

# Oil & the Economy



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offshore



onshore



downstream

## Douglas-Westwood

- U.K. based consultancy
- Aberdeen, Canterbury, New York, Singapore

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  - UK & Norway offshore wind strategy
  - Economic impact studies



power



LNG



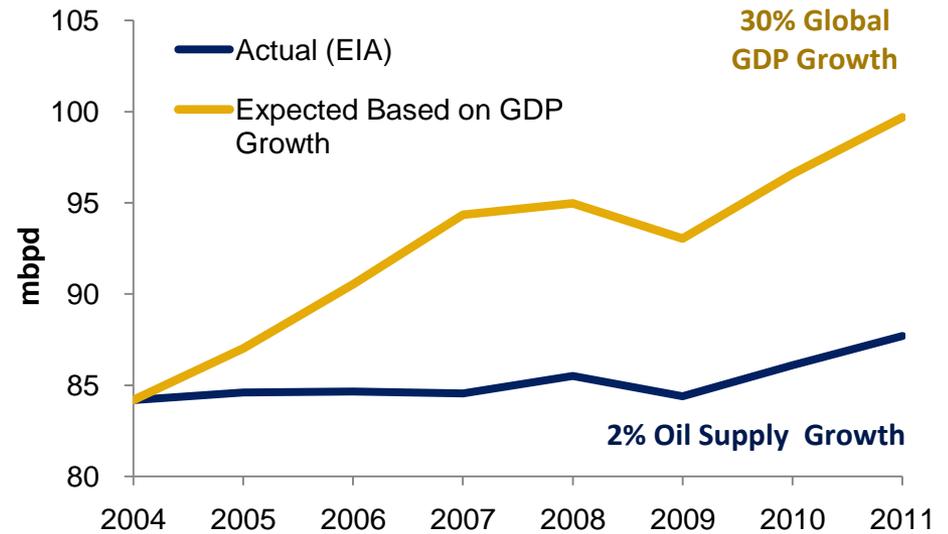
renewables

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Explaining the Past  
Looking Forward  
Conclusions

- Oil supply stopped responding in Q4 2004
- Global economy kept growing
- By 2008, the world economy was missing a quantity equal to the output of Saudi Arabia
- Today, compared to 2004 Q4, we're missing a Saudi Arabia + Iraq

