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EXAMINING THE LONG-RUN RELATION AMONG SPOT PRICES OF CRUDE OIL AND NATURAL GAS

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Overview

This study considers the effect of variable-specific and system-wide shocks on the long-run relationship between crude oil spot price and natural gas spot price in the United States with the help of impulse response analysis and persistence profiles. In addition, the generalized forecast error variance decomposition for the two variables was performed. To do this whole job, the study had to accomplish first the cointegration analysis of the two variables.

Methods

The study used monthly data from January, 1994 to April, 2005 for the two variables X and Y, where:

X: the natural log of the U.S. spot price of crude oil

Y: the natural log of the U.S. spot price of natural gas

The computer package Microfit 4.1 was used to process the data. The methodology of this research work can be summarized as follows:

- a. Ensuring that the jointly determined variables X and Y of the model are I(1). This was done using Augmented Dickey-Fuller test.
- b. Deciding the order of the VAR model of X and Y.
- c. Identifying the nature of the deterministic variables such as intercepts and trends in the underlying VAR.
- d. Identifying the cointegration (long-run) relationship between X and Y.
- e. Identifying the vector error correction (VEC) model to investigate the short-run and long-run causality between X and Y.
- f. Examining the short-run dynamic properties of the model by considering the effect of variable-specific and system-wide shocks on the cointegrating (long-run) relationship with the help of impulse response analysis and persistence profiles.
- g. Examining the degree of exogeneity/endogeneity of X and Y using the generalized forecast error variance decomposition.

Results

The results of this study can be summarized as follows:

- a. Both variables are I(1).
- b. The order of the VAR model is 2.
- c. The intercept term is only in the cointegrating relation, and the time trend should not be included. This is Case II of VEC model.
- d. The two variables X and Y are cointegrated. There is a long-run relationship between them.
- e. There is no short-run causality between X and Y. There is a long-run causality whose direction is from X to Y.
- f. The speed of adjustment towards the equilibrium relationship between X and Y is moderate.
- g. The resulting cointegrating vector is correct. Examining the effect of system-wide shocks on the cointegrating (long-run) relation proved that this relation has a steady tendency to converge to its equilibrium, and the speed of convergence is about ten months.
- h. The effects of shocks in either X or Y on the equilibrium relation die out after twenty months.
- i. Y is the less exogenous of the two variables.

Conclusion

There is a long-run relationship between spot prices of crude oil and natural gas. This relationship is maintained even when a shock occurs in either price. But the movement of crude oil spot price precedes the movement of natural gas spot price. Hence, crude oil is the leading source of energy, through its price, in the world economy. This situation is not expected to change soon. Therefore, the futures and forward prices of natural gas should be based on the spot price of crude oil.

References

The major and most related references of this study are given below. The rest of the references will be given in the full text.

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