



The economics of global LNG trade: the case of Atlantic and Pacific inter-basin arbitrage in 2010-2014

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Security of gas supplies has once again moved up the agenda of European policy makers due to the geopolitical tension in Eurasia. Given a rather limited list of potential sources to improve Europe's gas supply security, the current European Commission has turned to the global liquefied natural gas (LNG) markets as one possible solution to improve the situation. In particular, in its recently launched Energy Union Paper, the European Commission has proposed developing a comprehensive LNG strategy to extend gas import diversification. But what are the implications of Europe increasingly relying on global markets to deliver more diversity and security? We look at this question by examining economic and strategic perspectives of LNG trade between Europe and Asia. Our two main objectives are: (i) to examine commercial, logistical, and operational limits of LNG in meeting any shortfall in gas supplies in emergency situations in Europe, and (ii) to understand the dynamics of LNG arbitrage between Europe and Asia, and, in particular, any contractual, commercial, and strategic limitations.

The operational limitations of LNG to meet shortfall in supplies include issues such as vessel compatibility, interconnection across terminals, port congestion, injection rates, and gas quality issues. Therefore, any drastic response to European supply crises on the short-term LNG market could warrant a rapid price response, similar to the one seen in Japan following the nuclear disaster in Fukushima. LNG may replace large pipeline volumes if hub prices trade significantly above long-term contractual prices. Moreover, while interconnection is relatively advanced in Northwest Europe, it is highly underdeveloped in Southern, Central and Eastern Europe. Flows between the north and south of France are at present constrained, which, *de facto*, results in two regional markets. Flows between Spain, France and Portugal are also constrained. Spain, the market with most LNG import terminals, markedly lacks advanced pipeline interconnection with other European markets. Therefore, while LNG can offset some of the shortfalls that might emerge on the back of interruptions to pipeline supplies, such replacement is currently rather limited.

LNG shipping – the midstream component of the LNG supply chain – poses further constraints. The LNG market cannot offer the same level of short-term flexibility as pipeline gas or crude oil markets given its technical and operational constraints. The vast majority of LNG tonnage on the water today is committed to servicing long-term contracts. Operationally, the arrival and discharge of an LNG carrier requires advance notice, reservation of a slot at the terminal, and arrangements with port and coastal authorities well ahead of discharge, particularly around congested maritime points. Out of some 400 LNG tankers in operation today, only around 30 are currently available for spot trading. Moreover, there is no



mechanism to ensure that sufficient tonnage will be available in a market facing a severe demand crisis. Re-directing a vessel from a long-term project to spot trading typically requires a buyer and seller to absorb optimisation costs. In operational terms, spot LNG transactions typically requires several days to complete due to the complexity of credit terms. Therefore, LNG has never been a commodity of choice in terms of rapid reaction to energy crises. However, in the long term, we expect that the LNG market is very likely to offer more flexibility. The LNG market is set to grow with the onset of export projects in North America, Australia, Africa and Russia. Importers are being presented with more flexible contractual options that will allow diversions to take place more easily than they are now. In terms of technology, ship-to-ship transfer, floating storage and regasification units (FSRU), as well as small-scale LNG projects and ships, are bound to dramatically change the market after 2020. These new options will allow a greater level of flexibility and offer the potential to move LNG to the forefront of response options in a potential crisis.

Apart from the current operational and logistic constraints, there are also commercial limitations and a strategic rationale why LNG may not be able to fully respond to regional price spikes. In the period from 2011-2014, the price differential between Asia and Europe reached, on average, \$5/mmbtu and at some point was as high as \$10/mmbtu. In the same period, around 20% of traded LNG cargoes were sent to Europe when prices in Asia were higher, taking into account transport costs and trading margin. Two explanations for this trading phenomenon are put forth: (i) the market power of large LNG exporters, and (ii) the LNG industry structure with contractual, logistical and political limits that do not allow market participants to quickly arbitrage away regional price differences. Indeed, we found that as much as half of LNG contractual volumes to Europe were signed under a 'Delivered Ex-Ship' (DES) condition, which is a rigid contractual condition allowing sellers to enforce territorial restrictions and hence prevent the buyers from diverting cargoes to higher priced markets (to Asia at that time). Thus, some LNG importers in Europe, notably in Spain, the Netherlands, France and Belgium, have developed re-loading (re-export) capability in their LNG import terminals to bypass the 'destination clause'. Further, the other half of LNG import volumes to Europe were contracted under the 'Free on Board' condition which has less restrictions to divert cargoes. We found that these volumes were gradually removed from Europe to Asia after the Fukushima incident.