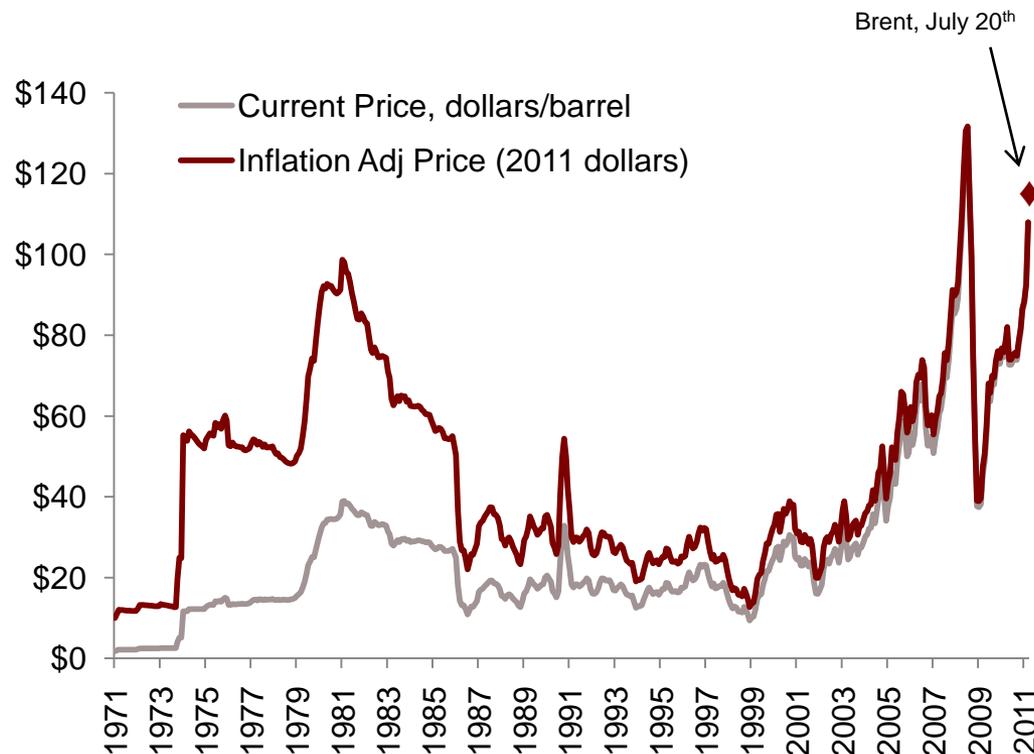


**Observed Oil Supply; and Oil Demand anticipated based on GDP growth**

Source: EIA, IMF, Douglas-Westwood analysis

\* Demand growth = GDP growth – 1.2% annual efficiency gain

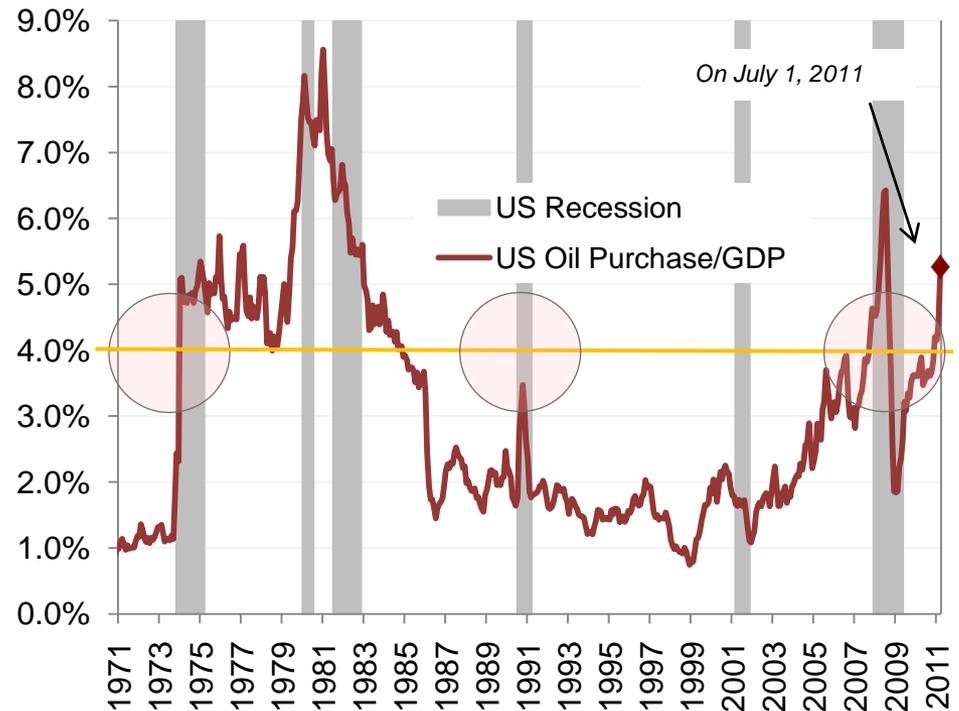
- The lack of oil to support economic growth lead to a prices surges in 2008...
- ...and now again in 2011
- Just three years later!
- (Oil price today above oil shock levels of '73, '79 in real and nominal terms)



**Real and Inflation Adjusted Crude (RAC) Oil Prices**

Source: EIA. Douglas-Westwood analysis, Monthly data, as of March 2011

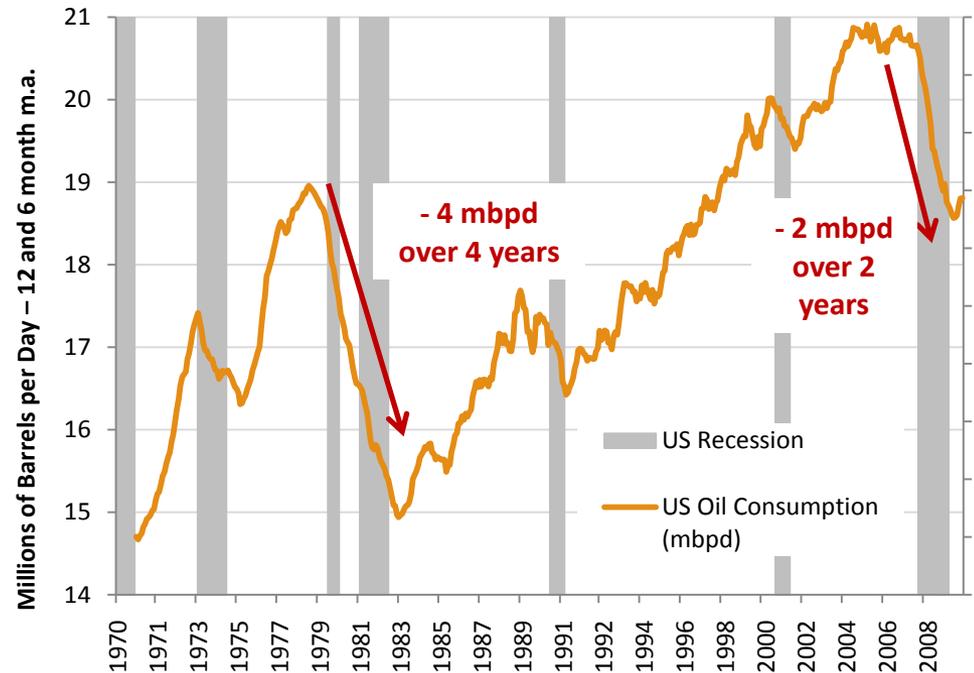
- Without incremental supply, oil prices spiked
- Historically, when crude oil expenditure has reached 4% of GDP, the US has fallen into recession
- Equals \$85-90 oil
- WTI July 22<sup>nd</sup>: \$99
- Brent July 22<sup>nd</sup>: \$118
- “Oil: What Price can America Afford?”



