Bubbles in Oil Prices - Evidence and Implications

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Motivation

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- Discuss implications

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- Which periods are characterized by bubbles?
- Cointegration based test for bubbles
- GS ADF test for periodically collapsing bubbles [Shi et al., 2010]

Empirical approach

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- Order of integration of oil price fundamental value?

The GSADF test

$$\Delta y_t = \alpha_{r_1,r_w} + \beta_{r_1,r_w} y_{t-1} + \sum_{i=1}^{k} \psi_{r_1,r_w} \Delta y_{t-i} + \epsilon_t \qquad (1)$$

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r_w : Sample window size

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$r_w \in [r_0, 1]$: SADF test

$r_1 :\in [0, 1 - r_w]$: GSADF test

Test statistic and critical values

- Test statistic:

$$GSADF(r_0) = \sup_{r_1 \in [0, 1-r_w]} \{ \sup_{r_w \in [r_0, 1]} ADF_{r_1}^{r_w} \} \qquad (2)$$

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- Critical values are based on numerical simulations

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- Bubble origination $\hat{r}^e$ and termination $\hat{r}^f$ points:

$$\hat{r}^e = \inf_{r_2 \in [r_0,1]} \{ s : ADF_{r_2} > cv \}$$

$$\hat{r}^f = \inf_{r_2 \in [\hat{r}^e + log(T)/T, 1]} \{ s : ADF_{r_2} < cv \}$$

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- Oil price is scarcity indicator [Hotelling, 1931; Sinn, 2008; Holland, 2008]