

TIME SERIES ANALYSES FOR MARKET DEFINITION OF LNG TRADE IN ASIA

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Overview

This study investigated the market definition of LNG trade in Asia which is the starting point for analysing the competition. Using customs data for each trade route for Korea and Japan, time series analyses were conducted considering factors that affect their movements.

International natural gas trade can be largely divided into three regions, North America, Europe, and Asia. Among them, a characteristic of natural gas trade in Asia is that natural gas is mainly traded in the form of liquefied natural gas (LNG). The main reason for this characteristic is that importing countries are generally distant from exporting countries, so it is more economical to trade with the form of LNG than piped natural gas (PNG). For example, since Korea and Japan are geographically far away from major natural gas exporters in the Asia-Pacific region, such as Qatar and Australia, they have imported all natural gas in the form of LNG.

Despite the important position of LNG in Asia, some practices in long-term LNG contract, such as pricing by oil indexation and including destination clause in the contract, have been criticized that it can be disadvantageous to the importers. Accordingly, Korea, Japan, and China have been trying to overcome unreasonable practices in the long-term contract through cooperation among them. Recently, it was also accompanied by the survey on these practices of being considered unreasonable by Japan Fair Trade Commission(JFTC). An analysis of LNG trade in Asia from the perspective of industrial organization theory and competition law, like the survey of JFTC, is important in that it can provide a basis for the importing countries' claims and also provide strategic directions for improving the anti-competitive situation.

When investigating anti-competitive practices in LNG trade of Asia, defining the relevant market needs to be prioritized. Thorough market definition, the product and geographic ranges to be investigated are identified so it is the starting point for analysing the effects of a particular activity of a market participant on its market. According to this importance, this study conducted time series analyses to provide the empirical evidence for the relevant market definition of LNG trade in Asia, reviewing the market definition of the JFTC's survey. The results of this study can be used a basic analysis to define the relevant market for further investigations by competition authorities as well as giving information about competition to market participants.

Methods

The relevant market definition is basically based on the substitutability of demand. In this study, time series analyses including correlation analysis and cointegration test were used to define the relevant market for LNG trade in Asia. Time series analyses are based on the logic that when the substitutability between two goods is sufficient to exist in the same relevant market, the prices of them will co-move though the absolute levels of them may vary. If two LNG prices are highly correlated or they are cointegrated, it is judged that those LNG prices co-move and that there is a basis for including them in the same relevant market. To conduct the analyses, LNG price data for each import route for Korea and Japan were constructed from customs data and common factors that make them move similarly such as oil prices and freight rates were controlled. This study used ARDL bound test for cointegration test, suggested by Pesaran *et al.* (2001), which can test long-run relation between variables even when I(0) and I(1) variables are mixed. ARDL bound test uses an error correction model (eq. 1) transformed from an ARDL model and it tests whether $\theta_1 = \theta_2 = 0$ or not.

$$\Delta P_{1,t} = \alpha_0 + \sum_{i=1}^{p-1} \beta_{1,i} \Delta P_{1,t-i} + \sum_{i=0}^{q-1} \beta_{2,i} \Delta P_{2,t-i} + \theta_1 P_{1,t-1} + \theta_2 P_{2,t-1} + u_t \quad (1)$$

These methods have become a research area in empirical industrial economics since Stigler and Sherwin (1985) investigated the relevant market using correlation coefficient (Jeon *et al.*, 2017). However, at the same time, time series analyses for defining the relevant market have been criticized for its difficulty in clearly identifying demand

substitutability between two goods when their prices have common factors that make them move similarly. In addition, they have been criticized that it is hard to find thresholds that reflect the degree of substitution. Thus, competition authority of each country has adopted and used the traditional methodologies such as the hypothetical monopolist test and critical loss test instead. However, as Boshoff (2011) pointed out, there is significance that time series analyses can be used as an exploratory tool for market definition though they are not a confirmatory tool. In addition, they can provide information for the relevant market when it is difficult to collect sufficient finance data of sellers, exporting countries in this study, to conduct critical loss test.

Results

Table 1 shows the results of the ARDL bound test between Indonesian and Qatari LNG prices for Korea from July 2010 to November 2018. The LNG prices controlled by freight rates, crude oil prices, and LNG spot price were used in this ARDL bound test. Even after controlling the common factors, ARDL bound tests rejected the null hypothesis that there is no long-run equilibrium between two LNG prices for Korea regardless of the dependent variable. This result supports that Indonesian and Qatari LNG prices exist in the same relevant market for Korea.

Table 1. The Results of the ARDL Bound Test between Controlled Indonesian and Qatari LNG Prices for Korea

Dependent Variable	Indonesian LNG Price	Qatari LNG Price
F-Statistics	30.360*	8.338*

* denotes that it rejects the null hypothesis at 1% significance level

The null hypothesis is that there is no long-run equilibrium

Upper and lower bound at 1% significance level are 5.58 and 4.94, respectively.

Conclusions

This study investigated the market definition of LNG trade in Asia using time series analysis. According to the results reported in Table 1, the JFTC's market definition on an LNG product that fixed-term contracts are included in the same relevant product market is supported partly. Although it used the "exploratory" tool, this study can provide some empirical evidence to help to define a relevant market of LNG trade in Asia for new or further investigations by each competition authority. In additions, it can give understanding on competition to market incumbents and possible entrants.

References

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