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Activity report on climate-related research 2023

Amundi has been particularly active in terms of climate-related research in 2023, with over 20 research papers published. In addition to analyses dedicated to environmental and climate issues, the year was marked by an increase in the inclusion of research on social cohesion and biodiversity, both quantitative and qualitative, as well as climate-related research with a focus on emerging markets.

Working papers

Date of
publication
01-2023

Title of document
Impact of Climate Risks on Social Inequality

Author(s)
R. Semet

This paper explores the impact of climate risks on social inequality and demonstrates a potential tradeoff between environmental and social improvements.

The first part is dedicated to the incorporation of social risk into climate economic modeling. In the second part, social inequality is empirically studied in the context of the transition risk in France.

KEY TAKEAWAYS

- Taking social inequalities into account changes substantially the optimal price of the carbon tax and its efficiency.
- As of January 16th 2023, the effort rate of the poorest 10% of households is 2.6 times higher than the richest 10% for a 100 euros per ton of CO₂e carbon tax.
- If the regressive nature of the tax can be mitigated by redistribution policies, compensation may induce some potential backfire effects.
- Implementing a carbon tax is challenging and its theoretical benefits may be lower in practice.

Date of publication
03-2023

Title of document
Companies and Climate change - A research application of the AIIB-Amundi CCIF

Author(s)
Asian Infrastructure Investment Bank (AIIB), Amundi, Climate Bonds Initiative (CBI)

The Asian Infrastructure Investment Bank (AIIB), Amundi and Climate Bonds Initiative (CBI) published the Companies and Climate Change report, which presents the first research application of the AIIB-Amundi Climate Change Investment Framework (CCIF).

Launched in September 2020, CCIF was developed to provide investors with a benchmark tool for assessing an investment against climate change related financial risks and opportunities. It translates the three objectives of the Paris Agreement into fundamental metrics that investors can use to assess an investment's level of progress towards achieving climate change mitigation, adaptation and resilience, and low carbon transition objectives.

KEY TAKEAWAYS

- This first report presents the findings and analysis of the research application of CCIF on three levels sectors, company case studies, and issuers of debt securities.
- By sector: Data availability and quality gaps drive differences in performance.
- By company: Some progress on climate mitigation, still lagging on climate adaptation.
- By issuer: Companies contributing to the transition are not necessarily prepared for climate risks.
- Overall, while sectors and corporates are more climate mitigation focused, more concentrated efforts are needed towards climate adaptation planning and implementation.

Date of publication
05-2023

Title of document
Green vs. Social Bond Premium

Author(s)
M. Ben Slimane, T. Roncalli, R. Semet

Amundi's research shows that green and social bond markets are not integrated. Unlike what is thought by responsible investors, social bond premium is not positively correlated with premium on green bonds (i.e. greenium), instead there is a negative long-term relationship between them.

KEY TAKEAWAYS

- There is a behavioral difference between the primary and secondary markets. The level of these two premia (especially the social bond premium) do not generally reflect the major concerns about a just transition to a low carbon economy and the financing dimension of net zero policies.
- Green and social preferences also differ in terms of bond pricing: there is a difference between green and social projects when they are financed in euros or other currencies. Non euro projects are subject to a higher premium.
- The level of the greenium is related to the credibility of the green project. Certification, external review and the SDG dimension impact the greenium. On the contrary, it is more difficult to understand the pricing in the social bond market since empirical relationships between the social bond premium and extra financial factors are missing or seem counter intuitive.

Date of publication
07-2023

Title of document
From Climate Stress Testing to Climate Value-at-Risk: A Stochastic Approach

Author(s)
T. Roncalli, T. Le Guenedal, B. Desnos, P. Morais

This paper proposes a comprehensive climate stress testing approach to measure the impact of transition risk on investment portfolios. Unlike most climate stress testing models, which are designed for the banking industry and follow a top down approach, Amundi's framework considers a bottom up approach and is mainly relevant for the asset management industry.

KEY TAKEAWAYS

- Climate policies implemented by countries are insufficient to effectively limit global warming to the 1.5°C threshold by 2050 (IPCC, 2018).
- As climate stress testing has gained significant attention in recent years, there is a growing need for these models to be applicable to the asset management sector.
- Transition risk methodologies differ in several aspects, and most underestimate contagion effects in the real economy and the interdependencies within the physical supply chain.
- Climate Value-at-Risk is an attractive framework for quantifying all possible loss scenarios.

