicated institutions such as the IPCC (Intergovernmental Panel on Climate Change) and IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) have been created to address them. In economics, the 2006 Stern Review (for climate) and the 2021 Dasgupta Review (for biodiversity) have also helped to raise awareness of the issues and propose solutions.

However, a major difference lies in the nature of the biodiversity problem, which is both global and very local. Unlike climate change, for which there is a universal measure - greenhouse gas emissions - there is no single, standardized metric for quantifying our impacts on biodiversity, making solutions more complex to design and implement.

Don't we know how to measure biodiversity loss?

NT: The problem lies less in the absence of measures than in their proliferation: there are, in fact, over a hundred indicators, and the scientific literature has yet to converge on a consensus.

These measures can be grouped into four main categories:

1. **Conservation measures:** these define a level of species conservation, such as the Red List of Threatened Species drawn up by the IUCN (International Union for Conservation of Nature).

2. **Measures of population dynamics:** these assess changes in animal or plant populations, such as the Living Planet Index of the WWF (World Wide Fund for Nature).

3. **Measures of biotic integrity:** these estimate the degradation of ecosystems compared to an undisturbed situation, an example being the MSA (Mean Species Abundance) index.

4. **Biomass measurements:** these quantify biomass, for example using satellite tools such as vegetation cover measurements.

Each of these approaches has its advantages and limitations, and their multiplicity reflects the inherent complexity of biodiversity assessment.

The economics of biodiversity is still largely analyzed with an anthropocentric, human-centric approach. But, according to one of your articles entitled The Dasgupta Review and the Problem of Anthropocentrism, the intrinsic value of biodiversity should also be taken into account. Why is this?

NT: Indeed, the economic literature, like much of the scientific literature, focuses on ecosystem services for humans. It stresses the importance of preserving species, but only for a single species, our own. In other words, biodiversity has no intrinsic value; it is only of instrumental value to humans. Such an approach, which amounts to saying that only humans have moral value, is, according to ethics experts, unacceptable. It was with this in mind that I published this critical article on the Dasgupta report, which adopts an anthropocentric perspective.

In my current work with Romain Espinosa (CIRED, CNRS), we are developing tools to measure the intrinsic value of biodiversity in monetary terms. This means that we defend the idea that there is an intrinsic value in preserving a whale, for example, a value for the whale independent of the benefits it brings to humans. We take a sentientist approach, according to which only sentient animals (those that feel pleasure and suffering) possess moral value. There is scientific consensus that plants are not sentient. However, their preservation remains essential, as they play a fundamental role as habitat and food for sentient beings.

You've also worked on meat consumption. What's the link with biodiversity?

NT: Studies show that food is the main sector responsible for global biodiversity loss. This is easily explained: biodiversity loss is first and foremost a question of habitat destruction, as we transform natural spaces to develop our human activities. Agriculture occupies around 50% of habitable land, and animal agriculture alone accounts for 80% of agricultural land. This is why meat production can be considered the world's leading cause of biodiversity loss.

For example, 85% of deforestation in the Amazon, a major biodiversity hotspot, is directly linked to livestock farming. Forests are replaced by pastures or crops such as soy, which are grown to feed animals. It is therefore clear that, to preserve biodiversity, it is crucial to reduce meat production and consumption. However, political decision-makers often look the other way, no doubt under the influence of powerful agricultural and food lobbies. That's why I'm pinning my hopes on the role of the financial sector in general in driving real change: reducing funding for conventional meat production, encouraging plant crops such as legumes, and actively supporting food innovations such as cultured meat and new fermentation techniques.

To conclude, what are your next projects on the economics of biodiversity?

NT: At the Toulouse School of Economics (TSE), I'm fortunate to be surrounded by fellow economists like Anouch Missirian and Sylvain Chabé-Ferret, true experts in the economics of biodiversity, with solid backgrounds in biology and agronomy. In addition to the topics on meat and the intrinsic value of biodiversity already mentioned, I'd like to further explore behavioral economics, an area still largely overlooked in biodiversity economics. It is indeed crucial to better understand how people perceive biodiversity, how these perceptions differ from those of experts and, above all, to what extent public policies need to integrate these perceptions to maximize their effectiveness.

