Changing Contract Structures in the International LNG Markets - An Empirical Analysis

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1. Overview

The global market for natural gas is dynamic, with increasing competition for world reserves, large scale infrastructure investments (LNG as well as pipelines), market entrants (countries as well as companies), an enhancement of the share of volumes traded under spot agreements, and changing contract structures. The past five to ten years have seen the development from an "infant" towards a "maturing" LNG industry (Ruester and Neumann, 2006) moving towards the globalization of natural gas markets; LNG has turned from being an expensive and only regionally traded fuel to a globally traded source of energy.

Changes in the institutional framework of downstream markets (i.e. Continental Europe, some Asian importers such as Japan) have moved the industry away from monopolistic structures towards competition, thus stipulating fundamental changes in the organizational behavior of market participants. Recent years have been characterized by diverse developments: On the one hand we observe vertical integration and strategic partnerships becoming a common corporate behavior in the industry (e.g. ExxonMobil in cooperation with Qatar Petroleum controlling the entire value added chain for LNG deliveries from Qatar to the UK). But we also observe an increasing importance of (liquefied) natural gas spot trade with natural gas hubs gaining in liquidity. From an institutional economics perspective, long-term contracts are a governance form between these two poles (i.e. spot market versus hierarchy). However, the structure of long-term contracts has changed during the last years: contract duration is shrinking, oil-price indexation is diminishing in importance in favor of gas-to-gas competition, and inflexible clauses (e.g. take-or-pay or destination obligations) have been eliminated (IEA, 2004).

Several empirical studies investigate the relationship between contract duration in commodity markets and environmental characteristics (e.g. Joskow, 1985; Crocker and Masten, 1988; Neumann and Hirschhausen, 2005). This paper contributes an empirical analysis of LNG supply contracts to this discussion. We analyze the change in contract structure over time, differences between contracts in the Atlantic and Pacific Basin and several other external parameters.

2. Methods

Our quantitative study is based on a unique dataset of 232 LNG supply contracts, of which 145 contain deliveries to Pacific Basin importers and 87 contracts are destined to the Atlantic Basin. The contracts have been concluded between 1964 and 2007. Using a linear regression model we test for changes in contract structure over time (start-up year of the deliveries, <u>START</u>), changes between Atlantic and Pacific Basin contracts (dummy <u>ATLANTIC</u>), a transaction cost variable (assuming dedicated asset specificity being increasing with contracted volume, <u>VOLUME</u>), the influence of downstream competition (dummy variable indicating competitive markets (e.g. UK, US), <u>COMP</u>), and renewed contracts (dummy <u>RENEW</u>). We test for linear relationships between contract duration as endogenous variable and the above described exogenous variables as well as for non-linear relationships using natural logarithms.

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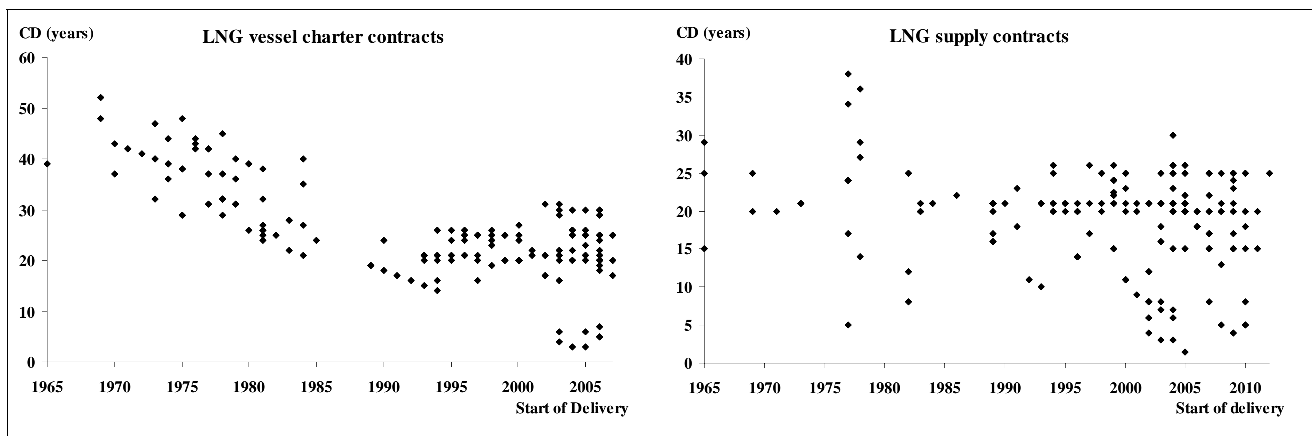
In Figure 1 contract duration of LNG vessel charter contracts (between vessel owner and charterer) and LNG supply contracts (between exporter and importer) are illustrated; we observe an increasing number of agreements with less than 20 years and even less than ten years duration.

Figure 1: Contract duration in the LNG market



3. Results

Our preliminary findings suggest that contract lengths have been shrinking over time, LNG supply contracts tend to be longer if they are dedicated to Asian customers (i.e. mirroring the high import dependence of countries such as Japan or South Korea), contract duration is increasing with dedicated asset specificity measured by the contracted volume which supports transaction cost economic predictions (Williamson, 1975, 1985), supply contracts to competitive downstream markets are shorter, and contract duration of renewals is shorter than the original first generation supply agreement.

4. Conclusions

The paper provides quantitative support that the structures in international LNG trade are changing, both in quantity and quality. This has important implications for company strategies (such as risk management and vertical integration), but also for government policies towards supply security. For example, we shall address the question whether exception to general competition rules should be applied along the LNG chain, both upstream (liquefaction, e.g. ensuring a diversified contract portfolio) and downstream (regasification, e.g. open access).

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