ARE WEST TEXAS INTERMEDIATE (WTI) PRICES EXPLOSIVE?

Theodosios Perifanis,

Energy and Environmental Policy Laboratory, Department of International and European Studies, University of Piraeus, Greece, +30-210-414-2657, tperifanis@unipi.gr

Research data

- Period: 1st January 1947 to 1st September 2018.

- Oil Price: Monthly WTI spot price deflated by Seasonally adjusted monthly CPI by FRED (Federal Reserve Economic Data) of Federal Reserve Bank of St. Louis.

Methodology

We apply both the:

- Phillips, Wu and Yu (PWY) (2011) statistic and date stamping procedure.

- Phillips, Shi and Yu (PSY) (2015) statistic and date stamping procedure. Their second proposal is that the second is more advance since it can detect more episodes of exuberance.

Main research hypotheses

- The term "bubble" is not used in this research, even if it is widely used in the literature, since there is no definite accepted method for the calculation of the oil's fundamental price. Instead, we use the term "explosiveness" or "exuberance".
- If explosive periods exist, then data should present break points of exuberance and collapse i.e. periods of non-stationarity.
- Real time date stamping can be achieved and help policy regulators.

Main research drawbacks

- The research does not answer whether these episodes are market fundamentally driven or by speculation or participants' feelings.
- The causal drivers of each explosive episode should be studied separately each time.
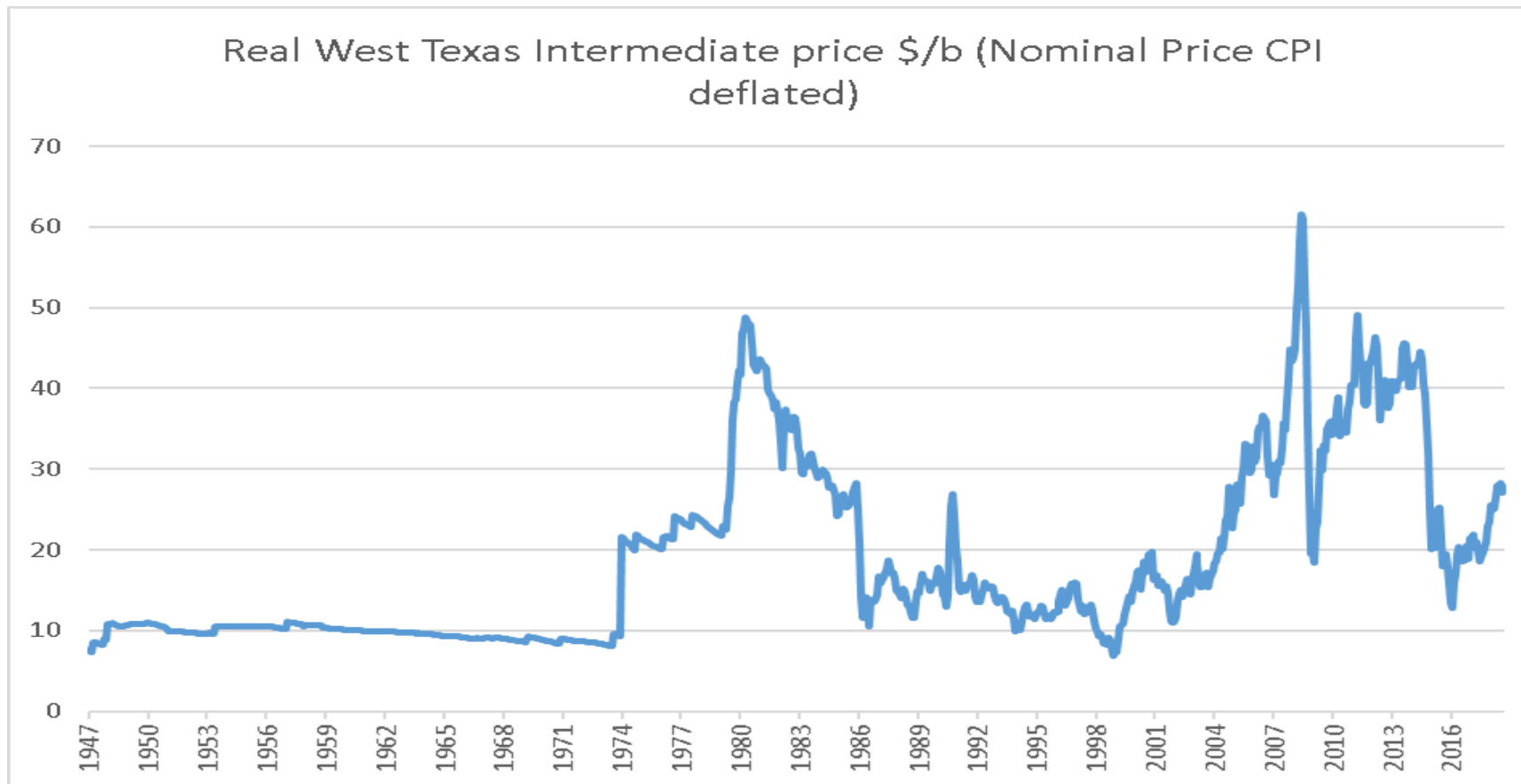
Figure 1 Real WTI Price - Nominal WTI CPI deflated