Nicolas Treich

*Nicolas Treich is an economist at the Toulouse School of Economics (TSE) and INRAE (National Research Institute for Agriculture, Food and Environment). His publications cover fields such as decision theory, environmental economics, agricultural economics and behavioral economics. His recent research focuses on a new area of economics: animal welfare economics. In 2025, he will publish a book entitled «*Animal Economics*» with Cambridge University Press, devoted to this field.*

How to reconcile the energy transition and social issues?

The ambitious climate objectives of Europe in general, and France in particular, to achieve carbon neutrality by 2050, call for a multitude of actions: massive investment in a sluggish economic climate, directing savings towards green projects, unwavering corporate commitment, and maintaining and even increasing research, particularly into green and sustainable finance. To address these crucial issues, Patricia Crifo, one of France's leading specialists, answers a host of questions.

ILB: ***How do you define the concept of just transition and what does it imply for climate objectives in Europe and France?***

Patricia Crifo: Just transition marks a key step in the climate action agenda by affirming that the energy transition must not come at the expense of social issues, whether these concern the sectors most affected or the most vulnerable stakeholders. This notion, already mentioned in the preamble to the 2015 Paris Agreement, stipulates that parties must take into account "the imperatives of a just transition for the workforce and the creation of decent, quality jobs, in line with nationally defined development priorities".

Recently, the COVID-19 pandemic and the war-related crisis in Ukraine have highlighted this notion, reminding us that to prevent climate change from causing irreversible damage to the global economy, it is essential to fundamentally transform the economic structure. This implies systemic changes in energy production and consumption, while taking care not to widen inequalities or hamper the investments needed for the energy transition. However, this challenge is made more complex by persistent inflation, fuelled by a variety of factors: the disorganization of value chains during the pandemic, the imbalance between supply and demand as we emerge from the crisis, the rise in energy prices linked to the war in Ukraine, as well as energy transition policies that contribute to "green inflation".

Can you describe the main social impact challenges posed by the energy transition?

PC: At the heart of just transition lies the need to articulate two dimensions over time: overcoming the climate risks associated with energy transition by generating new economic opportunities, while preserving social justice and limiting inequalities. However, since the transition will entail both the creation and disappearance of activities, the net effect on the economy and its social repercussions remain particularly difficult to assess. More generally, three challenges need to be taken into account

On the one hand, environmental risks are not distributed equitably, which raises an issue of "distributive justice"; and on the other, different stakeholders do not have the same opportunities to influence decisions affecting their immediate environment, which raises an issue of "procedural justice". Thirdly, technical progress and innovation also have an effect on social and environmental inequalities, making the problem complex.

The energy transition must not to the detriment of social issues, whether they concern the sectors most affected or the most vulnerable stakeholders

Turning now to companies, how do you study their corporate social responsibility (CSR) practices?

PC: Several types of data can be mobilized: data measuring social and environmental performance by extra-financial rating agencies (VigeoEiris, MSCI, Bloomberg etc.), industry data measured in official statistics surveys (e.g. COI, ENDD), or experimental data produced by researchers themselves.

ESG (environmental, social and governance) rating data differ widely from one rating agency to another. This divergence can be explained by the existence of a effect specific to the agency assessing ESG performance. Howerver, the very complexity of an ESG policy covering multiple dimensions that reflect how the company meets the expectations of its different and multiple stakeholders can also induce distributive conflicts. This phenomenon can give rise to arbitration, or complementarities, giving rise to synergies (cooperation) between the different environmental and social components. These complementarities or substitutabilities between the different E, S and G dimensions can explain differences in aggregate ratings from one agency to another. The standardization of ESG information must therefore be able to take into account these complex effects linked to distributive conflicts or complementarities.

Which CSR indicators should be analyzed?

PC: Take, for example, the categorization present in the data of VigeoEiris (VE), a pioneering extra-financial rating agency in Europe, for each of the 5 axes presented below. VE determines whether the company has put in place an integrated strategy and actions to meet societal challenges, through an analysis of multiple criteria. By consolidating and weighting these criteria according to business sector, we then define a score from 0 to 100, reflecting the company's exemplary level in each category.

