Gürcan Gülen, Ph.D.



Factors Impacting Oil Price

Baker Institute Energy Forum, November 9, 2012

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Bureau of Economic Geology
Jackson School of Geosciences, The University of Texas at Austin

gurcan.gulen@beg.utexas.edu 713-654-5404

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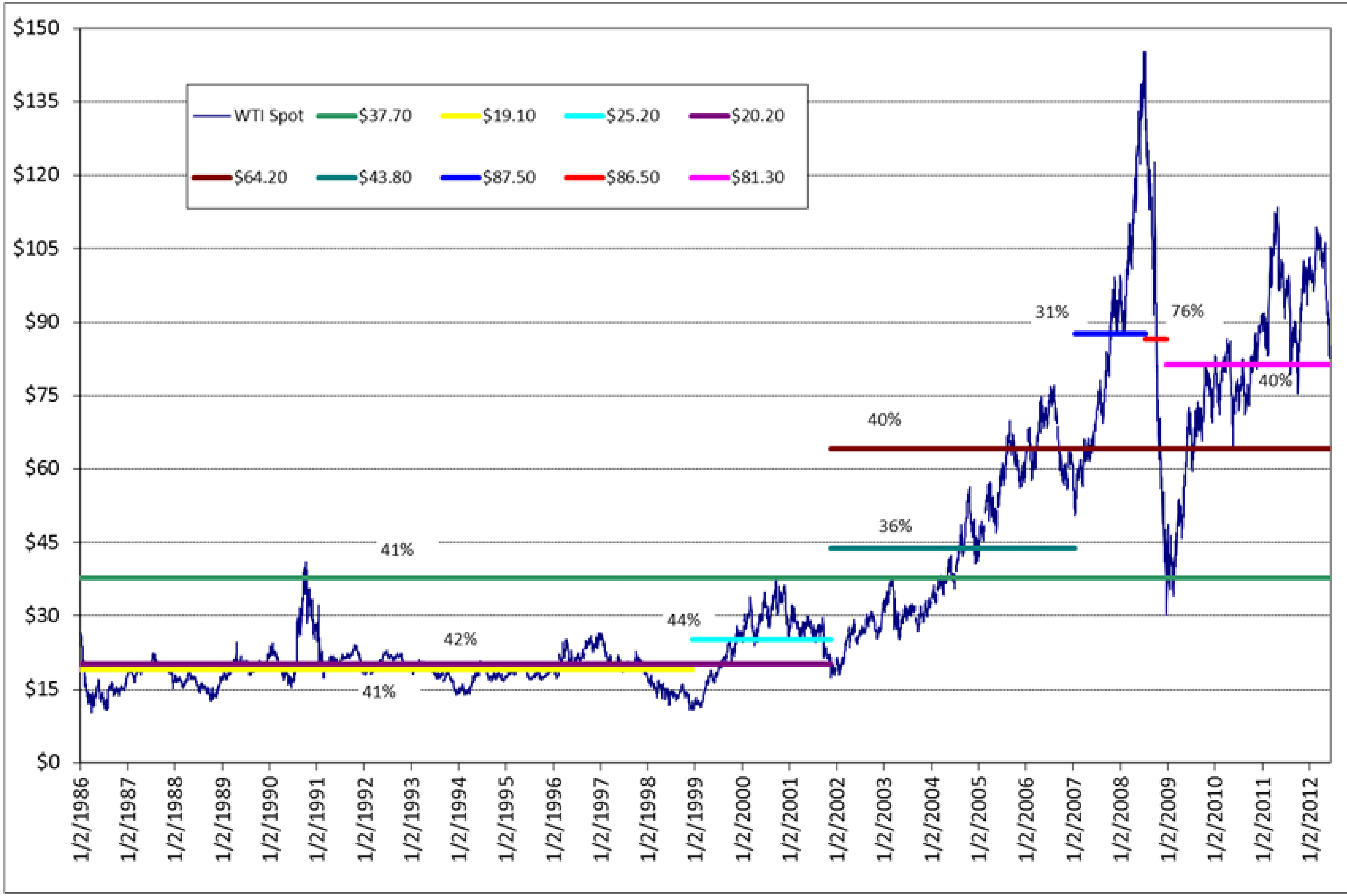
History of WTI Spot