Thus, contractual rigidity is part of an explanation for why the arbitrage between the two regions was so slow. However, it is not the only reason. If we look at the bargaining between contracting parties, then given huge opportunity costs, one would expect that the parties could negotiate and agree to '*split the net gain*' from sending contractual volumes to higher priced markets. In the LNG sales and purchase agreements, usually, there is a clause that would allow these operations - '*profit sharing mechanisms*' (PSM). Thus, to understand the distribution of costs and benefits between largest LNG exporters and importers in Europe from diverting cargoes under PSMs, we modelled the counterfactual scenario allowing LNG flows to freely move between the two markets.

First, diverting LNG to Asia would depress the spot prices creating economic incentives for Asian importers to demand renegotiations of long-term contracts, particularly to lower contract prices, possibly moving away (at least partially) from oil indexation and also introducing more flexibility in terms of importation volumes. Thus, from the perspective of large LNG exporters, diverting more cargoes to the Asian market to enjoy higher revenues from short-term market imbalances could be seen as a risky business strategy due to possible indirect negative effects on the pricing and market structure of their long-term sales, which have been established in Asia



for a rather long time. For example, the potential loss of profit from a hypothetical ten percent discount off the long-term oil-indexed contract price for Qatar alone could have been \$2.7 bn/year on average in 2011-2014. However, there are reasons why Asian buyers may not be able to renegotiate their contracts: (i) the so-called 'Asian energy security premium' translates into a high willingness to pay for gas, and demand for long-term and stable supplies which results in relatively weaker bargaining positions vis-à-vis LNG exporters; and (ii), the lack of economic incentives to renegotiate contracts because the majority of LNG import costs could be passed on to final consumers. Nevertheless, risks of re-contracting exist if large quantities of spot LNG are placed on the market.

In addition to the potential loss of profit from long-term sales, diversion of LNG cargoes would also negatively impact the profit from existing spot and short-term sales to Asian markets due to lower prices there. For Qatar, profit from short-term and spot sales could have decreased by \$1 bn/year on average in 2011-2014. Thus, in total, the net benefit for exporters and importers from LNG diversion in 2011-2014 would have been ca. \$0.3-5.7 bn/year or roughly \$2.9/mmbtu of net gains. However, taking other costs into account, such as transaction and logistical costs, regasification fees and other shipping-related fees, and the fact that these net gains must be shared amongst all parties to the contract, then the net gains may be minimal. Thus, diversion of large LNG volumes from Europe to Asia would have a rather marginal (though positive) impact on profitability of the parties, but could be seen as a risky move by exporters when risks of long-term contracts renegotiations are taken into account.

More importantly, one should also recognise the potential effect of LNG diversion on the entire gas portfolios of European importers. European importers may well have behaved strategically by retaining LNG volumes in Europe when they realised structural shifts in their home markets. They could see that by *not* diverting cargoes they benefited from increased liquidity in traded markets, which in turn allowed them to avoid the high oil-linked contract prices they had agreed to pay for pipeline gas. As an example, importers that have long-term contracts with Russia and Norway have clearly benefited from such market development. Thus, taking European importers' interests into account, because arbitrage would not be possible without the agreement of importers, and given the potentially huge negative impact on their long-term pipeline gas import costs, diversion is not profitable for both sides.

All in all, the modelling exercise shows the increasing linkages between global LNG markets and pipeline gas producers. The implication of these global linkages is that investment in LNG receiving capacity could bring benefits in terms of giving more bargaining power to European companies against the traditional pipeline suppliers. Importantly, investment in LNG import capacity reduces the need to invest in the '*strategic and special relationship*' with traditional suppliers to ensure against 'unfair' pricing practices.

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