**US Crude Oil Expenditure as a Percent of GDP**

Source: EIA STEO, Monthly data, through March 2011

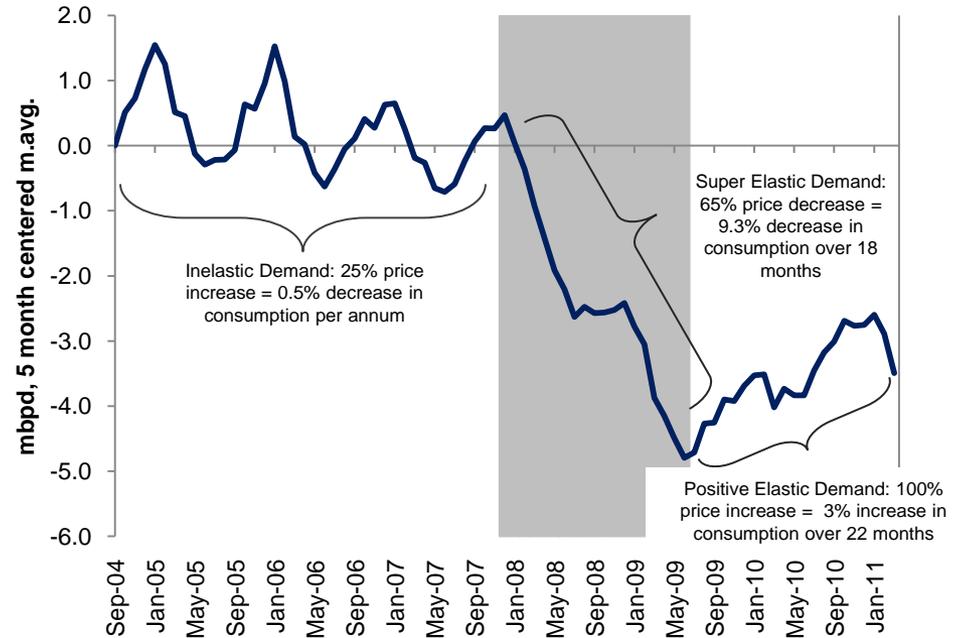
- Oil prices pressure are typically not resolved by efficiency or conservation...
- ...not by adding capacity
- They are solved by brutal recessions
- 2008 like prior oil shocks, except in one respect
- There was no supply disruption
- First 'peak oil' recession?



**US Crude Oil Consumption**

Source: NBER, EIA

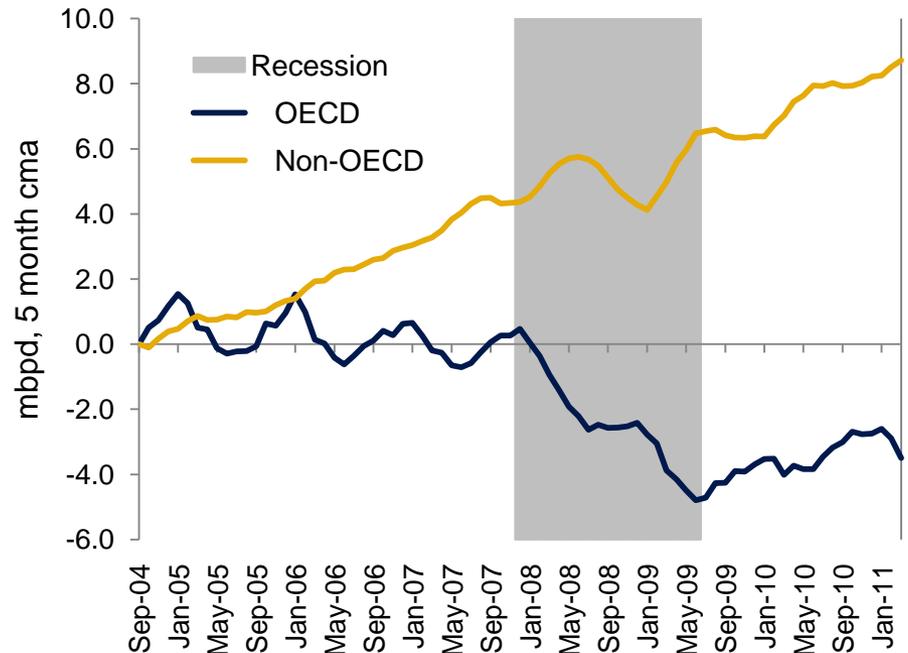
- Oil demand is typically inelastic during times of economic growth
- Demand is hyper elastic during recession
- Demand can grow in the face of stiff price increases during an economic recovery
- So oil consumption is only ceded historically during recessions
- (Suggests oil is an “enabling commodity”, like water or air—we won’t give it up easily because it reduces other activities, too)



