Activity report on climate-related research 2024

Amundi has published 19 climate-related research papers in 2024. In addition to analyses dedicated to environmental and climate issues, the year was marked by an increase in the inclusion of both quantitative and qualitative research on biodiversity, as well as climate-related research with a focus on emerging markets and developing economies.

Working papers

Date of publication	Title of document	Author(s)
02-2024	**Modeling the Links Between Economic Growth, Socio-economic Dynamics and Environmental Dimensions**	**D. Ouzillou, R. Semet, L. Stagnol, T. Sekine**

The paper studies the relationships between demographics, biodiversity, climate change, political stability, and inequality that shaped GDP growth in 166 countries from 2000 to 2020.

KEY TAKEAWAYS

- The impact of political stability on economic growth and inequality stands out, as does the link between inequality and demographics - in low-income countries, a 1% increase in freedom of expression leads to GDP growth of 0.5% after three years and 1% after ten years, while a 1% increase in access to water leads to a 1.5% increase in GDP growth after ten years.
- Improvement on the climate change front does not foster significant improvements on other variables in high-income countries, but in low-income countries it can substantially mitigate inequalities.

Date of publication	Title of document	Author(s)
03-2024	**The Economic Cost of the Carbon Tax**	**T. Roncalli, R. Semet**

This paper is a new publication on transition risk, which studies the impact of a global, regional or national carbon tax on GDP, inflation and corporate earnings.

KEY TAKEAWAYS

- Although a carbon tax generates significant revenues for the government (2.82% of GDP), it also generates net costs to economy (2.18% of GDP) and inflation. The main drivers of these costs are the density of the global supply chain and the price-demand inelasticity of some carbon-intensive sectors.
- This study helps understand why quantity-based instruments have been preferred by governments to manage their climate policies so far. It also questions the articulation of the new EU ETS and the CBAM, i.e. the combination of quantity- and price-based policy tools, as well as the efficiency between regulation by demand or regulation by supply.

Date of publication	Title of document	Author(s)
04-2024	**Companies and Climate change - An updated research application of the AIIB-Amundi CCIF***	**Asian Infrastructure Investment Bank (AIIB), Amundi, Climate Bonds Initiative (CBI), Fitch Solutions**

This report is an updated research application of the Climate Change Investment Framework (CCIF) created in 2020 by the AIIB and Amundi to tailor investment portfolios that actively consider alignment with the Paris Agreement. The CCIF translated the three key objectives of the Paris Agreement into fundamental metrics essential for investors to select climate champions.

KEY TAKEAWAYS

- Despite some progress, the report reveals a concerning trend regarding adaptation metrics and physical climate change risks. Among the three objectives outlined in the Paris Agreement—climate change mitigation, adaptation, and contribution to the transition to net-zero—adaptation receives the least attention from entities, particularly in the form of physical risk assessment and risk management.
- The report evaluates country, sector, and entity-level performance against the Climate Change Investment framework (CCIF) developed by AIIB and Amundi, highlighting areas for improvement in aligning investment portfolios with the goals of the Paris Agreement.

Date of publication	Title of document	Author(s)
04-2024	**Causality Approach Applied to Clean-Tech Equities**	**E. Lezmi, K. Sawaya, J. Xu**

The clean-tech industry has experienced remarkable growth, bringing forth groundbreaking technologies and sustainable solutions. This research article delves into the examination of factors that shape the evaluation of net-zero assets in various sectors and themes.

KEY TAKEAWAYS

- The companies exclusively involved in the clean-tech industry generally financially outperform those that have less focus in this area.
- The transition towards a sustainable energy system is greatly facilitated by comprehensive policies and regulations, such as the Inflation Reduction Act in the US and the Net Zero Industry Act in the EU.
- These regulatory frameworks contribute to the valuation dynamics and help drive the growth of clean-tech investments.
- Physical and transitional climate risks exert a substantial influence on the valuation of net-zero assets.

Date of publication	Title of document	Author(s)
05-2024	**Emerging Market Green Bonds - Report 2023**	**J. Abad, T. Jaulin, A. Roncal Bazan**

The 6th report jointly published by Amundi and IFC analyzes significant trends within the green, social, sustainability, and sustainability-linked (GSSS) bonds market in emerging economies for the year 2023, and provides projections for 2024 and beyond.

