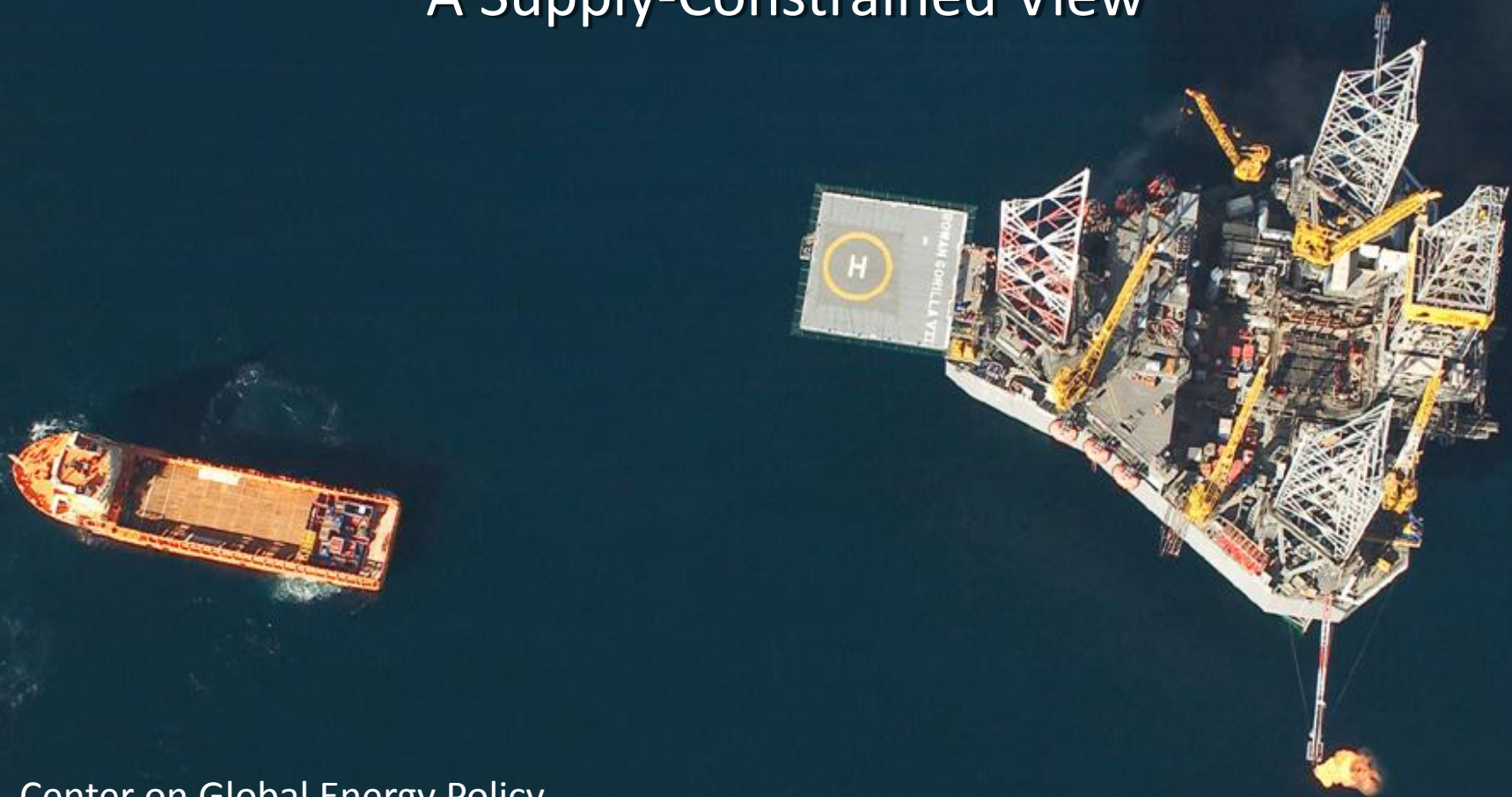


Oil and Economic Growth

A Supply-Constrained View



Center on Global Energy Policy
School of International and Public Affairs
Columbia University
11th February 2014

Steven Kopits
Managing Director
Douglas-Westwood / New York



offshore



onshore



downstream

History and Office Locations

- Established 1990
- Aberdeen, Canterbury, London, New York, Houston & Singapore

Activities & Service Lines

- Business strategy & advisory
- Commercial due-diligence
- Market research & analysis
- Published market studies

Large, Diversified Client Base

- 1,000 projects, 70 countries
- Leading global corporates
- Energy majors and their suppliers
- Investment banks & PE firms
- Government agencies

Spanning the Energy Sectors

- 10 years in offshore renewable energy



power



LNG



renewables

Demand-Constrained Models

Supply-Constrained Models

Supply Growth

Demand Growth

Oil Prices

Oil and Mobility

The Oil Majors

Oil and Economic Growth

Conclusions

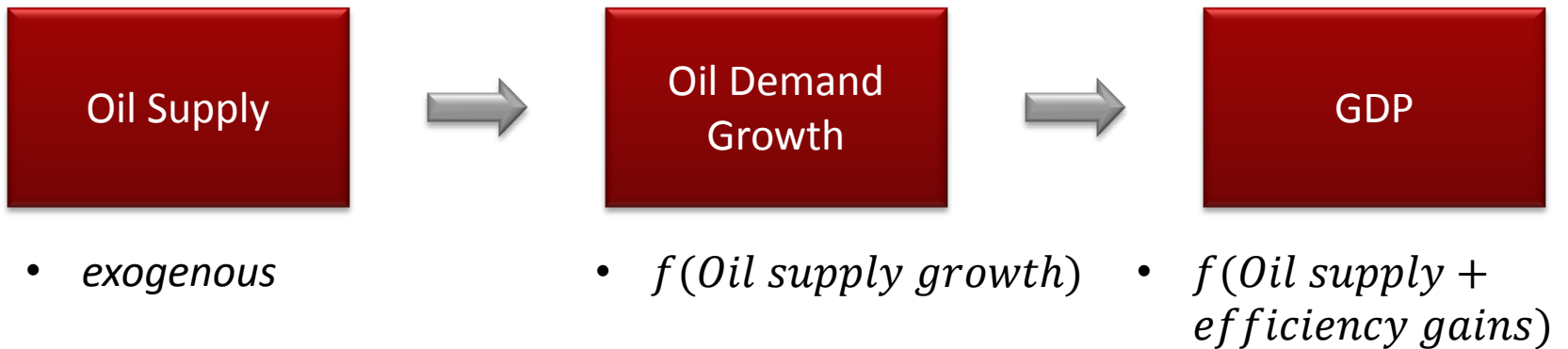


Demand versus Supply Driven Forecasting

Demand-driven Forecasting



Supply-driven Forecasting



Demand versus Supply Driven Forecasting

Demand-driven Forecasting



- *exogenous*
 - $f(\text{GDP growth})$
 - $f(\text{demand growth})$
- Traditional forecasting model
 - Many forecasters will never see anything but this during their entire career
 - Virtually all forecasters—investment banks, oil companies, and industry analysts, the US and foreign governments—use demand-constrained models.

Demand versus Supply-Driven Forecasting

Traditional Oil Markets Forecasting



- Supply growth is a function of non-OPEC supply and OPEC supply
- OPEC provides the residual: “Call on OPEC”
- OPEC is to stabilize prices with increased production or production cuts

From BP's *Energy Outlook, 2013*

*“Global liquids consumption is projected to reach 104 Mb/d by 2030 but **growth slows to 0.8% p.a.** (from 1.4% p.a. in 1990-2010 and 1.9% p.a. in 1970-90).”*

*“Demand growth comes exclusively from rapidly growing non-OECD economies. China, India and the Middle East together account for nearly all of the net global increase. **OECD demand has peaked** and consumption is expected to decline by 5.6 Mb/d.”*

BP Energy Outlook, Jan. 2013 (pp. 33, 39)

- A demand-driven interpretation.



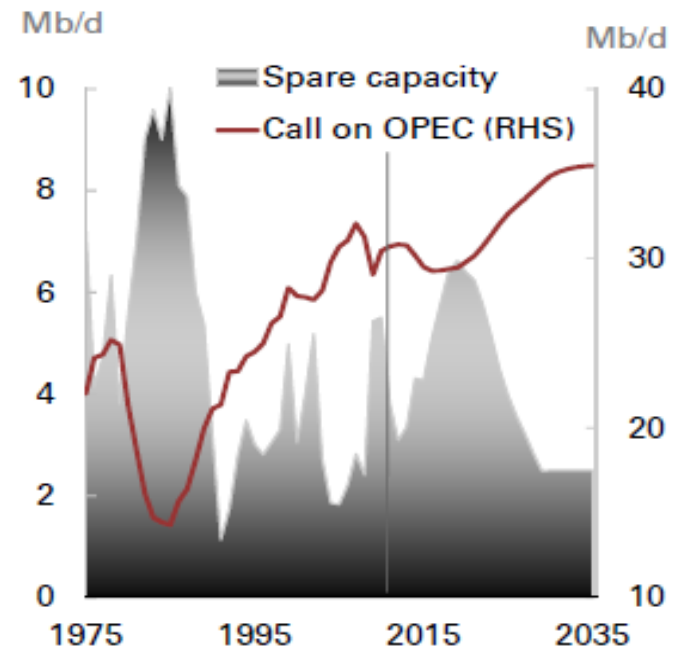
...create a more challenging future for OPEC

- In our outlook, demand growth slows and non-OPEC supplies rise – both as a result of high prices. Unconventional non-OPEC supply will account for all the net growth in global production over this decade, and over 70% of the growth from 2020-30.
- We assume that, in response, OPEC members will cut production over the current decade; spare capacity exceeds 6 Mb/d by 2015, the highest since the late 1980s. If OPEC were to maintain current production, the market would experience unsustainably large inventory increases.
- The market requirement for OPEC crude in our outlook is not expected to reach 2011 levels for another decade. Thereafter, OPEC production rebounds – and spare capacity shrinks – as the market requirement for OPEC crude recovers.
- While we believe that OPEC members will be able to maintain production discipline despite high levels of spare capacity, OPEC cohesion is a key oil market uncertainty, especially in the current decade.

BP's View of the Residual Call on OPEC



- BP solves oil supply growth > demand growth with rising spare capacity in OPEC.
- This means purely Saudi Arabia, barring unexpected outages in other countries—on which more later.



Assumptions of Demand Constrained Forecasting

- Oil demand is weak
 - GDP growth is endogenously weak, or
 - Social tastes or demographics have changed
- OPEC is central
 - OPEC has enormous leverage
 - OPEC discipline is key to industry economics
- Oil prices are balanced on a knife's edge
 - Any excess supply or lack of OPEC discipline will tank oil prices—and with it, the IOCs

Demand-Constrained Models

Supply-Constrained Models

Supply Growth

Demand Growth

Oil Prices

Oil and Mobility

The Oil Majors

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Conclusions



Need to demonstrate....

Constrained Supply

- Demand is likely higher than demonstrated
- Oil supply growth is constrained
- Oil is a key enabling commodity (can affect GDP)
- Constrained oil supply is materially affecting economic activity
- Efficiency gains are likely not enough
- GDP growth is off trend

Traditional Forecast (Demand-driven)

- “Peak demand” largely unsupported
- Oil prices sustaining in the face of supply growth in excess of forecast demand

The image features three oil pumpjacks in silhouette against a dramatic sunset sky. The pumpjacks are arranged in a line from left to right, with the one on the left being the largest and most prominent. The sky is filled with soft, orange and yellow clouds, transitioning to a darker blue at the top. The overall mood is industrial and atmospheric.

Demand-Constrained Models

Supply-Constrained Models

Supply Growth

Demand Growth

Oil Prices

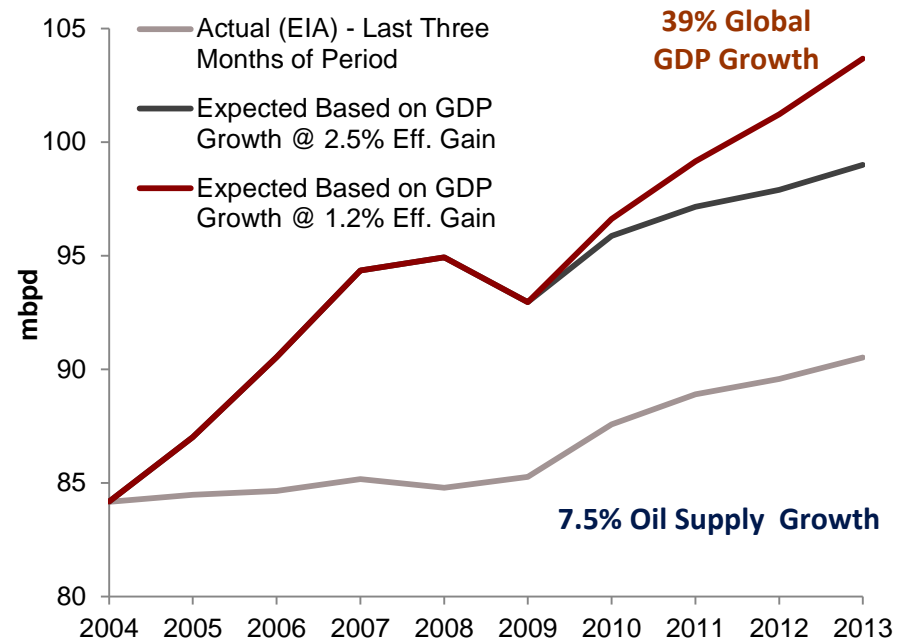
Oil and Mobility

The Oil Majors

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Conclusions

- Oil demand historically increases by 0.75 * GDP growth (inherent demand growth)
- Implies 23%+ oil consumption growth from 2004-2013
- Actual oil supply growth was only 7.5%
- 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 and an Iraq
- That's why oil is expensive



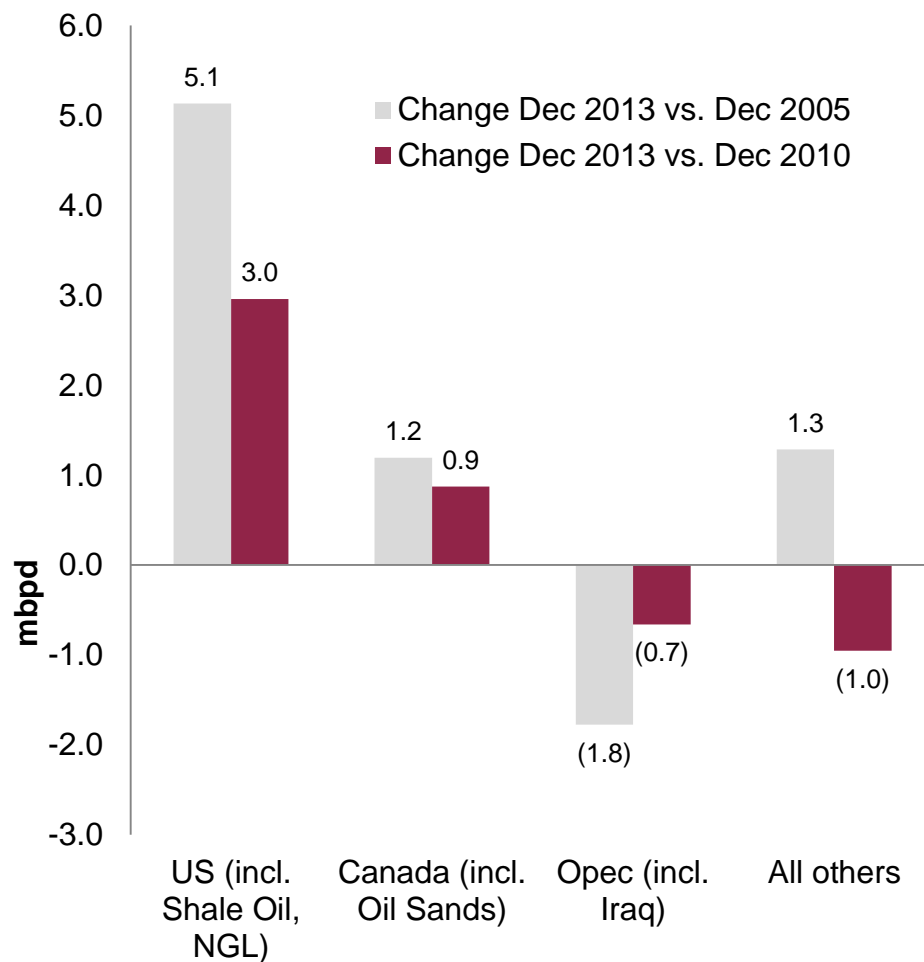
Observed Oil Supply; and Oil Demand anticipated based on GDP growth

