Using supply and use tables to study the energy sector: a simulation of the self-consumption in Spain

Topic: IO Data for environmental and social analyses
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The redesign of the electricity market is an absolute necessity today, since the transformation to a decarbonized system is needed in order to maintain the environment, which implies the use of renewables, for which several actions and efforts are needed.
Within the countries of the EU, despite its great potential in green technologies, Spain has a high energy dependence and its electricity system is characterized by a low competition and other managerial problems. One of these critical issues is the challenge of the implementation of the self-consumption, which will be the issue analysed here. Thus, the aim of this this paper is to analyse the economic and environmental effects of the implementation of the electricity self-consumption in Spain.
Self-consumption might reduce the electricity losses due to transmission and distribution. Secondly, it is a clear advance in the aim of a sustainable and decarbonized economy. And, finally, according to Langarita et al. (2017), the implementation of the self-consumption could reduce electricity costs in an irrigation scheme, such as one in the Northeast of Spain. Now, we would like to know how this measure could affect the rest of the variables and industries of the whole Spanish economy from a multisectoral perspective, not only irrigated agriculture in a concrete area.
As is known in the literature, the input-output model is a good tool to study energy and electricity sectors. Inside the input-output framework, we propose in this paper to use supply and use tables, since electricity is a product and we can observe its production in the supply table. In this sense, we use the supply and use tables for Spain for 2015, published by the National Institute of Statistics (INE in its Spanish acronym) and we modify the coefficients of the different sectors to include the scenario of self-consumption.
As a first step to advance in the modelling of the electricity self-consumption, with the original supply and use tables, following the methodology of EUROSTAT (2008), we obtain the symmetric table. Then, after having simulated the self-consumption in the supply and use tables, we obtain the symmetric one again. We use input-output applications to see the differences between the symmetric table before and after the self-consumption implementation. Making use of an emissions vector, we can fast observe the effects on CO2 emissions. We can also see the structural change in the Spanish economy associated with these simulations. Additionally, how the household income changes, the trade, and other economic variables. To this end, we will mainly use dependence chains and structural decomposition analysis (SDA).
Following Duarte et al. (2017), a next step in this analysis is the self-consumption simulation disaggregating electricity into several subsectors in supply and use tables.