

LNG import quotas in oligopolistic markets – What are the benefits for the European Union’s natural gas market?

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Overview

The natural gas market within the European Union (EU) is characterized by a strong import dependency on highly concentrated and oligopolistic suppliers from the Russian Federation, Norway or countries from North Africa. Due to declining indigenous production in the EU in the future, in particular in the Netherlands and the United Kingdom, this trend is likely to strengthen over the next decades (IEA 2015b). However, the oligopolistic market structure and therefore the strategic market behavior of some suppliers yields in particular two effects: (1) higher prices for the consumers as a result of producers’ quantity withholding, and (2) the need of stronger actions regarding security of supply due to the strong dependence on a small number of suppliers that are often located in political sensitive regions (Lefèvre 2007).

One important pillar of the European Commission’s “European Energy Security Strategy” to address the aforementioned issues is the diversification of supplier countries and routes (European Commission 2014). On the one hand, diversification can induce more competition and therefore lower prices by supporting the market entry to new market players. On the other hand, by an increase of market participants on the supply side, diversification decreases the risks of disruptions regarding single gas suppliers (Vivoda 2009).

The member states of the EU have strongly focused on the development of LNG import infrastructure to participate in the more competitive global LNG market in order to diversify the natural gas market. Thus, the EU’s LNG regasification capacity has more than doubled from a yearly capacity of 100 bcm in 2004 to a yearly capacity of 214 bcm in 2015 (GIE 2016). However, with a current import amount of solely 43 bcm in 2015, only 20 percent of the existing import capacity is utilized (IEA 2015a).

The objective of our work is the investigation of a minimum LNG import quota, comparable to the one in Lithuania (ACER/CEER 2015), for the entire EU’s natural gas market to increase the import terminal utilization within the EU. Thereby, the focus of our analysis is on the following questions:

- What is the optimal LNG import quota to diversify the EU’s natural gas market with respect to the domestic consumer rents and the profits of domestic gas suppliers?
- Could already the credible threat of a LNG import quota lead to a change in the oligopolistic players’ market behavior towards a more competitive pricing regime?

Methods

To answer those questions we structure the methodological section of our analysis into two main parts: (1) a theoretical simplified investigation in a oligopolistic model with three players and (2) an application of a more complex market model that covers the entire EU’s natural gas market and its global interdependencies.

Within the theoretical part of our work we develop a simple model with three market participants, separated in two Cournot players and a competitive fringe. To represent the oligopolistic character of the gas market we use a conjectural variation model. While the first Cournot player with unrestricted production capacity and low production costs represents the main external market supplier, the second Cournot player represents a smaller domestic supplier with similarly low production costs but constrained capacity. The competitive fringe, also constrained in capacity but with high production costs, characterizes the LNG supply. In a first step, we analyze in which parameter range a minimum LNG import quota decreases gas prices in a way such that the domestic welfare (the sum of consumer rent in the domestic market and the profit of the domestic gas supplier) is maximized.. Based on that, as a reaction on such an import quota, we vary the conjectural variation and therefore the market behavior of the main external supplier.

In the second part of our analysis we use our previous findings and apply an import LNG quota within a more complex market model that covers the entire global gas market. Therefore, we extend the COLUMBUS model, developed by Hecking and Panke (2012). COLUMBUS is a spatial equilibrium model of the global gas market formulated as a mixed complementarity problem. The model is also able to cover market behavior of the main

natural gas suppliers. On the demand side it takes into account elasticity and therefore repercussions of quantity effects on the natural gas prices. The main difference to the simplified model is that the COLUMBUS model covers different natural gas markets with their capacity restrictions as well as their intertemporal and spatial interrelations. Also in the spatial equilibrium model we are able to vary the conjectural variation as a reaction of the market-dominating player on the LNG quota.

Results

The first results of our theoretical model show that even if the costs of LNG are higher than the costs of the other suppliers, there is a parameter range in which a LNG import quota leads to lower prices and an increase in the domestic welfare. The increase in domestic welfare exceeds the subsidy that is necessary for the LNG supplier to enter the market. However, the external supplier is losing some of its profits leading to a reduction of the total welfare. Therefore, already the threat of the implementation of a LNG import quota can be a credible threat to the dominating player and could change his market behavior into a more competitive direction to defend his market share leading to lower gas prices. Such a change towards a more competitive pricing regime would increase the total welfare and can be a Nash Equilibrium.

The simulation of a LNG import quota within EU's market using the COLUMBUS model shows similar results. Comparable to the fixed feed-in tariff of renewables in the German power sector, the LNG amounts are forced into the European market. The subsidy that would be necessary to finance the additional LNG amounts can be paid by the welfare increase of the EU's market. Due to the underutilized LNG import capacities, quotas up to 50 percent of the EU's demand are without additional investment in regasification capacity theoretically possible. The results show that a EU LNG quota has strong repercussions on the global natural gas market. It shifts LNG from Asia to Europe, resulting in higher prices and the need of further investments in global liquefaction capacities. In addition to that and in analogy to our theoretical results, the simulation shows that under the threat a LNG import quota the main European suppliers would change their market behavior to a more competitive direction, resulting in lower prices and increased total welfare.

However, our results are preliminary and we will apply further robustness checks to validate these.

Conclusions

We investigate and quantify the effect of a EU LNG import quota on the gas market structure and the prices. We find that there is an optimal quota for the EU market that results in lower prices and supply diversification. Since the LNG import quota is a credible threat, it could lead to a change of some players' market behavior and therefore to a decrease of natural gas prices even if it is not actually implemented.

In the next step of our research we will look at other options to diversify the EU's natural gas market and their effect on the oligopolistic structure and the natural gas prices. These options include minimum import levels for gas from the Southern Gas Corridor (the Caspian Region or the Middle east) and maximum import restrictions on the supply of market dominating players.

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