**Change in OECD Oil Consumption from the Stalling of the Oil Supply in H2 2004**

Source: NBER, EIA

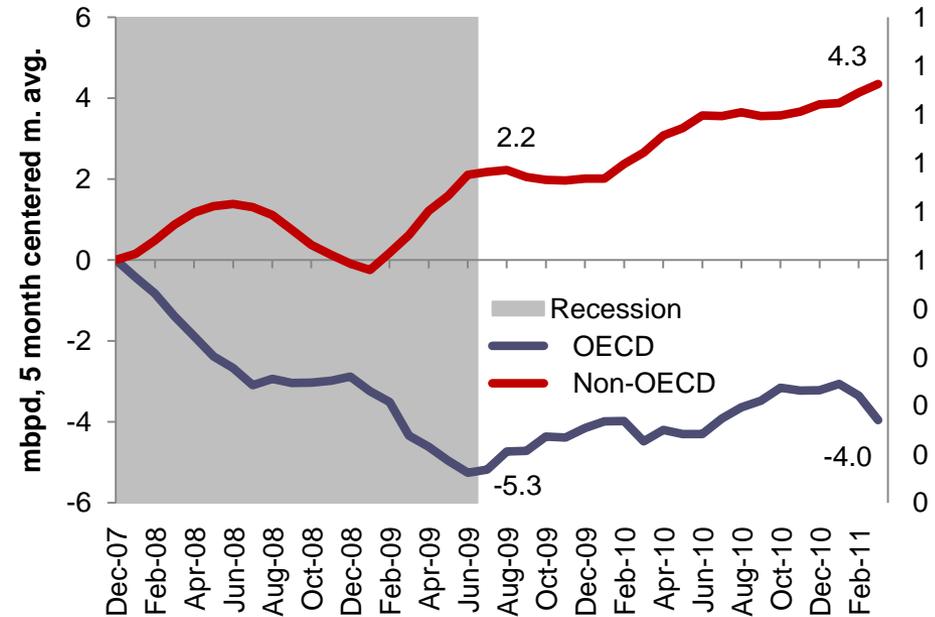
- No supply disruption in 2008
- No peak oil—in accounting terms
- Just a slow-growing oil supply
- But...the existing oil supply is being re-allocated from the OECD countries to the non-OECD countries
- Demand—not supply-- shock



**Change in OECD and non-OECD Oil Consumption, from Stalling of Oil Supply in Q4 2004**

Source: EIA STEO

- Recession not merely shock and recovery
- Fundamental vehicle for re-allocation of demand from OECD to non-OECD
- All of the drop in OECD consumption occurred from the first month of the Recession, to the last month of the Recession. Not before, not after.
- OECD consumers are providing more than 90% of increased consumption in the non-OECD
- Contribution of oil producers is minimal



**Change in OECD and non-OECD Oil Consumption from Beginning of Great Recession**

Source: NBER, EIA

- June production at 88.5 mbpd—up 1.1% over last June
- But fundamentals analysis shows consumption should be at 90 mbpd, using last June's prices
- So we're 1.5 mbpd /year short to achieve price stability
- Oil supply needs to grow around 2.8% per year—it's managing less than half that.
- The difference is worth \$30 / barrel compared to last June.





中国建设银行  
China Construction Bank

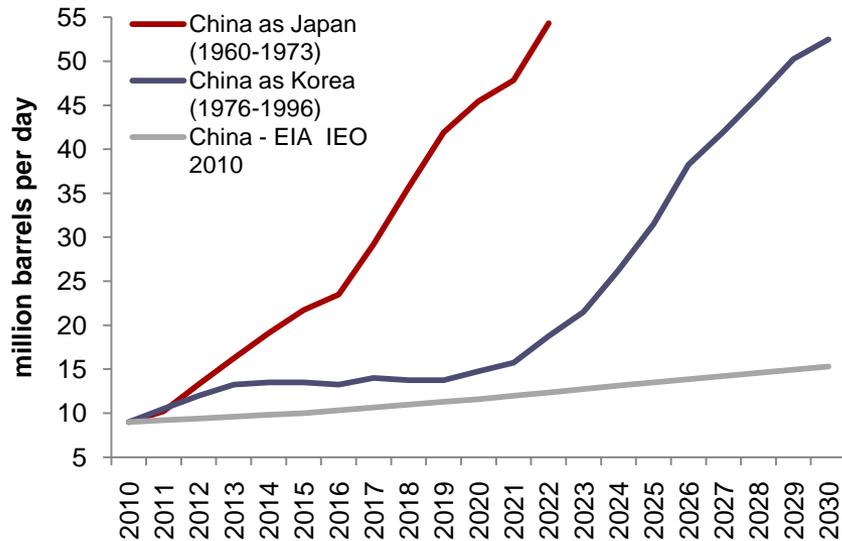
北京西路  
Beijing Rd (W)  
延安西路 陕西北路  
Yanan Rd (W) Shaanxi Rd (N)