Source: EIA, IMF, Douglas-Westwood analysis

- Demand growth = GDP growth – 1.2% annual efficiency gain without oil price pressure
- Demand growth = GDP growth – 2.5% annual efficiency gain with oil price pressure at recent levels

- Total production up 5.8 mbbpd since 2005, of which 1.7 mbbpd is OPEC NGL's (non-crude)
- OPEC liquids production (crude + NGL) is unchanged since 2005
- US unconventional liquids (shale oil and NGL) up 5.1 mbbpd—literally all net crude oil production growth—since 2005.
- Canadian oil sands up 1.2 mbbpd from 2005
- Legacy, conventional system still peaked in 2005.
- Oil supply growth *entirely* leveraged to unconvensionals

Liquids Supply Since 2005

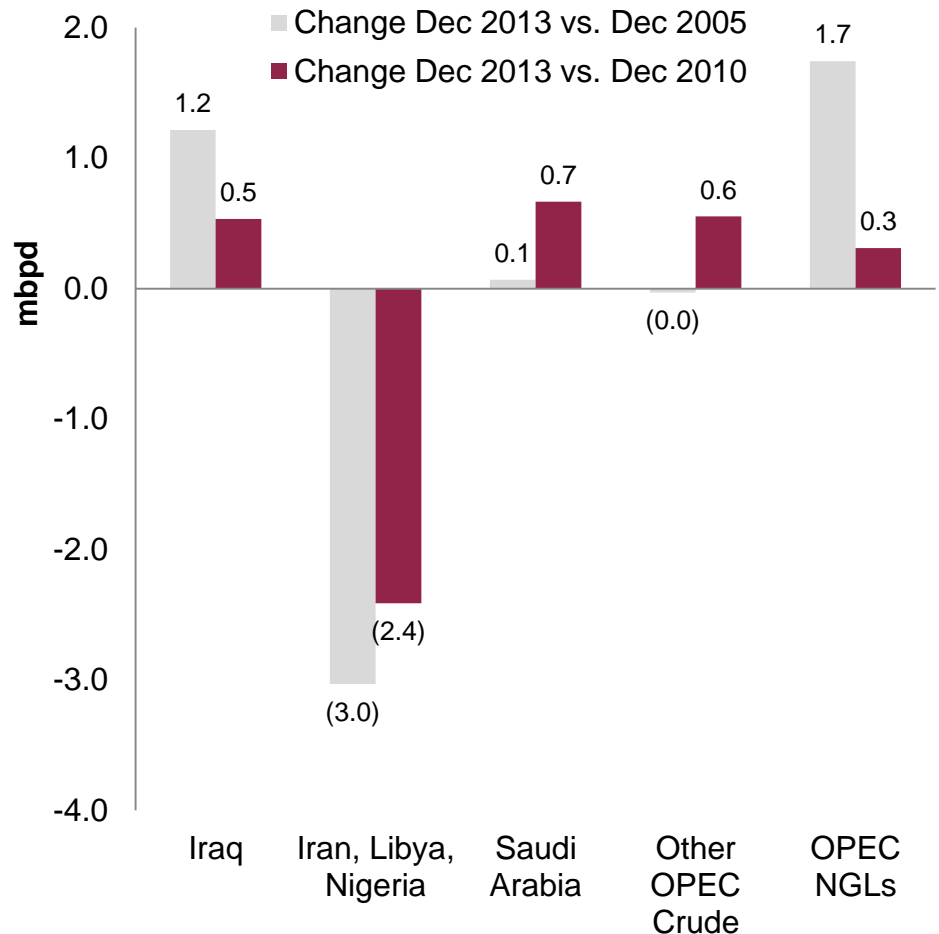


World Liquids Production Growth, 2005-2013, Oct-Dec averages, excludes OPEC NGLs

Source: EIA STEO

OPEC Liquids Supply since 2005

- OPEC crude essentially unchanged in last three years, 1.8 mbpd less than 2005
- Most growth is NGLs, up 1.7 mbpd since 2005
- Iran, Libya, and Nigeria together down 2.4 mbpd since 2010
- Saudi up nearly 700 kbpd from 2010, close to 1979 levels
- Iraq up only 1.2 mbpd since 2005—US adds more in a year now
- US shale oil and NGLs would be easily the second largest producer in OPEC

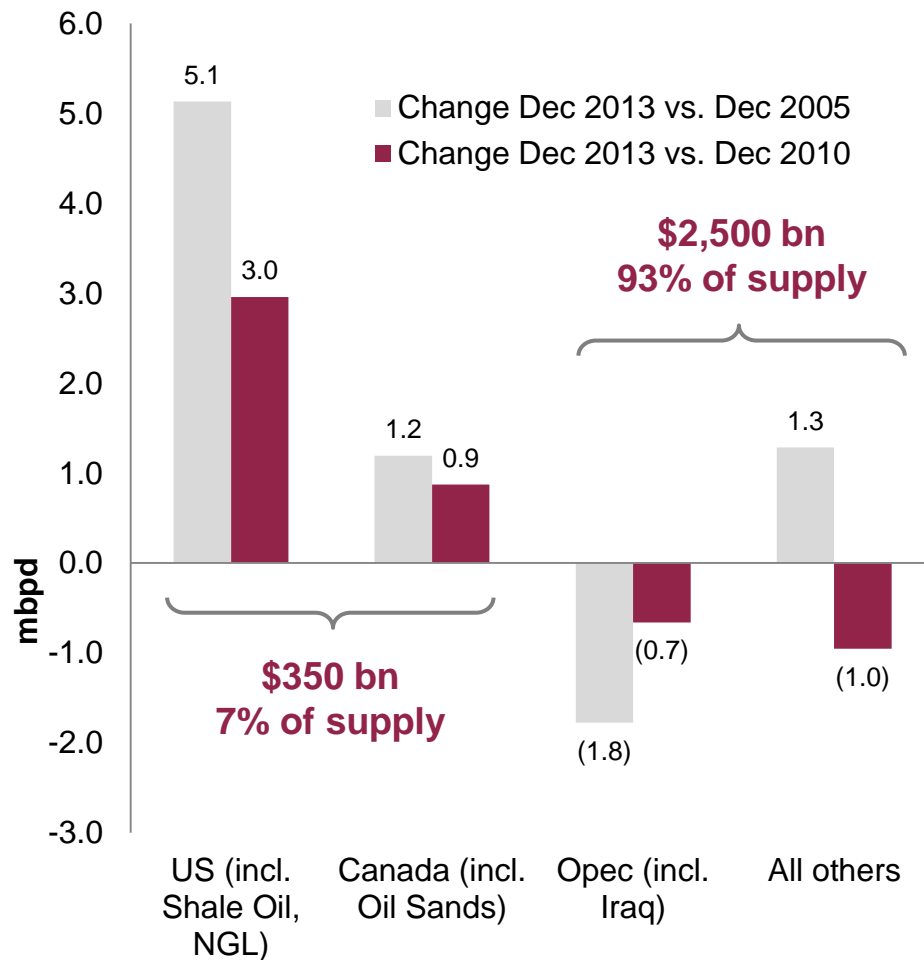


OPEC Liquids Production Growth 2005-2013

Source: EIA STEO, three month averages ending December of each year

- Total spend since 2005 on upstream exploration and production:
 - \$4 trillion**
- Of which, \$350 bn on US and Canadian unconventional oil and gas...
- ...and another \$150 bn on LNG and GTL
- \$3.5 trillion was spent maintaining the 2005 legacy oil and gas system
- About \$2.5 trillion* was spent on legacy crude oil production—94% of the petroleum liquids supply today.
- Result: legacy oil production has fallen by 1 mbpd
- Peak oil for legacy system: still 2005
- For comparison: '98-'05, \$1.5 trillion spend added +8.6 mbpd crude production
- Compared to '98-'05 period, vaporized GDP of Germany

Liquids Supply Since 2005



World Liquids Production Growth, 2005-2013, Oct-Dec averages, excludes OPEC NGLs

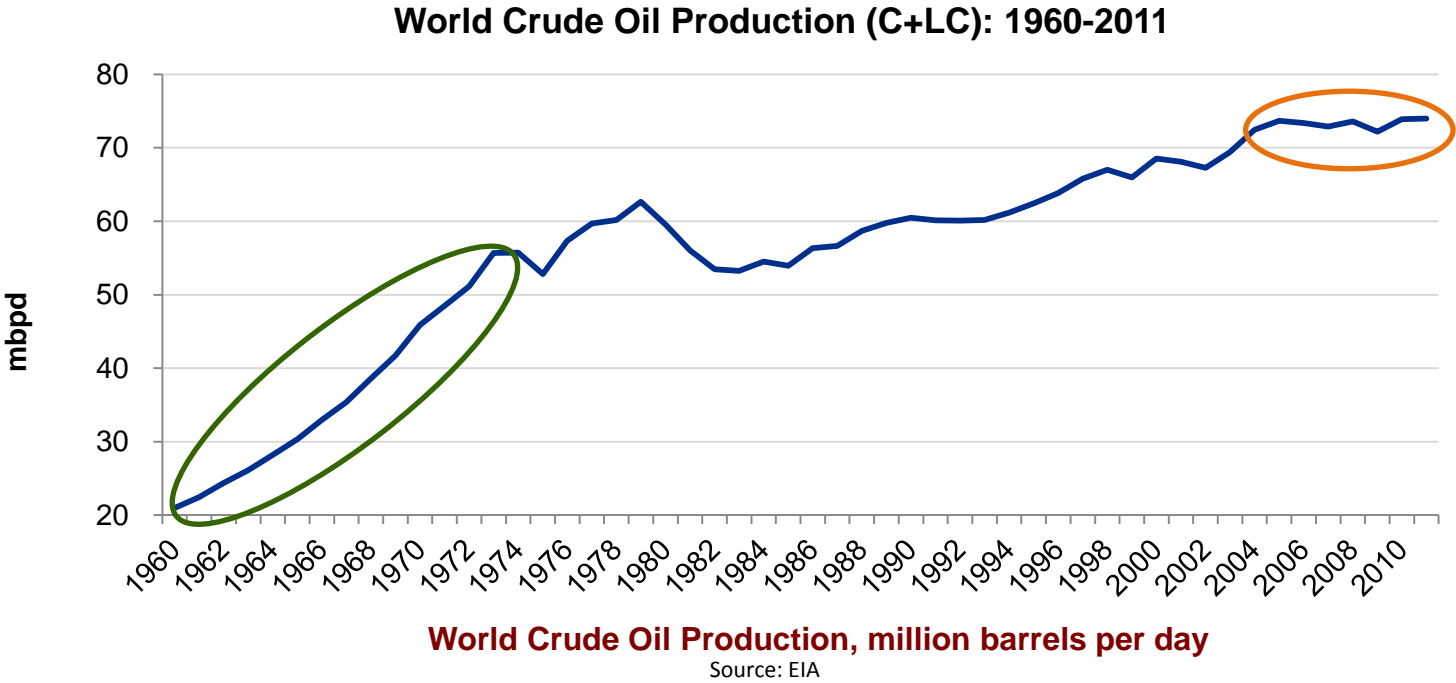
Source: EIA STEO, Barclays, DW Analysis

* GDP of Germany is \$3.5 trn, Italy \$2.0 trn



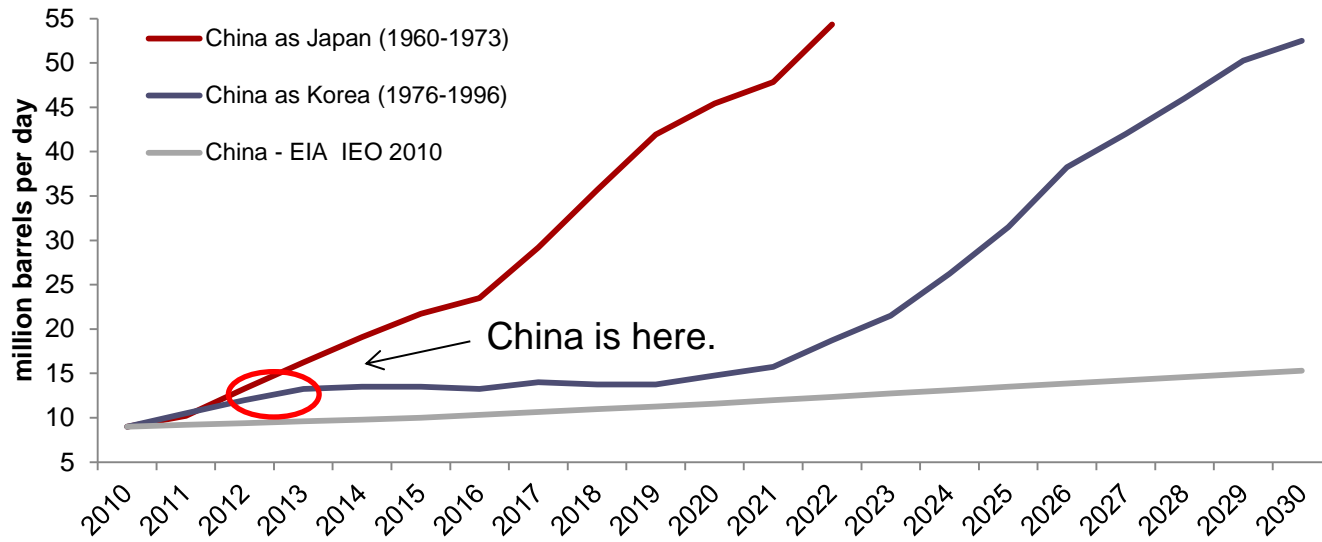
Demand-Constrained Models
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Motorization and Oil in Historical Context



- Motorization in West: 1.2 bn people, +30 mbpd supply, 12 years
- Motorization in the East: 1.3 bn people, +4 mbpd crude, 8 years
- Based on historical precedent, anticipated growth would be 2.7% per year, not 0.8%

China Key Driver of Oil Demand Growth

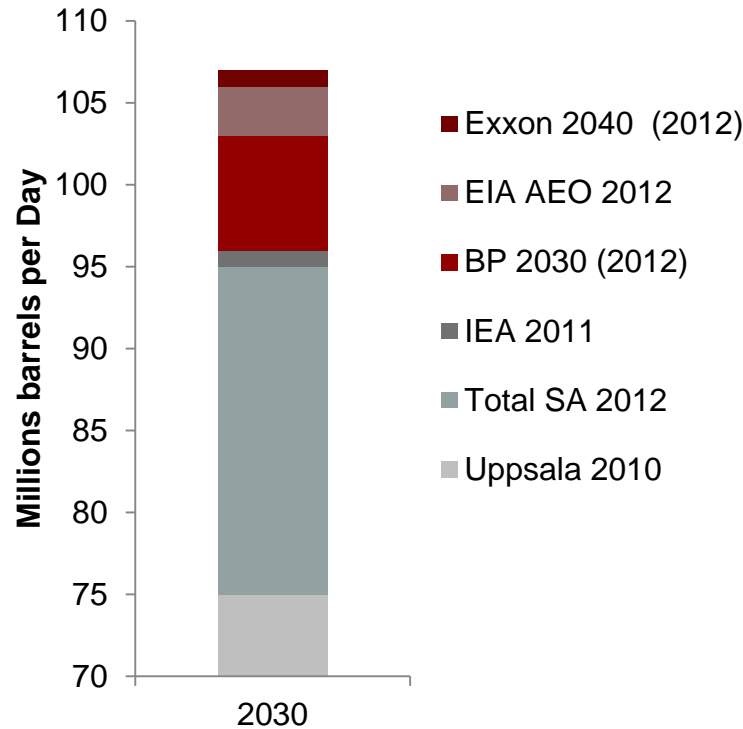


China Unconstrained Demand

Source: EIA, Douglas-Westwood Analysis

- How far? Japan, Korea, Taiwan: 0.5-0.6x US oil consumption per capita
- When? S curve is 20-30 years—about one generation
- Potential is enormous—50 mbpd in 2030 versus 10.5 now (if the oil supply were available; US is at 18.5 mbpd now)
- Total non-OECD demand growth to 2030 could be 60 mbpd—2/3 as much as total production today.
- How does this translate in 0.8% growth?