- **Human resources.** What role does human resources policy play in corporate strategy? How good are working conditions? Are there career development programs?

- **Environment.** What is our impact on the environment, and how can we reduce it? What policies are in place to prevent excessive consumption of natural resources? Is there a strategy for reducing the impact of goods and services at the production, distribution and design levels?

- **Market behavior.** Does the company have loyal customers and lasting relationships with its suppliers? What steps have been taken to prevent corruption? Does it take part in anti-competitive practices?

- **Community involvement.** Is the company involved in local development and what impact does it have? Are there any commitments to public-interest causes?

- **Human rights.** What measures are in place to eliminate discrimination? Does the company use forced or child labor? Does it monitor its suppliers on these issues?

You study the link between CSR and wages, notably in the article Wages and corporate social responsibility: entrenchment or ethics? Employee Relations . What are your main findings?

PC: In this article, we analyze, using French data, the impact of environmental and social strategies (i.e. CSR policy) on wages. Economic theory does not predict an unequivocal link between CSR and wages, as socially responsible companies may on the one hand wish to attract employees through ethical concerns and a green corporate culture, antinomic with a compensation system based on pure financial incentives (inducing a negative CSR-wage link). On the other hand, socially responsible companies may, on the contrary, wish to combine CSR with more generous salaries as part of strategies combining environmental and social performance, or managerial retention. Based on French data comprising over 13,000 employees, we show that CSR has an ambiguous impact on companies' wage policy depending on the type of monetary incentives and employee status. Greener companies tend to pay lower bonuses to non-managerial employees and higher ones to managerial staff.

Greener companies tend to pay lower salary and profit-sharing bonuses to non-managerial employees and higher bonuses to managerial staff

What are your next research projects on this subject?

PC: I'm interested in the supposed effect of stimulus packages on competitiveness and inequality. In September 2020, the European Union announced the issue of 225 billion euros in green bonds to finance its recovery, representing 30% of the total budget deployed to deal with the consequences of the coronavirus crisis. France has also set itself the goal of "becoming Europe's leading low-carbon economy, with 30 billion euros of the total budget for its 2020 recovery plan earmarked for four priority sectors: energy-efficient renovation of buildings, transport, agricultural transition and energy. These investments will enable France to develop through sustainable and equitable growth". China, meanwhile, announced in late September 2020 a goal of carbon neutrality by 2060 at the latest. These stimulus plans are based on the premise that "cleaner air quality, cleaner water, efficient waste management and better protection of biodiversity not only reduce communities' vulnerability to pandemics and improve resilience, but have the potential to stimulate economic activity, generate income, create jobs and reduce inequality".

But can the goal of carbon neutrality for states, and the green investments it requires to achieve it, actually be seen as a source of higher incomes, job creation and reduced inequality? The aim is to offer a theoretical analysis and empirical illustration of these issues.

You've also worked on SRI (socially responsible investment) labels, which have developed considerably in France and Europe over the last 25 years. Why and for what purpose?

PC: A dozen green and sustainable labels have appeared on the financial markets of European Union member states since the first label was created in France in 1997, demonstrating a quantitative success, particularly in France.

This project analyzes the evolution of these green and sustainable labels in Europe over the last few decades, their construction dynamics, and questions the real benefits of a proliferation of labels in this sector.

What have you found out about SRI labels?

PC: Does the multiplicity of factors contributing to the development of labels achieve the desired goal, or does it clutter up the market with strong but uncertain signals? At a time when household savings are at their highest and there is a demand for financing the ecological transition,

doesn't the multiplication of labels complicate market clarity? We show that, instead of simplifying the choice of agents, the multiplication of labels tends to increase the noise provided by each of the quality signals and deteriorate confidence. Economic agents have less interest in benefiting from a generic label, but seek out a less demanding label at lower cost. The system as a whole can therefore be counterproductive, with each player minimizing the intrinsic effort involved. Information asymmetry increases as the number of labels grows, and end-investors risk ultimately turning away from labeled products. Only the regulator can counter this perverse effect.