Date of publication
11-2023

Title of document
Net Zero Investment Portfolios – Part 2. The Core-Satellite Approach

Author(s)
M. Ben Slimane, T. Roncalli, J. Xu, D. Lucius

The working paper focuses on the core-satellite approach as a portfolio strategy to address net zero policies which is relevant for multi asset portfolios, strategic asset allocation of asset owners as well as thematic investing. This paper is part of a comprehensive research project on net zero investing and it follows a first working paper dedicated to the comprehensive integrated approach.

KEY TAKEAWAYS

- In the core-satellite strategy, the decarbonization dimension is managed within the core portfolio, while the objective of the satellite strategy is to finance the transition to a low-carbon economy.
- The choice of the decarbonization policy is an important step in the design of the core portfolio. At least, three issues need to be considered: the magnitude of the decarbonization pathway, the sequence of decarbonization, and the self-decarbonization property of the core portfolio.
- A decarbonization pathway is not neutral if we refer to a strategic asset allocation process. Building the satellite portfolio is certainly the most challenging part of the allocation process.
- As there is a gap in the current funding requirements, we need to prioritize financial investments and narrow the definition of the eligible investment universe. As a result, the investment processes of the core and satellite portfolios are very different.
- The core portfolio is more of a top-down allocation process and exclusion strategy, where the central climate risk metric is carbon intensity. The satellite portfolio is more of a bottom-up allocation process and asset selection strategy, where the central climate risk metric is green intensity.
- The risk assessment of the global core-satellite portfolio must be addressed, such as the level of tracking error volatility relative to a conventional benchmark (e.g., the 60/40 constant mix strategy) or a traditional strategic asset allocation.

Date of publication
11-2023

Title of document
Climate-Related Stress-Testing and Net-Zero Valuation

Author(s)
T. Le Guenedal, H. Chen, Y. Derbel, B. Duval, M. Jouanneau, M. Keip, T. Le Berthe, F. Lepetit, R. Mery, S. Paltsev

This paper is a research collaboration between Amundi, Amundi Technology, and the MIT Joint Program on the Science and Policy of Global Change which combines Amundi's expertise in asset management and financial valuations, and MIT's expertise in climate and energy-transition scenarios.

The research paper connects long-term climate scenarios with corresponding financial impacts at the company level.

KEY TAKEAWAYS

- Expanding the approach established by the Network for Greening the Financial System (NGFS), the authors have developed a methodology for calculating company-specific cash flows and valuation metrics, along with the consequences for the cost of borrowing, under different transition scenarios.
- The research shows a substantial premium in the equity market for renewable energy companies, alongside a reduction in debt costs for entities deeply engaged in low-carbon-intensive technologies.
- The paper's focus on selected major carbon-intensive corporations reveals that these key energy players could face up to a 50-basis-point rise in capital costs by 2030 in a net-zero-consistent scenario, barring substantial investments and low-carbon assets acquisition.
- The methodology can be expanded to different regions, economic sectors, and policy scenarios. It equips decision-makers with a deeper understanding of how different factors—including growth projections, inflation, policy shifts, and global trade developments—can influence company valuations and other climate-related financial impacts.

Investment Insights

Date of publication
06-2023

Title of document
Net Zero investing and its impact on a 60-40 allocation

Author(s)
V. Mortier, J.J. Barberis

Global warming and the Net Zero transition have far reaching implications for investors. In this paper Amundi states that embracing a Net Zero path will impact investors' asset allocation in two ways:

- Strategic asset allocation decisions will need to consider how the transition will impact economic and financial variables and thereby, the returns investors can expect in the future across asset classes.
- Investors will have to reassess traditional asset allocation approaches, so as to reflect the fundamental shifts in the world's economy caused by climate change.

KEY TAKEAWAYS

- Key findings suggest that the short-term financial cost of integrating Net Zero considerations into investors' asset allocation is limited and should be offset over the long run as corporates gradually transition towards low-carbon models.
- The results also indicate that embracing climate considerations can have positive effects for investors over the long-term.