Petroleum Liquids – 2030 Forecast



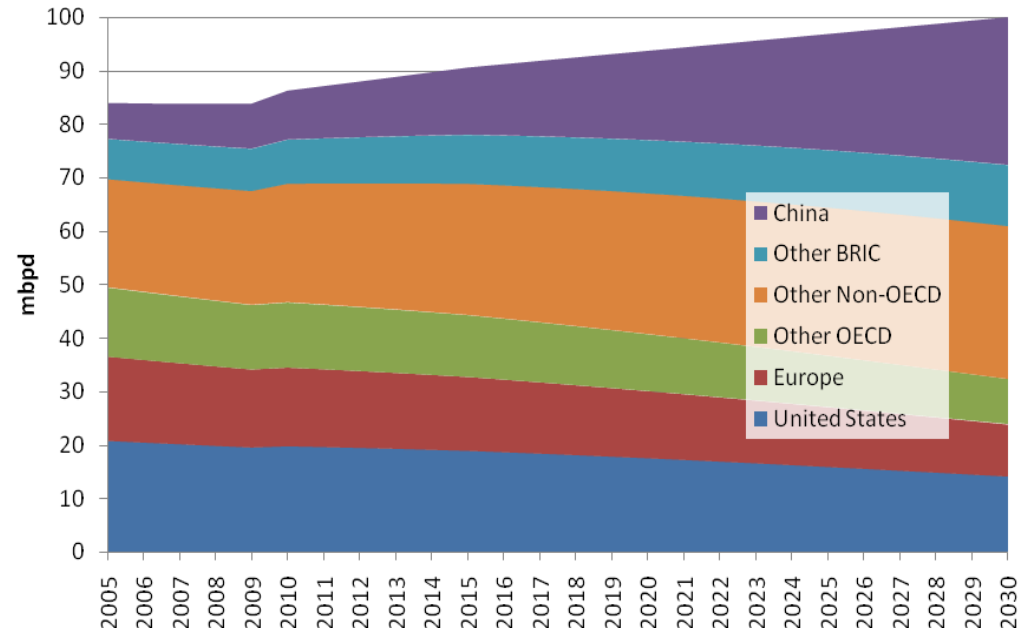
Oil (Petroleum Liquids) Supply Forecasts to 2030

Source: EIA

- Exxon, BP, EIA: 103-107 mbpd
- Total, IEA: 95-96 mbpd
- Kjell Aleklett (ASPO Europe): 75 mbpd (ex-shales)
- These are all peak oil forecasts—not much changed in last few years

Determining Demand Trends

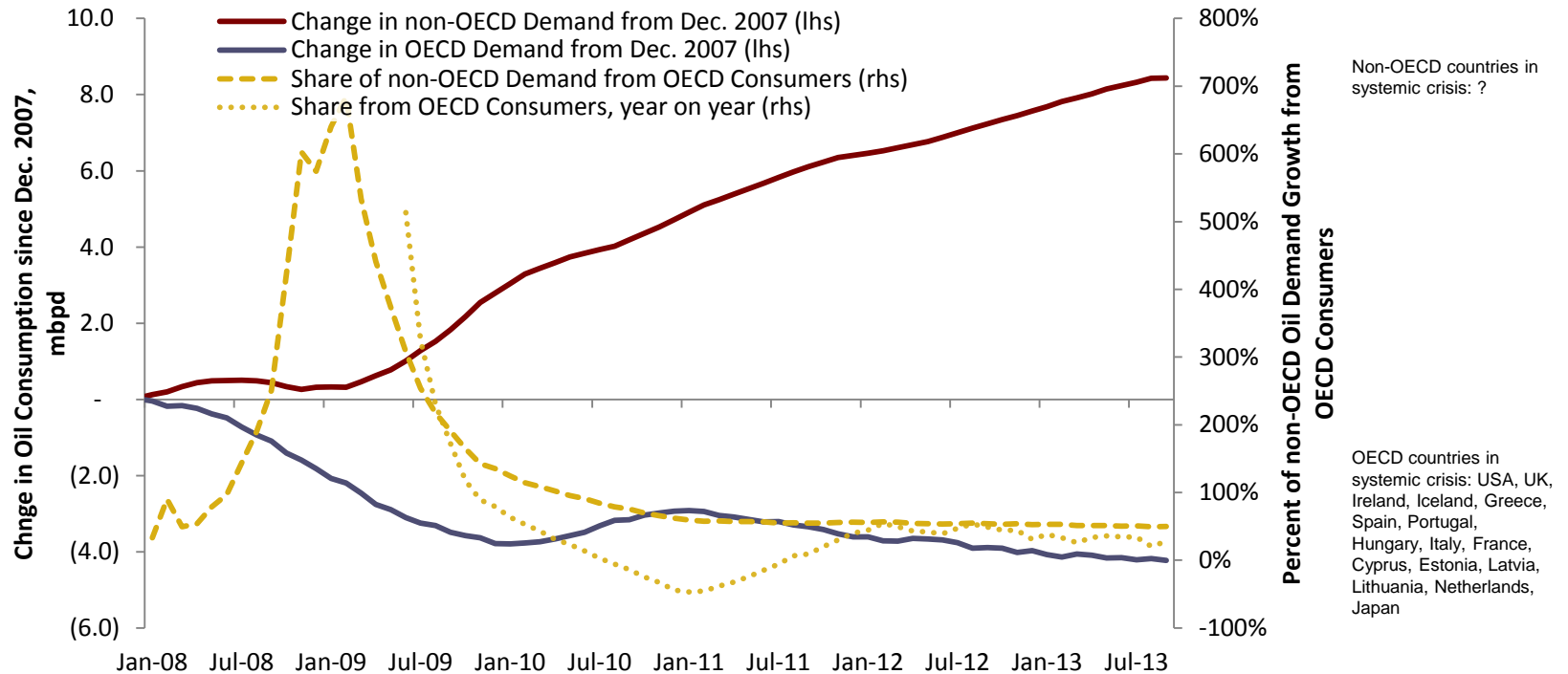
- Assuming 100 mbpd supply by 2030, US consumption would be expected at 14 mbpd—down 1/3 from 21 mbpd in mid 2007
- Rate of long term decrease: 1.5% per annum, 2.3% on a per capita basis
 - Per capita, still puts US in 2030 on par with Japan, Korea today.



Global Oil Consumption 2005 - 2030

Source: Douglas-Westwood projections based on EIA data

OECD and Non-OECD Oil Consumption



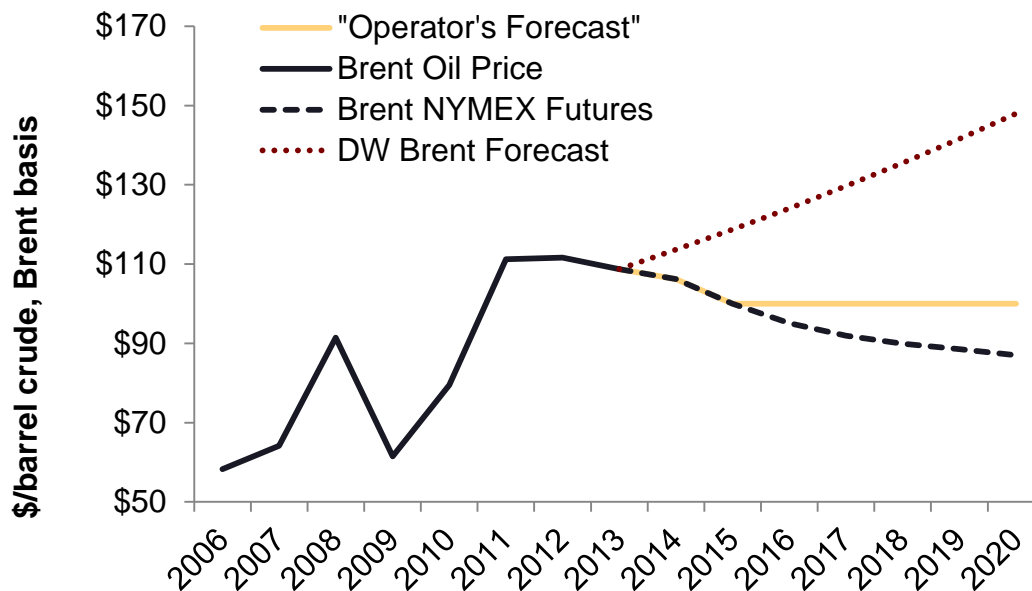
Change in OECD and non-OECD Oil Consumption since Start of the Great Recession

Source: EIA

- OECD consumers providing 50% of new non-OECD oil consumption since Dec. 2007
- OECD consumers providing 28% of new non-OECD oil consumption in last year

- Demand-Constrained Models
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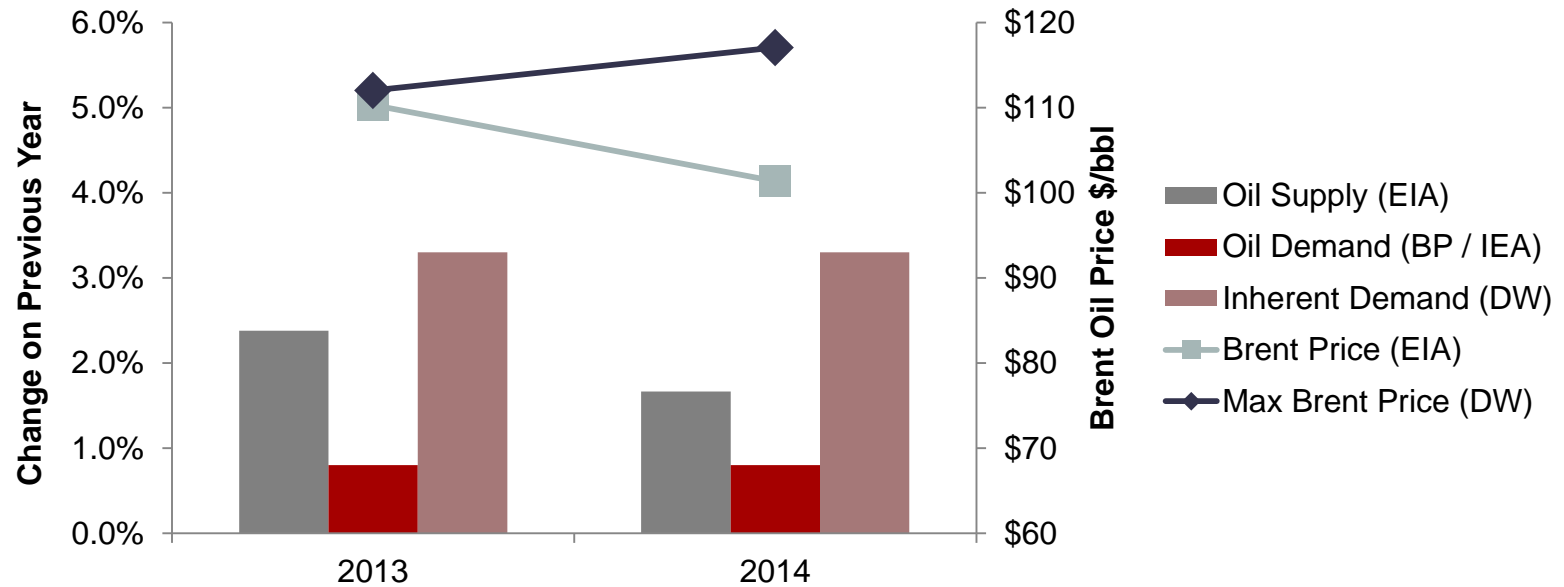
Brent Oil Prices – Historical and Forecast

Source: EIA, NYMEX, DW Forecast

Oil price forecasts generally fall into one of three schools:

- **Futures Curve:** The NYMEX futures curve sees oil prices falling below \$90 / barrel by 2020. Underlying this is the implicit assumption that oil will somehow become cheaper or easier to find and produce, in contrast to the experience of the last decade.
- **“Operators’ Forecast”:** Absent a convincing oil price model, a number of oil companies are using a “best guess” approach, which assumes that oil prices will remain around or above \$100 / barrel on a Brent basis. This is not scientific, but many, if not most, oil company executives think this seems plausible and sufficiently conservative for investment decisions.
- **DW Forecast:** Douglas-Westwood uses a unique supply-constrained model which has proved itself successful in both explaining and predicting oil prices and country level demand. This model assumes the global economy is constrained by a struggling oil supply, with the oil price rising to the global carrying capacity (similar to the monopoly price). Global carrying capacity should continue to increase by up to 7% theoretically, and about 4.5%, empirically.

Why no price collapse in 2013?

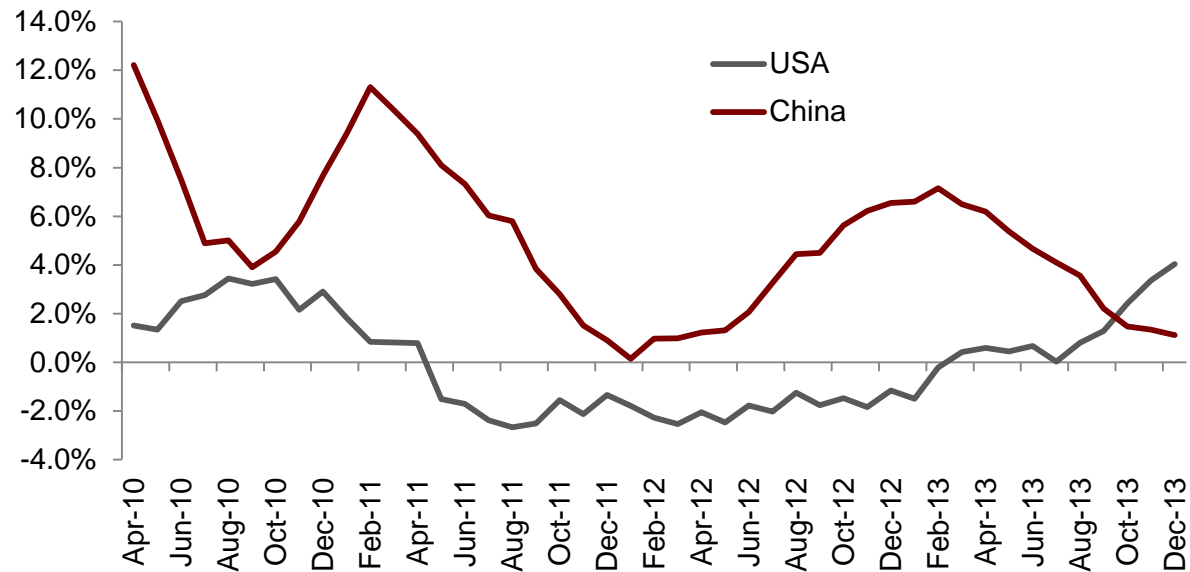


Oil Supply and Demand under Supply- and Demand-Constrained Approaches

Source: EIA, BP, Douglas-Westwood analysis

- **Demand-Constrained** : Supply-growth substantially in excess of demand growth should have crashed oil prices. But that didn't happen.
- **Supply-Constrained**: With a global economy starved for oil, economic activity expanded to absorb excess supply, prices returned to carrying capacity.

