Green Growth or Degrowth? Green Transition under Ecological Limits

Abstract

Can economies grow while staying within ecological limits? We revisit the directed technical change framework of Acemoglu et al. (2012) by relaxing two assumptions central to the green-growth versus degrowth debate. First, we assume that the clean sector also relies on an exhaustible resource (e.g., critical minerals), alongside the dirty sector's reliance on fossil fuels. When the clean resource is relatively costly, a carbon tax induces a larger transitional slowdown than in models without clean-resource scarcity. Long-run green growth remains feasible if clean-resource prices rise and clean R&D is permanently subsidized. Second, we impose a no-backstop cap on the clean share of output, capturing thermodynamic limits to substitution. This yields a finite maximum sustainable scale and requires permanent climate policy: if the cap is far away, policy achieves strong decoupling and then stabilizes the economy at a sustainable level (green growth); if close, managed degrowth becomes necessary. Our analysis suggests that even modest strong-sustainability assumptions, when introduced into an otherwise optimistic green-growth framework, reinforce the message that climate policy must be a lasting institution.