What are the preferences of investors in SRI products?

PC: In a project based on experimental data, we investigate the relationship between the nature and consistency of risk preferences and individuals' pro-environmental attitudes, through a comprehensive survey encompassing daily habits, views and socio-demographic factors. Our results reveal, firstly, a positive correlation between reduced risk aversion and enhanced pro-environmental attitudes. This suggests that pro-environmental behavior is more likely to be motivated by changes in personal habits than by a conscious effort to mitigate greater environmental risks. Secondly, our results indicate that the stability of risk preferences demonstrates that individuals who demonstrate consistency in their risk preferences across different methods tend to display stronger pro-environmental attitudes. This link underlines the fact that consistent decision-making behavior is a reliable indicator of pro-environmental actions, and can reinforce an individual's commitment to such actions.

What are your next research projects on the subject of SRI labels?

PC: I'd like to work on the combination of different labels: what explains single-label or multi-label strategies, particularly on a European scale? What is the role played by the categories of article 8 funds (which have environmental and/or social characteristics) and article 9 funds (which have sustainable investment objectives) of the European SFDR (Sustainable Finance Disclosure)

regulation?

In conclusion, how are sustainable finance research programs like FDIR transforming teaching and academic research?

PC: While the development of green and sustainable finance appears to be an important tool for steering economic activities in the direction of more ecologically and socially responsible paths, higher education establishments have been developing innovative collaborative platforms over the last two decades, through Chairs in Green and Sustainable Finance, in which academics, practitioners and decision-makers converge to innovate and advance research, teaching and practices in sustainable finance.

To achieve this, they have four main levers:

- Cutting-edge research and training. The Chairs in Green and Sustainable Finance play a key role as incubators for research and teaching in areas such as green finance, energy transition and impact investing. They are transforming academic and professional research by providing high-level resources, data and collaborations, while training a new generation of committed researchers and decision-makers.

- Educational innovation. Through a variety of activities (workshops, seminars, collaborative projects), these Chairs develop innovative pedagogical approaches integrated into educational programs. They enrich the student experience by fostering a culture of continuous learning and innovation, rewarded by awards such as the FIR-PRI awards.

- Interdisciplinarity. These Chairs mobilize a wide range of disciplines, from economic and social sciences to applied mathematics, computer science and even geophysics. This holistic approach provides a comprehensive understanding of the economic and financial challenges of green and sustainable finance.

- Practical learning and professionalization. By collaborating with industry players, they offer students hands-on experience via internships, applied projects and challenges, enabling them to familiarize themselves with emerging trends. This reinforces their employability and sense of responsibility to create positive impacts through finance.

> ***The transition will lead to both the creation and disappearance of activities, and the net effect on the economy and its social repercussions remain particularly difficult to assess***

Patricia Crifo

Patricia Crifo is Professor of Economics at Ecole Polytechnique, member of CREST (CNRS), and associate researcher at CIRANO (Montreal, Ca). At Ecole Polytechnique, she is director of the Master Economics for smart cities and climate policy and of the Sustainable Finance and Responsible Investment IdR (TSE-Ecole Polytechnique), and deputy director of the Energy4Climate center.

Holding a PhD in Economics and is an alumnus of the Ecole Normale Supérieure de Paris Saclay, she sits on a number of bodies and expert committees on sustainable development and SRI, including the ACPR's Commission Climat et Finance Durable (Vice-Chair).

Climate patents: are innovative companies rewarded by financial markets?

Mitigating global warming requires the mobilization of all economic players: governments, households and businesses alike. The latter are in the front line when it comes to developing innovative technologies to move towards a low-carbon economy. As part of the FDIR Research Initiative and the Getlink-TSE Research Chair on Effective Corporate Climate Action, a team of three researchers (Ulrich Hege, Sébastien Pouget and Yifei Zhang,) from the Toulouse School of Economics (TSE) and Peking University has studied whether companies have a financial interest in launching climate innovations.