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CEE analysis based on EIA data

A Review of the Literature

- More than 200 documents (academic research, testimonies, industry publications, government analyses)
- See Persistent Puzzles in Commodity Markets: Factors Impacting Oil Price http://www.beg.utexas.edu/energyecon/thinkcorner/Think%20Corner%20factors%20impacting%20oil%20price.pdf

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Conclusions

- The fundamentals responsible for rising prices: rapidly increasing demand in emerging economies led by China, sluggish supply growth, supply disruptions, low spare capacity, discrepancy between products specifications and refinery yields, infrastructure bottlenecks;
- Low interest rates (a result of expansionary monetary policies) and weak U.S. dollar have an impact if only occasionally.
- A speculative bubble at least during the first half of 2008.

Factors impacting the price of oil and their significance in different time periods

Factors	2002-04	2005-06	2007-08H1	2008H2-
Rapid demand growth in emerging economies led by China (unanimous up to 2005 and after 2008; but some pointed out that global demand growth, including that of China, leveled off and even declined from 2007H2 to 2008H1).	✓✓✓✓	✓✓✓	✓✓/✗	✓
Financial investment.	✓/✗	✓✓/✗	✓✓✓/✗	✓✓/✗
Distillate stockpiling by China before Beijing Olympics and due to Sichuan earthquake in May 2008 (industry press and financial analysts) – no direct empirical testing probably due to lack of data but Amenc et al (2008) offer some relevant data.			✓✓	
New low-sulfur regulations in EU and US, mismatch between available crude quality and refinery technology (Verleger, 2009b, Amenc et al, 2008) – related to distillate stockpiling in China.			✓✓	✓
Adding light sweet crude oil into SPR (Verleger, 2009a, 2009b).			✓	

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Factors impacting the price of oil and their significance in different time periods

Factors	2002-04	2005-06	2007-08H1	2008H2-
OPEC spare capacity declining (counter by Yanagisawa, 2008: OPEC spare capacity declined because they supplied more oil in response to increasing demand in 04-05) – curiously some studies include Saudi spare capacity and others do not in their empirical analyses.		✓	✓	✓/✗
Non-OPEC production capacity declining (unanimous) – Hamilton (2009b) does not find supply scarcity to be a driver in the 2000s but confirms that costs have been rising and production has been declining for a variety of reasons.		✓✓	✓	✓
Perfect storm of geopolitical events by Smith (2009): Venezuela stopping supplies to ExxonMobil in February 2008, pipeline bombings in Iraq in March 2008, labor strikes in Nigeria and Scotland in April 2008, militant attacks on facilities in Nigeria in April through June, and reports of declining Mexican exports. Lost production of light sweet Nigerian crude could not be readily compensated by heavy sour crude from Saudi Arabia.			✓	
Expansionist monetary policy leading to low interest rates (Akram, 2009; Krichene, 2006, 2008; Anzuini et al, 2012; Diwan, 2008))	✓	✓	✓✓	✓
Weak US dollar (Akram, 2009; Krichene, 2006, 2008; IMF, 2008; He et al, 2010; Breitenfellner and Cuaresma, 2008; Diwan, 2008)	✓	✓	✓✓	✓

A Complex Market → Info Asymmetry

- Demand for various products in different regions
  - Subsidies, black market, regulation
- Non-competitive supply of varying quality crudes (OPEC, NOCs, resource access)
  - location of production & transport capacity
  - storage capacity, level & location
- Refining is the connection between D & S
  - Installed capacity, location & utilization
  - Technology & crude quality

Financial Markets

- Organized exchanges & OTC markets
- Institutional investors: share of oil in portfolios & "negative" relation to other assets
- Interest rates
- Arbitrage (time, products, markets)
- Market participants' perceptions about S, D, Refining, Regulation & reactions

