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Summary

The global energy crisis that began in fall 2021 and the following spike in energy price constitute a major challenge for the world economy which risks undermining the post-COVID-19 recovery. In this paper, we develop and validate a new macroeconomic agent-based model with an endogenous energy sector to analyse the role of energy in the functioning of a complex adaptive system and assess the effects of energy shocks on the economic dynamics. The economic system is populated by heterogeneous agents, i.e., households, firms and banks, who take optimal decision rules and interact in decentralized markets characterized by limited information. After calibrating the model on US quarterly macroeconomic data, we investigate the economic and distributional effects of different types of energy shocks, that is an exogenous increase in the price of natural resources such as oil or gas and a decrease in the energy firms' productivity. We find that whereas the two energy shocks entail similar effects at the aggreagate level, the distribution of gains and losses across sectors is largely driven by the subsequent impact on the relative energy price, which varies depending on the type of shock. Our results suggest that, in order to design effective measures in response to energy crises, policymakers need to carefully take into account the nature of energy shocks and the resulting distributional effects.

Keywords: Energy Sector; Energy Shocks; Agent-Based Models; Macroeconomic Dynamics

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