Dynamic heterogeneous R&D with cross-technologies interactions

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In many countries, inducing large-scale technological changes has become an important policy objective, as in the context of climate policy or energy transitions. Such large-scale changes require the development of strongly interlinked technologies. But current economic models have little flexibility for describing such linkages. We present a model of induced technological change that covers a fairly large set of cross-technology interactions and that can describe a wide variety of long-run developments. Using this model, we analyse and compare the development induced by optimal fifrm behaviour and the socially optimal dynamics. We show that the structure of cross-technology interactions is highly important. It shapes the dynamics of technological change in the decentralised and the socially optimal solution, including the prospects of continued productivity growth. It determines whether the decentralised and the socially optimal solution have similar or qualitatively diffffferent dynamics. Finally, it is highly important for the question whether simple r&d policies can induce effifficient technological change.