

Cross-border effects between the Spanish and French electricity markets: Asymmetric dynamics and benefits in the light of European market integration

Ignacio Mas Urquijo^a and Florentina Paraschiv^{b,c}

In 2014, Spain was the European country with the highest interconnection deficit in the EU, with additional 6.8 GW required (mostly with France) to meet the 2020 EU interconnection goals. After more than 30 years without new interconnectors commissioned between Spain and France, a key step towards market integration to Spain was the commissioning of a new underground interconnector passing the Pyrenees, commissioned in October 2015. In this paper, we analyze cross-border effects between the Spanish and French spot electricity markets under different market integration regimes. We employ a number of cointegration tests, as well as fundamental modeling of hourly spot electricity prices.

We found that benefits of grid integration are asymmetric, whereby especially users in import-dependent Spain take advantage of the development of the cross-border infrastructure with France. Driver of the low import prices is not only the historically nuclear-based energy production in France, but also the undergoing energy transition in the country. In addition, the substitution between domestic fuel-based units and imported green electricity allows Spain to further decarbonize its energy mix and increase security of supply at EU level. The expansion of the cross-border grid until 2030 will be key for a successful phasing out of remaining coal-based units, and to reduce the dependency of EU countries as Spain on imported fossil fuels.

Although European initiatives rely on the principle of solidarity of the EU, upcoming projects should be financed considering the asymmetric benefits of grid integration and especially the apparently limited interest from net exporting countries like France, which has a relatively low degree of market liberalization as compared to other European peers. In addition, the integration with a country with a high share of variable RE, as is the case for Spain, results in an undesired increase in volatility in the French electricity market. The financial support for involved participants should be granted inversely in relation to the economic savings perceived from the infrastructure project. Such support scheme design could efficiently align incentives of participants and lead to a faster and successful achievement of the common interconnection goals. Our results also raise the question of whether the development of RE in net exporting countries should at least in part be financed by import-dependent neighbors or even with EU funds. Our empirical evidence is relevant not only to EU policy makers, but also to Spanish and French energy players. Results allow to derive conclusions on the promotion of renewable energies and on the design of their support schemes.

Finally, our results highlight the reliance of countries with a high share of variable RE generation like Spain on the backup provided by countries with a high share of dispatchable (nuclear) generation like France, a finding which is relevant in the context of the new EU Taxonomy, which among others recognizes nuclear generation as a necessary transitional technologies to achieve climate neutrality by 2050.

a Corresponding author. University of St.Gallen, Institute for Operations Research and Computational Finance, Bodanstrasse 6, CH-9000 St. Gallen, Switzerland. E-mail: ignacio.masurquijo@gmail.com

b Department of Finance, Zeppelin University, Am Seemooser Horn 20, Friedrichshafen, 88045, Germany

c NTNU Business School, Norwegian University of Science and Technology, 7491 Trondheim, Norway