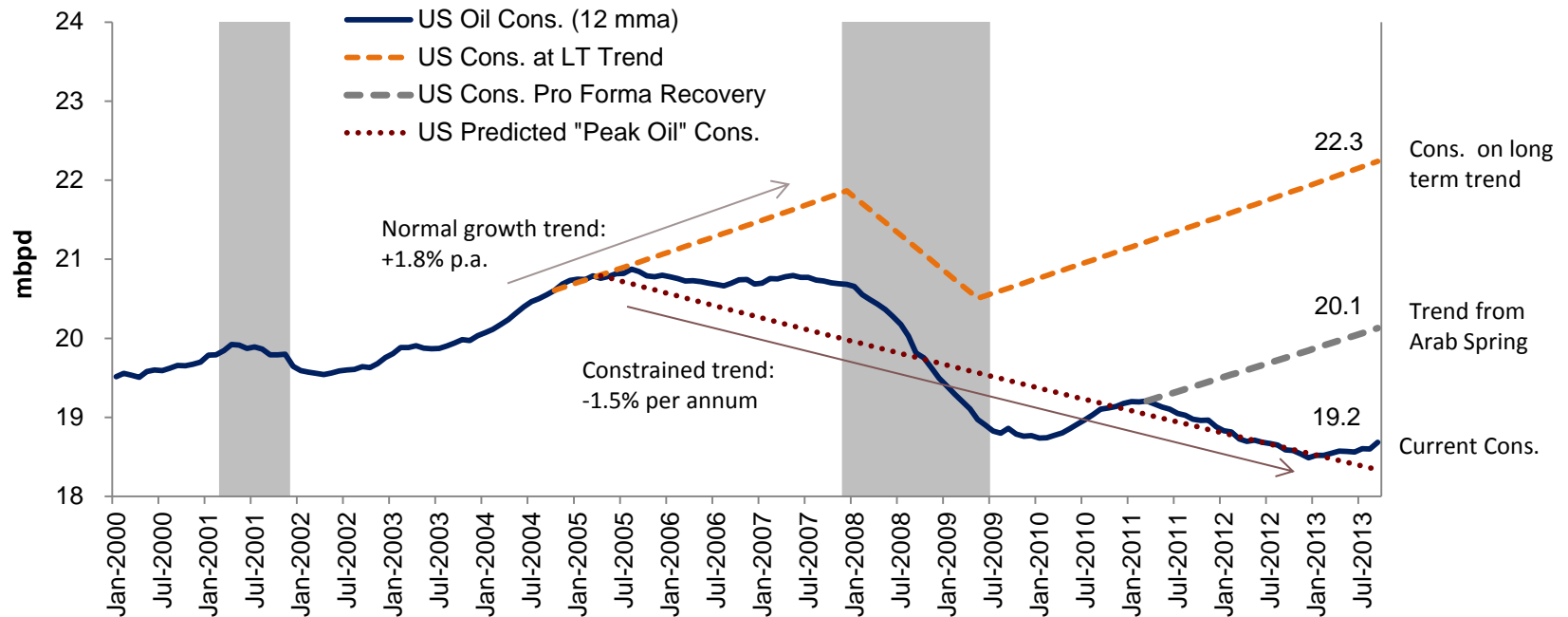
But a supply constrained models depends on China



US and China Annual Oil Consumption Growth (3 mma)

Source: EIA

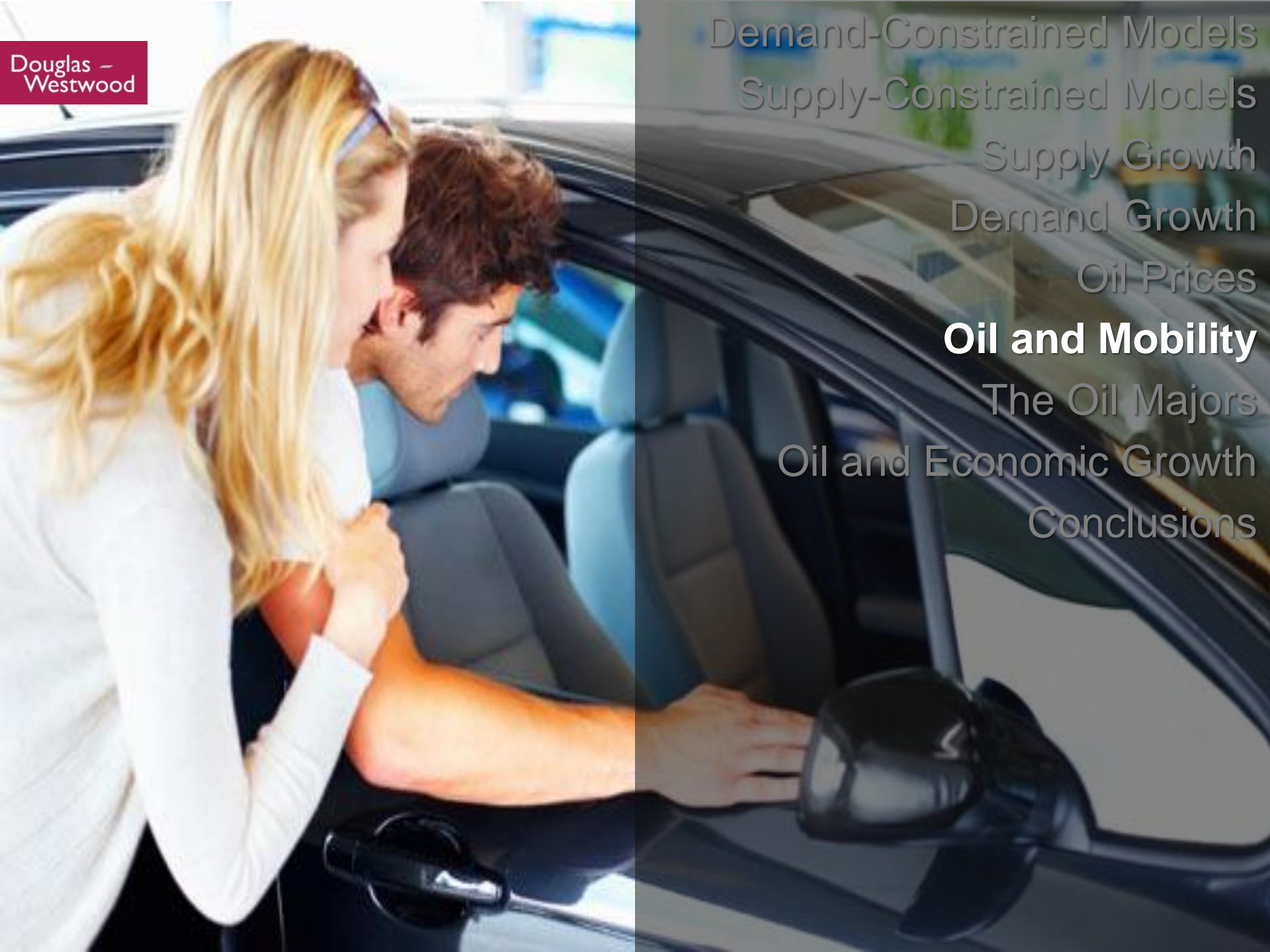
- A demand-constrained model is driven primarily by demand in China
- China sets the price, and causes the oil supply to be rationed
- China has been all but absent from oil markets in recent times
- This has allowed supply growth to increasingly flow to the advanced economies—US consumption has jumped since Q4 2013
- Without pressure from China, the OECD countries growth may not be constrained



US Oil Demand – 2000 to 2013

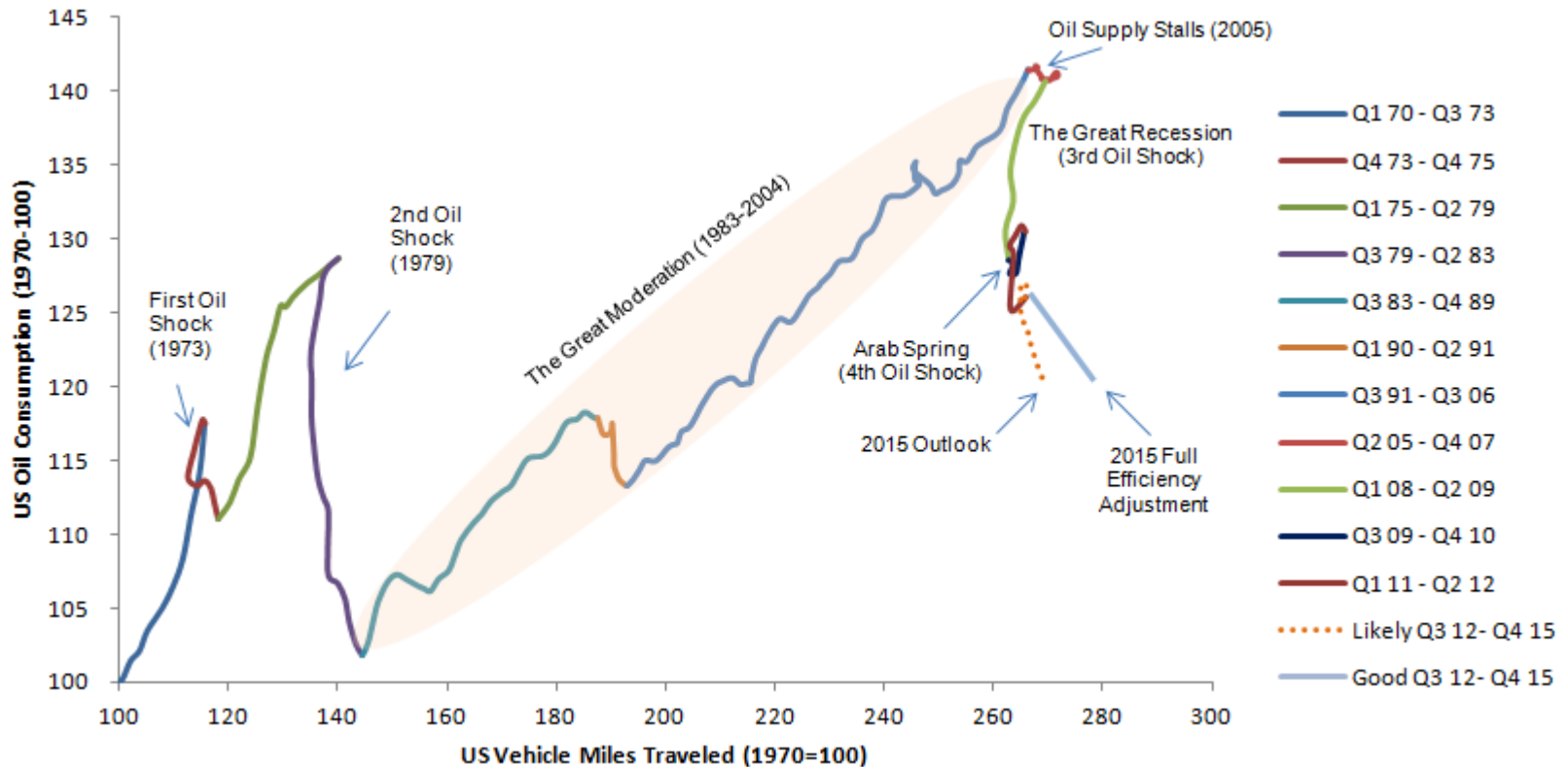
Source: EIA

- Normal US oil consumption growth trend: 1.8% per annum
- Break trend 2005, US off trend twice now in last nine years
- Consumption should be 22.3 mbpd, actual 19.2 mbpd (-14%)
- The US is still a major exporter, but also the fastest growing oil producer. How does this affect US consumption and GDP growth?
- Does increased US oil production allow the US to consume more oil?



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Oil Consumption, VMT and Prosperity are Related

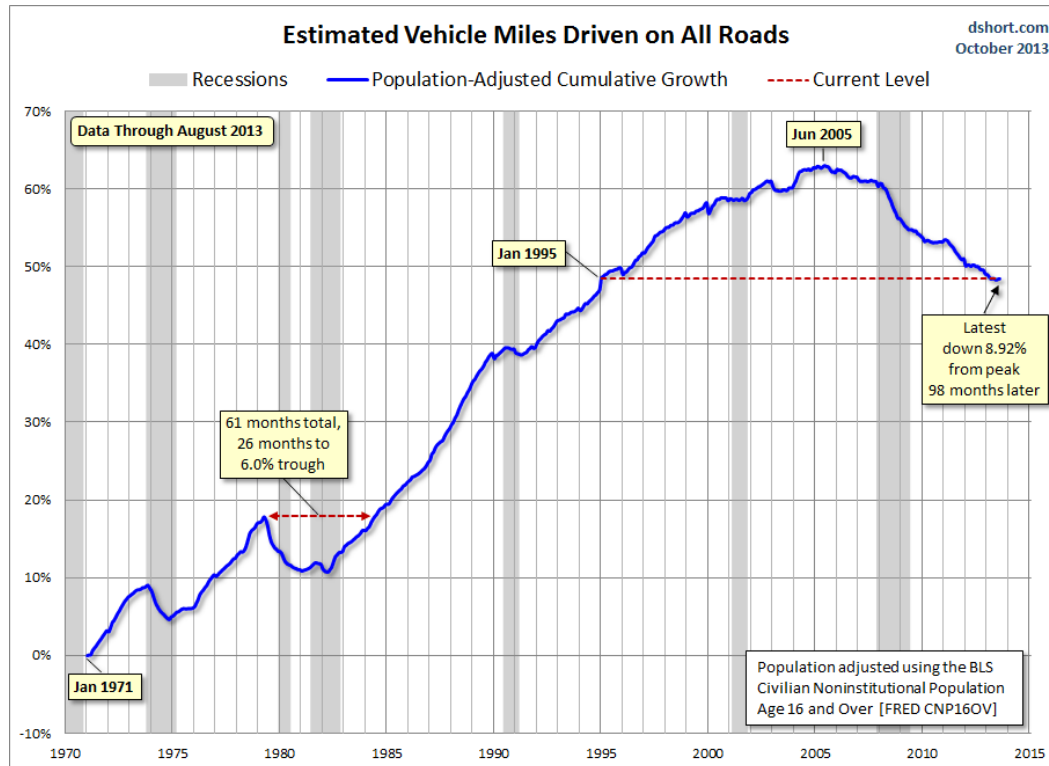


Index of US Vehicle Miles Driven and Oil Consumption (1970 = 100)

Source: US Department of Transportation, EIA, Douglas-Westwood analysis

- VMT, oil consumption and GDP growth have historically been almost directly correlated.