Full sample test statistics

I apply the whole sample SADF and GSADF tests in order to test for such explosiveness. The finite sample critical values are obtained by Monte Carlo simulations with 2000 replications and for a sample size of 861 observations. I apply the rule for the smallest window of $r_0 = 0.01 + 1.8/\sqrt{861}$, and this is 61 observations. Both SADF and GSADF statistics for the whole sample period exceed their 1% right tail critical values, 4.91>1.99 and 5.01>2.70 respectively. The calculations are conducted with transient dynamic lag order k = 0.

Table1. The SADF TEST and the GSADF TEST of the WTI Price

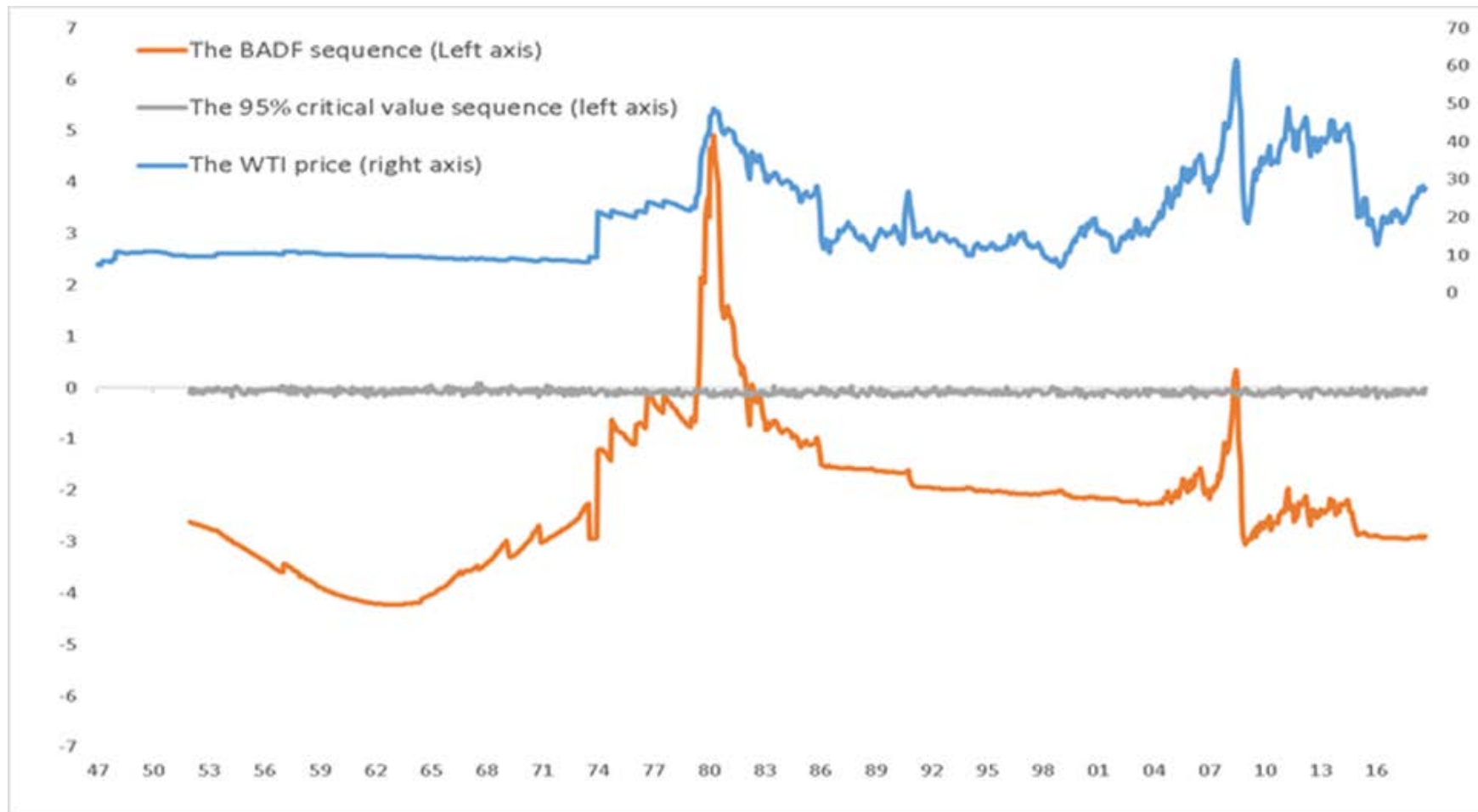|	Test Stat.	Finite Sample Critical Values		
		90%	95%	99%
SADF	4.91	1.25	1.49	1.99
GSADF	5.01	2.07	2.28	2.70

