MERGERS OF GAS MARKET AREAS AND COMPETITION AMONGST TRANSMISSION SYSTEM OPERATORS: EVIDENCE ON BOOKING BEHAVIOUR IN THE GERMAN MARKETS

Jann T. Keller, Faculty of Economics and Business, University of Groningen
and Gastransport Nord GmbH,+49 441 20980 314, j.keller@rug.nl
Gerard H. Kuper, Faculty of Economics and Business, University of Groningen, +31 50 363 7018, g.h.kuper@rug.nl
Machiel Mulder, Faculty of Economics and Business, University of Groningen, +31 6 3103 5729, machiel.mulder@rug.nl

Overview

Transmission networks are crucial for gas wholesale markets and the European internal gas market. They connect the key players of the value chain as well as the different, mostly national, gas markets to allow for cross-border flows and trading of natural gas. They are operated by regulated transmission system operators (TSOs). In the past, market areas were determined by the individual TSO networks. However, driven by the prospect of higher liquidity in the wholesale market, welfare gains for society, and completion of the internal energy market in Europe, market areas are merged. Prior to a merger, a market area was equal to the physical network of a TSO. After a merger, a market area combines a number of physical networks of different TSOs. Furthermore, TSOs' gas transportation services are standardised by regulation and thus, are in principle interchangeable. This offers the choice to customers to book capacities for trading between market areas at different TSOs. Compared to other EU countries, Germany has by far experienced the most significant reduction from 41 market areas in 2006 to two market areas today, while the number of TSOs amounts to 16. Thus, the network users' ability to choose between capacities from different TSOs is particularly pronounced at the border of the German market areas. By drawing inferences from the experiences in the German market areas, one can learn how to further improve the design of the European regulatory regime for gas markets.

As network users have the choice to book capacity at different TSOs, the question arises if their booking behaviour is economically efficient. Secondly, if it is inefficient, what are the explanations for this? Thirdly, if inefficiencies are observed and the underlying factors are understood, to what extent should the tariff scheme and the allocation mechanisms be redesigned to improve the allocation of transport capacity?

Initial results show that network users' booking behaviour seems not to be efficient. This is defined by a booking behaviour that is not in every case leading to the lowest costs possible; a more expensive alternative is preferred over a cheaper alternative. This inefficient booking behaviour can be explained to a very large extent by further distinguishing between different capacity types that are offered. Hence, traders appear to be prepared to choose a more expensive route because of the conditions associated with that route compared to the conditions associated with routes that are at lower tariffs. This finding also means that the TSOs do not operate as pure natural monopolist anymore, but that they face competitive pressure from other TSOs, which is created by mergers of gas market areas.

Methods

To analyse the booking behaviour of network users, this paper utilises publicly available auction data provided by the leading platform for gas transport capacities in Europe named 'PRISMA' (https://platform.prisma-capacity.eu/). The data used covers auctions for firm capacities to and from the German market areas in 2016.

All auctions of the data set are assigned to 'homogeneous groups', which are defined by certain attributes. This will ensure that capacities within the same homogeneous group connect the same markets and are assumed to be interchangeable. A homogeneous group is defined based on the equality of the following attributes: product runtime, time of auction start, start of the product runtime, exit and entry market area, and the gas quality[1].

For each homogeneous group of auctions, we create a merit order based on total transport costs. The actual and the optimal costs of allocations are determined and compared in order to calculate the inefficiencies. We define and measure the level of inefficiency of a group of auctions - or an aggregation of these - by a ratio *IER*. *IER* is calculated as the ratio of actual transport costs (per unit) observed and the optimal transport costs (per unit) according to the merit order. A hypothesis to explain the inefficiencies is formulated and tested.

[1] Natural gas may be either high- or low-calorific, which needs to be distinguished.

Results

Determining the difference between actual and optimal capacity bookings
According to the data set used, capacity was booked only in a small fraction of all homogeneous groups of auctions at German gas market area borders in 2016. The overall inefficiency, i.e. the loss in consumer welfare, amounts to €4m for 2016. In terms of the flow direction of capacity to and from the two German market areas, the capacity and runtime weighted inefficiency varies between approximately 2 % and 31 % (see Table 1). Connections within the EU show higher inefficiencies (7 %) compared to connections to and from adjacent third countries (5 %). The overall inefficiency is approximately 6 %.

Explaining the difference between actual and optimal capacity bookings
Costs of observed bookings that exceed the optimal costs according to the merit order of a homogeneous group are considered to be inefficient. However, a merit order assumes that all auctions are adequate alternatives, i.e. all auctions of a group are interchangeable. Firm capacity defined and introduced by European legislation is further specified in Germany. Thus, there are different qualities of firm capacity offered, called 'capacity types'.

We hypothesise that the quality of firm capacity products matters to network users and has an impact on their booking behaviour. Only capacity products of the same capacity type are adequate alternatives. Therefore, the definition of homogeneous groups of auctions needs to be extended by the 'capacity type' for entry and exit.

As Table 1 summarises, the distinction of the quality of capacity types explains nearly all the inefficiencies initially measured. The hypothesis is validated. The inefficiency decreased varying now between approximately 2 % and 9 %. The inefficiency of connections within the EU as well as to third countries amounts to approximately 1 %. The same applies to the overall inefficiency. The loss in consumer welfare in monetary terms can be explained by approximately 93 %.

Table 1: Summary of results of efficiency calculation based on PRISMA auctions of German TSOs in 2016 distinguishing between capacity types compared to initial results

Cluster of connections	Weighted IER[2] (without distinguishing between capacity types)	Loss in consumer welfare [thousand euro]	Weighted IER (distinguishing between capacity types)	Explained loss in consumer welfare [%]
GASPOOL entry	1.22	731	1.09	78.59
GASPOOL exit	1.02	48	1.02	11.57
Total GASPOOL	**1.16**	**780**	**1.06**	**74.45**
NCG entry	1.03	2,389	1.00	97.65
NCG exit	1.31	894	1.04	92.75
Total NCG	**1.05**	**3,283**	**1.00**	**96.31**
EU	1.07	3,002	1.01	95.37
Non-EU	1.05	1,028	1.01	84.86
Overall	**1.06**	**4,030**	**1.01**	**92.69**

Conclusion

As the results show, approximately 93 % of all inefficiencies initially measured in monetary terms could be explained by our analysis. The remaining inefficiency after controlling for capacity types is about 1 %. Thus, we conclude that network users are sensitive to differences in gas transport capacity offered by TSOs and that their booking behaviour is efficient to a very large extent. However, there are still inefficiencies left unexplained, which may be subject of deeper analysis.

The analysis focussed on transport alternatives for network users. Market mergers are the source of such alternatives. As network users book capacities efficiently, there is an indication that market mergers also have the potential to create an infrastructure competition amongst TSOs. However, if and to what extent market mergers create competition amongst TSOs does not only depend on the network users' behaviour, and requires further research.

[2] IER always amounts to 1.00 + x, whereby x expresses the inefficiency in percent.