Stay at Home: US Miles Driven



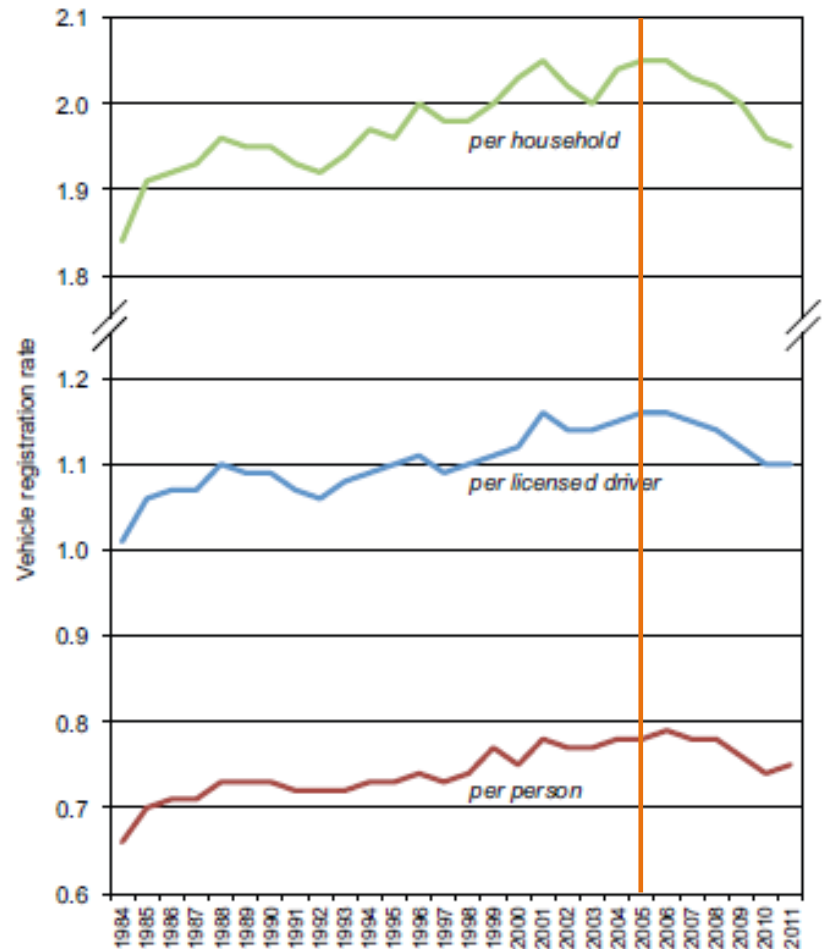
US Vehicle Miles Driven

Source: DS Short, US Department of Transportation

- Peak driving was 2005—not 2007!
- The US has lost mobility as it has lost oil consumption
- New hires in the US cannot use any more oil—and this affects mobility
- 1 in 6 cars missing from the road

Vehicle Ownership

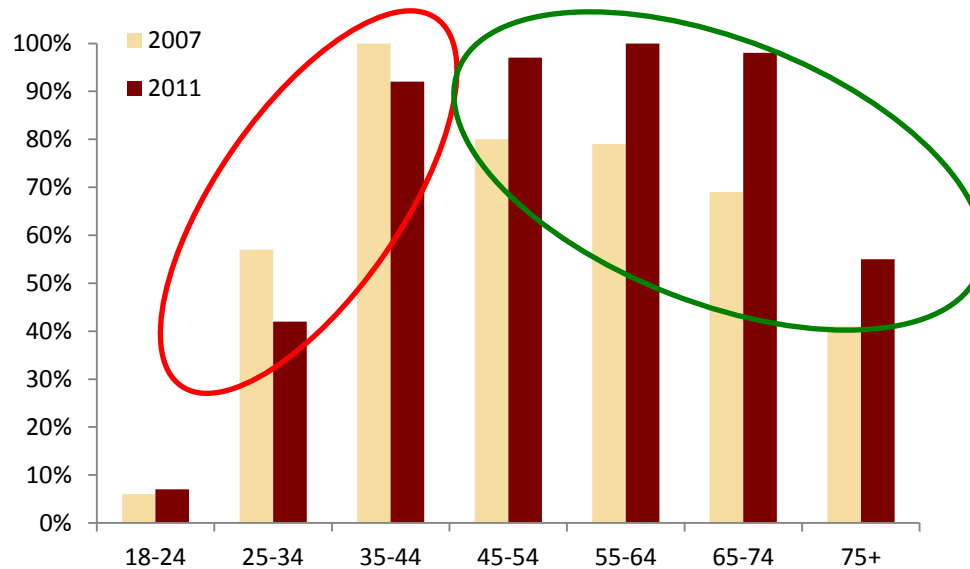
- Also, “peak car ownership”, in 2006
- Predates the recession



Car Ownership in the United States

Source: Michael Sivak, UMTRI, “The Reasons for the Recent Decline of Young Driver Licensing in the U.S.”

Not because seniors don't want to drive

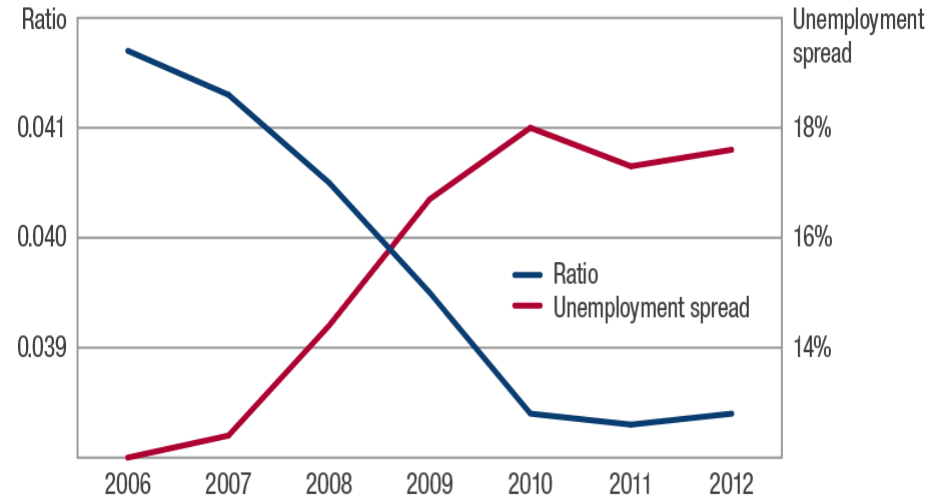


Relative Probability of Buying a Car in the US by Age

Source: Michael Sivak, UMTRI, "MARKETING IMPLICATIONS OF THE CHANGING AGE COMPOSITION OF VEHICLE BUYERS IN THE U.S."

- Relative probability for buying a car for 25-44 year olds has fallen.
- Relative probability of buying a car for age 45+ has risen--substantially

What is your current level of employment?	Percent
Full-time employment	18.8
Part-time employment	14.9
Full-time student (and not employed)	20.6
Not currently employed (including retired)	45.8
<i>Total</i>	<i>100.0</i>



Employment Status of Person's without a Current Driver's License

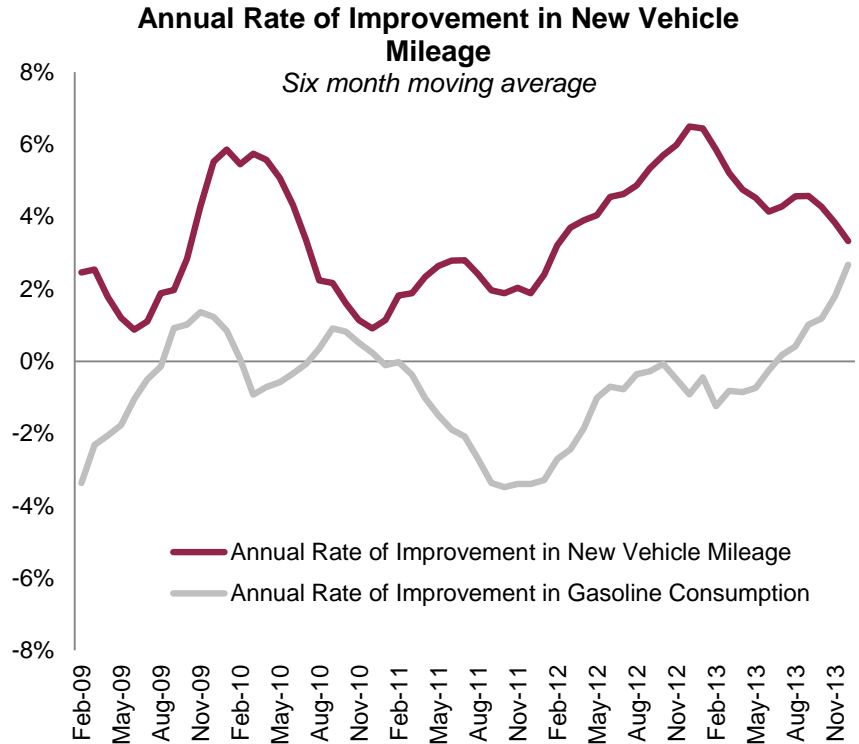
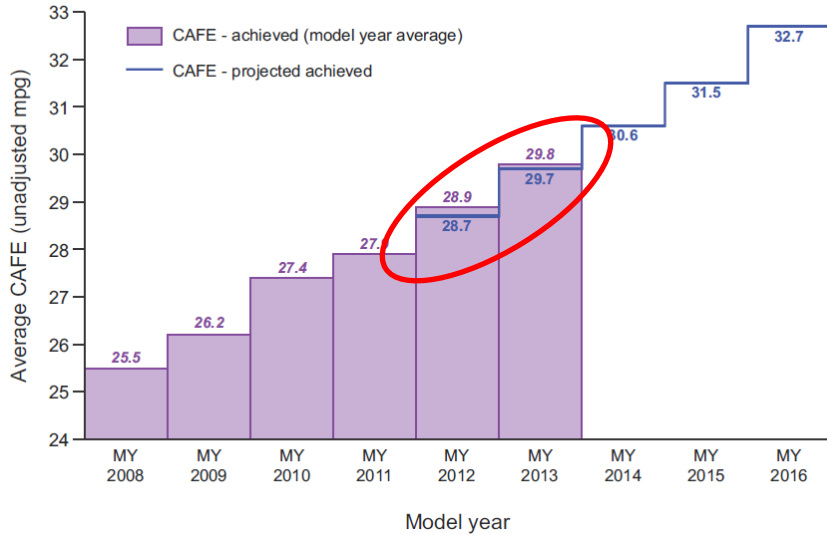
Source: Michael Sivak, UMTRI, "The Reasons for the Recent Decline of Young Driver Licensing in the U.S."

Ratio of teen drivers to prime-age drivers and unemployment spread between teens and prime-age workers

Source: HDLI, "Drop in teen driving tracks with teen unemployment", <http://www.iihs.org/iihs/news/desktopnews/drop-in-teen-driving-tracks-with-teen-unemployment-hldi-study-finds>

- No car, no job: Only 19% of persons aged 18-39 without a driver's license hold a full time job.
- Unemployment represents 80% of the reason young people are driving less

Evidence of Oil Price Pressures on Behavior

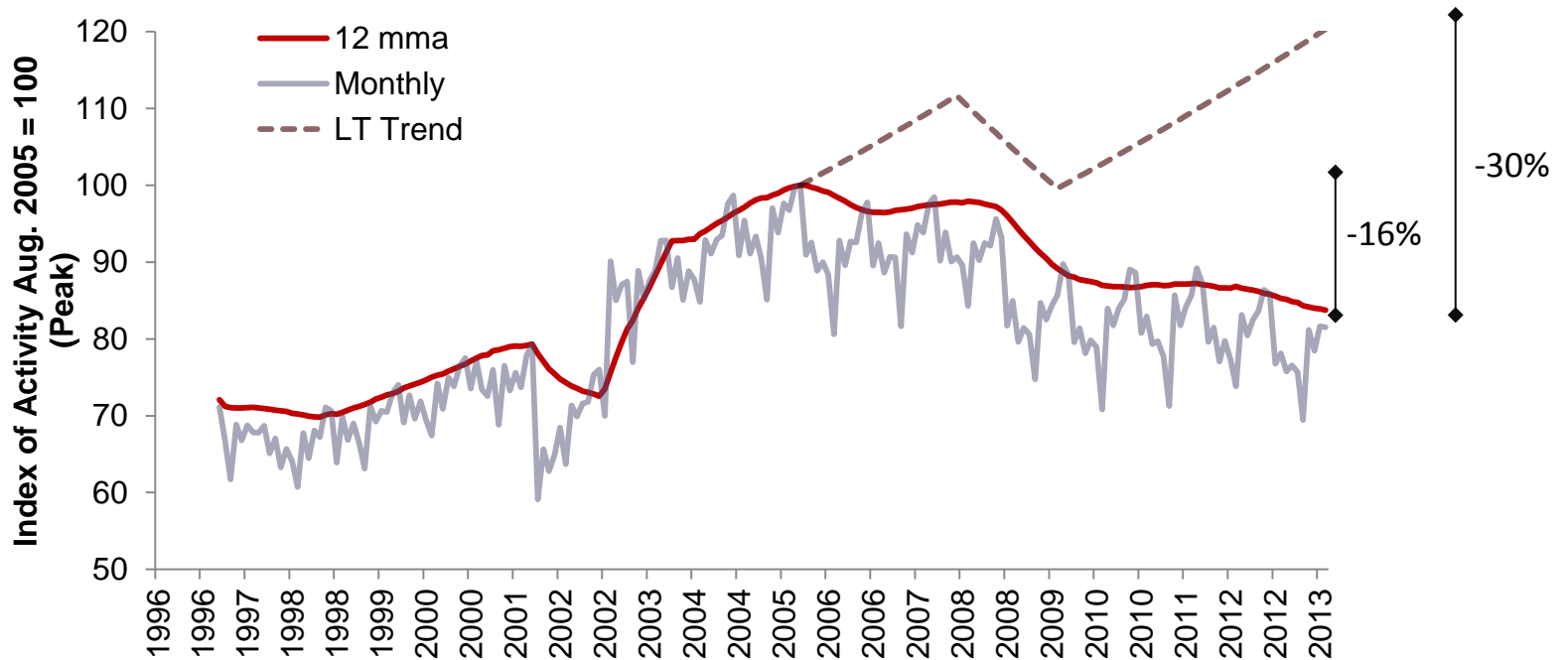


Achieved and “Projected Achieved” CAFE Standards

Source: : Michael Sivak, UMTRI, “A Comparison of CAFE Standards and Actual CAFE Performance of New Light Duty Vehicles”

- Achieved new vehicle fuel economy has exceeded required standards—suggests price pressures influencing consumer choice
- However, if oil (gasoline) prices ease, the pressure on the consumer to conserve rapidly dissipates

And it's not just cars: US Airline Departures

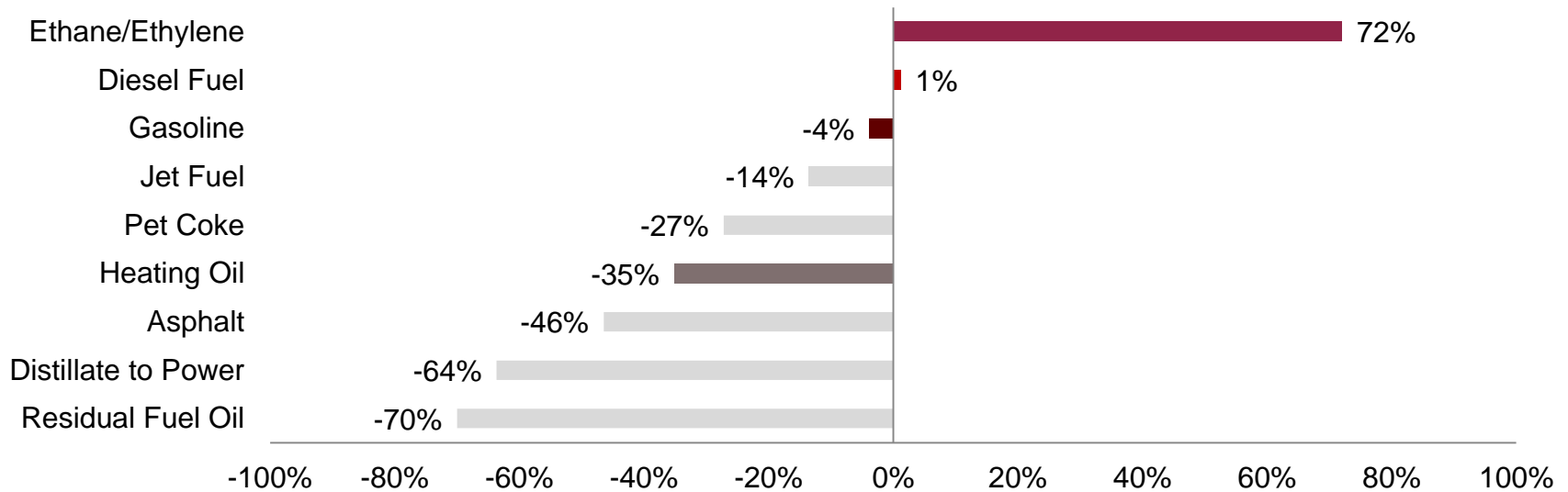


US Commercial Airlines (System) Departures: Peak = 100 (Aug. 2005)

Source: US Department of Transportation, Douglas-Westwood analysis

- US commercial airline departures are 16% below their 2005 peak...
- ...and departures are 30% below trend (even allowing for recession)
- For every two aircraft taking off from US airports, one is missing
- And the trend continues to decline.

