7th Green Finance Research Advances

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Book of Abstracts

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Session 1: Sustainable investment, sustainable products

The preferential treatment of green bonds

Speaker: Matthias Kaldorf[1]

Co-authors: Florian Wicknig[1]; Francesco Giovanardi[1]; Lucas Radke[1]

[1] *University of Cologne*

Abstract:

We study the preferential treatment of green bonds in the central bank collateral framework as an environmental policy instrument within a DSGE model with environmental and financial frictions. Green and conventional firms issue corporate bonds to banks that use them as collateral. The associated collateral premium induces firms to increase bond issuance, investment, leverage, and default risk. Collateral policy solves a trade-off between increasing collateral supply, adverse effects on firm risk-taking, and subsidizing green investment. Due to these adverse effects, optimal collateral policy is characterized by modest preferential treatment, thereby increasing the green bond share and, to a smaller extent, the green investment share, which reduces pollution. The limited response of green investment is directly related to higher risk-taking of green firms. Furthermore, we show that preferential treatment is an imperfect substitute of Pigouvian taxation on pollution: only if the optimal tax can not be implemented, optimal collateral policy features preferential treatment of green bonds.

Biography:

Matthias Kaldorf is a PhD Candidate at the University of Cologne and associated member of the Cluster of Excellence ECONtribute. In October 2022, he joins the Bundesbank's Research Centre as research economist.

His research interests lie at the intersection of financial economics and macroeconomics. His work is also touching the fields of environmental economics, international finance, and financial econometrics.

Building portfolios of sovereign securities with decreasing carbon footprints

Speaker: Gong Cheng[1]

Co-authors: Eric Jondeau[2]; Benoit Mojon[1]

[1] *Bank for International Settlements*

[2] *HEC Lausanne*

Abstract:

We propose a strategy to build a "net zero" portfolio of sovereign securities that delivers progressively declining carbon footprints. Passive investors could use it as a new benchmark that is consistent with the Paris Climate Accords while keeping the portfolio's financial characteristics as close as possible to a business-as-usual benchmark.

Our research is among the first to propose a decarbonisation strategy for sovereign securities portfolios. It is easy to implement and suitable for passive investors given the limited impact on the net zero portfolio's financial performance. However, it is a powerful tool to encourage sovereign governments to keep up their commitments in the Paris Climate Accords because of potentially

large weight shifts for sovereign issuers after portfolio rebalancing relative to the business-as-usual benchmark.

Our strategy rewards sovereign issuers that have made stronger efforts to reduce the carbon intensity of economic activity in their jurisdiction, measured by total domestic emissions per capita. The net zero portfolio we propose could reduce carbon intensity by 41% between 2014 and 2019 without affecting the portfolio's financial performance. The reduction in carbon intensity is achieved by assigning higher weights to countries with lower carbon emissions. Among advanced economies, portfolio rebalancing increases the shares of France, Italy and Spain while reducing that of the United States. Among emerging market economies, the weights of Chile, the Philippines and Romania would increase at the expense of China. Even when changes in country weights in the net zero portfolio are capped, the portfolio can still achieve a 30% cumulative reduction in carbon intensity, much higher than the business-as-usual benchmark could achieve (14%).

Biography:

Gong Cheng is a senior economist at the Bank for International Settlements, with a focus on green finance, sovereign debt and Chinese economy. He represents the BIS in the G20 IFA Working Group on debt issues and NGFS subgroups. In 2014-2020, he was a senior economist at the European Stability Mechanism, where he led policy and research work on Regional Financing Arrangements and sovereign debt restructuring. He especially contributed to the set-up of a policy framework for the collaboration between RFAs and the IMF. He was an economist in the International Macroeconomics Division of Banque de France in 2010-2013. Gong Cheng holds a PhD in economics from Sciences Po and master's degrees in finance and international political economy from Sciences Po and London School of Economics.