上海商城  
900m SHANGHAI CENTRE 36 P

协和城  
800m CONCORD CITY 88 P

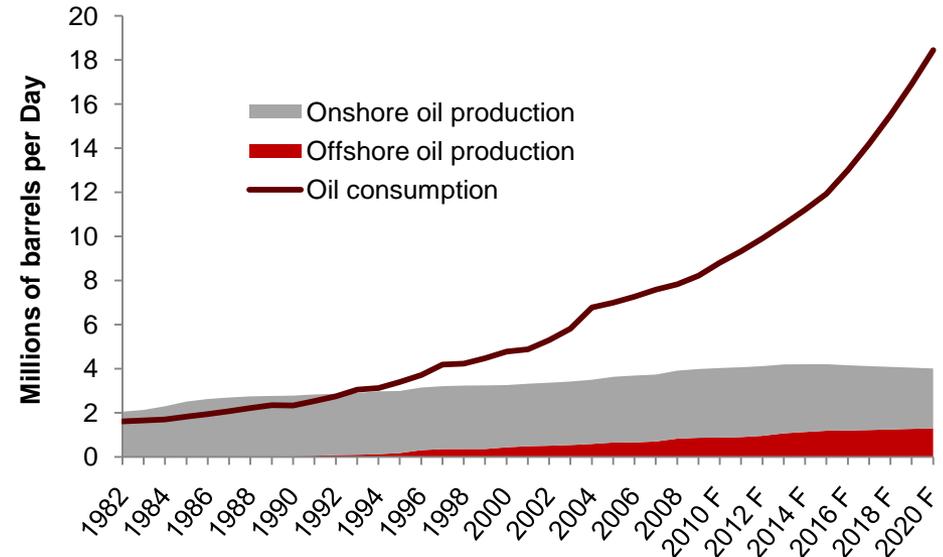
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Explaining the Past  
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**China Unconstrained Demand**