And it's worse in other sectors

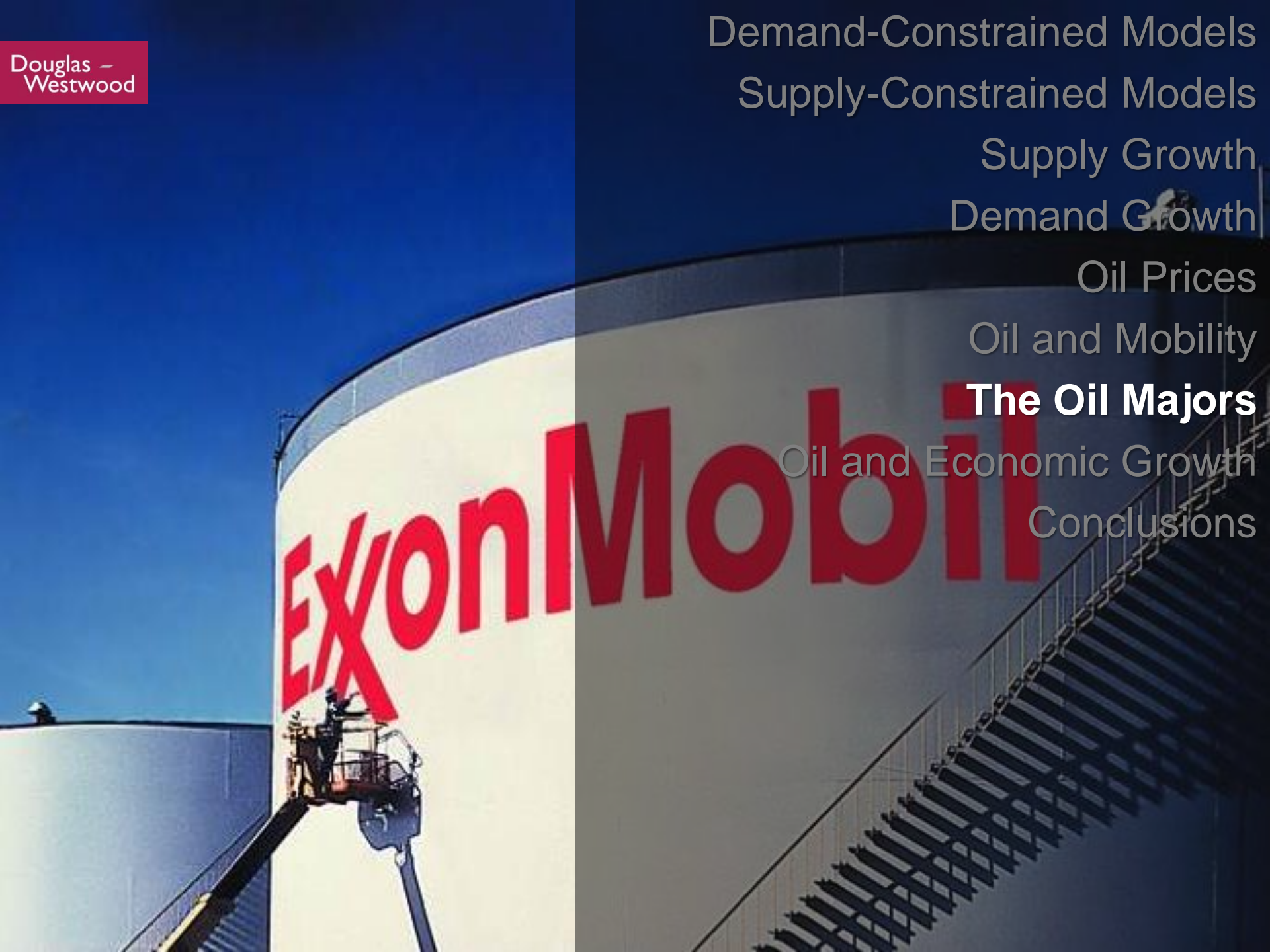


Product Supplied in the US: Change from 2005 to 2013

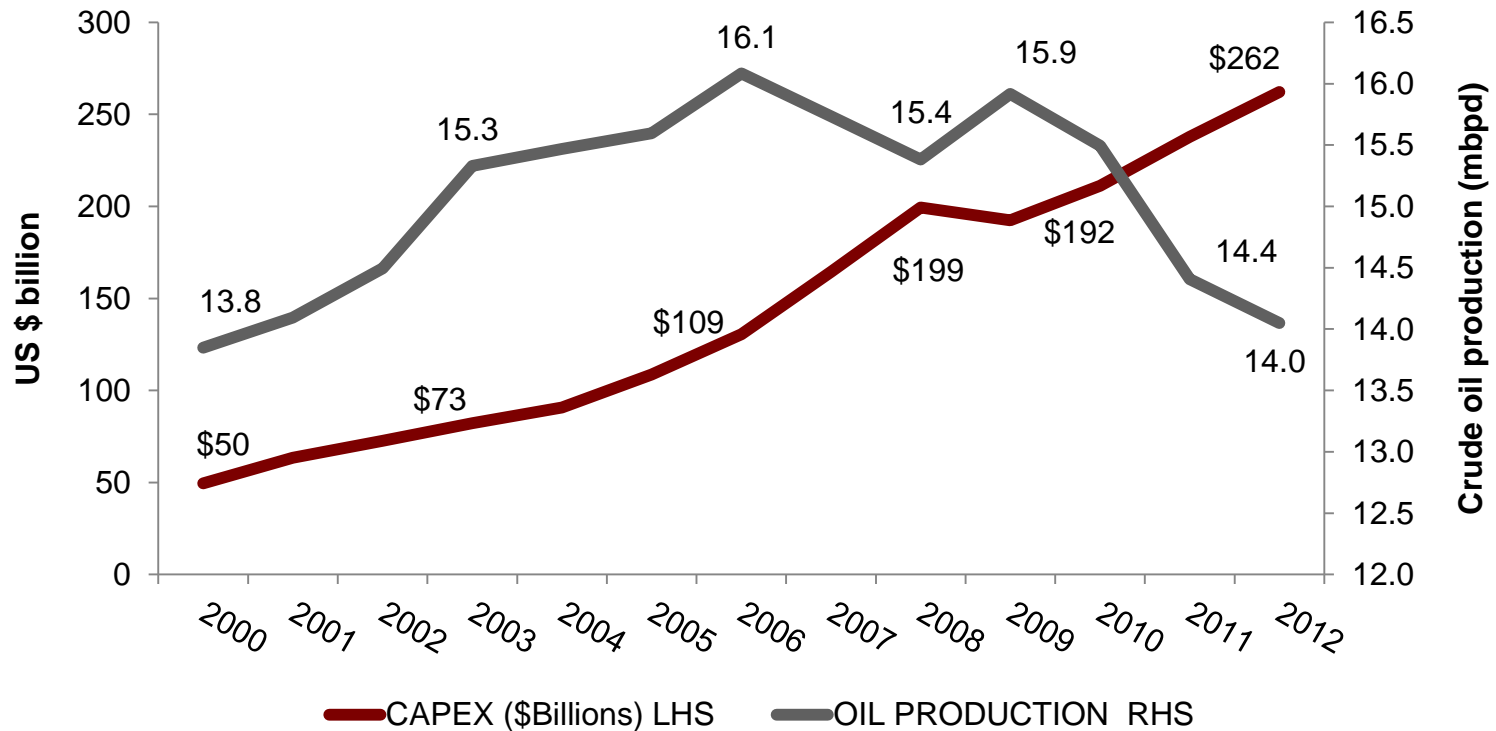
Source: EIA

- Ethane/Ethylene production growth linked to low natural gas prices and abundant supplies of natural gas liquids
- Jet fuel down 14%
- Heating fuel down 35%
- But on-road diesel up by 1% and gasoline down by only 4%
- Refutes proposition of reducing driving attributable to changed tastes or demographics—people are struggling to hang on to mobility

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Listed Oil Majors: Capex and Crude Oil Production

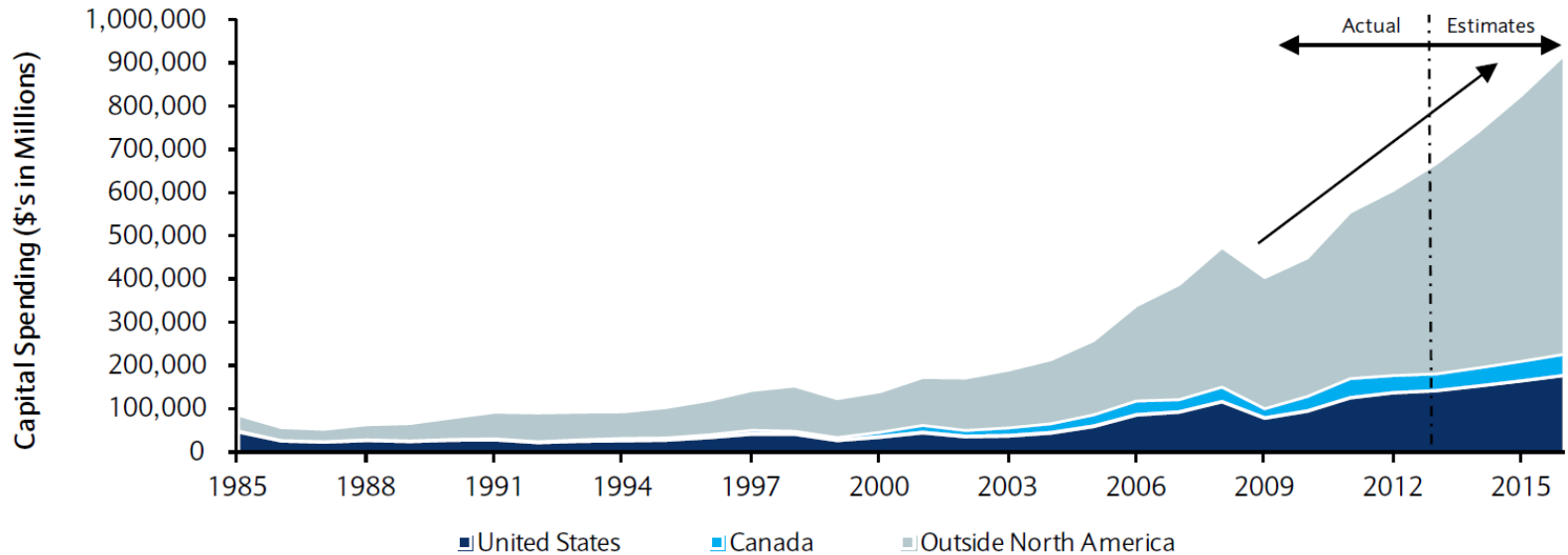


Crude Oil Production and Capex

Combined data for BG, BP, COP, CVX, ENI, OXY, PBR, RDS, STO, TOT, XOM
 Source: Bloomberg via Phibro Trading LLC

- Oil production has faltered, even as capex has soared
- Capex productivity has fallen by a factor of five since 2000
- Observed decline trend now approaching 5% per year

Upstream Spend Continues Strong

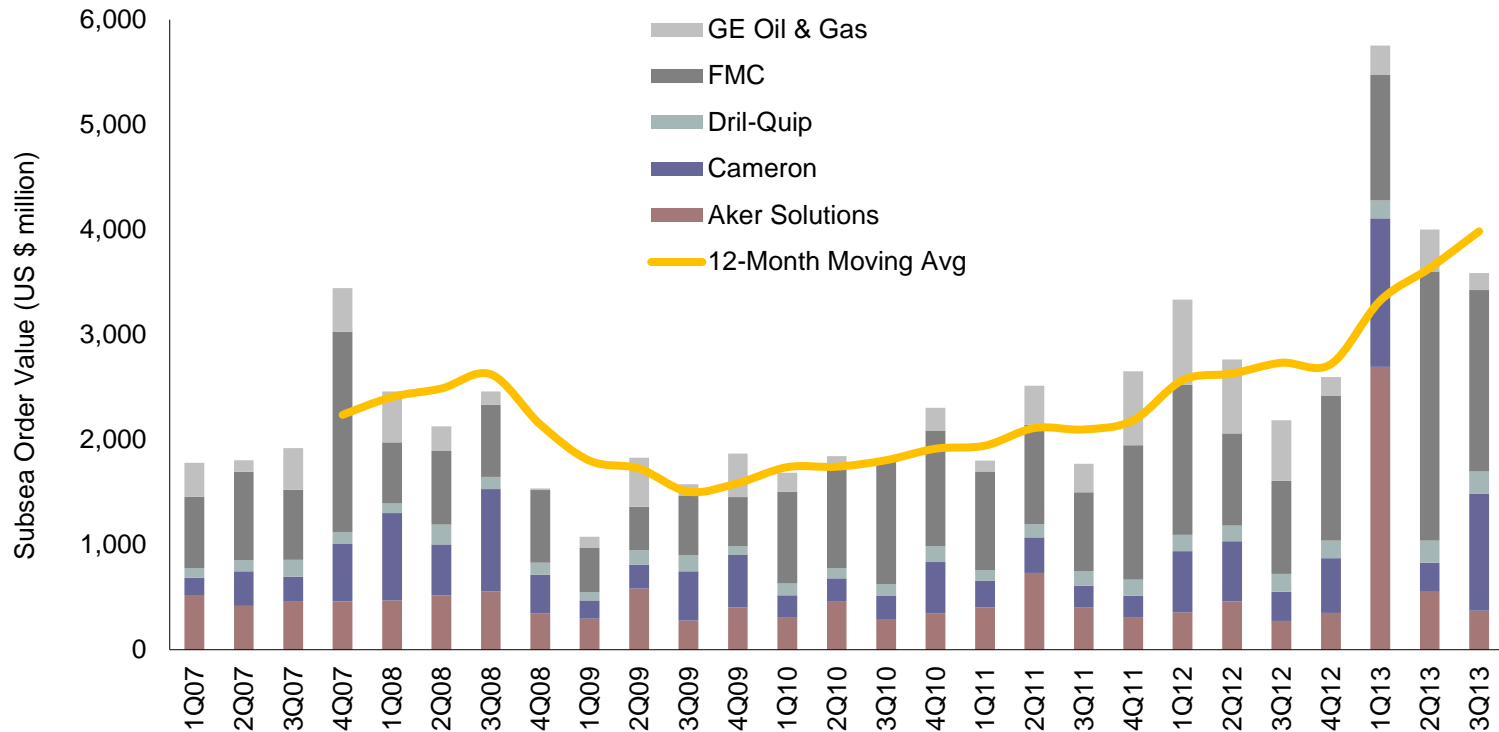


Upstream Spend – Actual and Forecast (includes both NOCs and IOCs)

Source: Barclays Capital

- Upstream spend (capex) has risen strongly in the last decade, with industry expectations, only six months ago, for continued strong gains

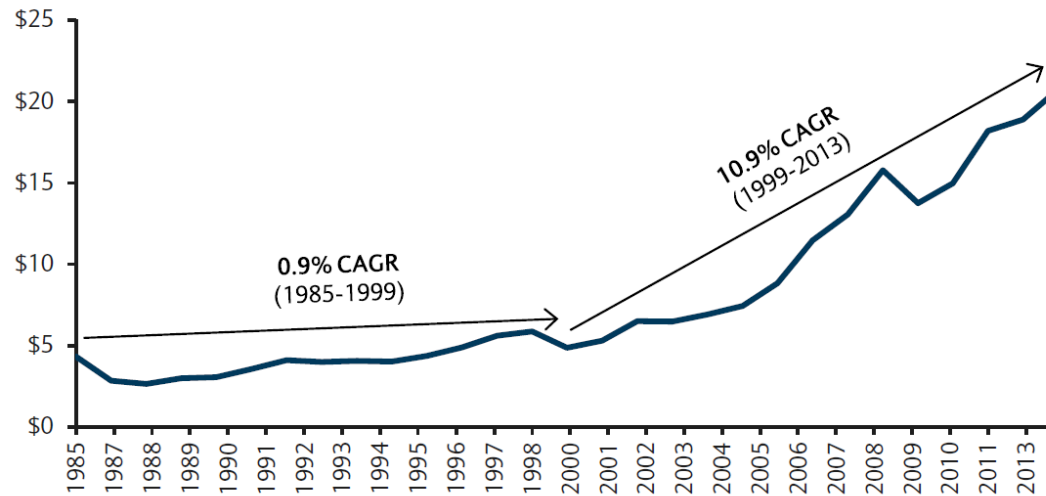
Parts of the Industry Look Great



Subsea Hardware Orders

Source: Douglas-Westwood

- Current revenues and backlog are at record levels throughout much of the industry
- Q1 2013 subsea hardware orders were the best ever—by far
- But profitability has lagged.