Time-varying environmental betas and latent green factors

Speaker: Mirco Rubin[1]

Co-author: Emanuele Chini[2]

[1] *EDHEC*

[2] *EDHEC Risk Climate Impact Institute*

Abstract:

We study whether the US stock market is pricing exposures to climate risks through the lenses of a latent linear factor model with time-varying betas estimable by an extension of the instrumented principal component analysis (IPCA) of Kelly, Pruitt, and Su (2019). In our specification, the factor loadings are allowed to be functions of both "financial" and environmental ("green") company specific characteristics, such as ESG ratings and carbon intensity. We extend the original IPCA model to allow for the presence of different sets of orthogonal factors whose loadings are driven by only one of the two types of characteristics. Our extension allows (i) to identify and estimate latent green factors from a large panel of stock returns without defining (and constructing) them ex-ante, as typically done in the climate finance literature, (ii) to interpret our factors as purely "green" or "financial" factors. We identify one "green" factor which is important for the out-of sample pricing of stocks in the Energy and Utilities sectors, above and beyond "financial" factors, which suffice to explain the cross section of stock returns of the stocks in the other sectors.

Biography:

Mirco Rubin is Associate Professor of Econometrics at EDHEC Business School. Mirco's research interests are at the intersection of Econometrics, Financial Economics, Macroeconomics, and Asset Allocation. He is specialized in the development of new econometric methodologies for large and mixed-frequency dataset.

When green investors are green consumers

Speaker: Olivier David Zerbib[2]

Co-author: Maxime Sauzet[1];

[1] *Boston University*

[2] *EDHEC*

Abstract:

We bring investors with preferences for green assets to a general equilibrium setting in which they also prefer consuming green goods. Their preferences for green goods induce consumption premia on expected returns that counterbalance the green premium stemming from their preferences for green assets. Because they provide green investors with a financial hedge when green goods become expensive, brown assets command lower consumption premia on average, and green investors allocate a larger share of their wealth towards them. Empirically, the average difference in consumption premia between green and brown assets gradually increased to reach 30 to 40 basis points per year and contributes to explaining the limited impact of green investing on polluting firms' costs of capital.

Biography:

Olivier David Zerbib has been an Associate Professor of Finance at EDHEC Business School since 2022. Prior to that, he was an Assistant Professor of Finance at Boston University (2021-2022). His research focuses on the interactions between finance and sustainability issues, especially environmental topics. In his recent work, Olivier David Zerbib has been interested in how investors can have a positive impact on the environmental practices of companies.

How sustainable finance creates impact: transmission mechanisms to the real economy

Speaker: Alex Clark[1]

Co-authors: Felicia Liu[2]; Ben Caldecott[2]; Elizabeth Harnett[3]; Krister Koskelo

[1] *Oxford Smith School of Enterprise and the Environment*

[2] *Oxford Sustainable Finance Group*

[3] *RMI*

Abstract:

When and how does sustainable finance contribute to a better world? In this paper, we outline the mechanisms through which impact is transmitted from the financial system to the real economy. We argue that, in order to have a positive environmental impact, financial institutions must make a clear and measurable difference in one or more of the following ways: (i) reducing (increasing) the cost of capital for (un)sustainable activities; (ii) increasing (reducing) access to capital for (un)sustainable activities; and (iii) encouraging or enabling sustainable practices by counterparties, such as companies, sovereigns, and individuals. We assess the availability of impact across key asset classes, hypothesising a maximum potential for impact for each. We call for financial institutions, and particularly large universal owners, to integrate the development of "impact budgets" into strategic asset allocation. Future research could usefully consider the implications for impact-oriented portfolio construction in more detail, as well as seeking to develop empirical methods for further testing and quantifying the impact of the different transmission mechanisms discussed here.

Biography:

Alex is a PhD researcher at the Smith School of Enterprise and the Environment, University of Oxford, where his research focuses on the identification and transmission of fossil-fuel related economic risks in the public sector, and how governments and their agents should respond to

these risks, with a focus on China. Alex supports Oxford's engagement with China through the Economics of Energy Innovation and Systems Transition (EEIST) project. Alex is a Global China Initiative Fellow at Boston University, a Visiting Fellow at the European Council on Foreign Relations, a Europaeum Scholar, and a 2021 Summer Programme fellow at the International Institute for Applied Systems Analysis (IIASA). Alex has also worked as a consultant to the Center on Global Energy Policy at Columbia University.