Date of publication
12-2023

Title of document
Amundi Responsible Investment Views 2024

Author(s)
E. Laugel, T. Jaulin, A. de Bazin, J. Collin, V. de Vecchi

Amundi decided to bring clarity to the current responsible investment landscape and published the 1st edition of the Amundi Responsible Investment Views, to describe six main trends to watch in responsible investment in 2024 and infer the implications for investors of each one.

KEY TAKEAWAYS

- Green tech race acceleration with the US Inflation Reduction Act (IRA) and the EU Green Deal Industrial Plan.
- Net Zero investment trends in the light of the Global Stocktake exercise, and mounting climate risks in a delayed transition scenario.
- Capital market mobilization to support just transition in emerging markets, in a new macro environment requiring to accelerate and scale further blended finance.
- System thinking integrating planetary boundaries with increased attention to intertwined nature and earth systems.
- Long-lasting impact of EU Sustainable Finance Action Plan on capital markets and the asset management industry.
- Moving beyond ESG and greenwashing backlash.

Date of publication
12-2023

Title of document
Integrating biodiversity into portfolios : a bespoke framework

Author(s)
J. Elbaz, G. Dauphine, A. Sciau, P. Niall, T. Le Berthe, C. Le Meaux, S. Santarsiero

Integrating biodiversity risks into investment frameworks is becoming more and more relevant. Biodiversity losses may have a material effect on some companies, but companies also erode biodiversity through their activities and practices. A bespoke ESG rating process and investment framework can ensure that biodiversity issues are taken into account in portfolio construction.

KEY TAKEAWAYS

- A biodiversity-oriented approach should exclude the weakest issuers regarding practices and policies, while favouring those with over 20% of revenues linked to natural capital themes, or over 80% aligned with providing climate change solutions.
- The most appropriate measure to assess and compare the biodiversity footprints of companies and sectors is the Mean Species Abundance (MSA) metric - the biodiversity footprints of portfolios.
- Engagement with companies on biodiversity issues in their operations and value chains is crucial.

Economy & Markets

Date of publication
03-2023

Title of document
A rocky net zero pathway

Author(s)
M. Defend, V. Mortier, M. Germano, A. Berardi, V. Gisimundo, L. Portelli, A. Usardi, T. Walsh, N. Zanetti

In 2022, the war in Ukraine impacted the energy supply outlook and also had implications for the net zero path. Security, affordability (in volume and prices) and sustainability of the energy supply were challenged, driving the need to diversify the energy supply mix. While this has somewhat accelerated the shift towards greener energy sources, it has also led to a more uncoordinated response, as each country moved to secure its own needs. These developments come on top of inflation remaining high, having originally stemmed from the Covid-induced supply bottlenecks, which are becoming less sticky.

KEY TAKEAWAYS

- While the spike in energy costs is adding a sense of urgency to the transition, greater focus on national strategic independence as a consequence of the war in Ukraine is increasing the likelihood of a move towards a disorderly scenario.
- In the short-term, high inflation episodes will occur, driven by rising carbon prices (although the implementation of carbon pricing remains an issue) and higher commodity prices, structurally supported by the transition's demand for investment.
- Central banks will have to carefully handle their balance sheets in the future to help finance green investments, while short-term interest rate management will continue to be policymakers' key tool for combating inflationary swings.
- Limiting the induced social costs of the transition will be key. Corporations could manage a rebalancing of profits towards labour.
- Bonds' return profile is starting to move back to its long-term trend, after a 'lost decade', but uncertainty deriving from the transition and a weaker macro scenario is expected to cause higher volatility over the next decade.
- Equity returns will be lower compared to the past decade, but better than last year's forecasts, with regional diversification in focus.
- Value investing and energy transition themes will remain in the spotlight over the coming decade.
- Real and alternative assets and commodities will be important tools for building inflation-resilient portfolios.
- The coming decade will call for enhanced diversification.
- To target higher returns, investors will have to count on EM equity, as well as real and alternative assets.

