INTERVAL TESTS FOR STRUCTURAL BREAKS IN THE DEPENDENCE: EMPIRICAL EVIDENCE OF OIL AND GOLD MARKETS

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Overview

As the representatives of the international commodity market, both the oil market and gold market are driven by multiple factors, e.g. economic, currency, supply and demand, market extreme risk or even wars, so their commodity and financial attributes are often interconverted under different economic situations. For example, during the 2008 global financial crisis, the international oil price dropped sharply from 140 dollars to 40 dollars per barrel and energy market risks were extremely large. Meanwhile, the gold market is taken as a safe haven and then widely focused by market investors. As a result, the dependence between them changes over time and especially presents a great structural change. However, traditional dependence break point tests may hardly identify this changing period since most market extreme events may persist for a shorter period of time, i.e. less than one year. This paper tried to investigate the dynamic dependence between oil and gold markets via proposing a new changing interval test method combined with the copula theory.

The paper is organised as follows: After the introduction the second section proposes the research methodology. Section 3 conducts the empirical analysis and the last Section concludes the paper.

Methods

In this paper, we propose a new interval test to identify the structural breaks in the joint dependence between oil market and gold market during the financial crisis based on the copula model. And then, the time-varying copulas are modelling to capture the small dynamic structural changes in the dependence between oil market and gold market.

Results

In our empirical findings, the traditional change point test cannot identify the structural changes in the dependence between oil and gold markets during the 2008 global financial crisis, whereas our proposed change interval test can identify these transitory structural breaks effectively, and the structural change period is from Sept. 9, 2008 to Apr. 23, 2009.

The results of change interval test also show the dependence is significantly different before and after the 2008 global financial crisis, indicating the price influencing mechanisms of oil and gold have changed. The dependence between oil and gold has decreased sharply during the crisis period due to their different attributes, that is oil price decreases affected by macroeconomic shocks while gold price increases as a safe haven in response to the systematic economic risk.

In addition, the results of change interval test show that there are two additional structural breaks in the dependence between oil and gold markets after the financial crisis, i.e. Apr. 27, 2010 and Oct. 9, 2013. It indicates that oil and gold prices present different dynamic behavior mechnism duiring the different periods. It’s related to the change of the global energy trade pattern and the change of the U.S. monetary policy.

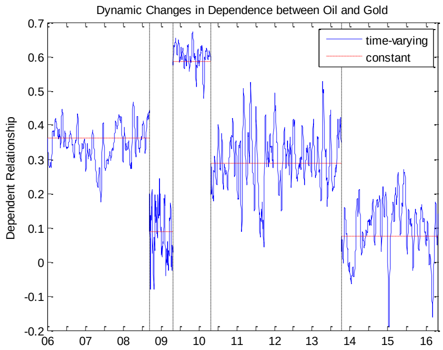

Figure 1. The structural breaks for the dependence between oil and gold prices.

Conclusions

In summary, our empirical results indicate that the proposed interval test for structural breaks can effectively idfentify the transitory dependence jumps which may be ignored by the traditional change point tests. The dynamic dependence between oil and gold presents their changing multiple attributes in different periods. In general, their commodity properties are significant under economic boom period and their financial properties are larger under extreme risk period. Meanwhile, both the exogenous economic shocks and the changes of internal mechanism may lead to the structural changes in the dependence. Above conclusions may offer some guidance for financial investors and risk managers to optimize their hedging strategies.

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