The benchmark greenium

Speaker: Johannes Klausmann[1]

Co-authors: N. Aaron Pancost[2]; Stefania D'Amico[3]

[1] *ESSEC Business School*

[2] *University of Texas at Austin*

[3] *Federal Reserve Bank of Chicago*

Abstract:

Exploiting the unique twin structure of German government green and conventional securities, we use a dynamic term structure model to estimate a sovereign risk-free greenium: the premium investors are willing to pay to subsidize environmentally beneficial projects. Differently from the simple yield spread between the green security and its conventional counterpart (i.e., the green spread), the model-implied greenium is purified of idiosyncratic factors such as relative scarcity. The greenium often differs notably from the observed green spread and the divergence varies across maturities. Indeed, the term structure of the greenium is upward sloping while that of the green spread is downward sloping. Our estimates lead to different conclusions about perceived climate concerns, provide a better measure of the expected borrowing advantages to green issuers, and give a clearer signal to policy makers currently considering to broaden support for sustainable finance.

Biography:

Johannes is a PhD Candidate at ESSEC Business School in Paris. Previously, he has completed a Bachelor of Arts in Technical Management at the Baden-Wuerttemberg Cooperative State University and a Master of Science in Finance from UCD Michael Smurfit Graduate Business School. In 2018, Johannes joined the PhD program in Finance at ESSEC Business School. From October 2021 until August 2022, he visited the University of Texas at Austin under the supervision of Professor Laura Starks. His research is focused on topics related to sustainable finance, ESG, asset pricing and corporate finance. He also gained work experience as a product manager at Helios Ventilatoren GmbH, in investment banking at Société Générale in Paris and worked as financial data scientist for Sociovestix Labs in Edinburgh.

Session 2: Physical risks

Systemic climate risk

Speaker: Tristan Jourde[1]

Co-author: Quentin Moreau[2]

[1] *Banque de France*

[2] *Paris-Dauphine university*

Abstract:

This paper proposes a new market-based framework to study systemic climate risks in the financial sector. Our framework aims to identify which financial institutions are the most vulnerable to physical and transition climate risks and test whether climate risks can generate tail dependence in the financial sector. We apply our framework to large European financial institutions and show that, unlike physical risk, transition risk significantly influences systemic risk. The exposure to transition risk appears lower for institutions with cleaner investment and lending portfolios. Besides, the financial institutions most exposed to transition risk tend to engage more in carbon disclosure.

Biography:

Tristan Jourde is a research economist at Banque de France. Previously, he worked for Longchamp Asset Management and Credit Agricole CIB, respectively as a market economist and risk analyst. He obtained his Ph.D. in Financial Economics from Paris-Dauphine University - PSL. His main research interests are in environmental & sustainable finance, financial interconnections, and asset pricing studies.

Natural disasters and financial stress : can macroprudential regulation tame green swans?

Speaker: Pauline AVRIL[1]

Co-authors: Camélia Turcu[1]; Grégory Levieuge[2]

[1] *Laboratoire d'Economie d'Orléans*

[2] *Banque de France et Laboratoire d'Economie d'Orléans*

Abstract:

We empirically investigate the impact of natural disasters on the external finance premium (EFP), conditional on the stringency of macroprudential regulation. The intensity of natural disasters is measured through an original set of geophysical indicators for a sample of 88 countries over the period 1996-2016. Using local projections, we show that, following storms, the EFP significantly drops (rises) when macroprudential regulation is stringent (lax). This suggests that regulated financial systems could foster favorable financing conditions to replace destroyed capital with more productive capital. Macroprudential stringency seems less crucial in the case of floods, the predictability of which may prompt self-discipline.

Biography:

Currently in her fourth year of PhD at the University of Orleans, Pauline's research is focusing on the impact of natural disasters on financial stability. In a world where natural disasters are multiplying, it seems essential to analyze and understand the role that these shocks can play on the economic and banking sphere in order to improve the resilience of the system. In parallel to her thesis, Pauline Avril also carried out a visiting position at the Banque de France as part of a project on the impact of transition risk on the financing costs of firms.

