A Data-Driven Agent Based Model for the Italian Economy

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Abstract : We develop a data-driven agent based model (ABM) for the Italian economy. We calibrate the model for the initial condition and parameters. As a preliminary step, we replicate the Monte-Carlo simulation for the Austrian economy. Then, we evaluate the dynamic properties of the model: the long-run equilibrium and the allocative efficiency in terms of disequilibrium patterns arising in the search and matching process for final goods, capital, intermediate goods, and credit markets. In this perspective, we use a randomized initial condition approach. We perform a robustness analysis perturbing the system for different parameter setups. We explore the empirical properties of the model using a rolling window forecast exercise from 2010 to 2022 to observe the model's forecasting ability in the wake of the COVID-19 pandemic. We perform an analysis of the properties of the model with a different number of agents, that is, with different scales of the model compared to the real economy. The model generally displays transient dynamics that properly fit macroeconomic data regarding forecasting ability. We stress the model with a large set of shocks, namely interest policy, fiscal policy, and exogenous factors, such as external foreign demand for export. In this way, we can explore the most exposed sectors of the economy. Finally, we modify the technology mix of the various sectors and, consequently, the underlying input-output sectoral interdependence to stress the economy and observe the long-run projections. In this way, we can include in the model the generation of endogenous crisis due to the implied structural change, technological unemployment, and potential lack of aggregate demand creating the condition for cyclical endogenous crises reproduced in this artificial economy.

Keywords : agent-based models, behavioral macro, macroeconomic forecasting, micro data
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