To contain global warming to 1.5°C, or even 2°C, by the end of the century, in accordance with the Paris Agreement ratified in 2015 and entered into force in 2016, greenhouse gas (GHG) emissions, particularly carbon (CO_2), must necessarily be reduced. One way of achieving this is through the development of innovative technologies by businesses. Yet, according to a 2017 study by the Carbone Disclosure Project, companies are the world's biggest contributors to GHG emissions. Faced with this situation, many companies are announcing climate strategies to reduce their carbon footprint and/or provide innovative solutions for the climate. However, behind this stated voluntarism may lie deceptive greenwashing practices, which are not always easy to detect.

It is against this backdrop that three researchers from TSE and Peking University have taken an interest in corporate climate patents and their effects on financial markets. The aim is to answer the following questions: what are the incentives for companies to register climate patents? How do financial markets value these patents? What are their consequences?

An original scientific methodology

To answer these questions, the three researchers looked at climate patents filed and obtained in the USA between 2010 and 2020, which represent around 10% of total patents in the country. The category of patents examined concerns technologies linked to climate change mitigation (low-carbon energies, carbon capture, energy storage and conservation, hydrogen). "Since 2010, the United States Patent and Trademark Office (USPTO) has been classifying certain patents as climate-related, enabling us to easily identify and analyze them", explains Sébastien Pouget.

However, one still needs to establish an explicit causal link between a company obtaining a climate patent and its performance on the financial markets. This is where the three researchers' original methodology comes in. "By observing climate patents, we can avoid the pitfalls of greenwashing, since these patents are certified by the USPTO. But to avoid certain statistical biases and establish a causal link, we also needed an exogenous variable affecting the granting of climate patents, but unrelated to the specific characteristics of the company, such as having a more astute management team inclined to innovate or having abundant financial resources to finance Research & Development."

> **For financial markets, obtaining a climate patent serves as certification of an ambitious climate policy**

"We therefore resorted to so-called 'lucky' climate patents, which are linked to greater leniency on the part of the USPTO examiner", continues Sébastien Pouget. The reasons? Academic literature has shown that some examiners grant more patents than others. This allows researchers to use the level of examiners' leniency, an exogenous variable, as a substitute for the actual granting of climate patents, an endogenous variable. "Within a given field of technical expertise, examiners are randomly designated according to their availability. Their level of indulgence is assessed by a leniency ratio. This leniency ratio is used as an explanatory variable in our study", explains Sébastien Pouget.

Climate patents are indicative of a corporate commitment in favor of the environment

Following the previous steps and two-stage regression procedures, the three researchers were able to obtain their results. When companies obtain a climate patent, their stock market valuation rises by 2% in the year that follows. This rise in valuation can be explained by a better assessment of the environmental policy of these companies by extra-financial rating agencies, and by greater interest from institutional investors, particularly those focused on environmental criteria. There is therefore a positive incentive for companies to develop climate innovations.

The icing on the cake is that the increase in stock market valuation translates into a fall in the implicit cost of capital for the companies concerned. In other words, they have easier access to capital. When all climate patents are analyzed (and not just the so-called "lucky" climate patents), the scope 1 carbon emissions of the companies involved are reduced over a three-year horizon. "This suggests that it is green technologies that reduce emissions, not the granting of a climate patent. For financial markets, obtaining a climate patent serves as certification of an ambitious climate policy", concludes Sébastien Pouget.

+2%

companies that obtain a climate patent see their stock market valuation rise in the year following

Methodology

The researchers carried out an empirical study, using a linear regression model with instrumental variables, to establish a causal link between a company obtaining a climate patent and its stock market valuation. This method avoids endogeneity and omitted variable biases, as patents obtained may be due to expected good financial performance or more astute management, factors which are also valued by financial markets. To do this, they identified climate patents that could be qualified as exogenous: those linked to greater leniency on the part of patent-awarding examiners.

TO REMEMBER:

- Climate patents obtained by companies serve as credible signals for communicating their climate commitments to financial markets.
- Climate patents are associated with higher stock market valuations for the companies concerned.
- Companies that obtain climate patents are better perceived by extra-financial rating agencies and institutional investors, particularly those with a preference for environmental criteria.

From Climate Patents and Financial Markets, Ulrich Hege, Sébastien Pouget and Yifei Zhang, and an interview with the second of them.

