Optimal Subsidies for Capital Replacement and the Green Transition

Abstract

We analyze optimal subsidies for the replacement of durable assets in a model with heterogeneous producers, endogenous capital-embodied innovation, and environmental externalities that depend on capital vintages. We characterize the constrained-efficient allocation assuming a planner chooses capital replacement subject to the equilibrium evolution of innovation. Optimal subsidies equal the sum of two terms: (i) the difference in present discounted value of damages associated with old vs. new capital and (ii) the social value of innovation induced by capital replacement, net of the associated markup distortion. We generalize the analysis to the case of heterogeneous technologies. We calibrate the model using evidence on aircraft, vehicles, and aggregate investment. Initially, the optimal transition features an investment spike, which comes at the cost of consumption; optimal subsidies are steeply increasing in the age of the replaced asset. In the long run, optimal policy is determined by the trade-off between innovation and markups.

This paper is joint work with Andrea Lanteri and Hyeonsik Yoon.

Fabio Bertolotti
Assistant Professor at Collegio Carlo Alberto (on leave from the Bank of Italy)