ESG Thema – Thematic analysis

Date of publication 04-2023	Title of document <u>ESG Thema #12 - Responsible Investing in Asia: Outlook 2023</u>	Author(s) T. Jaulin, H. Champollion Morel, V. de Vecchi, G. Guan, K. Wong, S. Chen, Y. Iwanaga, T. Nguyen, P. Dhingra, Y. Choi
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Amundi published an ESG Thema on responsible investing in Asia with an outlook for the upcoming year and a trend to watch in 2023. It is the first of a yearly ESG Thema publication that will be released on RI trends in Asia.

KEY TAKEAWAYS

- Asia, home to 60% of the world's population (UNFPA, Asia and the Pacific 2022 Population trends) and one of the fastest growing economies, which account for over half of the world's greenhouse gas emissions, has its distinct challenges both in terms of economic development and transition towards an inclusive low-carbon economy.
- Responsible investment in Asia has long been thought to trail behind that of Europe and North America. However, we believe this has changed, as our local ESG specialists believe this to be untrue due to two main factors a regulatory push and an increased demand for responsible investing.
- Countries in Asia face diverse, yet acute economic development, climate-related risks and transition challenges. Therefore, we expect continued innovation in blended finance and public-private partnerships to accelerate the regional coal phase-out and energy transformation journey.
- A trend to watch in 2023 is transition finance, a new approach to the decarbonisation of high-emitting industries that is spearheaded in Asia. It is defined as finance "intended to decarbonise entities or economic activities that are emissions intensive, may not currently have a low- or zero-emission substitute that is economically available or credible in all relevant contexts, but are important for future socio-economic development".

Date of publication
09-2023

Title of document
ESG Thema #13 - Time for action: Unlocking climate finance in Africa

Author(s)
S. Simon, R. Seager, G. Esamble Njume, F. Moussas, D. Milenge Uwella, J. Lacal Bereslawski, A. Woldemicheal, A. Boly, J. Elbaz, T. Deneke, G. Blanchard, L. Acton

Amundi published a paper on climate finance in Africa in cooperation with the African Development Bank. The African continent is the least climate resilient region in the world, with high vulnerability and low readiness for climate change. Yet, almost all African countries have signed the 2015 Paris Agreement and have set net zero targets with the aim of decarbonizing their economies.

KEY TAKEAWAYS

- The mobilization of funds from international public sources need to be complemented with private sources.
- A supportive policy and regulatory environment is crucial to accompany the development of climate finance and attract international investors at scale to the continent.
- There is a strong potential for blended finance instruments to de risk investments and catalyze private investors to frontier markets across the African continent.
- Supporting the development of efficient carbon markets can lead to the unlocking of the needed capital to finance climate mitigation and adaptation efforts in Africa.

Date of publication
11-2023

Title of document
ESG Thema #14 - Navigating the Net Zero landscape: a toolbox for investors

Author(s)
T. Tixier, T. Deneke, J. Elbaz, T. Chaillou, J. Foll, L. Lucet, M. Minton

The Net Zero landscape is changing rapidly due to changing regulatory frameworks as well as increased investor focus on climate scenarios. The paper explores the main tools at the disposal of investors to embark on and navigate their Net Zero journey, looking at both opportunities and challenges ahead.

KEY TAKEAWAYS

- Net Zero initiatives are raising standards and market practices by encouraging real-economy carbon reduction and increasing investments in climate solutions, as well as the remaining challenges.
- Accompanying High Climate Impact Sectors in their decarbonization is of the outmost importance, focusing on the challenges and opportunities that lie ahead for heavy industries in particular.
- Financing climate mitigation and adaptation in Emerging Markets and Developing Economies (EMDEs), which account for two-thirds of global greenhouse gas emissions and are typically highly vulnerable to climate hazards, is fundamental. In this regard, blended finance partnerships hold significant potential to catalyze private capital towards the achievement of the Paris Agreement in EMDEs.
- The new frontiers of climate investing are explored, focusing on circular economy and biodiversity investment solutions, both of which are essential to deliver on the global Net Zero by 2050 objective.

Date of publication
12-2023

Title of document
ESG Thema - Special COP28: Main outcomes and implications for investors

Author(s)
T. Jaulin, V. de Vecchi, A. Mcdougall, T. Tixier

The ESG Thema - Special COP 28 describes the main outcomes of COP28 and infers the implications for investors. The stakes at COP28 could not have been higher. Hosted in Dubai, UAE, from November 30th to December 13th, the outcomes of the first Global Stocktake (GST) were presented. The GST is the world's first exhaustive check up on progress towards meeting the objectives of the 2015 Paris Agreement, and it showed that global GHG emissions levels have exceeded interim targets and are off target for the near term goals of 2030.