Source: IEA, Barclays Research

E&P Capex per Barrel

Source: Barclays Capital

- Profits have lagged because costs are rising faster than revenues. E&P capex per barrel has been rising nearly 11% per year.
- Brent oil prices have been largely flat.
- A number of projects have consequently been deferred, cancelled or return for re-evaluation.

Chevron puts Rosebank on hold



\$68 – On Hold

On hold: the Rosebank project lies off the Shetland Islands

'Cost overrun' on Castberg



\$81 - Stalled

Challenges: Statoil's Johan Castberg field in the Barents Sea

BP's Mad Dog 2 Highlights Big Challenge for Oil Majors

By [Arjun Sreekumar](#) | [More Articles](#) | [Save For Later](#)
April 29, 2013 | [Comments \(0\)](#)

Watch stocks you care about

The single, easiest way to keep track of all the stocks

\$43* - Deferred

British oil giant **BP** (NYSE: [BP](#) ) recently announced that it may delay Mad Dog Phase 2, its largest new oil project in the Gulf of Mexico, due to market conditions and industry inflation.

Recs **6**

Rec This

Hadrian semisub plan scrapped



Appraisal programme: ExxonMobil chief executive Rex Tillerson

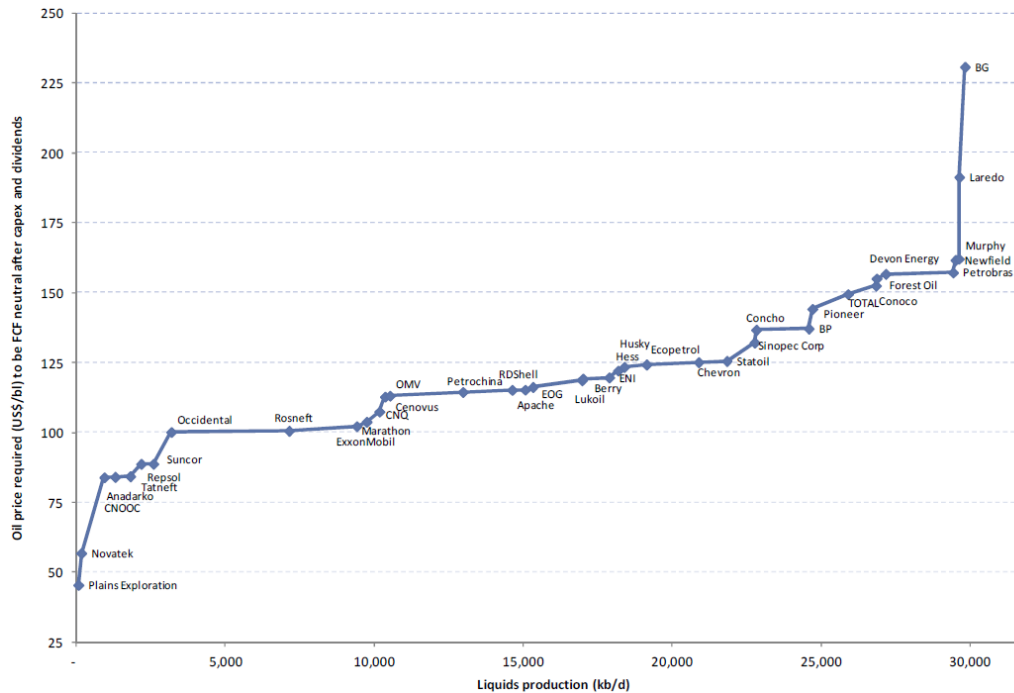
By Anthony Gueffel Houston (UPI) — ExxonMobil has scrapped plans for a 100,000-barrel-per-day floating production semi-submersible for development of the Hadrian North oilfield in the deep-water Gulf of Mexico.

\$76 - Scrapped

SHARE STK
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* Goldman Sachs calculated economic breakeven oil price; Mad Dog breakeven price for Phase I and II together

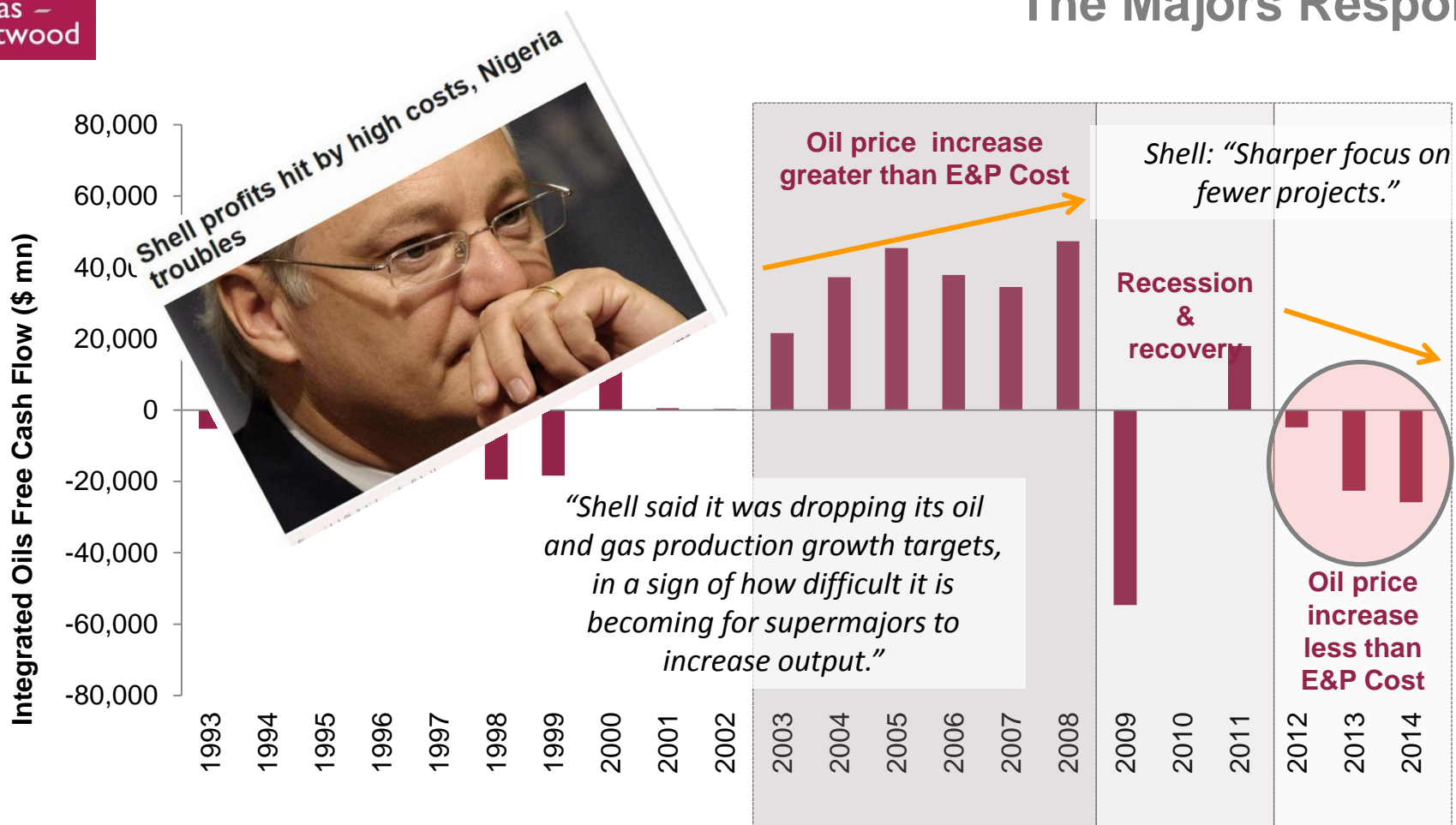
The Industry Needs \$100+ Oil Prices



Oil Price Required by Oil Companies to be Free Cash Flow Neutral After Capex and Dividends

Source: Goldman Sachs

- Costs have outpaced revenues by 2-3% per year. Profitability is down 10-20%.
- The vast majority of public oil & gas companies require oil prices of over \$100/bbl to achieve positive free cash flow under current capex and dividend programs
- Nearly half of the industry needs more than \$120/bb. The 4th quartile, where most US E&Ps cluster, needs \$130/bbl or more.

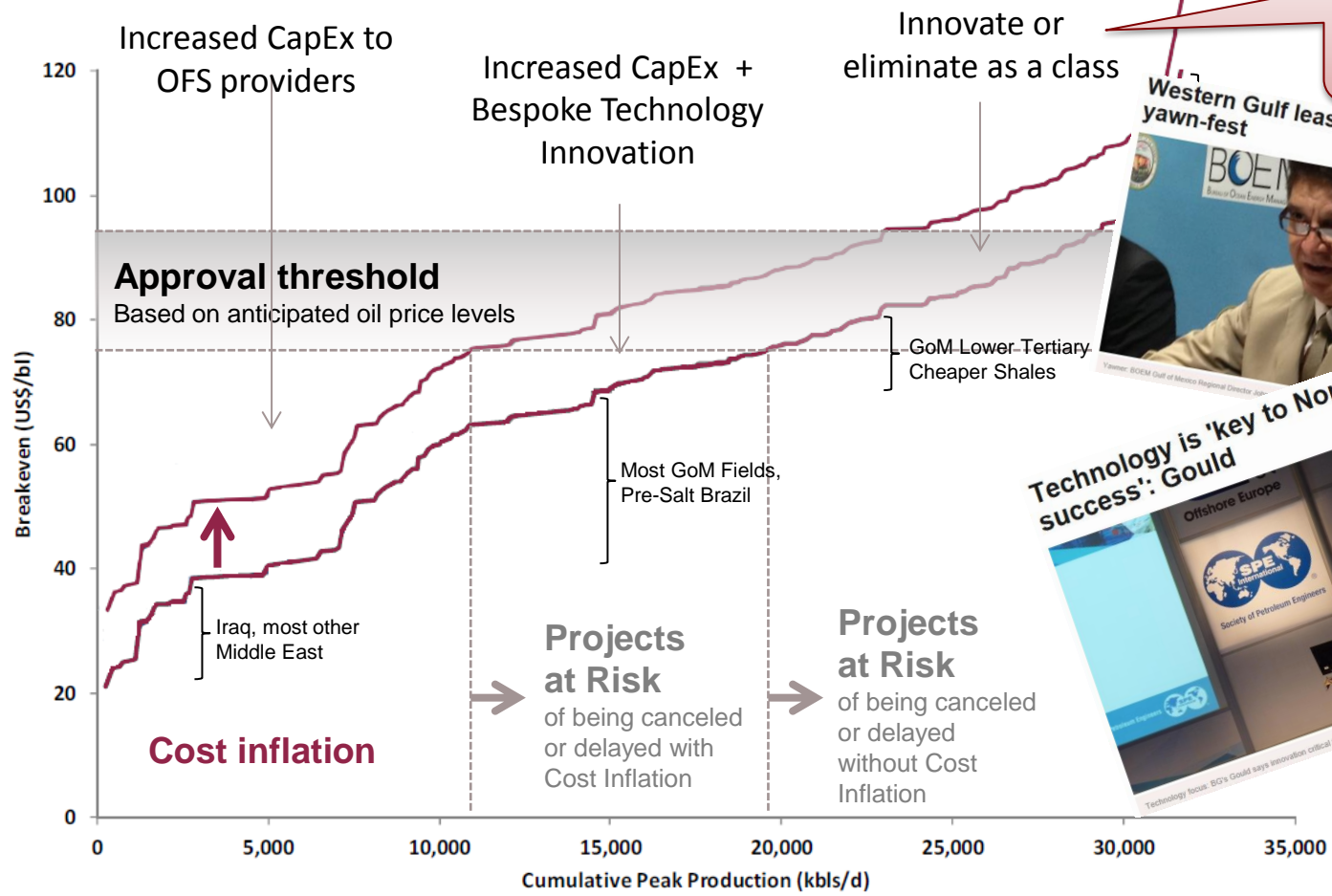


Integrated Oils Free Cash Flow Post Working Capital, Dividends and Capex

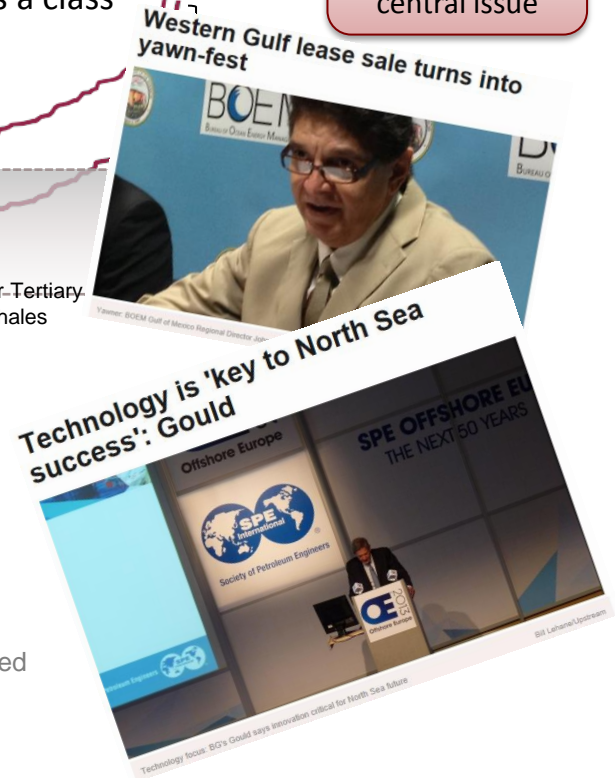
Source: Goldman Sachs

- Shell: Discontinue production guidance and focus on increased cash flow generation.
- Shell: No Alaska 2014
- Major divestment programs

The Oil Cost Curve

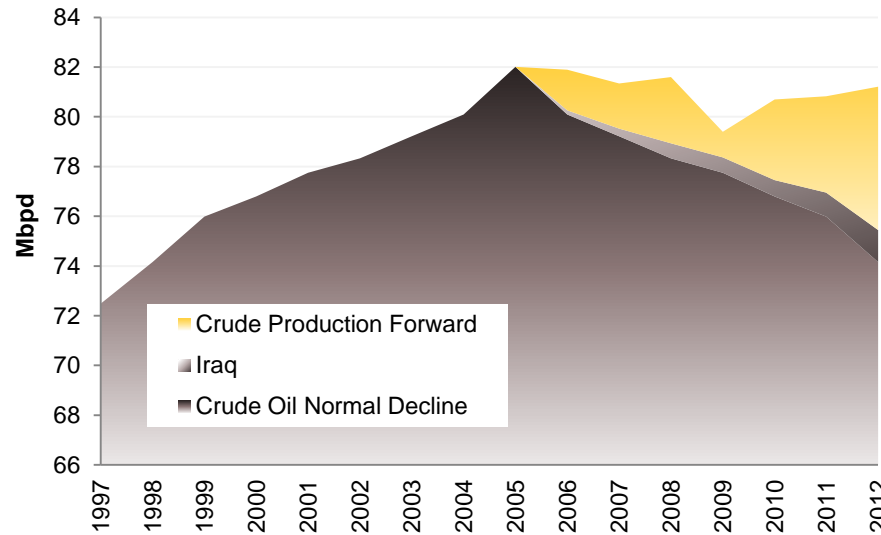


Govt take becomes central issue



- Some high cost projects will be abandoned. More will be “pushed to the right” as operators use their current capex budgets to pay for earlier years’ cost overruns.
- Operators will begin to take a closer look at their budgets, particularly related to deepwater exploratory drilling. Cost-effective solutions will be in demand, opening a new chapter on technology development.
- Reducing government take (tax and royalties) will be a key focus of operator efforts. Governments will respond in an attempt to keep the operators in play, as they have been or are doing in US, Russian and Norwegian Arctic.