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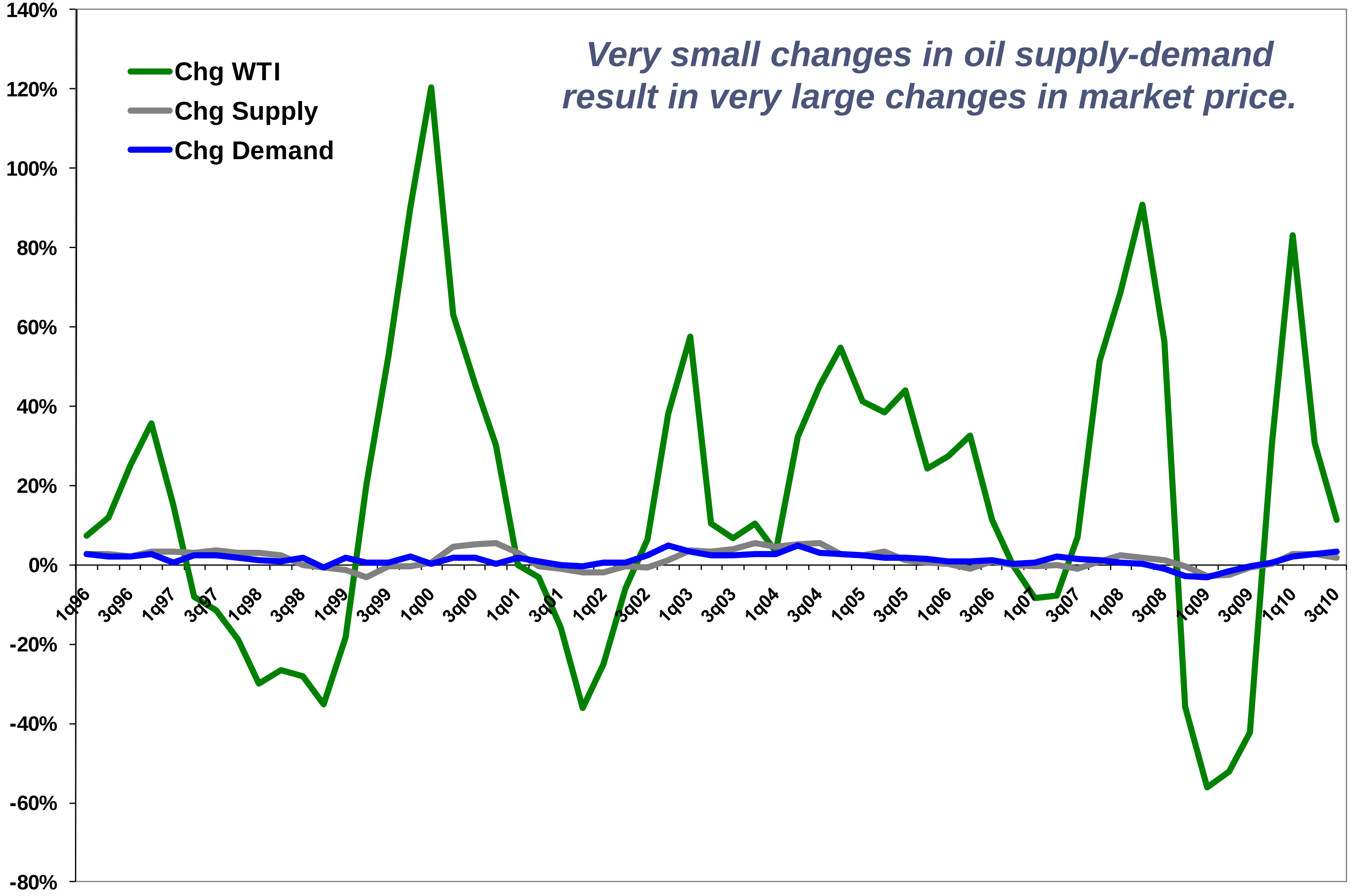
Fundamentals v Price



