

Modelling trans-boundary trade using an object-oriented model: The case of the west Mediterranean Market

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Abstract

The Mediterranean natural gas market is a particular one. Natural Gas projects are capital intensive with important and costly trade infrastructure needed. Partly due to that, long term projects are still the most economically feasible tools for trade. The European Commissions Green Paper on Energy emphasises Europe's future dependence on external suppliers and recommends the diversification of partners and the diversification of fuels amid a move towards deregulation. In this same line of argument, some importing countries have introduced legal constraints to trade. These fundamental attributes are not taken into explicit account by many academic models.

There is little academic research for trade modelling taking into account diversification of partners and infrastructure issues. The present paper attempts to tackle these two issues by: (1) Adapting a novel modelling technique taking into explicit consideration long term contracts with infrastructure change to trade economics modelling; (2) Applying this model to the West-Mediterranean natural gas market (Spain, France, Italy as buyers; Russia, Netherlands, Norway, Algeria, Nigeria, Iran and others as suppliers and potential suppliers); And (3) providing a framework for explicitly taking into consideration security of supply and demand through the diversification of partners.

LNG liquefaction and regasification plants and pipelines are considered as objects with attributes (e.g. capacity and date of becoming operational). Long Term contracts are also seen as objects (attribute examples are quantity, date of start, expected date of finish). Countries are also considered as objects (with array attributes of production series, consumption series, and the incorporation of legal constraints such as Spain's 60% supplier maximum.)

The advantages of this modelling technique is that it allows for infrastructure change (the construction of a new LNG liquefaction plant, or a new pipeline) and actually invokes infrastructure changes when so required according to past patterns. Also, through the usage of boolean attributes 'enabled' with different infrastructure objects, it allows for scenario simulation such as problems with pipelines restricting capacity. This modelling technique

also allows for the incorporation of legal constraints which was not possible with most other trade modelling techniques.

This model also incorporates a trade matrix based on portfolio weights that calculates, according to past patterns obtained econometrically, the weights of supply of each country as a partner to the other with regards to the spare capacity and the price and taking into consideration security of supply concerns through the diversification of partners (importers and exporters).