Sebastien Pouget

Professor of Finance at Toulouse School of Economics (TSE) and Toulouse School of Management (TSM) Université Toulouse Capitole, Sébastien Pouget conducts research aimed at proposing solutions to improve financial market regulation and socially responsible investment policies. He is director of the Fondation TSE-Partenariat (TSE-P), under the aegis of the Fondation Jean-Jacques Laffont - TSE. Within the Autorité des Marchés Financiers (AMF), he is a member of the Haut Comité Certificateur de Place (since 2021) and the Conseil Scientifique (since 2023).

How can European insurers finance more long-term projects?

While there is no doubt that the banking sector must contribute to financing the environmental transition, the insurance sector, with its substantial assets under management, also has a role to play in this area in Europe. However, work by two researchers (Olivier Gossner and Michael Florig) shows that the interpretation of Solvency II, the regulations in force in the European Union (EU), results in the double-counting of management fees, thus reducing the capital available for long-term investment.

The Solvency II Directive, which came into force in early 2016, establishes and regulates the prudential framework for the EU insurance sector. It is based on three pillars: quantitative requirements (rules for asset valuation and methods for calculating regulatory capital); qualitative requirements (governance and risk management rules, and self-assessment of solvency risks); and information disclosure to the public and regulators (including directive-specific reporting).

This framework is designed to be rigorous, even restrictive, and is crucial given the size of the sector, with assets under management totaling 8.82 trillion euros as of the end of the third quarter of 2024, according to the European Central Bank.

In France, life insurance is by far the leading investment for savers, with assets under management totalling 1.985 trillion euros at the end of November 2024, according to France Assureurs.

Management fees vary according to the nature of the assets

With these very high figures, Europe's insurance sector is well placed to invest in long-term projects, particularly those linked to the environmental transition, which are capital-intensive, inherently risky and require follow-up and expertise in terms of project management. In practice, however, insurers invest mainly in debt securities (government and corporate bonds). « Government bonds incur minimal management fees, especially when held to maturity. Corporate bonds, however, require greater monitoring. For unlisted assets and investments in long-term projects such as infrastructure, energy, or environmental initiatives, management fees are significantly higher, largely due to the complexity of valuing these investments and the need for active oversight," explains Olivier Gossner. In this context, it is easier for insurers to finance government debt rather than the longer-term financing of the economy. "This asset allocation is not Pareto-optimal. We could achieve better outcomes for policyholders, entrepreneurs, and insurance company shareholders alike," says Olivier Gossner.

Management fees are double-counted in insurers' balance sheets

To delve deeper, the two researchers analyzed the balance sheets of European insurers. They found that when an insurance company adjusted its investment profile toward assets with higher management fees, its Solvency II balance sheet was penalized, despite there being no change in the risk profile.

This contradicts fundamental economic principles. Upon closer examination, they discovered that this anomaly arose because management fees were being double-counted in insurers' balance sheets: first, on the asset side, as part of prices measured at market value; and second, on the liability side, as part of technical provisions.

This can be illustrated with a simple example: rental property. An asset manager owns a rental building, whose gross yield corresponds to the total rent received plus management fees, which cover maintenance and rental operations. The net yield is then the gross yield minus the management fees. However, due to supply and demand dynamics, the market value of the property already incorporates these management fees, as it is recorded as a net asset (gross value minus management fees).

The researchers demonstrated that this principle applies across all asset classes: management fees are typically incorporated into their market value.

"When examining insurers' assets and liabilities, we see the gross cash flows from assets alongside their management fees. However, if assets are recorded at their market value—which reflects net returns and already accounts for management fees—it is contradictory to also accrue these fees on the liabilities side. This results in unnecessary duplication," explains Olivier Gossner.

He adds: "Solvency II is grounded in academic principles, such as risk-neutral probabilities, which is a step in the right direction. However, it lacks clarity regarding the implementation of certain rules: should these be driven by national supervisors or by the companies themselves? In the case of asset management, the core issue lies

in Solvency II reporting, which has led to the double-counting of management fees."

