

# Analysis of mean and volatility price transmissions in the MIBEL and EPEX electricity spot markets.

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The passing of Directive 96/92/EC opened up the path to the liberalization of electricity markets in Europe. At the beginning, national electricity pools were created such as OMEL in Spain, AEX in Germany, Powernext in France and EXAA in Austria. Then regional initiatives were launched, e.g. MIBEL to integrate the Spanish and Portuguese markets, and EPEX to integrate French, German, Austrian and Swiss markets. Directive 2003/54/EC set the target of full integration of national markets by 2014. Thus, harmonization of market rules is one pillar, alongside effective price responsiveness and transmission of volatilities between trading partners. The purpose of our research is to assess the extent to which price convergence is being achieved.

We use data on daily electricity prices from MIBEL and EPEX for the period from 7-1-2007 to 2-29-2012. The existence of negative prices for the German market is handled by using the inverse hyperbolic sine transformation. The methodology used is based on multivariate Generalized Autoregressive Conditional Heteroscedastic models, which allow mean and volatility transmissions of prices between different markets to be studied. An analysis of the presence and degree of interdependence between the markets and a study of price convergence are used to determine whether the regional markets selected are integrated. Constant and dynamic conditional correlation models in which seasonal effects are taken into account are estimated and compared to select the best models and analyze the mean and volatility transmissions.

Our estimation results are mixed. The pairs formed by the three largest countries, namely Spain-France and France-Germany, do not seem to be on the path of convergence since there is no evidence of volatility transmissions. These are precisely the countries where the share of imports in total electricity consumption is lowest (3% for France and Portugal and 8% for Germany). Moreover, exchange between Spain and France does not follow proper market rules: Lower prices in one pole do not necessarily mean a net exporting position, which raises inefficiencies in electricity allocation. The results are more supportive when the smaller countries are involved. Thus, we can conclude that the targets of the Directive 2003/54/EC and the Eu-

ropean Climate Foundation Energy Roadmap 2050 can be achieved as long as there is harmonization of market rules across countries and sufficient interconnection capacity.

Our research uses a methodology that, under certain conditions in the behavior of the price time series, can be used to analyze the fulfilment of the targets set in the Directive and reveal evidence of shortcomings in the process. The Price Coupling of Regions initiative launched by the European Union can be evaluated using this approach, by analyzing the different pairs of power exchanges involved.