Overcoming the trade-off between economic growth and CO2 emissions. Tools and policies with CGE model based on E-SAM

Topic: Energy policies
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As a member of the European Union, Italy is committed to respect the binding targets to contribute in reducing the total amount of greenhouse gas emissions by 55% within 2030 and achieving the net zero emissions balance by 2050.
Since the Italian-specific commitment involves the reduction of greenhouse gases from selected sectors (road transport, buildings, agriculture, waste management and non-energy industries) the National Recovery and Resilience Programme (PNRR) and the Integrated National Energy and Climate Plan (PNIEC) provided for comprehensive structural and sectoral reforms and investments aimed at achieving these objectives. Although considerable progresses have been made in terms of reducing greenhouse gas emissions, further efforts are required to meet the targets by 2030.
Indeed, energy and climate transition processes are an important challenge that will require significant investment and generate a significant tax impact. The transition will involve a large-scale shift in employment between sectors, requiring the Government to implement policies to facilitate this structural transformation and protect vulnerable households. In this context, the selection of the most appropriate environmental policy tool or set of tools requires an ex-ante evaluation of the potential disaggregate economic and environmental effects of each proposal.
In particular, the development of multisectoral general equilibrium models based on national and regional accounts responds to this exigency as they are able to delineate the functioning of economic systems in disaggregated terms and identify the transmission mechanisms of policy measures. Computable General Equilibrium (CGE) models calibrated on Social Accounting Matrices (SAM) are widely applied to support the policy maker decision process on different domains and they can be extended to the evaluation of the effectiveness of environmental policies since they can be extended to include the interactions between environmental and economic variables.
With this intent, in this paper an extension of MACGEM-IT (Multisector Applied Computable General Equilibrium Model for Italy) to include the environmental module is proposed, to provide the policy maker with an analysis instrument able to evaluate both the economic and environmental disaggregate, direct and indirect impacts of policy measures on the income circular flow.
The environmental extended MACGEM-IT model is a SAM based CGE model in which the environmental variables are assumed to be endogenous, thus related not only to the total amount of total production (or consumption) of goods, but also to the amount of abatement capital demanded by production processes to trigger the energy transition target. Indeed, the demand of abatement capital would drive to technological leap toward less polluting production processes. This can represent one of the channels to reduce the amount of CO2 emissions, and consequently the amount of carbon taxes payed by activities. In other words, an effort is made to incorporate in the model the possibility for the production processes to substitute the polluting capacity, thus the costs associated to environmental taxes, with new capital able to abate the amount of emissions. In this perspective, the CO2 emissions would be positively affected by the total production and negatively affected by the amount of capital abatement employed in each production process, allowing to overcome the supposed trade-off between environment protection and economic growth.
Based on the SAM for Italy integrated with environmental flows (E-SAM), the environmental MACGEM-IT model will be implemented to assess the impacts of hypothetical scenarios of technological transition to greener processes coupled with environmental fiscal policies.