***Energy Trade sanctions and international spatial integration:***

***What is the impact of sanctioning Iran?***

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## Overview

Politically-motivated sanctions decided by a small group of nations to restrict a country’s access to international trade usually generate fierce discussions.[[1]](#footnote-1) These economic sanctions consist in a series of measures aimed at raising the export cost for the targeted country. For example, the sanctions imposed between 2012 and 2016 prohibited Iran’s access to western-controlled services (e.g., ship insurance, banking system), to lines of credit for moving cargo and to fuel supplies for Iranian ships. By construction, these measures are primarily aimed at harming the economy of the targeted country. But, because of their effects on international trade, their impact is conceivably not limited to the coerced country. When the targeted country is a large exporter of a given commodity, the sanctions can cause a complete reorganization of the international trade flows for that commodity that can affect the price formation for that commodity at international importing markets. Surprisingly, this phenomenon topic is seldom examined in the energy literature.

The purpose of this paper is thus to examine the impacts of the sanctions on the degree of spatial integration of international markets. The law of one price states that, in integrated markets, homogeneous goods sold in different locations must sell for the same price. Of course, if transporting the good is costly, the spatial price spreads observed between the locations should reflect the difference in transportation costs. For example, in the case of energy and petrochemicals commodities, the flow of sea-based trade from the exporters to the various importers is nearly continuous and this trade is connecting the destination markets and linking their pricing. The efficient arbitrage response to a price increase for an importing market “A” relative to the ones observed in neighboring importing regions involves a rerouting of the oceangoing tankers initially directed to these other destinations to “A” whenever such operations are profitable. These spatial arbitrages are thus central to ensuring an efficient supply of the commodity. Yet, in the presence of trade sanctions, the arbitrage activity for product coming from the sanctioned nation is restricted and one can conjecture that it may affect the degree of observed spatial integration among importing nations.

## Methods

To explore whether product allocation from the producing countries to the consuming ones takes place efficiently or whether periodic gluts or shortages occur as the result of product misallocations, we use an empirical approach based on the parity bounds model (PBM) first introduced in Sexton et al. (1991) and further extended in Negassa and Myers (2007).

In a PBM, arbitrageurs are assumed to be profit-maximizing agents. Using that assumption, intermarket price spreads are examined using a regime switching specification which estimates the probability of observing each of three possible trade regimes: an “at the parity bounds” regime where the spatial price difference equals the unit intermarket arbitrage cost; an “inside the parity bounds” regime where the local prices differ by less than that cost; and an “outside the parity bounds” regime where the observed spatial price difference is larger than that arbitrage cost. By allowing possible dynamic shifts in regime probabilities, the extended PBM in Negassa and Myers (2007) makes it possible to assess whether the probabilities of observing the various trade regimes are affected by an exogenous policy change. By construction, this model provides an adapted methodology to investigate whether the sanctions have affected the frequency at which the gluts and shortages occur.

## Results

As an application, we examine how the 2012–2016 sanctions imposed on Iran’s hydrocarbon exports have affected price formation at destination markets. We use Iran’s largest petrochemical export: methanol, a basic petrochemical predominantly produced form natural gas, that is either used as a precursor to produce a variety of chemicals or consumed as a fuel. This homogeneous commodity is traded at the main importing markets and its local prices are expressed in a common currency. We focus on the destination markets in Asia because that region accounts for about 70% of the global consumption and Iran is reputed to behave as a swing supplier (IHS, 2017).

Our findings indicate that, prior to the sanctions, a high degree of market integration was achieved among the main Asian markets. In contrast, we observe a complete reconfiguration of the spatial extent of these methanol markets under the sanctions as they became more fragmented and form two distinct market areas respectively comprising China and India on the one hand and Korea and Southeast Asia on the other. The degree of market integration achieved within each of these two areas remain very high as we found a high probability of these market pairs to be “at the parity bound” when the sanctions are imposed. In contrast, that probability is very low for the market pairs involving one countries in each market areas which can be interpreted as objective signs of balkanization.Under a perfectly functioning blockade of Iranian exports, all markets should have been symmetrically impacted by the privation of Iranian supplies. As a result, all the market pairs should have exhibited a lower degree of market integration than the one prevailing without the sanctions. But, we observe a widening of the price differentials observed between the destination markets that are reputed to have imported Iranian products (China and India) and the other ones (Korea, South-East Asia). This finding is consistent with the opinions of market commentators who assert that Chinese and Indian importers have obtained insurance from domestic providers and reaped huge profits from conducting that niche trade.

## Conclusions

This paper sheds light on the effects of the international sanctions targeted against Iran’s foreign trade in petrochemicals and more particularly on their asymmetric incidence on the prices observed at the main destination markets in Asia. Our findings document the occurrence of a complete reconfiguration of the spatial extent of the methanol markets. Prior to the sanctions, a high degree of market integration was achieved among Asian markets. In contrast, we observe the emergence of two little integrated market areas when the sanction are imposed: on the one hand China and India and on the other hand Korea and South-East Asia. Given the curcial importance that energy-focussed trade sanctions have in public policy debates, we believe that these results can usefully contribute to these discussions.

## References

Barrett, C.B., Li, J.R. (2002). “Distinguishing between Equilibrium and Integration in Spatial Price Analysis.” American Journal of Agricultural Economics 84(2): 292–307.

Bown, C. and M. Crowley (2007). “Trade deflection and trade depression.” Journal of International Economics, 72, 176–201.

Haidar, J.I., (2017). “Sanctions and Export Deflection: Evidence from Iran.” Economic Policy, 32(90): 319–355

IHS (2017). “Chemical Economics Handbook – Methanol”. IHS Markit.

Negassa, A., Myers, R.J. (2007). “Estimating Policy Effects on Spatial Market Efficiency: An Extension to the Parity Bounds Model.” American Journal of Agricultural Economics 89(2): 338–352.

Sakanashi, S., Kutani, I., Koyama, K., (2018). “Scenario analysis on the Iran Sanctions and its impact on the International oil Market.” IEEJ Energy Journal, 13(4): 37–47.

Sexton, R., Kling, C., Carman, H. (1991). “Market Integration, Efficiency of Arbitrage and Imperfect Competition: Methodology and Application to U.S. Celery.” American Journal of Agricultural Economics 73(3): 568–580.

1. For example, the unprecedented wave of coercive economic measures implemented by the U.S. and the E.U. against Iran during the years 2012-2016 was hotly discussed (Cordesman et al., 2014; Haidar, 2017). More recently, the U.S. decision to re-impose the sanctions against Iran by November 4, 2018 also triggered controversies in energy importing nations (Sakanashi et al., 2018). [↑](#footnote-ref-1)