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## Embracing dynamic complexity in climate economics: The DSK Agent-based Integrated Assessment Modelling

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Integrated Assessment Models are a key tool to search and evaluate climate policies - i.e. a set of measures best suited to avoid the worst of climate change without “harming the economy” too much.

Climate action  $\mu(t)$  is typically portrayed as coming at a cost (relative to a no-policy case)  $C(\mu)$ , where  $C$  is a positive, monotonously increasing function.

However, this representation ignores economic dynamics. For instance, it assumes that CO<sub>2</sub> abatement costs today are independent from efforts done last year, whereas in reality, previous investments in infrastructure or knowledge will have effects on abatement and abatement costs in the future. More generally speaking, the economy is a complex system of interacting players, capable of path-dependent behaviour, multiple equilibria or out-of-equilibrium dynamics, and transitions between states, and climate policy measures (or climate impacts) targeting some actors can affect the whole system.

Agent-based modelling has in recent years emerged as a tool to break the constraints imposed by generalised equilibrium models underlying most IAMs. Agent-based models directly simulate the activities of diverse interacting agents, rather than making assumptions of the aggregate behaviour of groups of agents.

Here, we present an agent-based Integrating Assessment Model, the Dystopian Schumpeter-Keynes (DSK) model. It contains an industrial sector with interacting machine and consumption good firms, a banking sector, a government, and an electricity supplier, coupled to a climate module. The model has been used, among other things, to investigate how different types of climate impacts propagate through the economy. In this presentation, we focus on climate policy. In particular, we investigate

1. which policy tools, or combination of tools, are effective at bringing about a sufficiently rapid decarbonisation. Is a uniform carbon tax really sufficient to cause a green transition?
2. what will be the side effects on the economy. Will there be ongoing strain on the economy, or will costs be transitional - potentially even with long-term benefits?