KEY TAKEAWAYS

- Emerging Market Green Bonds issuance reached $135bn in 2023 (+34% since 2022).
- China remained the largest green bonds issuer in emerging markets growing by 18% year over year.
- Issuance of green bonds from Emerging Markets outside of China increased by 81%.
- 37% of funds raised from green instruments in Emerging Markets in 2023 were allocated to renewables

Date of publication	Title of document	Author(s)
05-2024	**Climate investing is an opportunity for Emerging Markets**	**M. Defend**

This paper explains how Climate pathways are integral to economic and market expectations, and investors must increasingly focus their attention on the impact of the energy and climate transitions, particularly in Emerging Markets.

KEY TAKEAWAYS

- Delayed climate policies disproportionately impact lower income and emerging countries, challenging their transition paths to net zero targets: Private investments will be crucial to finance their transitions.
- Mineral-rich countries, such as Chile and Indonesia, are better positioned to withstand the energy transition and sustain higher growth, presenting sectoral and commodity investment opportunities for global investors.
- The next decade may be characterised by a reordering of asset class preferences driven by changing expected returns. India and emerging market equities ex-China look more appealing than developed markets.

Date of publication	Title of document	Author(s)
05-2024	**Modeling Direct and Indirect Climate-related Physical Risks**	**F. De Maximy, V. Pouderoux, T. Le Guenedal**

This paper addresses the methodological challenges in quantifying physical risks associated with climate change, proposing a novel top-down stochastic approach focused on modeling financial losses from extreme events.

KEY TAKEAWAYS

- The authors extend the value-at-risk concept for transition risk analysis to incorporate direct physical shock impacts through input-output mechanisms (indirect damages to the economy) and temporal considerations (forward projection, capacity for a sector to rebuild itself). This bottom-up approach is tailored for use in analysing physical infrastructure portfolios.
- The insights from the paper highlight the urgent need for effective adaptation strategies, which even when in place are currently often costly and present additional physical risks for companies.

Date of publication	Title of document	Author(s)
06-2024	**About SDGs, reading the manual with NLP**	**L. Bennani, A. Cherief, T. Le Guenedal, T. Sekine, R. Semet, L. Stagnol**

The paper examines the Sustainable Development Goals (SDGs) framework and questions its implementation by companies. The SDGs were adopted by the United Nations in 2015 to guarantee peace and prosperity for people and the planet, with 17 objectives to be achieved by 2030. However, to date only 15% of targets have been reached. By mapping the SDGs using a Natural Language Processing (NLP) perspective, **Key takeaways** of the paper include:

- Cooperation appears to be lacking for developing countries, that are facing significant financing gaps for SDGs' completion.
- Despite having highlighted the importance of the partnership and cooperation, particularly within the geographical dimension, SDG17 ("partnership for the goals"), is often disregarded in the financial industry, which considers that SDGs can be achieved in both developed and developing countries separately.
- Companies undertaking "North-North" FDIs (Foreign Direct Investments) do not truly contribute to SDGs compared to those involved in "North-South" FDIs in the sense that the latter close developing countries' financing gap.

Date of publication	Title of document	Author(s)
09-2024	**An Introduction to Carbon Pricing**	**I. Dao, T. Roncalli, R. Semet**

The paper provides an introduction to carbon pricing mechanisms through micro and macro-based empirical analysis.

KEY TAKEAWAYS

- The implementation of market-based regulations worldwide are moving in the right direction but are still falling short of the level required to achieve carbon neutrality.
- The heterogeneity of carbon prices and coverage underscores the need to increase the stringency of these policies.
- Firm-level carbon pricing data from the Carbon Disclosure Project (CDP) does not fully internalize carbon costs.
- Limited internal carbon price (ICP) adoption raises concerns about greenwashing.

Date of publication	Title of document	Author(s)
11-2024	**Investor Concerns and the Pricing of Physical Climate Risk**	**M. Briere, A. Duranovic, K. Huynh, I. Monasterolo, S. Ramelli**

The paper investigates how global equity markets price physical climate risks, particularly those associated with tropical cyclones in the sample period 2016-2022, and how investor concerns influence stock performance. It also assesses how climate risks impact equity markets, the role of investor perceptions, and strategies to address these risks in financial decision-making.