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IEA, NYMEX

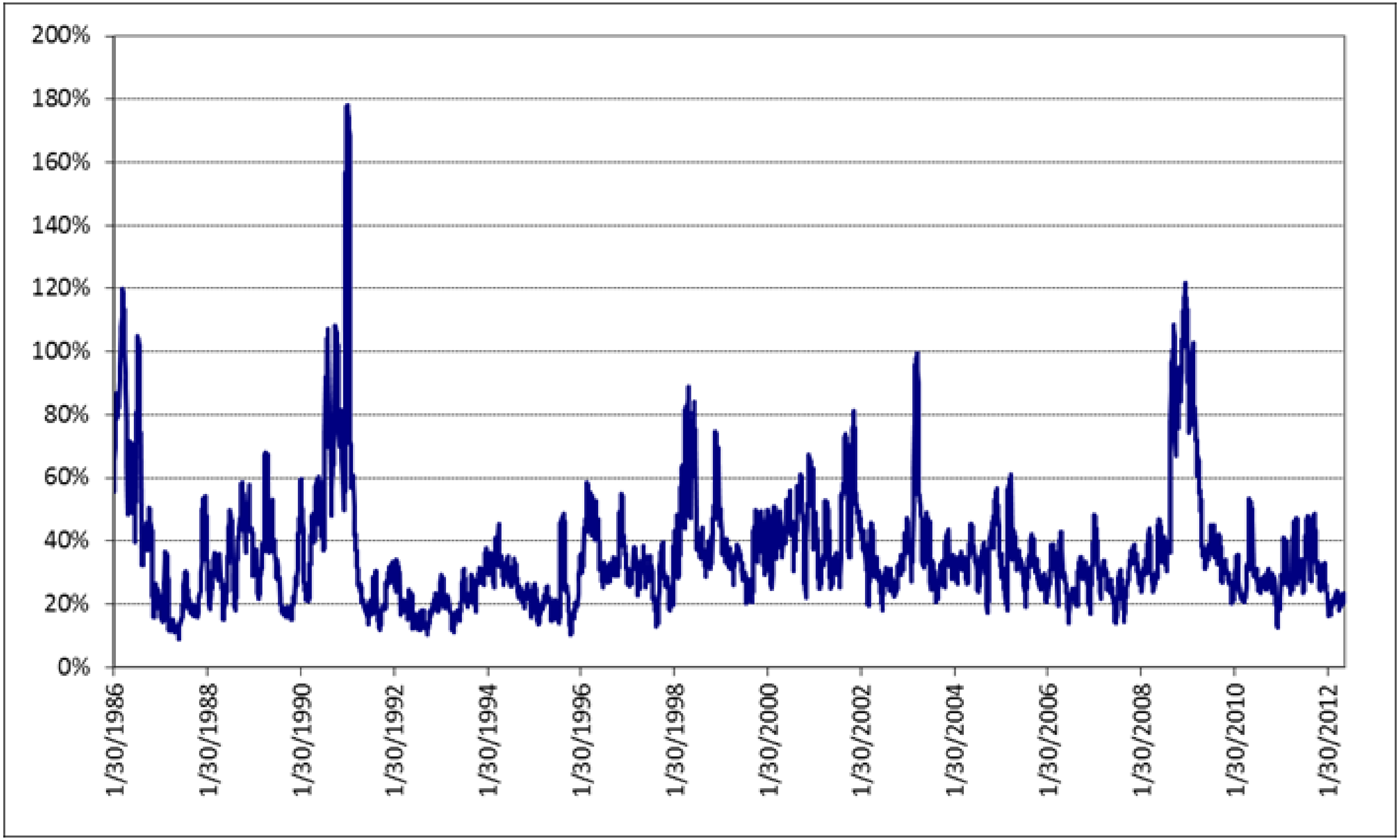
"Loopholes"

- ***Enron loophole***: the extent to which energy commodity derivatives are traded over the counter rather than in exchanges and the lack of transparency associated with OTC trades.
- ***London loophole***: the volume of trade in international exchanges that are not subject to same regulations as exchanges in the U.S.
- ***Swaps loophole***: the prevalence of swaps or index trading in energy commodity derivatives.