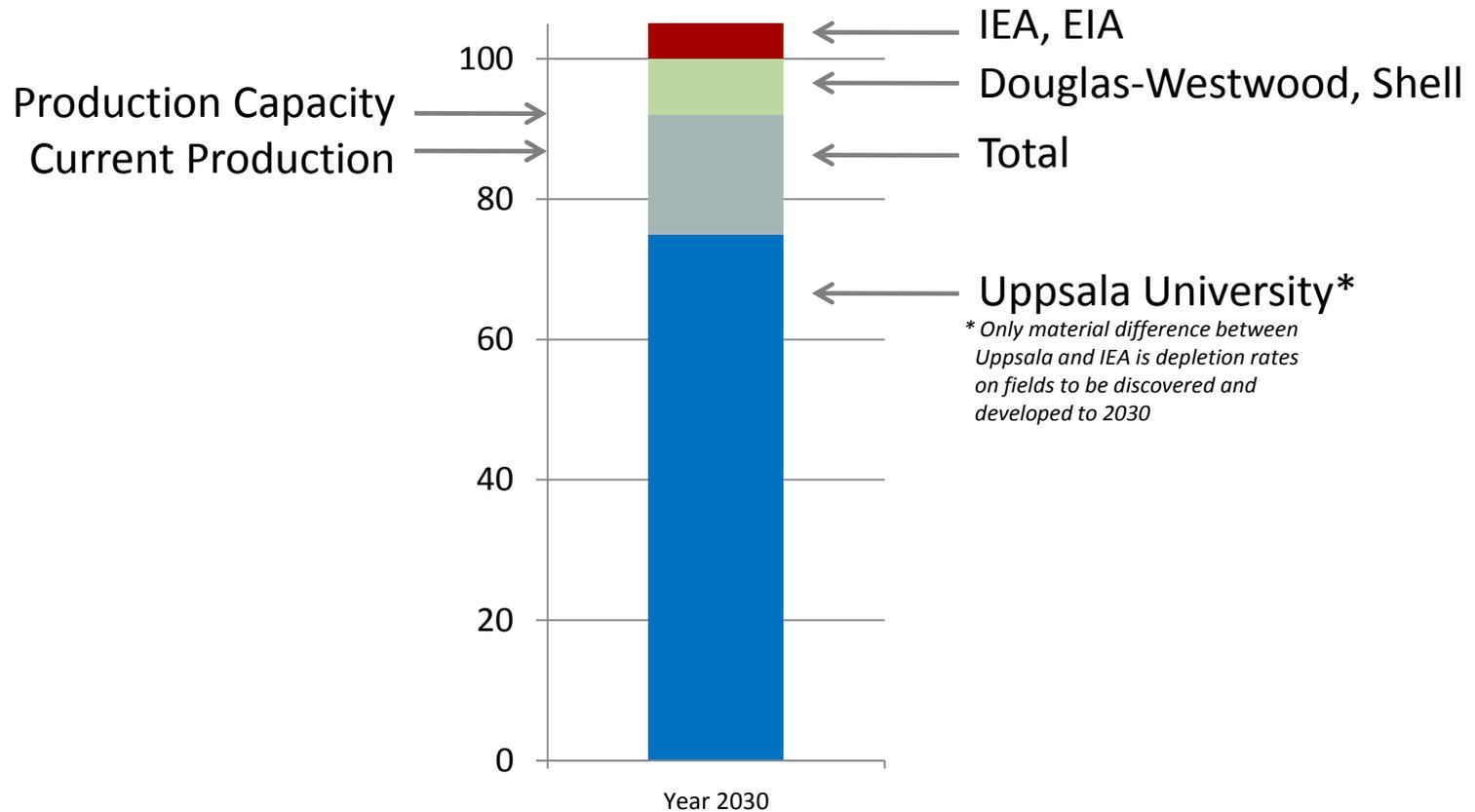
Source: EIA, Douglas-Westwood Analysis



**China Crude Oil Production and Constrained Demand**

Source: EIA, Douglas-Westwood Analysis

- GDP growth of 10%; oil demand growth of 10.5% in 2010
- 18 million light vehicle sales in 2010 vs. 13.6 m prior year (12.6 m for US in 2010)
- “S” curve – motorization in one generation
- Crude oil imports up 27% in January (imports = half of consumption)
- In 2010, China was 1/3 of total global oil demand growth
- Prospective unconstrained growth: 50 mbpd by 2030 (vs. US 19 mbpd today)
- On paper, 140 – 160 mbpd of demand by 2030, nearly 2x current demand

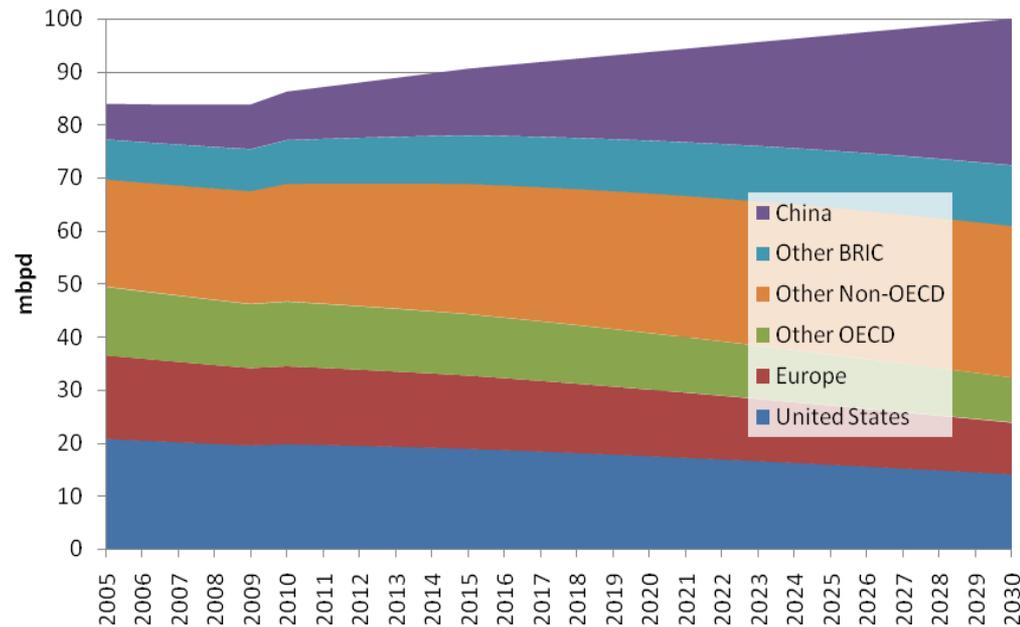


Range of Global Oil Supply Forecasts – 2030 – All Liquids

Source: Various

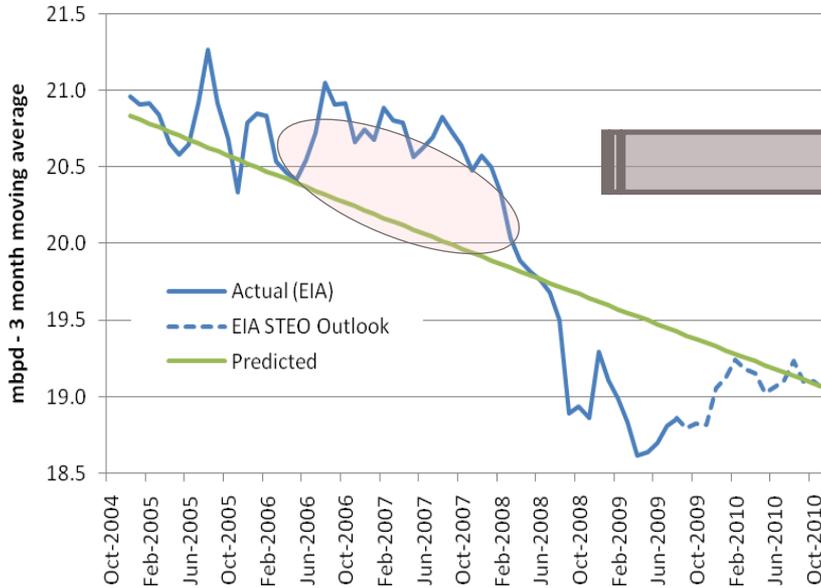
- Petroleum liquids supply forecasts from 75 – 105 mbpd for 2030

- The emerging markets will bid away the advanced countries' oil
- It's not 'peak demand', it's unaffordable oil
- Assuming 100 mbpd supply by 2030, US consumption would be expected at 14 mbpd—down 1/3 from 21 mbpd in mid 2007
- Rate of long term decrease: 1.5% per annum, 2.3% on a per capita basis
  - Per capita, still puts US in 2030 on par with Japan, Korea today.
- It also provides us a baseline to measure stress in the system