KEY TAKEAWAYS

- Sectors like utilities and regions such as East Asia are most vulnerable, with potential asset losses varying widely depending on cyclone severity.
- Integrating physical climate risks into investment models is critical. Strategies include leveraging tools like resilience bonds, catastrophe bonds, and public-private partnerships mitigate these risks effectively.

Investment Insights

Date of publication	Title of document	Author(s)
02-2024	**Five insights on institutional investors' approach to Responsible Investments**	**M. Briere, T. Jaulin, C. Le Meaux, M. Nuriyev, E. Taze Bernard**

The paper explores the approach of 20 institutional investors to responsible investing, as this has become an important consideration in many investors' portfolio management decisions.

KEY TAKEAWAYS

- There is a broad diversity in investors' responsible investment preferences: geography, regulation and stakeholders all have an impact.
- For most investors, responsible investing enhances financial returns and risk management.
- Engagement and voting activities are seen as a key pillar of many institutions' responsible investment approach.
- Divestment can be a last-resort strategy.
- ESG data remains a key challenge, and many investors feel they need to strengthen their resources in the area.

Date of publication	Title of document	Author(s)
04-2024	**Who will finance the green transition? Can central banks help?**	**L. Portelli, M. Pradhan**

The paper analyses the unprecedented financing dilemma that the green transition presents, and the role of the public sector, especially central banks in maintaining price stability.

KEY TAKEAWAYS

- Due to inflationary pressures, many governments have recently scaled down their near-term ambitions to meet net zero targets.
- Private investments in green energy will require incentives in the form of higher expected returns than investments in old energy, primarily through higher carbon taxes and other incentives, such as the Inflation Reduction Act in the United States.
- It estimates that the annual global demand for climate investments will be USD 4-5 trillion from 2030 to 2050.

Date of publication	Title of document	Author(s)
04-2024	**Five questions on the impact of carbon taxes on economies and markets**	**T. Roncalli**

The paper asks five pertinent questions on the what, why and how of implementing a carbon tax, while addressing both the opportunities and challenges it presents.

KEY TAKEAWAYS

- A global carbon tax of USD 100 per ton of CO_2 emitted would mostly affect the emerging markets, starting with India, followed by Russia, China, Bulgaria and Taiwan.
- The authors estimate that a global carbon tax of $100 per ton of CO_2 emitted would, in total, be the equivalent of 5.01% of global GDP.
- A regional carbon tax at the European Union level would result in more than 95% of the costs falling on the countries within the Union, while the impact outside it would be relatively small.

Date of publication	Title of document	Author(s)
04-2024	**Amundi Asia Responsible Investment Views 2024**	**E. Laugel, T. Jaulin, P. Theillard, K. Wong, J. Collin**

The complex challenge of building a sustainable future, demands the collective efforts of nations worldwide, and Asia increasingly plays a pivotal role in ensuring the success of these global efforts.

With an aim to better understand the responsible investment trends in Asia, Amundi has published a dedicated focus paper to help investors better navigate the complexities of the sustainable transition in the region, while leveraging on the region's strengths.

KEY TAKEAWAYS

The 3 significant responsible investment trends of 2024 to in Asia:

- Green technology acceleration
- Momentum on transition frameworks
- Carbon credits market trading development

Date of publication	Title of document	Author(s)
12-2024	**Amundi Responsible Investment Views 2025**	**E. Laugel, T. Jaulin, P. Theillard, J. Collin, A. McDougall**

The paper highlights key trends shaping the responsible investing landscape in 2025.

KEY TAKEAWAYS

- 2024 Responsible Investment Dynamics: The responsible investment market normalisation continues, in a year marked by additional transparency requirements and continued companies' commitments, increasingly integrating environmental and social considerations into their core strategies.
- Energy Transition Reaching Self-Acceleration Mode: Clean energy investments surged in 2023, outpacing fossil fuels, driven by supportive national and regional policies.
- Impact And Innovation Shaping The Responsible Investment Landscape: Despite political challenges, investor appetite for Responsible Investments remains robust. The focus on tangible impacts will drive demand for innovative financial solutions.
- Addressing Regulatory Divergence: Addressing global regulatory divergence will require international alignment to facilitate compliance and support Responsible Investment products.

ESG Themas

Date of publication	Title of document	Author(s)
03-2024	**ESG Thema #15 - Measuring the Biodiversity Footprints of Investments: An Assessment of the Metrics**	**S. Santarsiero, J. Elbaz, M. Jouanneau, A. Sciau, S. Nguiakam**

This paper is the 3rd ESG Thema that focuses on biodiversity.