Practices are gradually evolving

According to a static estimate by the two researchers—which nevertheless provides an approximate scale—double-counting of management fees results in unjustified provisions of €100 billion across Europe, including €25 billion in France. These significant sums could instead be used to finance long-term projects, particularly those related to the environmental transition, while delivering higher returns to savers.

"Our work, published in the leading journal The Geneva Risk and Insurance Review, has been academically validated," explains Olivier Gossner. The researchers recommend eliminating the double-counting of management fees. Discussions with industry stakeholders have been productive, contributing to changes in practices. In Germany and France, national regulators issued guidelines in 2022 and 2023 to clarify the issue of double-counting management fees and reduce this practice.

"Insurers have a multifaceted role: maintaining close relationships with their customers, financing the economy through forward-looking projects, and carrying out true capital-intensive management based on cost-benefit analyses and the pursuit of returns for their clients," concludes Olivier Gossner.

At a time when mobilizing private savings is critical for preparing the future, additional capital from insurers would be invaluable in addressing upcoming challenges.

Methodology

The researchers started with intuitive economic reasoning, asserting that the value of an asset corresponds to its incoming cash flows minus its management costs. They then conducted fundamental research based on general equilibrium, risk-neutral probabilities, and uncertainty to analyze how management fees are reflected in the market price of an asset. The originality and added complexity of their work lie in the fact that management costs can vary between economic agents. To address this, they thoroughly examined the balance sheets of insurance companies, identifying the management costs of their various assets before estimating the extent of double-counted costs.

TO REMEMBER:

- Europe's abundant savings must be directed toward more productive asset classes critical to the future, such as financing environmental projects. In this regard, insurance companies have a crucial role to play.
- Under the Solvency II directive, asset management costs are double-counted, a practice that should be corrected to free up capital for investment. Addressing this issue would give insurers greater flexibility to deliver higher returns to savers.
- Discussions among various stakeholders in the sector (European regulators, national supervisors, companies, etc.) have been positive and are gradually driving changes to the rules and practices surrounding the double-counting of management fees.

Based on Double accounting of management costs under Solvency II and Market equilibrium with management costs and implications for insurance accounting, written by Olivier Gossner and Michael Florig.

Olivier Gossner

Olivier Gossner is Director of Research at CNRS and CREST, a Professor of Economics and Finance at École Polytechnique, and a Professor of Mathematics at the London School of Economics. He specializes in game theory, operating at the intersection of economics and mathematics. In his recent work, he has developed innovative models of strategic reasoning and proposed reforms to Solvency II aimed at reallocating more insurance capital to the productive economy. He is a Fellow of the Game Theory Society and the Econometric Society.

ESG stocks: what are individual investors' preferences?

Limiting global warming implies more investment in sustainable development and a reduction in financial flows towards brown activities. In this area, abundant household savings have a crucial role to play in channelling funds into green activities. However, the heterogeneity of individual investors is complex to apprehend. Three researchers (Milo Bianchi, Zhengkai Liu and Gang Wang) have analyzed their preferences for investing in stocks with ESG (environmental, social and governance) criteria.

While ESG equity investments and socially responsible investing (SRI) have been the subject of intense criticism in the USA for over two years now, the topic is still very important worldwide. In fact, according to the Global Sustainable Investment Alliance (GSIA), $30.3 trillion invested in sustainable assets by 2022.

The following year, in Europe, assets under management in SRI funds amounted to 4,550 billion euros, a 13-fold increase in five years, according to the Observatoire de la Gestion ISR 2023. Admittedly, these amounts are not enough to combat climate change, indeed an increase would be more than welcome. Investment needs are colossal, as estimated by the International Energy Agency: the energy transition alone would require a whopping 4,500 billion dollars a year by 2030, in a NZE scenario (zero net emissions by 2050).

In this situation, it is interesting to understand investors' individual tendencies and preferences to hold ESG stocks, in particular whether having prosocial attitudes and valuing ESG criteria influence their investment choices. Recent models suggest that investors take into account both monetary and non-monetary dimensions in their portfolio allocations. This raises a number of research questions to understand the determinants and evolution of ESG investment trends: how much weight do investors attach to this non-monetary component? Are pro-social attitudes favorable to ESG investments? How can individual investor preferences evolve over time?