KEY TAKEAWAYS

- For the first time, following the outcomes of the GST, 198 countries agreed on a landmark agreement to transition away from fossil fuels.
- On the first day of COP 28 the Loss and Damage fund was operationalised with 725 million pledged.
- A series of initiatives to accelerate the energy transition and reduce global GHG emissions. Amongst these are the Global Pledge on Renewables and Energy Efficiency which sets global target by 2030 to triple renewable energy capacity and double the rate of energy efficiency; the Industrial Transition Accelerator which aims to accelerate the decarbonisation of key heavy emitting sectors across industry, transport and energy, and the Oil and Gas Decarbonisation Charter signed by 50 companies representing 40 of global oil production, who commit to zero methane emissions and end routine flaring by 2030 to total net zero operations by 2050.
- Yet, there is still a lot of room for improvement mainly concerning climate finance and implementation of the commitments taken into tangible action According to the International Energy Agency, COP28 pledges meet only 30 of needed emissions reductions to achieve the objectives of the Paris Agreement.

Research

Date of publication	Title of document	Author(s)
01-2023	<u>The Market Effect of Acute Biodiversity Risk: the Case of Brazilian Corporate Bonds</u>	A. Cherief, T. Sekine, L. Stagnol

Human activities erode biodiversity but biodiversity losses also impact human activities. Amundi's event study is among the first of its kind, examining the linkages between biodiversity events and micro-level security prices (e.g., Brazilian corporate debt).

KEY TAKEAWAYS

- The Global Database of Events, Language and Tone (GDELT) database and National Language Processing (NLP) are used to analyze biodiversity as a danger to business operations, reputations, financial health, and physical assets.
- Companies in sectors most affected by biodiversity face a widening of their corporate bond spreads following acute biodiversity events.

Date of publication	Title of document	Author(s)
01-2023	<u>Biodiversity : It's Time to Protect Our Only Home - N°3 Addressing Biodiversity in Mining & Metals, Utilities, Paper & Forest Products</u>	C. Le Meaux, M. Minton, S. Talwar, C. Maury

The Biodiversity: It's Time to Protect Our Only Home series invites investors to integrate biodiversity related actions by facing risks and tackling opportunities.

The utilities, mining & metals, and paper & forest products are sectors with direct impacts on biodiversity. These sectors have a strong link between biodiversity and short-term financial materiality. They have a clear impact on the environment and communities.

KEY TAKEAWAYS

- Biodiversity's importance is growing in the mining & metals, utilities, and paper & forest products sectors.
- Reporting on a company's impacts, risks, dependencies, and opportunities need to be developed.
- Practices to address biodiversity loss are in place, including site level monitoring & impact assessments.
- Biodiversity reporting should be more concrete and quantitative.

Date of publication
03-2023

Title of document
Biodiversity : It's Time to Protect Our Only Home - N°4 Addressing Biodiversity in Food-based Sectors

Author(s)
C. Le Meaux, M. Minton, L. Lucet

The Biodiversity: It's Time to Protect Our Only Home series focuses on the causes and challenges of biodiversity loss, and highlights the need to further integrate this subject in investment decisions.

The 4th part assesses in particular the impact and management of food-based sectors (food retail, restaurants and catering) on biodiversity as well as the risks the sectors face from biodiversity loss.

KEY TAKEAWAYS

- Despite the sectors' inherent reliance on nature, companies in the food sector are in the very early days of understanding and addressing the issue.
- Addressing the impacts (and associated risks) linked to biodiversity will require an entire review of food systems from agriculture to end user.
- Most impacts are indirect in nature, adding to the complexity of addressing the issue.
- Restaurants and catering services have an additional layer of complexity as they are often franchised and sourcing decisions are conducted at a regional level.
- Many companies have focused on addressing a few key commodities or biodiversity impact drivers but this can leave major impacts in impact management and mitigation.

