

# ***WHAT DRIVES NATURAL GAS PRICING? A CROSS COUNTRY STUDY***

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## **Overview**

Whether the occurrence of “Asian Premium” in natural gas trade is due to price discrimination or market fundamentals has been a heated debate. Answering this question can help to guide gas industries and policy makers in this region especially when the traditional oil-indexed price mechanism has faded away. Using a new systemic time-series approach, this paper shows how much oil prices and market fundamental factors contribute to gas price variation in Japan, the United States, and Germany. Clear cross-country differences and time-varying patterns have been found. Comparing to oil prices, supply and demand factors are much less relevant to gas prices in Japan and Germany, whereas they are relatively more important in the US market with a pricing hub. Through rolling-windows and sub-sample analysis, we discover that oil prices were important in Japan and Germany, but the level of importance has declined significantly in recent years, though the contribution of fundamentals does not change much. The results provide evidence that the Asian gas prices are mainly determined by oil prices and thus the “Asian Premium” is more likely due to pricing mechanism rather than market fundamentals. It suggests to developing Asia’s benchmark prices (through trading hubs) that reflect more of the regional own fundamentals, which leads to a more efficient allocation of gas resources.

The paper is organized as follows. Section 2 reviews the previous literature. Section 3 briefly describes the methodology. Section 4 discusses the data. Section 5 reports and discusses our empirical results, and section 6 concludes with policy implications.

## **Methods**

this paper constructs a system based on the VAR approach introduced by Diebold and Yilmaz (2009). The system incorporates the supply side, the demand side, oil prices, and global economic conditions in the empirical model and show how much these factors contribute to natural gas prices. Moreover, we apply this in three major markets, namely, Japan, the United States, and Germany (representing the European market) respectively, to make cross-country comparison in three regions that are in different pricing mechanisms.

## **Results**

First, Market fundamentals in Japan and Germany, including domestic production, imports, and consumption, are the least important. Oil prices are the dominant factor in these two markets, however, its contribution to gas prices shows a declining trend in recent years.

Second, market fundamentals play a more important role in the US market. Although the contribution of oil to natural gas increases a bit after the 2008 global financial crisis, it still remains at a relatively low level.

Third, the declining trend of the system impact in Japan and Germany can be linked to the recent literature on energy market financialization (for example, Cheng and Xiong, 2013; Creti et al., 2013; Creti and Nguyen, 2015) for possible reasons.

Forthly, we can effectively claim that neither oil indexation, nor the market fundamentals are the causes of the “Asian premium”, suggesting that this price increase does not necessarily reflect the true fundamentals, but rather an evidence of market speculation. Without a trading hub, it is harder for the participants in the gas market to find the correct (fundamental) value, which leads to an inefficient market.

## **Conclusions**

This study confirms that the “Asian Premium” is not caused by market fundamentals and more likely due to pricing mechanism in the gas market than to market fundamentals. These results provide further evidence for ongoing debates on the transition from oil indexation to hub pricing mechanism in East Asia. First, it supports the argument that transition away from oil indexation to hub pricing is desirable. The US has already stepped into the stage of using hub price so its fundamentals’ role is most essential among all three countries. Germany is

in the process of shifting from oil indexation to hub pricing. While Japan is still using oil indexation and in exploring the transition, fundamental's role therefore has the least impacts on Japan's gas prices. Since oil indexation fails to reflect market fundamentals in the natural gas markets and it will not be able to lead to efficient allocation (Shi and Variam, 2016 ). The development of financial market, such as futures market, further reinforces the needs for local natural gas hubs (Shi et al., 2017 ).

Second, the results suggest that the transition of pricing mechanism should be continued especially during the low oil price period. The previous high oil price benefited the sellers so that they lacked the motivation to coordinate transition. On the contrary, the current low oil price makes buyers comfortable since oil-indexed gas prices are low and converging to spot prices. However, a sluggish in transition is not in buyers' long term interests as oil indexation cause market failure (Shi and Variam, 2017 ) and oil price may go up in the future and thus the "Asian Premium" will return sooner or later. Moreover, such price convergence will make both buyers and sellers less painful in switch of pricing mechanisms as the difference between the two alternatives are limited.

Lastly, for the companies that will sign long-term gas and LNG contracts, the findings suggested that oil indexation is still acceptable. However, they should also keep the option to change their price benchmark in the future.

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