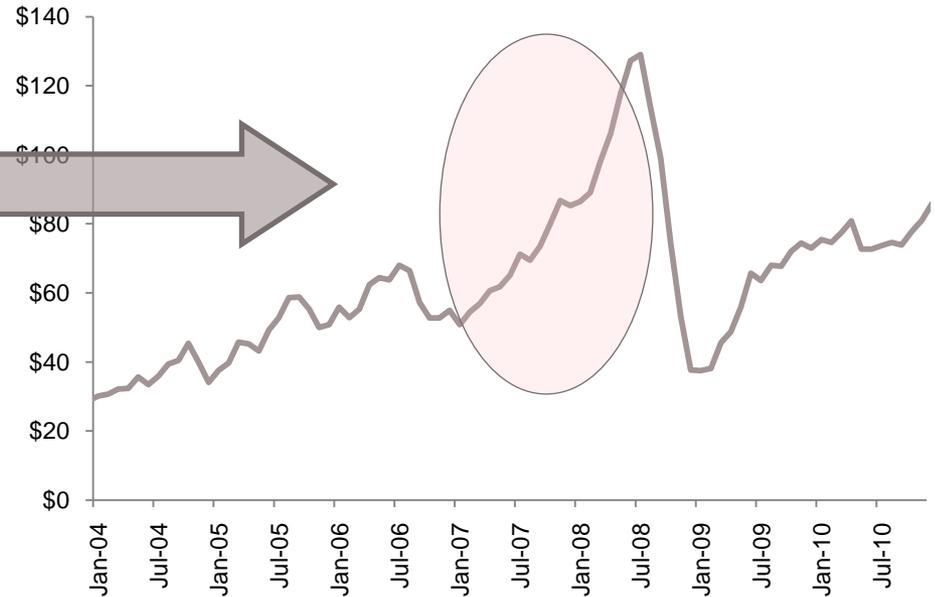
**Global Oil Consumption 2005 - 2030**

Source: Douglas-Westwood projections  
based on EIA data



**US Oil Consumption, Actual and Predicted based on Demand Re-Allocation to non-OECD**

Source: EIA and Douglas-Westwood Analysis



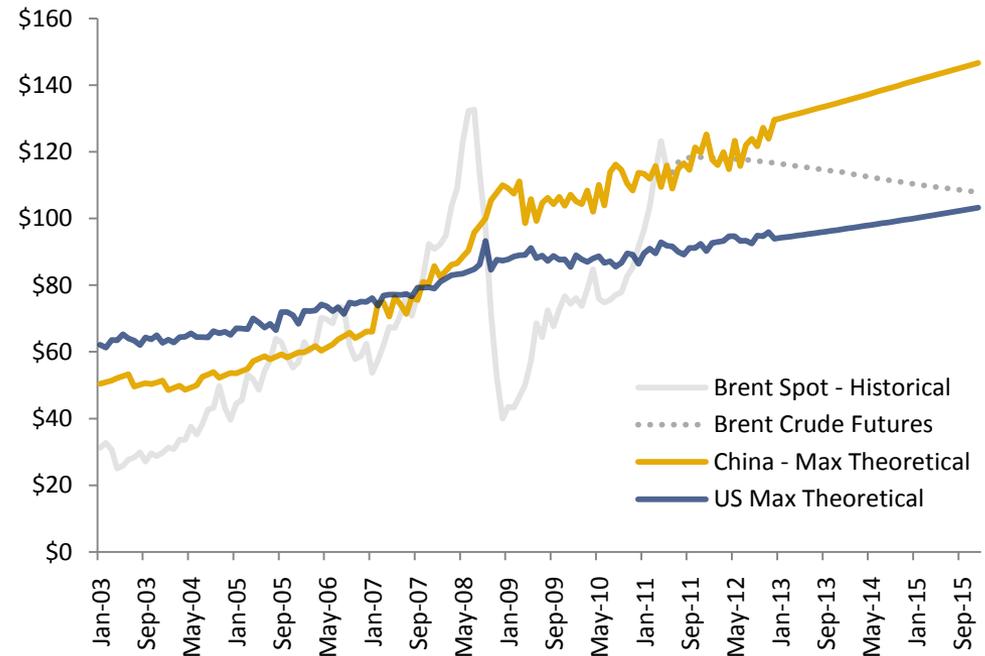
**Brent Crude Oil Spot Price, US Dollars**

Source: Barchart.com

- Difference between actual and predicted oil consumption (based on re-allocation of demand to non-OECD) gives us a measure of stress in the system

- Does systemic stress equate to exponential price rise?

- China setting oil prices? Appears so.
- China tolerance limit: \$110
- US tolerance limit: \$90
- And the gap appears to grow over time.
- Still early days for the model.