Date of publication
04-2023

Title of document
Climate change and social inequality: how does climate change impact on inequality?

Author(s)
R. Semet

The research study stresses that considering social inequalities and properly accounting for the distribution of consumption and damage within regions in climate modelling is of paramount importance.

KEY TAKEAWAYS

- There is a tradeoff between social and environmental objectives. On the environmental side, a carbon tax stimulates a reduction in GHG emissions by dissuading households from consuming carbon intensive products. On the social side, price increases can push vulnerable households into poverty.
- However, the urgency surrounding climate change is forcing practitioners to prioritise the environmental benefits of the energy transition, while underestimating the induced social costs. Yet, the current level of income inequality within and between countries is still ominous.
- We believe that a future with growing inequality within or between regions could put the energy transition at risk because the public would not accept the kind of policies that are needed to address a fairer distribution of climate damage.
- Greenhouse gas (GHG) emissions of high-income households in France were 2.6 times higher than that of low-income households. Yet, low-income households devoted 12% of their income to pay a tax of 100 euros per ton of CO₂ emitted compared to only 4% for the richest households.

Date of publication
05-2023

Title of document
Biodiversity : It's Time to Protect Our Only Home - N°5 Managing Biodiversity in the Insurance Sector

Author(s)
**C. Le Meaux, E. Dijkman
Dulkes**

The Biodiversity: It's Time to Protect Our Only Home series focuses on the causes and challenges of biodiversity loss, and highlights the need to further integrate this subject in investment decisions. The 5th part addresses the impact of biodiversity loss in the insurance sector.

Awareness on the role of biodiversity for the insurance sector is still low. Most insurers are not focused on this topic yet, as they are rather in the process of grappling the full impact from climate change. The industry's primary focus on biodiversity is a risk approach, more than an approach of impact, dependencies or opportunities.

KEY TAKEAWAYS

- Biodiversity is a standalone risk and opportunity for the insurance sector.
- There is a high degree of variability in the sector around awareness of biodiversity with only a handful of companies identifying it as a distinct topic requiring strategic attention.
- Overall the sector demonstrates a lack of top down oversight over biodiversity within their operations, investments and underwriting.

Date of publication
09-2023

Title of document
Emerging Market Green Bonds – Report 2022

Author(s)
**Y. Syzdykov,
S. Lund**

Amundi published the 2022 Annual Report of Amundi Emerging Markets Green Bonds fund, co-written with the IFC. This is the fifth edition of the 'Emerging Market Green Bonds Report' reviews key green, social, sustainability, and sustainability-linked (GSSS) bond market trends in 2022 and outlines our expectations for 2023 and beyond. It also discusses the implications for the asset class of recent developments in policy, regulation, and technology.

KEY TAKEAWAYS

1. Total fixed income issuance fell by 16% from 2022, while GSSS bond issuance in this category fell 13% from 2022, the first ever decline for this asset class (Amundi, IFC)
2. \$323 billion of total cumulative green bonds issuance through the end of 2022 (2012-2022) (Bloomberg, CBI, Environmental Finance, IFC)
3. 52% of total emerging markets green bonds are issued by financial institutions (Amundi, IFC)

Date of publication
11-2023

Title of document
Biodiversity: It's Time to Protect Our Only Home - N°6 Chemicals & Pharmaceuticals sectors

Author(s)
C. Le Meaux, E. Chastenet, J. Foll

The Biodiversity: It's Time to Protect Our Only Home series invites investors to integrate biodiversity related actions by facing risks and tackling opportunities. The 6th and last part covers the chemicals and pharmaceuticals sectors.

KEY TAKEAWAYS

- Companies in the engagement pool demonstrated mixed awareness around biodiversity but all were very interested in having a dedicated dialogue with Amundi on the topic, even those that were the less advanced.
- The degree of commitment to biodiversity was not necessarily linked to the magnitude of company's exposure to natural capital. There was a significant weaknesses in dealing with biodiversity for companies having the most direct and specific impact on nature (e.g. pharmaceutical residues in the environment).
- While some biodiversity concerns may already be incorporated into the ESG strategies of corporates, the chemicals and pharmaceuticals sectors still have a long way to go in terms of integrating these elements into a more comprehensive biodiversity strategy.

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