KEY TAKEAWAYS

- The urgency and scale of biodiversity loss are exposing a high number of companies across sectors to significant financial risks: it has become increasingly necessary for investors to reliably assess the impact and dependence of companies on biodiversity.
- As of today, there are significant hurdles to effectively account for biodiversity, such as challenges around data measurement and a lack of clear standards for reporting.
- To measure corporate biodiversity impacts in the form of a biodiversity footprint, a metric has emerged: the Mean Species Abundance (MSA), which expresses the mean abundance of original species in a habitat compared to their abundance in an undisturbed habitat.
- There is a strong case for integrating the MSA into investment frameworks, from risk management purposes, to impact assessment and compliance with emerging regulations. This should be done in combination with other indicators.

Date of publication	Title of document	Author(s)
06-2024	**ESG Thema #16 - Investing in India's energy future: a just transition challenge**	**C. Le Meaux, J. Elbaz, S. Santarsiero, P. Dhingra**

This paper written in collaboration with SBI MF, focuses on India's energy transition landscape and highlights the related challenges and opportunities. The paper also discusses India's targeted policies to align with the Paris Agreement objectives while facing a unique trilemma of energy, security, affordability and environmental sustainability.

KEY TAKEAWAYS

- India, as the most populous country in the world sees the energy transition as particularly noteworthy due to its extensive scale and profound impact on India's economy and environment
- While the Asian giant is the third largest CO_2 emitter in the world, with an economy still heavily reliant on fossil fuels, the country has committed to reach Net Zero emissions by 2070.
- To garner support of global investors in driving India's energy transition, the Securities and Exchange Board of India (SEBI) has updated regulations on ESG investing to impose higher disclosure standards and transparency on India's largest companies.
- The main challenges that lie in the way of India's Net Zero path is the effective deployment of green technologies while phasing out heavy reliance on a key component, coal.
- India needs the unanimous support of global asset owners that should increasingly work alongside public actors to scale the funding of Indian sustainable energy infrastructure.

Date of publication	Title of document	Author(s)
10-2024	**ESG Thema #18 - When extreme becomes the new normal: how to address physical climate risk**	**J. Jie Tan, V. Hintzy, S. Chen, J. Elbaz**

The paper focuses on physical risks, that are multi-dimensional and typically viewed as an interaction of three core dimensions: hazard, vulnerability and exposure. For investors, climate impacts have a direct and indirect influence on investments.

KEY TAKEAWAYS

How to address physical risks?

- With a greater emphasis on climate adaptation, as mitigation efforts alone cannot halt the negative effects of climate change. However, climate adaptation and resilience remain severely underfinanced, with a significant and growing gap of US$194-366 billion per year, or 0.6%-1.0% of GDP for developing countries.
- Pricing on physical risks into investors financial modelling and their investment decision process, while acknowledging the limitations for integrating physical risk due to data and methodologies challenges.

What investment solutions can address physical risks?

- To support investors, one of the ways in which Amundi integrates adaptation consideration into investments is through a dedicated climate change framework, called AIIB-Amundi Climate Change Investment Framework.
- Other investment solutions that exist to break financing barriers are - green bond funds investing in resilience bonds, blended finance arrangements, public-private partnerships, catastrophe bonds, and insurance-linked securities.

Date of publication	Title of document	Author(s)
11-2024	**Special ESG Thema - Lessons learned from COP16 and COP29 for Sustainable Finance**	**T. Jaulin, P. Theillard, A. McDougall, J. Collin**

The ESG Thema on COPs analyses the outcomes and progress of the recent COP16 - Biodiversity and COP29 - Climate, and provides implications for investors on the role of innovative financing models, corporate initiatives and sustainable finance in advancing global commitments.

KEY TAKEAWAYS

- Integrated Solutions for Interconnected Challenges: Biodiversity, climate change, and land degradation require cohesive strategies, with growing alignment across global frameworks and recognition of synergies among stakeholders.
- Innovative Financing Models: Disappointing negotiations around public finance have highlighted a growing demand for innovative private-sector financing solutions – blended finance, climate bonds, and debt-for-nature swaps – that offer scalable pathways to address funding gaps and align investments with environmental goals.

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