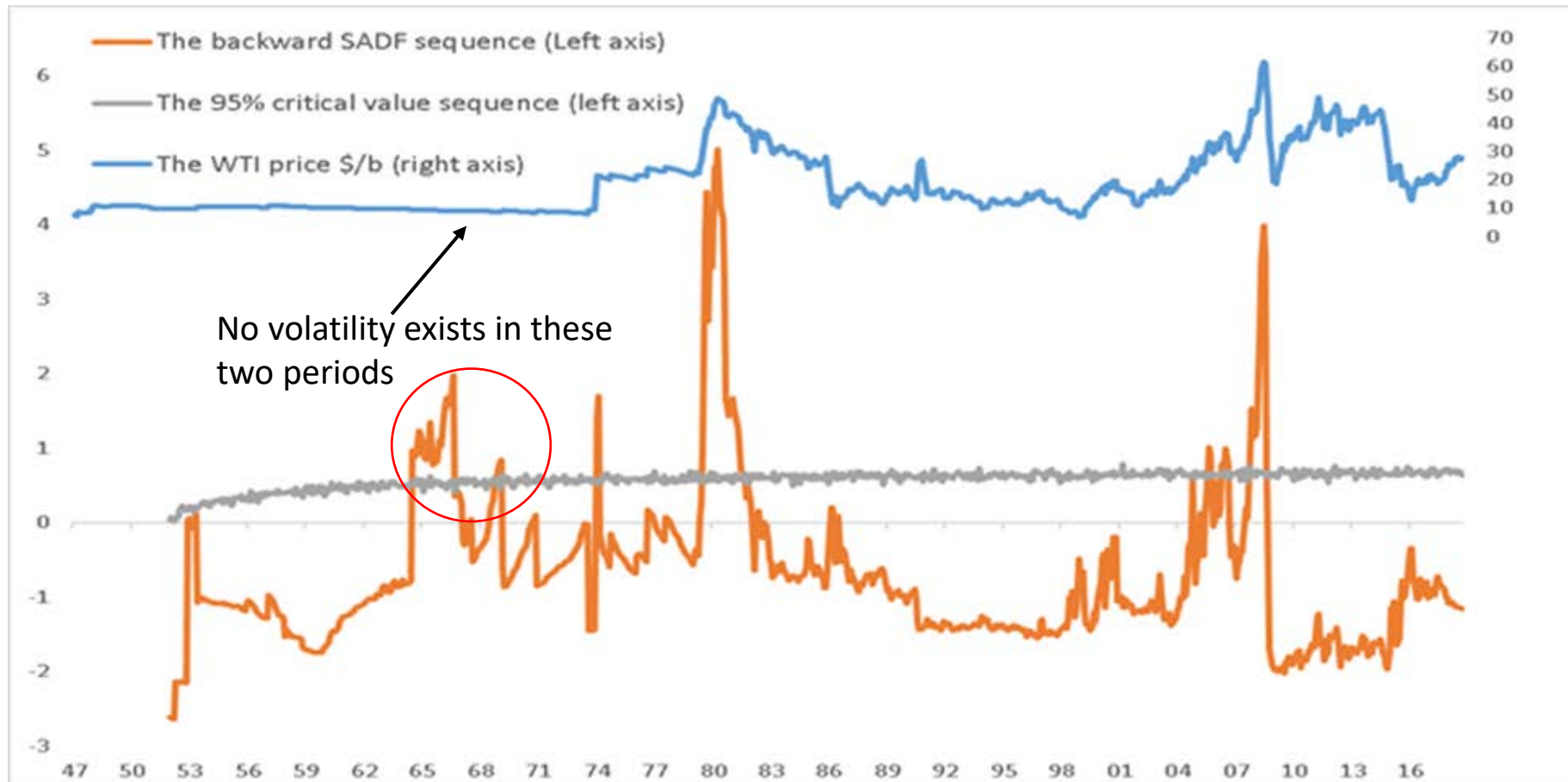Figure 2 Date-Stamping Explosive periods in the WTI prices: the SADF Test

Figure 3 Date-Stamping Explosive periods in the WTI prices: the GSADF Test

Results

- Both SADF (PWY 2011) and GSADF (PSY 2015) confirm sub periods of explosiveness.
- The PWY (2011) date stamping procedure suggests two periods of exuberance
  1. July 1979 to January 1982.
  2. May 2008 to July 2008.
- The PSY (2015) suggests seven periods of exuberance.
  1. July 1964 to August 1966,
  2. December 1968 to February 1969
  3. January 1974 to February 1974
  4. July 1979 to July 1981
  5. August 2005 to September 2005
  6. April 2006 to August 2006
  7. October 2007 to August 2008.

Conclusions

- The PSY (2015) confirms the two periods of exuberance of PWY (2011). But the PWY (2011) definitely misses the oil price surge of the First Oil Crisis and the 80s oil price collapse.
    1. 1978-1979 (Second Oil Crisis)
    2. 2008 (Highest level of price and Financial Crisis)

- The PSY (2015) captures more periods of exuberance
    1. 1974 (First Oil Crisis – Yom Kippur War - 1973)
    2. 2005 (Oil price advancing to its 2008 peak)
    3. 2006 (Oil price advancing to its 2008 peak)

- But it is much more sensitive suggesting periods of exuberance when volatility is non-existent. This might result in wrong decisions by governments, regulatory boards, or market participants.
    1. 1964 - 1966,
    2. 1968 - 1969

Conclusions

- Even if we detect episodes of explosiveness, we should be extremely careful about their causal drivers.

- These might be fundamentally or speculatively driven.

- Episodes of exuberance might result in extreme market anomalies, which will harm the long-term prospects.

- The duration and the intensity of the episode of exuberance might demand corrective actions by policy makers and regulatory authorities.

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