Challenge

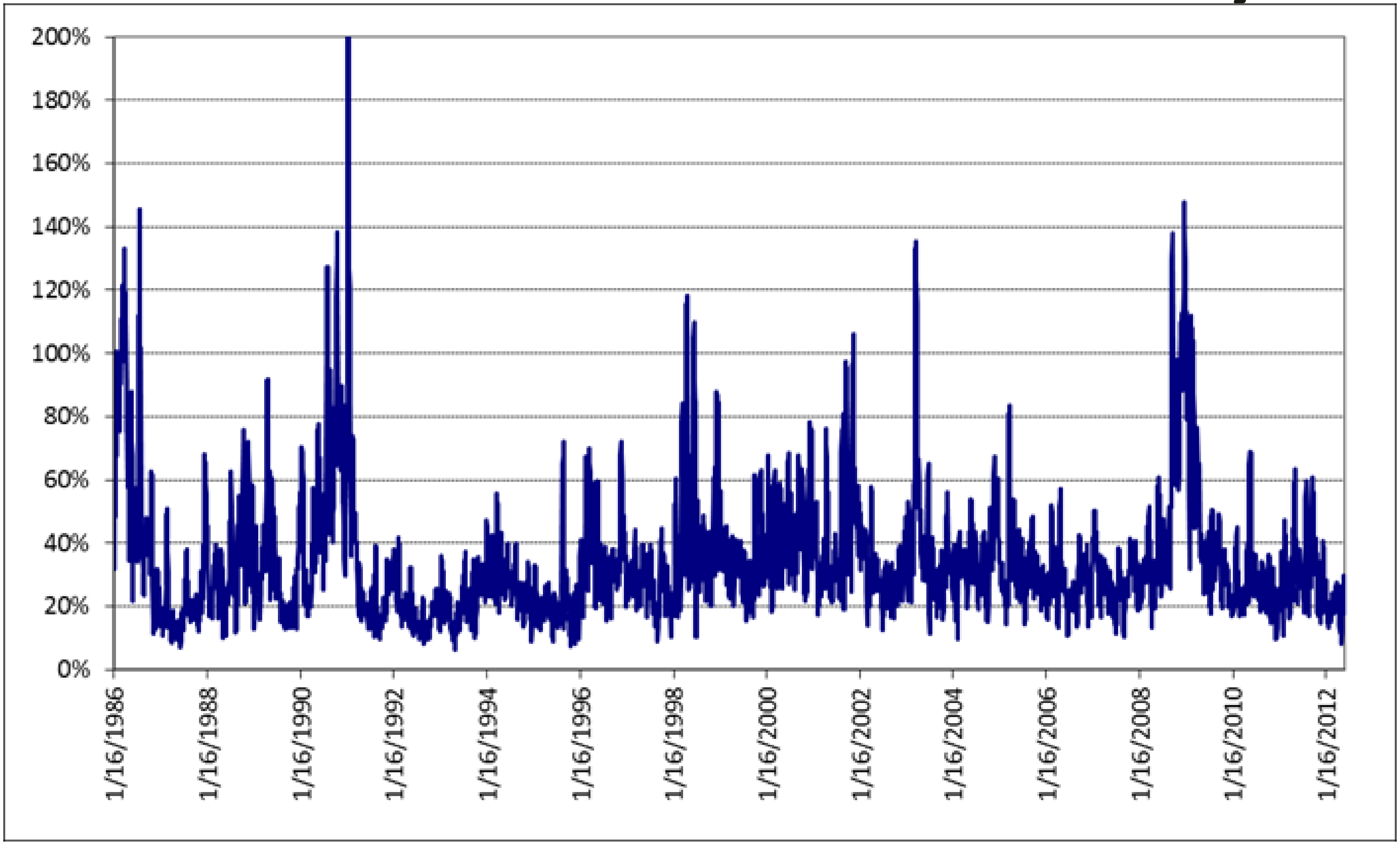
- The empirical literature struggles with this dynamic complexity
- An important constraint is the lack of reliable, publicly available data from
  - increasingly larger portion of the world oil market on both demand (e.g., the pace of demand growth, inventory levels and subsidies) and supply (e.g., access to resources and operations of NOCs)
  - positions of heterogeneous traders in the oil derivatives market, especially in OTC markets

