Philippe Aghion

Title: Transition to Green Technology along the Supply Chain (joint with Lint Barrage, David Hémous, Ernest Liu)

Abstract
We analyze a model of green technological transition along a supply chain. In each layer, a good is produced with a dirty technology, or, if the required “electrification” innovation has occurred, with a clean technology which uses the immediate upstream good. We show that the economy is characterized by a single equilibrium but multiple steady-states, and that even in the presence of Pigouvian environmental taxation, a targeted industrial policy is generally necessary to implement the social optimum. We also show that: (i) small, targeted, industrial policy may bring large welfare gains; (ii) a government which is constrained to focus its subsidies to electrification on one particular sector, should primarily target downstream sectors; (iii) when extending the model so as to allow for supply chains also for the dirty technology, overinvesting in electrification in the wrong upstream branch may derail the overall transition towards electrification downstream. Finally, we illustrate our model with a calibration to decarbonization of global iron and steel production via hydrogen direct reduction, and show that, absent industrial policy, the economy can get stuck in a “wrong” steady-state with CO2 emissions vastly above the social optimum even with a carbon price in place.