Floods, fires and firms: estimating the effect of extreme weather events on the pricing of corporate loans

Speaker: Carmelo Salleo[1]

Co-author: Tina Emambakhsh[1]

[1] *European Central Bank*

Abstract:

Do banks account for firms' exposure to physical climate risk when pricing corporate loans? In our paper we investigate this question by mapping granular data on corporate loans issued by euro area banks to information on firms' individual exposures towards wildfire and flood risk, and conducting three different types of methodologies, namely panel regression, propensity score matching and difference-in-difference. We find that firms' exposure towards physical risk significantly reduces the size of a loan that firms can borrow, while having only partial impact on interest rate spreads. Furthermore, our results show that banks do not yet take into account physical risk in the valuation of probabilities of default. Furthermore, we find that the pricing of loans towards tail risk firms is more negatively affected than of the average firm. The results are heterogeneous, depending on the type of risk and maturity of loans considered.

Biography:

Tina Emambakhsh is a Financial Stability Analyst in the General Directorate of Macroprudential Policy and Financial Stability in the ECB. She is part of the Climate Stress Testing team of the Stress Test Modelling Division since 2021 and co-authored ECB's first top-down, economy wide climate stress test exercise. She holds a double Master's degree in Economics and International Economic Policy from Stockholm School of Economics and Sciences Po Paris and a Bachelor's degree in Economics and Social Sciences from Vienna University of Business and Economics. Before joining the ECB, she worked as a research assistant in the Stockholm School of Economics.

Session 3: ESG, disclosure and data

Do scope 3 carbon emissions impact firms' cost of debt?

Speaker: Ahyan Panjwani[1]

Co-authors: Benoit Mercereau[2]; Lionel Melin[3]

[1] *Board of Governors of the Federal Reserve System*

[2] *Arvella Investments*

[3] *MacroLucid Research*

Abstract:

Do firms that report more carbon emissions particularly scope 3 emissions face a higher cost of borrowing in credit markets? In this paper, we find that firms that disclose scope 3 emissions face a lower cost of borrowing in credit markets and estimate a scope 3 disclosure premium of -20 basis points on average. However, credit markets do not significantly discriminate the quantitative amount of reported scope 3 emissions while penalizing scope 1 + 2 carbon generation. Is this trend because markets reward advertised rather than actual pollution reduction efforts greenwashing or because scope 3 data is not yet mature enough to provide reliable information? While the literature has documented evidence of investors rewarding greenwashing, we find substantial discrepancies in firms' scope 3 disclosures across time, regions, and sectors. We show that these discrepancies are mainly concentrated in downstream data. Based on these findings, we highlight possible areas of engagement between firms and investors or policymakers that would be beneficial to all stakeholders.

Biography:

Ahyan Panjwani: Ahyan is an economist in the Division of Financial Stability at the Federal Reserve Board and graduated from Yale University (PhD Economics) in 2022.

Lionel Melin: Lionel is an independent economic consultant at MacroLucid Research specializing in ESG finance. Lionel conducted research projects with the Federal Reserve of Chicago, the International Monetary Fund, Bank of America Merrill Lynch and BNP Paribas. He holds a PhD in Economics from The University of Chicago.

Benoit Mercereau: Founder & CIO of Arvella Investments, an ESG-focused investment firm. Benoît is a former Managing Director at Goldman Sachs International in London and received his PhD in economics from Yale University.

Net zero investment portfolios

Speaker: Thierry RONCALLI[1]

Co-authors: Inès BARAHHOU[1]; Mohamed BEN SLIMANE[1]; Noureddine OULID AZOUZ[1]

[1] *Amundi Asset Management*

Abstract:

In this paper dedicated to net zero investing, we decompose a net zero investment policy into two dimensions: decarbonization and transition. Hence, we first present the two kinds of metrics needed to implement such a policy. While the first dimension is assessed through traditional carbon footprint measures and a decarbonization pathway, we suggest some metrics to evaluate the capacity of financing the transition to a low-carbon-economy. As portfolio alignment is a dynamic process, we also highlight the need to consider static as well as forward-looking metrics for both dimensions. Beyond our suggestions, we implement an optimization-based approach for aligning a

portfolio by integrating various constraints based on the previous metrics and show three major results. First, portfolio managers need to be careful when they define their alignment program, particularly regarding the carbon scope for reduction. Indeed, including scope 3 upstream or downstream, although mandatory, leads to higher tracking error costs. Secondly, decarbonizing is easier than aligning a portfolio. We show that decarbonizing along CTB/PAB pathways never lead to exploding tracking errors. However, the true difficulty of the exercise lies in the diversification and liquidity loss an investor might face when decarbonizing. This result is even truer when we add the transition dimension in the program as a solution almost never exists on the full pathways. Finally, preventing greenwashing is a key challenge of net zero investment and needs a rigorous bottom-up analysis in order to protect investors from controversial companies.