Annualized 10-day volatility



Source: calculated by CEE based on EIA data

Annualized one-month volatility



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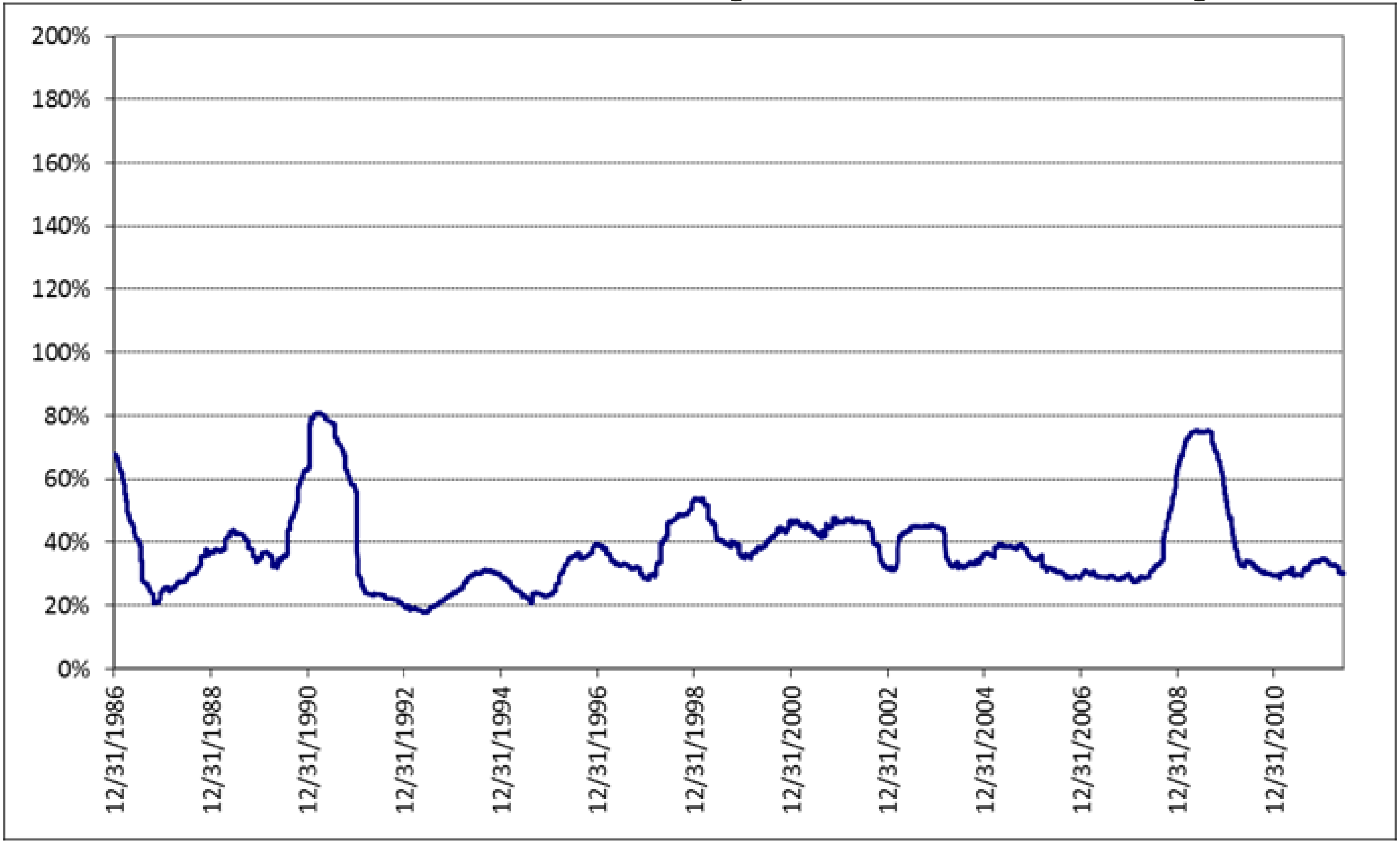
Source: calculated by CEE based on EIA data

Annualized one-year volatility



Source: calculated by CEE based on EIA data

Observations from volatility charts

- As we reduce frequency, volatility smoothens
- Average volatility is the same for all frequencies (~37%)
- But, "volatility" of volatility is higher in higher frequencies
- And, the range of volatility is wider in higher frequencies

Implications

- All of this is consistent with the view that in the long-run fundamentals govern (mean reversion); but the mean itself may change due to changes in fundamentals.
- Financial players focus on the short-run when there is more volatility, to which they may be contributing with their entry and exit, and change of positions.