An empirical study on Chinese data

Three researchers therefore carried out an empirical study to gain a clearer understanding of investor choices, using data from the Shanghai Stock Exchange. "One of the distinctive features of our research work is the use of individual data over a relatively long period, with a very fine-grained level of information on individual investors (age, gender, place of birth, place of residence, etc.), who carry out stock market transactions", emphasizes Milo Bianchi. He adds: "With this information, we were able to retrace a global history of each investor, for example, exposure to pollution or natural disasters, whether they live in an advantaged or disadvantaged environment, in a growth or recession zone...".

Next, the researchers were able to recreate a series of

> **According to some recent models, investors take into account both monetary and non-monetary dimensions in their portfolio allocations.**

experiments to assess the situations in which investors lived, with the aim of correlating them with ESG stock ownership. At the same time, still with the aim of drawing comparisons on investors' experiences and preferences, the researchers focused on nearby geographical areas with different levels of pollution and collectivist or individualist social norms. In this way, they exploited the policy in force near the Huai River in China, which provides heavily subsidized coal for indoor heating to residents in the north as opposed to those in the south. This led to a significant increase in pollution in the northern cities compared with those in the south, enabling the researchers to compare the investment choices of residents in the two areas.

Following the same logic, the researchers compared the ESG stock preferences of investors living in regions that grow rice and wheat. While this may seem surprising at first glance, previous research has shown that people who grow up in rice-growing areas have significantly more prosocial attitudes than those in wheat-growing regions. This is explained by the fact that rice cultivation requires much more public investment for irrigation and social interaction for work sharing, compared to wheat cultivation, which is more individualistic in nature.

Life experiences influence ESG stock ownership

Using the scientific framework outlined above, the researchers were able to obtain some interesting results on the effects of life experiences on individual investment choices. Investors living in more polluted areas and in rice-growing regions (i.e. with more prosocial attitudes) have more preferences for investing in ESG-certified stocks. "This result confirms that prosocial attitudes can be an important determinant of demand for ESG assets, even though economic experiences are very important in ESG stock ownership, for example when

investors live in a growth area or when financial markets are favorable," says Milo Bianchi. On the other hand, non-economic experiences have a greater impact on ESG share ownership, in terms of volume and duration over time. And recent experiences seem to be more decisive in determining individual investor preferences. Last but not least, the experiments act on investors' social preferences rather than on expected stock market gains. "Investors have very heterogeneous preferences over time, which can evolve strongly as a function of life experiences. Their choices are also very different from one investor to another. It would be very interesting to dig deeper into the non-economic motivations that influence ESG equity investments," concludes Milo Bianchi. Perhaps this will encourage even more investment in ESG equities.

Méthodology

The researchers studied the effects of life experiences on individual investors' demand for ESG stocks. They used several standard econometric methods: non-linear regressions and discontinuity regressions using data from the Shanghai Stock Exchange over the period 2011-2019. With this approach, they were able to compare the life experiences (e.g. living in a polluted area or one affected by natural disasters, growing or in crisis...) of investors and their associated preferences for investing in ESG stocks. They were also able to compare life experiences to assess which have the greatest and most lasting impact on investors' ESG stock preferences.

TO REMEMBER:

- Economic and non-economic experiences over the life course are important for investors' individual preferences to hold ESG stocks.
- More recent experiences are more decisive for investors' ESG preferences, but those of the past are still very persistent in investors' choices.
- The experiments have significant effects on the social preferences of ESG equity investors, rather than on their expectations of future returns.

Based on Are We Becoming Greener? Life-time Experiences and Responsible Investment, written by Milo Bianchi, Zhengkai Liu and Gang Wang, and an interview with the former.

Milo Bianchi

Milo Bianchi is Professor of Finance at Toulouse School of Economics (TSE) and Toulouse School of Management (TSM) Université Toulouse Capitole. His current research program focuses on fintechs and sustainable finance, with a particular emphasis on individual investors. His work has been published in leading economics and finance journals, including Journal of Finance, Review of Economic Studies, Journal of Economic Theory and Management Science.

Institut Louis Bachelier

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