Biography:

Thierry Roncalli is Head of Quant Portfolio Strategy at Amundi Institute. Prior to joining Amundi in November 2016, he was Head of Research and Development at Lyxor Asset Management. Thierry began his professional career at Crédit Lyonnais in 1999 as a financial engineer. Before that, Thierry was a researcher at the University of Bordeaux and then a Research Fellow at the Financial Econometrics Research Centre of Cass Business School. Since February 2017, he is Member of the Scientific Advisory Board of AMF, the French Securities & Financial Markets Regulator. Thierry is also Adjunct Professor of Economics at the University of Paris-Saclay (Evry), Department of Economics.

Machine learning methods in climate finance: a systematic review

Speaker: Andres Alonso[1]

Co-authors: Jose Manuel Carbo[1]; Jose Manuel Marques[1]

[1] *Banco de España*

Abstract:

Preventing the materialization of climate change is one of the main challenges of our time. The involvement of the financial sector is a fundamental pillar in this task, which has led to the emergence of a new field in the literature, climate finance. In turn, the use of Machine Learning (ML) as a tool to analyze climate finance is on the rise, due to the need to use big data to collect new climate-related information and model complex non-linear relationships. Considering the potential for the use of ML in climate finance and the proliferation of articles in this field, we propose a survey of the academic literature to assess how ML is enabling climate finance to scale up. The contribution of this paper is threefold. First, we do a systematic search in three scientific databases to assemble a corpus of relevant studies. Using topic modeling (Latent Dirichlet Allocation) we uncover representative thematic clusters. This allows us to statistically identify three overarching research areas, and seven granular application domains where ML is playing a significant role in climate finance literature: physical risks (natural hazards, biodiversity and agricultural risk), transition risks (carbon markets and energy economics), and corporate and social responsibility (ESG factors, investing, and climate data). Secondly, we do an analysis highlighting publication trends, and a breakdown of ML methods applied; and thirdly, we provide a literature review of each topic, pointing out emerging research directions.

Biography:

Andrés Alonso Robisco joined Banco de España in 2019 as senior economist in the Financial Innovation Division where he analyses the latest trends in financial innovation. Specifically, he studies the impact of machine learning on credit risk modelling, and different topics related to climate finance innovation. Previously he had been working in the Single Resolution Board (SRB), an agency of the European Commission, focusing on banking regulation and beforehand, in the treasury and capital markets teams of Instituto de Credito Oficial (ICO), the Spanish financial agency, with responsibilities on the valuation of financial instruments. He has published articles in journals like Financial Innovation, and International Review of Financial Analysis.

Session 4: Transition risk, scenarios, stress testing

A climate credit risk model: a structural approach

Speaker: Stefano Battiston[1]

Co-authors: Antoine Mandel[2]; Irene Monasterolo[3]; Alan Roncoroni[1]

[1] *University of Zurich*

[2] *Paris School of Economics*

[3] *EDHEC, ERCII*

Abstract:

We introduce a structural model to assess the climate transition risk associated to portfolios of corporate bonds and equity shares, conditioned to climate scenarios, such as those developed by the Network for Greening the Financial System (NGFS). We translate forward-looking economic trajectories developed by process-based Integrated Assessment Models into adjustments in the valuation of financial securities issued by counterparties in economic sectors that are relevant for transition risk. Importantly, we consider the composition of firm's revenues from high and low-carbon activities and how they will be affected would specific orderly or disorderly transition scenarios materialize. The adjustment in equity share value, default probabilities, loss-given-default and expected value of the bond depends thus on the interplay between the scenario and the technological profile of the issuer. We illustrate the outcome of the methodology on a sample portfolio of securities. Our approach is science-based, transparent and replicable. It contributes to fill an existing gap in the financial literature, thus contributing to strengthen climate credit risk modelling. This, in turn, is crucial for central banks and financial supervisors, being credit ratings a relevant part of the information set for both monetary policy implementation and reserve management purposes.

