

Advances in Macro and Finance Modelling of Climate Change

17-18 March 2022

Welcome address by Olivier Garnier

- Good morning and welcome to all the participants at this conference dedicated to the “*Advances in macro and finance modelling of climate change*”. A very warm welcome especially to all the distinguished speakers and participants who join us today and tomorrow to be a part of this event. We are honoured to have you all with us in this room or online.
- Unfortunately, ongoing renovation work prevents us from hosting the conference in the Banque de France premises. However, Comet, the jungle-like meeting space where we are today, is the perfect place for a Green conference!
- It is a pleasure for me to introduce this event on behalf of the Banque de France. As you know, at the Banque de France and within the Eurosystem, we encourage all initiatives to understand better the macroeconomic and financial implications of climate change. The Banque de France was at the origin of the creation of the Network for Greening the Financial System (NGFS), which was launched in Paris in December 2017 and now counts more than one hundred members. The European Central Bank has also been the first central bank to include climate change issues in its strategy review.
- The greening of the economy has become a major challenge. The transition to a low-carbon economy can have substantial macroeconomic impact, notably through a rapid obsolescence of the capital stock and stranded assets. It could also trigger significant labour reallocation, skill obsolescence and job losses. The anticipation of transition policies could also affect behaviours even before they are actually announced or implemented. Altogether, such developments could create challenges for policymakers to fulfil their macroeconomic and financial stabilisation mandates.

- The transition will not be possible without adequate policies. Thus, we need to deepen our understanding of the effects of climate change not only on prices but also on growth and on the financial system, both over the business cycle and over much longer time horizons. Economists have an important role to play in providing policymakers with tools, recommendations and insights on the paths to follow. Throughout this conference, we will see that researchers have begun to develop models and methods to this end, especially through:
 - First, the analysis of the transition within dynamic macroeconomic models incorporating different types of economic policies;
 - and second the financial impact of the transition.

First, the structural modelling of climate changes and the implications for macro policies

- Initially, studies in the economics of climate change have heavily relied on so-called Integrated Assessment Models (IAM). One of the most famous IAM is the Dynamic Integrated model of Climate and Economy (DICE), popularized by Nobel Prize William Nordhaus. The importance of this neoclassical energy-economy-environment model stems from its use by policymakers and institutions to estimate the social cost of carbon, which aims at measuring the externalities (like economic costs and damages) incurred in emitting one ton of carbon dioxide into the atmosphere.
- DICE models are often used to derive the greenhouse gas reduction pathway that maximizes the social welfare. The main policy instruments to this end are carbon emission regulation and taxes. Environmental DSGE (E-DSGE) models have been jointly developed for a decade. They embed the climate block of DICE models. Given their explicit micro-foundations of economic behaviors, they are

well suited for analyzing economic policies. Moreover, they can incorporate uncertainty into agent decision-making processes.

- In this vein, the externalities of the economic activity on climate were introduced into RBC models and in New Keynesian E-DSGE models. Garth Heutel and Barbara Annicchiarico, who participate to this conference, were among pioneers in this field. All in all, these new macroeconomic models have begun to be used to analyze how economic policies can support the energy transition. This concerns fiscal, macroprudential and monetary policies.

1) **Fiscal policy:** Some recent papers investigate the role of fiscal policy in mitigating transition risk. By investigating the role of government action, through public subsidies, taxation and/or emission quota, the papers that will be presented this morning in Session 1 by Gauthier Vermandel and by Conny Olovsson offer new perspectives to help greening economies.

2) **Macroprudential policy:** In E-DSGE with financial frictions, it is possible to investigate the effects of introducing “brown-penalizing” through taxes or subsidies on banks’ assets, depending on whether assets are brown or green. The paper that Garth Heutel will present in Session 1 is representative of this emerging literature.

3) **Monetary policy:** Some (but still few) contributions based on structural models deal with the way monetary policy in general, and unconventional monetary policy in particular, could dampen transition risk. The three papers presented in Session 2, by Barbara Annicchiarico, Valerio Nispi Landi, and Carolin Nerlich deal with monetary policy in the context of climate change.

In addition to macroeconomic risks, climate change raises important financial concerns.

- The impact of climate change on financial stability hinges not only on the distribution of financial exposures but also on the evolution of prospective

financial system losses. For this, innovation in forward-looking modelling is needed to identify prospective financial losses. Stress-testing models provide valuable information to quantify future risks and prepare the financial system to be more resilient to such risks.

- Session 3 will be devoted to climate stress testing from a financial market perspective. The three papers by Hyeyoon Jung, Henk Jan Reinders and Marcin Kacperczyk propose different approaches to measure the impact of climate-related risks on large global banks or on the market value of financial assets.
- Before concluding, I would like to thank our three prestigious keynote speakers: Warwick McKibbin, Valérie Masson-Delmotte and Christian Gollier. I would like to thank them in advance for the valuable insights they will give us on the issues related to climate change.
- Last but not least, please join me in congratulating the organizers of this promising conference: Jean-Guillaume Sahuc and Stéphane Déès. They have done an outstanding job in setting such an outstanding conference agenda.

I wish you an excellent Conference.