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SECURITY OF EUROPEAN GAS SUPPLY

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Overview

We use the Rice World Gas Trade Model (RWGTM) to calculate a possible future path of development for world gas trade to 2040, with a focus on the likely future sources of natural gas consumed in Europe. We then use the model to examine the sensitivity of European gas prices to a disruption of supply from Russia modeled as a one-off unanticipated event. We consider two scenarios. In the first scenario, the model solution represents our "base case" assumptions about future developments. In a second scenario, we assume that the nations of Western Europe tax the import of gas from Russia in an attempt to diversify sources of supply and increase "energy security". We examine how supply from alternative sources, including LNG in particular, responds to the tax on Russian imports. The same unanticipated supply reduction is then imposed, and the results in the two scenarios are compared.

Our paper addresses several conference themes including the role of natural gas in supplying future European energy demands, the evolution of European natural gas markets, the possible role of LNG, and the security of gas supply to Europe.

Methods

The RWGTM is described in detail in *Natural Gas and Geopolitics From 1970 to 2040*, edited by Amy Jaffe, David Victor and Mark Hayes, Cambridge University Press (2006). It is a dynamic spatial general equilibrium model that utilizes a Hotelling-type optimization for wellhead supplies. Thus, suppliers schedule resource extraction projects to maximize the discounted present value of profits. The resulting supply schedules in different resource basins reflect geologic resource assessments and econometric evidence on the manner in which geologic characteristics of fields affect development and operating costs. Capacity additions to facilitate the movement of natural gas (via pipelines and/or LNG liquefaction, shipping and regasification) reflect capital, operating and maintenance costs and expected prices. Demand is based on econometric models of the relationship of natural gas demand to economic and population growth and energy prices, the last of which allows for short run substitution in end-use. Technological developments influence both costs and demands in the long run. Equilibrium price paths are calculated endogenously to equate supplies and demands in numerous market areas around the world.

Results and conclusions

Previous work reveals that the impact of supply shocks will benefit foreign traders and have a smaller effect in Europe than a partial equilibrium model would predict. The developing world market for natural gas will link gas prices and lead to a natural dissipation of shocks, and hence a form of "energy insurance", even in the absence of any explicit policies aimed at encouraging energy security.