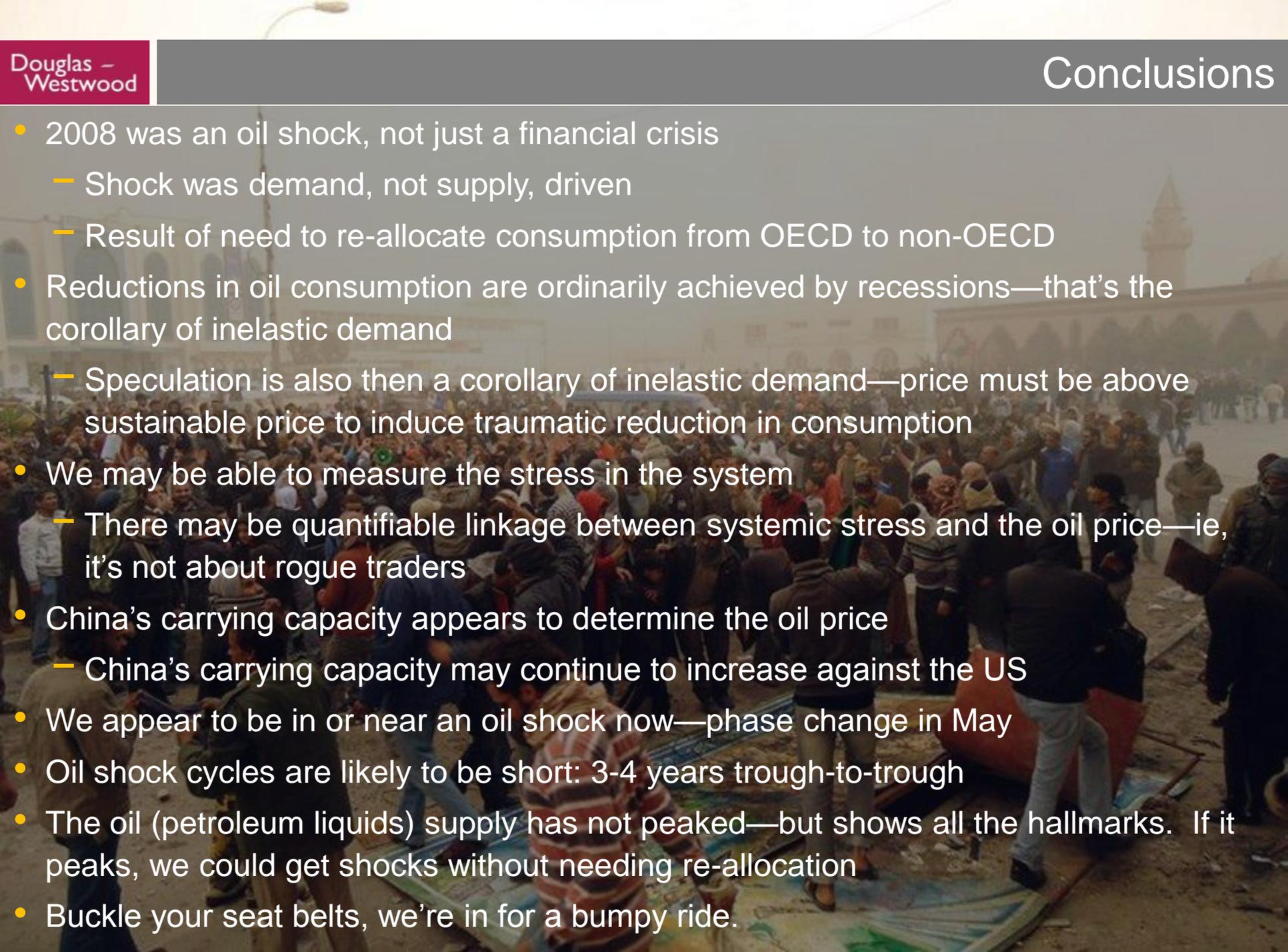


**Carrying Capacity of the US and Chinese Economies in terms of Brent Crude Prices; Brent Crude Spot Prices and Futures, Jan. 2003-Dec. 2015**

Source: EIA, IMF, Barchart.com, Douglas-Westwood Analysis



Explaining the Past  
Looking Forward  
Conclusions

- 2008 was an oil shock, not just a financial crisis
    - Shock was demand, not supply, driven
    - Result of need to re-allocate consumption from OECD to non-OECD
  - Reductions in oil consumption are ordinarily achieved by recessions—that's the corollary of inelastic demand
    - Speculation is also then a corollary of inelastic demand—price must be above sustainable price to induce traumatic reduction in consumption
  - We may be able to measure the stress in the system
    - There may be quantifiable linkage between systemic stress and the oil price—ie, it's not about rogue traders
  - China's carrying capacity appears to determine the oil price
    - China's carrying capacity may continue to increase against the US
  - We appear to be in or near an oil shock now—phase change in May
  - Oil shock cycles are likely to be short: 3-4 years trough-to-trough
  - The oil (petroleum liquids) supply has not peaked—but shows all the hallmarks. If it peaks, we could get shocks without needing re-allocation
  - Buckle your seat belts, we're in for a bumpy ride.
- 



Thank You.

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