Biography:

Stefano Battiston is Associate Professor of Banking at the University of Zurich, Department of Banking and Finance and Associate Professor of Economic Policy at Univ. of Venice, Department of Economics. He is also a Lead Author of the IPPC Report Chapter 15 Finance and Investments. As a leading scholar in the fields of sustainable finance and financial risk in networks, Prof. Battiston has made advances in the scientific understanding of risk and interconnectedness in the financial system, and on climate-related financial risk, in particular in relation to climate scenarios analysis and climate stress-testing. He has co-authored 60+ publications. His scientific methods have found applications in several policy-relevant studies carried by financial supervisors.

Transition risk, asset stranding and financial instability

Speaker: Louis Daumas[1]

[1] *CIRED*

Abstract:

This paper analyses how financial instability can emerge due to technological displacement and asset stranding along mitigation pathways limiting global warming to 1.5°C or 2°C. To do so, it develops a stock-flow consistent model for the study of transition risks with an embedded financial system with bank and non-bank financial agents and an explicit representation of asset stranding as the decommissioning of excess high-carbon capital. The framework is used to simulate decarbonisation pathways and carbon price paths embedded in scenarios provided by the Network

for Greening the Financial System (NGFS). The model follows the literature in showing that more climate-ambitious and more technically constrained scenarios yield higher transition risks. It further shows that distinct types of financial institutions are not equally affected by different transition scenarios. For instance, banks are much less affected in delayed-action scenarios than non-bank institutions. The model also illustrates the importance of accounting for the reaction of the financial sector along decarbonisation scenarios. Finally, by studying decarbonisation pathways from various integrated assessment frameworks, I show the necessity to consider a wide array of scenarios generated by different models.

Biography:

Louis Daumas is a PhD student at CIRED, France, under the direction of Céline Guivarch (Ecole des Ponts ParisTech) and Emanuele Campiglio (Università di Bologna). His doctoral thesis takles the issue of low-carbon transition risks by coupling stock-flow consistent modelling to decarbonisation scenarios explored by the IPCC. His work notably includes the use of robust decision-making and scenario discovery approaches, as well as quantitative work on the exposure of financial agents to transition risks.

The double materiality of climate physical and transition risks in the euro area

Speaker: Irene Monasterolo[1]

Co-authors: Andrea Mazzocchetti[2]; Laura Parisi[3]; Nepo Dunz[4]; Regis Gourdel[5]

[1] *EDHEC, ERCII*

[2] *Ca' Foscari University of Venice*

[3] *European Central Bank*

[4] *The World Bank*

[5] *WU Wien*

Abstract:

We study the double materiality of climate physical and climate transition risks in the euro area economy and banking sector. First, by tailoring the EIRIN Stock-Flow Consistent model, we provide a dynamic balance sheet assessment of the Network for Greening the Financial System scenarios. We find that an orderly transition achieves early co-benefits by reducing carbon emissions (-12% in 2040 than in 2020) while supporting growth in economic output. In contrast, a disorderly transition worsens the euro area economic performance and financial stability, while high physical risks can lead to a real GDP level 12,5% lower in 2050 than with an orderly transition. Second, by extending the concept of climate sentiments, we analyse how firms' expectations about climate policy credibility affect their investment decision in high or low-carbon goods, and the impact on economic decarbonization. We find that firms that trust an orderly policy introduction and anticipate carbon price scenarios, switch earlier to low-carbon investments, leading to 20% less carbon emissions in some periods. This, in turn, contributes to decrease the risk of stranded assets for the economy and for the banking sector. Our results highlight the crucial role of early and credible climate policies signal to investors in the low-carbon transition.

