

SECURITY OF GAS SUPPLY AND SHALE GAS FEVER IN THE US

Honorata Nyga-Lukaszewska, Warsaw School of Economics, Phone: +48 22 564 93 61, e-mail: hlukas@sgh.waw.pl

Overview

Security of gas supply (used interchangeably with energy security) gains more and more importance with every gas crisis. Therefore, majority of the scientific research in this area roots in politics, while economics' perspective is still missing. Shale gas fever that started in the US has already translated itself into fuel abundance and power shifts in international markets.

Thus, presented research offers a closer look at the natural gas supply security from the economics' perspective with a focus on the US market. That allows for an extension of an existing security of supply theory. Analysis includes the case-study for US in period 1983-2014.

The paper is organised as follows: after the introduction, the second section gives a brief overview about the theory of security of supply. The third section describes methodology that has been used in the paper, while in the fourth section, I present the conducted research and its results. In the final section policy implications are derived.

Methodology

In the theoretical layer study uses critical literature review. I employ logical synthesis and analysis in order to thoroughly investigate the security of supply idea. The complexity of the phenomenon makes it difficult to assess in its all dimensions quantitatively.

Such an successful attempt to determine factors influencing the energy security was undertaken by Erdal (2015). Therefore in the empirical layer, the study uses Erdal approach. Analysis relies on the regression with the time-series data and covers unconventional gas extraction in the USA between 1983 and 2014. I estimate three different time-series regression equations including different sets of determinants and afterwards choosing the best model accordingly to models' information criteria. All models are diagnosed against their stationarity.

Results

First, study investigates the theoretical aspects of the energy security phenomenon. Even though, the notion is broadly investigated (Winzer, 2012; Ang, Choong Ng, 2015) there is no common understanding what energy security really is, that is why it is often described as a "blurred concept" (Loeschel, Moslener Ruebbelke, 2010). Study sums up existing theoretical efforts in this area and offers framework to assess the phenomenon of security of supply in the natural gas market.

Second, among different measures used to assess the energy security, I chose the above mentioned Erdal's approach. This method includes not only fuel production, consumption, and its environmental aspects but also its relation to competitive energy resources. This original framework is extended to natural gas market with inclusion of the macroeconomic data. For the US natural gas market, that includes among others statistics referring to unconventional gas drillings/reserves, renewables' consumption and GDP.

Third, the result of empirical study suggests that security of gas supply in the American market improved within the analysed period. That was possible mainly to intensive shale gas production. Some of the variables followed the results of the original research but some of those that were extended for natural gas market behaved differently than expected. That refers especially to predictors describing renewables' use.

Conclusions

Shale gas production in the US changed the natural gas market once for all. That is true both for the domestic US and international market. At the global level it is visible in the form availability of additional fuel quantities extending price pressure and at the domestic (US) level one of the effects include influence over security of gas supply.

It has been proved through an empirical assessment that with increased domestic production US energy security improves. However, it is not the number of drillings that causes it but rather incremental growth in natural gas reserves. That shows how time-delayed is an effect of any additional drillings policy. Surprisingly, study reveals counter-intuitive relation between energy security and wind energy consumption, showing its inverse proportionality. This result presents far reaching policy implications as wind and natural gas are said to be complementary fuels.

References (selected)

- Ang B. W., Choong W. L. and Ng T. S. (2015), "Energy security: Definitions, dimensions and indexes", Renewable and Sustainable Energy Reviews, No. 42.
- Bohi D. and M. Thoman (1996), "The economics of energy security", Kluwer Academic Publishers, Massachusetts.
- Coq Ch. and Paltseva E. (2009), "Measuring the Security of External Energy Supply in the European Union", SITE Working Paper, No. 2.
- Erdal L. (2015), "Determinants of Energy Supply Security: An Econometric Analysis for Turkey", EGE Academic Review, No. 15.
- Neumann A. (2004), "Security of supply in liberalised European gas markets", Diplomarbeit, Viadrina Universitaet, Frankfurt.
- Loeschel A., Moslener U. and Ruebbelke D. T. G. (2010), "Indicators of energy security in industrialised countries", Energy policy, No. 38.
- Sovacool B. and Mukherjee I. (2011), "Conceptualizing and measuring energy security: A synthesized approach", Energy Policy, No. 36.
- Stern J. (2002), "Security of European gas supplies. The impact of import dependence and liberalization", Royal Institute of International Affairs, London.
- Stirling A. (1999), "On the Economics and Analysis of Diversity", SPRU Electronic Working Paper Series, No. 28.
- Stirling A. (2010), "Multicriteria diversity analysis. A novel heuristic approach for appraising energy portfolios", Energy Policy, No. 38.
- Winzer Ch. (2012), "Conceptualizing energy security", Energy Policy, No. 46.

Abstract

The extraction of unconventional hydrocarbons has revolutionized energy markets. Repeated arguments about its impact on energy security have not been extended to an in-depth economic analysis. The difficulty of this task arises from the fact that energy security is a poorly defined concept. Such an successful attempt to indicate the determinants of energy security (Erdal, 2015) has been used and extended in this study. The analysis is conducted on the example of shale gas extraction in the USA in 1983-2014. The study consists of several parts. The first of these is the introduction, in which the unconventional hydrocarbon production in the USA and the issues of energy security are presented. The second element of the study is explanation of the adopted methodological approach. The third part is an empirical study based on a multiple regression model. The study ends with a summary supplemented with proposals for further research.