



**The Coalition
of Finance Ministers
for Climate Action**

The use of external models and the climate policy decisions they inform

Spain—Ministry of Economy, Trade and Enterprise

A contribution to the 'Compendium of Practice from a Global Community of Ministries of Finance and Leading Organizations: Economic analysis and modeling tools to assist Ministries of Finance in driving green and resilient transitions'

Topic: Specific analytical tools and approaches relevant to Ministries of Finance

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Access the full Compendium at www.greenandresilienteconomics.org

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Within the field of energy and climate, the Spanish Ministry of Economy, Trade and Enterprise undertakes economic modeling exercises aimed at estimating the impact of macro-relevant policies as well as the exposure to climate-related shocks.

Modeling tools

Policy simulation is an important exercise in the process of medium-term economic planning and policy coordination among countries, of particular relevance in the context of European Union Member States. Under the European Semester, the annual coordination cycle between Member States, as well as in the context of the National Recovery and Resilience Plans,¹ countries are asked to submit a series of documents explaining their economic policy plans in the medium term. In this context, policy modeling becomes a powerful tool to inform and assess policy decisions.

Modeling exercises are mainly based on dynamic stochastic general equilibrium (DSGE) models calibrated for the Spanish economy, namely, the EREMS (Boscá et al., 2020), REMS (Boscá et al., 2010), and QUEST R&D (Ratto et al., 2009) models. DSGE models aim to capture the relationships between economic agents (households, companies, public fiscal and monetary authorities, and the rest of the world) by defining their behavior and their interactions in the main markets (goods, labor and capital markets). Simulations aim to translate policies to shocks in the exogenous variables or parameters of the model and result in estimated impulse-response paths of the endogenous variables,² which represent relevant macroeconomic variables, such as prices, employment rate, or GDP. The main advantage of these types of models compared with others that use constant multipliers or input-output approaches is they consider the endogenous responses from all agents to shocks as well as a long-run equilibrium that implies market clearing. Therefore, this approach allows green transition policies to be modeled as changes in certain structural parameters of the economy, and it allows the analysis of not only the direct short-run effects of these policies but also wider effects derived from the behavior of economic agents as a result of those changes.

Analyzing the impact of energy-related policies

The green transition entails a wide range of specific policies aimed at reducing the use of fossil fuels in the energy mix, with specific energy mix objectives detailed in the Spanish National Integrated Climate and Energy Plan. The impact analysis of this transition has been approached from both a macroeconomic perspective and a case-by-case policy perspective.

Macroeconomic perspective

The objective is to grasp the economic impact of the reduction in fossil fuel consumption that would result from the deployment of certain policies. Thus, the aim is not to analyze a specific policy but to analyze the overall impact of energy transition policies, if their goals were to be met. For modeling purposes, the impact of fossil fuel reduction policies is translated into shocks:

- A positive total factor productivity shock, equivalent to the savings in import needs derived from lower fossil-fuel dependency and higher energy efficiency; given Spain's external dependence on fossil fuel imports, reducing the consumption of such energy inputs translates into lower costs for companies in their production processes, which increases their external competitiveness and thus their productivity levels.
- A temporary increase in the depreciation rate of capital, to account for fossil fuel related capital that will no longer be available in the production function; such an approach allows the model to simulate the technology substitution necessary in the green transition, where fossil fuel capital is no longer available, leading to investment in green capital.

¹ After the COVID-19 pandemic, the European Union created the Recovery and Resilience Facility, which offered support to Member States in the form of grants and loans to carry out the reforms and investments included in said plans, aimed at facilitating the green and digital transitions, as well as addressing national structural and economic challenges.

² The simulations have been computed using the open-source preprocessor Dynare.

In the short run, capital suffers a temporary depreciation rate shock, which means that higher levels of investment are needed in order to sustain a certain level of output. Thus, such a shock generates a positive investment cycle, which could be interpreted as the investments in green technologies incentivized by fossil fuel restrictions. This positive demand-driven impact is temporary: once the depreciation rate goes back to its normal values, investment levels go back to pre-shock values. In the long run, once the depreciation rate shock has faded away, the total factor productivity shock generates a structurally higher GDP level. Thus, the long-term impact is supply driven and is positive, and the short-term impact generates a positive but temporary investment cycle.

Policy perspective

The case-by-case analysis of policies is aimed at incentivizing the green transition and dealing with its effects. This approach considers different paths to the transition, with different short- and medium-term impacts. In the short run, direct effects are estimated using administrative data and surveys, to account for the exposure of companies and households to changes in prices and income because of green policies. Simulations through DGSE models are also carried out to consider the potential impact on macroeconomic variables and indirect effects. However, there are expectations of future improvement in terms of tools and models that explain the exposure of economic agents to energy and climate policies in a more precise way.

Analyzing the economic impact of changes in climate patterns

Aside from policy evaluation, preliminary workstreams are being carried out to improve analysis of the exposure to climate change, in order to inform policy discussions. The objective is to be able to analyze the subject at two levels:

- Assessing the macroeconomic effect of increased uncertainty in Spain as a consequence of the volatility associated with climate change, which requires dedicating resources to obtaining information and insurance, and might generate long-term persistent effects if the exposure to emerging risks is under-insured.
- Identifying markets where market failures do not allow an adequate response to the effects of climate change, which would be public policy priorities.

References

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