Biography:

Irene Monasterolo is Professor of Climate Finance at EDHEC Business School and EDHEC-Risk Climate Impact Institute. Irene has codeveloped the climate stress test of the financial system that introduced the framework to translate climate scenarios into adjustment in financial valuation and portfolio risk. The climate stress test includes the Climate Policy Relevant Sectors, a science-based classification of activities' exposure to climate transition risk that has been applied by several financial supervisors. Irene's research has also investigated under which conditions green finance policies can foster the low-carbon transition while mitigating trade-offs with the EIRIN model, which has been applied by the World Bank and the ECB. Irene has published in Science and Nature Climate Change.

Bridging socioeconomic pathways of CO2 emission and credit risk

Speaker: Florian Bourgey[1]

Co-authors: Emmanuel Gobet[2]; Ying Jiao[3]

[1] *Bloomberg L.P.*

[2] *Ecole Polytechnique*

[3] *Université Lyon 1*

Abstract:

This paper investigates the impact of transition risk on a firm's low-carbon production. As the world is facing global climate changes, the Intergovernmental Panel on Climate Change (IPCC) has set the idealized carbon-neutral scenario around 2050. In the meantime, many carbon reduction scenarios, known as Shared Socioeconomic Pathways (SSPs) have been proposed in the literature for different production sectors in more comprehensive socio-economic context. In this paper, we consider, on the one hand, a firm that aims to optimize its emission level under the double objectives of maximizing its production profit and respecting the emission mitigation scenarios. Solving the penalized optimization problem provides the optimal emission according to a given SSP benchmark. On the other hand, such transitions affect the firm's credit risk. We model the default time by using the structural default approach. We are particularly concerned with how the adopted strategies by following different SSPs scenarios may influence the firm's default probability.

Biography:

Florian Bourgey is a quantitative researcher in the Quantitative Research Group at Bloomberg L.P., London. He holds a Ph.D. in applied mathematics from Ecole Polytechnique. His research focuses on Monte Carlo simulations, stochastic approximations, climate risk, mathematical finance, and machine learning.

Is climate stress testing accounting for scenario uncertainty right?

Speaker: Matteo Gasparini[1]

Co-author: Moriz Baer[1]

[1] *Oxford University*

Abstract:

Different studies show that the net zero carbon transition might have a significant impact on financial stability. However, very few discuss how this could change depending on the many different ways in which the transition could manifest. In this paper we explore the impact of three possible mitigation scenarios in a consistent climate stress test model. We show that the impact of the net zero transition on companies valuations, and consequently on the financial system, varies for the same emission target (below 2C) depending on how the transition will unfold. We argue that expanding the breadth of scenario narratives could significantly improve our understanding of climate-induced uncertainty and we discuss some implications of our study.

Biography:

Matteo is a Doctoral researcher at Oxford University's Smith School of Enterprise and Environment (SSEE) and Institute for New Economic Thinking (INET). Previously, he was an Associate at McKinsey & Co based in London where he supported leading financial institutions across Europe on climate, risk, strategy and analytics projects.

Banks divesting and stranding assets: a self-reinforcing phenomenon?

Speaker: Fanny Cartellier[1]

[1] *ENSAE Paris*

Abstract:

Divestment from the most carbon-intensive sectors up to 2050 has been pledged by a high number of GSIB European banks. Given their own risk preferences and constraints, some banks may start to divest first. By lowering financing resources of the company, it may increase the probability of default of the company, and hence have an impact on the financing choice of banks who would have kept the same financing amount otherwise. We model a dynamic game of divestment between heterogeneous banks who initially finance a low-carbon company relying on important tangible assets and show that it has a unique Nash equilibrium. We calibrate it on an oil company and find the Nash equilibrium between two heterogeneous banks numerically. We show that this divesting game between banks may end up in an acceleration of the stranding phenomenon, for given conditions of real economy, compared to initial divesting pledges.

Biography:

Fanny Cartellier is a PhD student at CREST-ENSAE Paris under the supervision of Peter Tankov and Christian-Yann Robert since January 2020. She's working on the modelling of transition risks to financial stability, using stochastic and dynamic framework. She has started with a literature review on climate stress testing, available at SSRN, and submitted to Journal of Financial Stability. She has a mixed training in economics and quantitative finance. She's dedicating her research to understanding how a low-carbon transition could be implemented without hampering financial stability.