Conventional Oil Production



Change in Legacy Crude Oil Production from 2005 to 2012

Source: BP Statistical Review 2013, EIA STEOs 2008, 2013; smoothed data

- The conventional oil system—including Iraq, excluding Canada, US unconventional and NGLs—peaked in 2005
- Oil systems normally follow symmetrical advance and decline around a peak.
- Crude production has been maintained primarily by a massive increase in upstream spend, bringing production to the left from inherently lower “natural” levels
- How does oil production regain trend? Fast? Slow? Or at all?

FT

Oil majors under pressure to curb spending

RIGZONE

Hess Cuts 2014 Capital Budget

WSJ

Statoil to Postpone 2020 Production Target

- Statoil Chief Executive Helge Lund -- cut costs \$1.3 billion a year starting in 2016 in a bid to counter escalating oil sector costs.
- Chevron -- 5% decrease in 2014 Capex from \$42 billion in 2013.
- Hess capex down 30% over two years
- Shell capex down 20% for 2014.
- BG expects 2015-2016 capital expenditure to fall to \$8-10 bn from \$12 bn(BG est.) in 2013.

CREDIT SUISSE 

Rigs Will Be Stacked Next Year

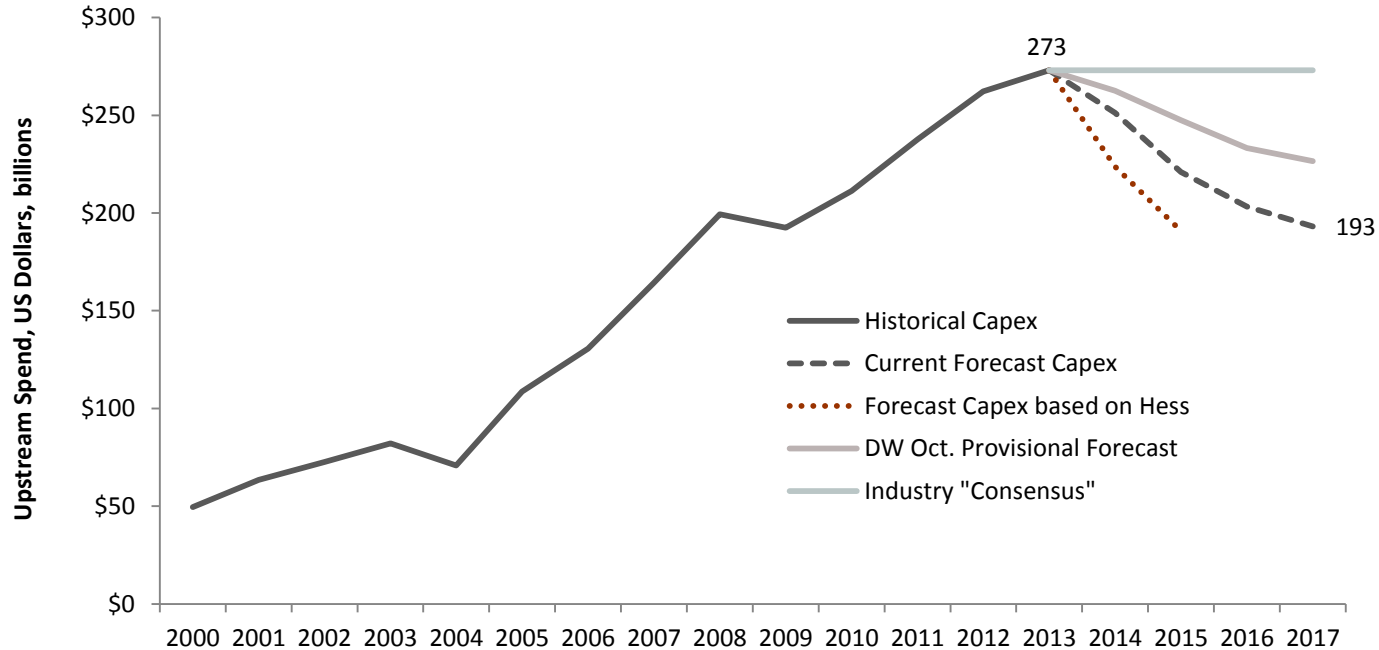
BG GROUP 

Capex Set to decline



Chevron Lowers Capital Expenditure for 2014, Shifts Focus to Shale Gas

Listing Oil Majors: Capex



Historical and Forecast Crude Oil Production and Capex (Provisional, subject to Revision)

Combined data for BG, BP, COP, CVX, ENI, OXY, PBR, RDS, STO, TOT, XOM
 Source: Bloomberg via Phibro Trading LLC

- Capital discipline now a key theme at oil majors
- Cash flow growth over production growth
- Implies unraveling
- Substantial deterioration in outlook since October 2013
- Oil majors face a very challenging climate



- Demand-Constrained Models
- Supply-Constrained Models
- Supply Growth
- Demand Growth
- Oil Prices
- Oil and Mobility
- The Oil Majors
- Oil and Economic Growth**
- Conclusions

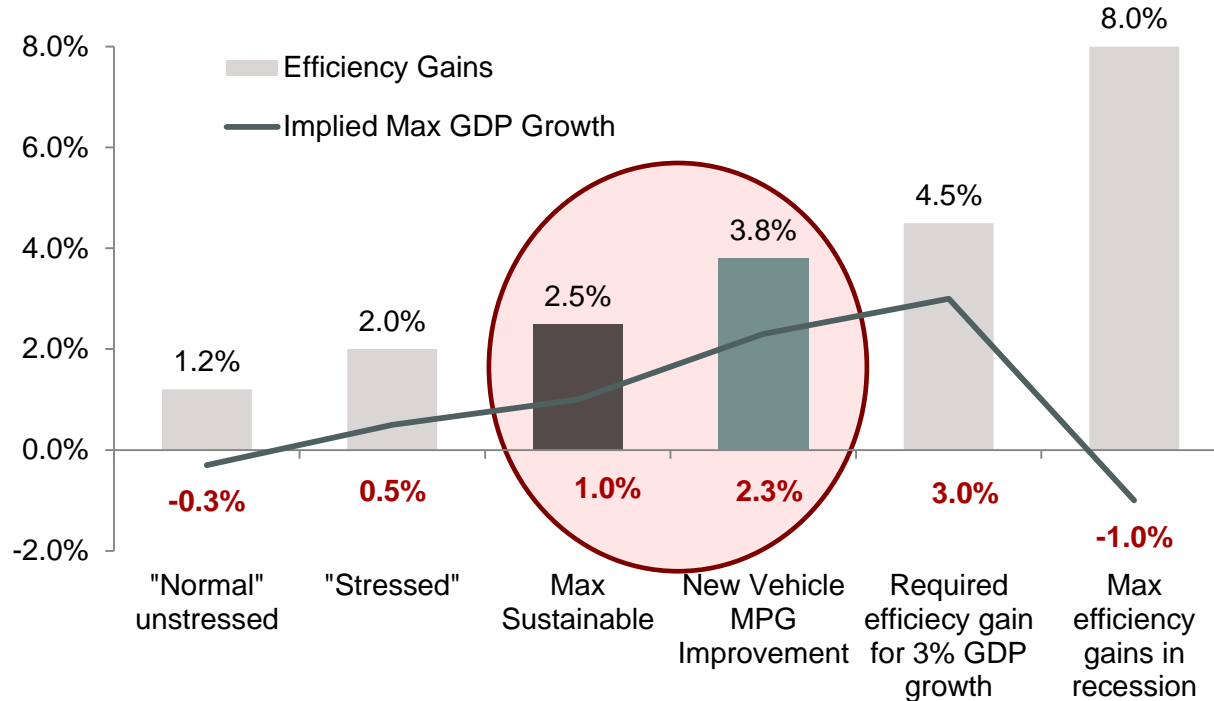
Supply-Constrained Oil and Economic Growth

- In order to argue for a supply-constrained model, there must be a residual prepared to adjust up or down for increased or decreased oil supply.
- This must be GDP growth, assuming the efficiency gains are bounded.
- What do we need to demonstrate if this is true?

Supply-Constrained Oil and Economic Growth

- Need a plausible model showing the mechanism of constraint.
- Need to see some empirical evidence.

Oil Efficiency and GDP

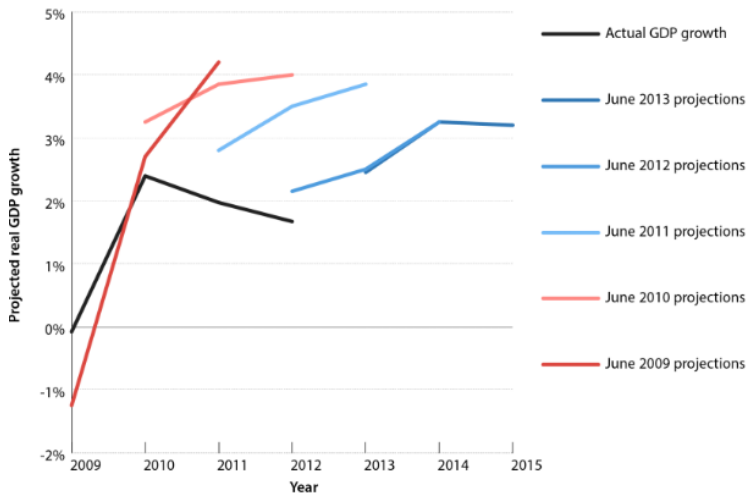


- In normal times, oil efficiency in GDP increases by 1.2% / year
- In “stressed” times, 2.0% is possible
- For six recent quarters, US efficiency up 3.8% -- 2.3% GDP growth
- OECD GDP growth probably capped at 1.0-2.0%
- A constrained oil supply is reducing OECD GDP growth by 1-2%

GDP Growth Forecasting Errors

The spotty track record of the Federal Reserve's economic projections.

Source: The Board of Governors of the Federal Reserve System.

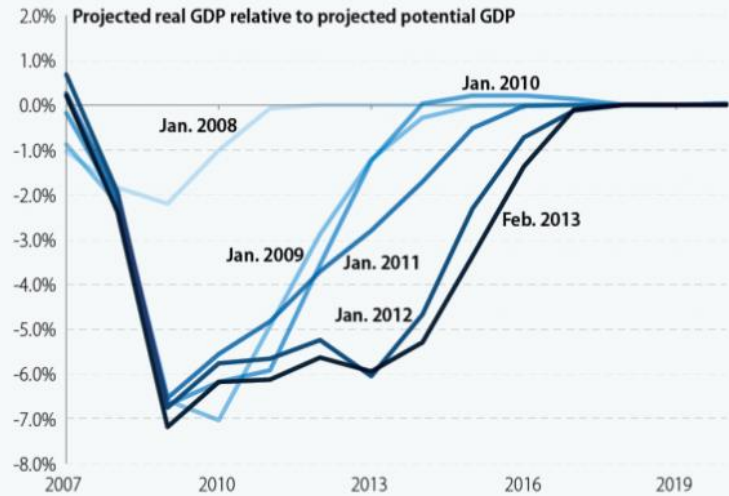


US Federal Reserve GDP Growth Forecasts

Source: Wonkblog,

<http://www.washingtonpost.com/blogs/wonkblog/wp/2013/06/19/this-graph-shows-how-bad-the-fed-is-at-predicting-the-future/>

CBO's projections for full economic recovery continue to be pushed back



CBO GDP Growth Forecasts

Source: Wonkblog,

<http://www.washingtonpost.com/blogs/wonkblog/wp/2013/06/19/this-graph-shows-how-bad-the-fed-is-at-predicting-the-future/>

- Fed and CBO forecasts: Consistently over-estimated the pace of GDP growth
- We seem to have some sort of unexplained factor holding back growth

Why This U.S. Recovery Is Weaker

By Michael Bordo | Oct 21, 2012 12:26 PM ET



79 COMMENTS

QUEUE

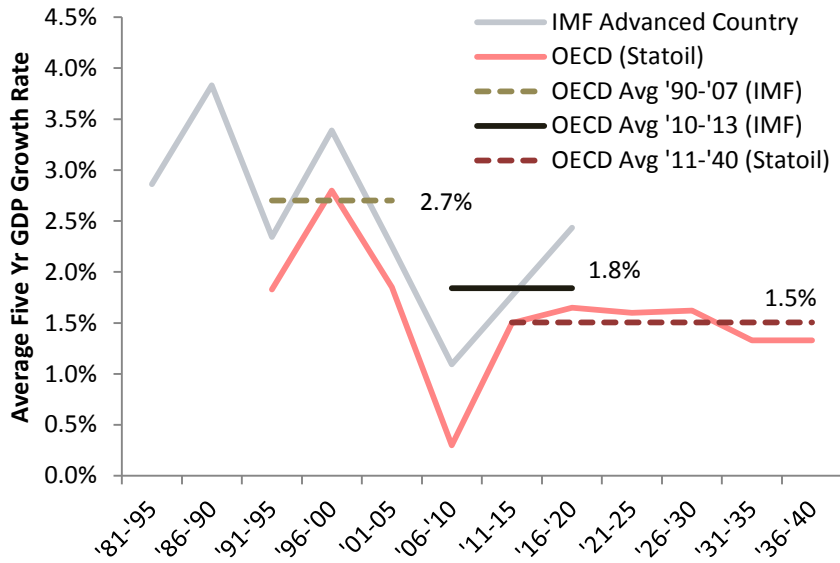


There is a vigorous debate over whether the U.S. economy's recovery from the recent deep recession and financial crisis is weaker than similar events in economic history.

In work with Joseph Haubrich, an economist at the Federal Reserve Bank of [Cleveland](#), I have [argued](#) that this recovery is unusually weak compared with previous episodes. The Harvard University economists [Carmen Reinhart](#) and [Kenneth Rogoff](#) say the pace of the current recovery is consistent with the aftermaths of serious U.S. financial crises of the past.

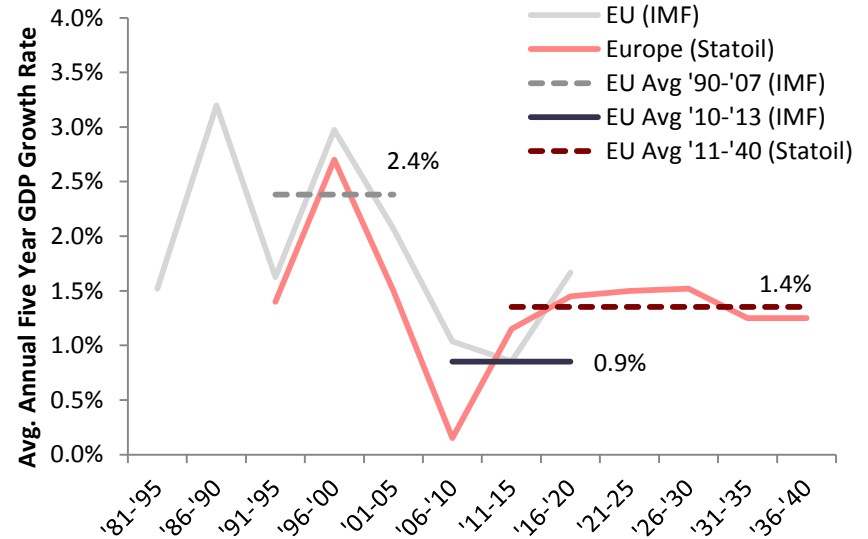
This is more than simply an academic debate. If, as [Haubrich and I contend](#), this recovery is unusually slow, then the policies of President [Barack Obama's](#) administration must bear some of the responsibility. (I would like to make clear that I am not affiliated with Republican [Mitt Romney's](#) presidential campaign, though I was among 670 prominent economists who signed a letter of support for the candidate.)

Dire Long-term Growth Forecasts



Advanced Country / OECD GDP Growth Rates

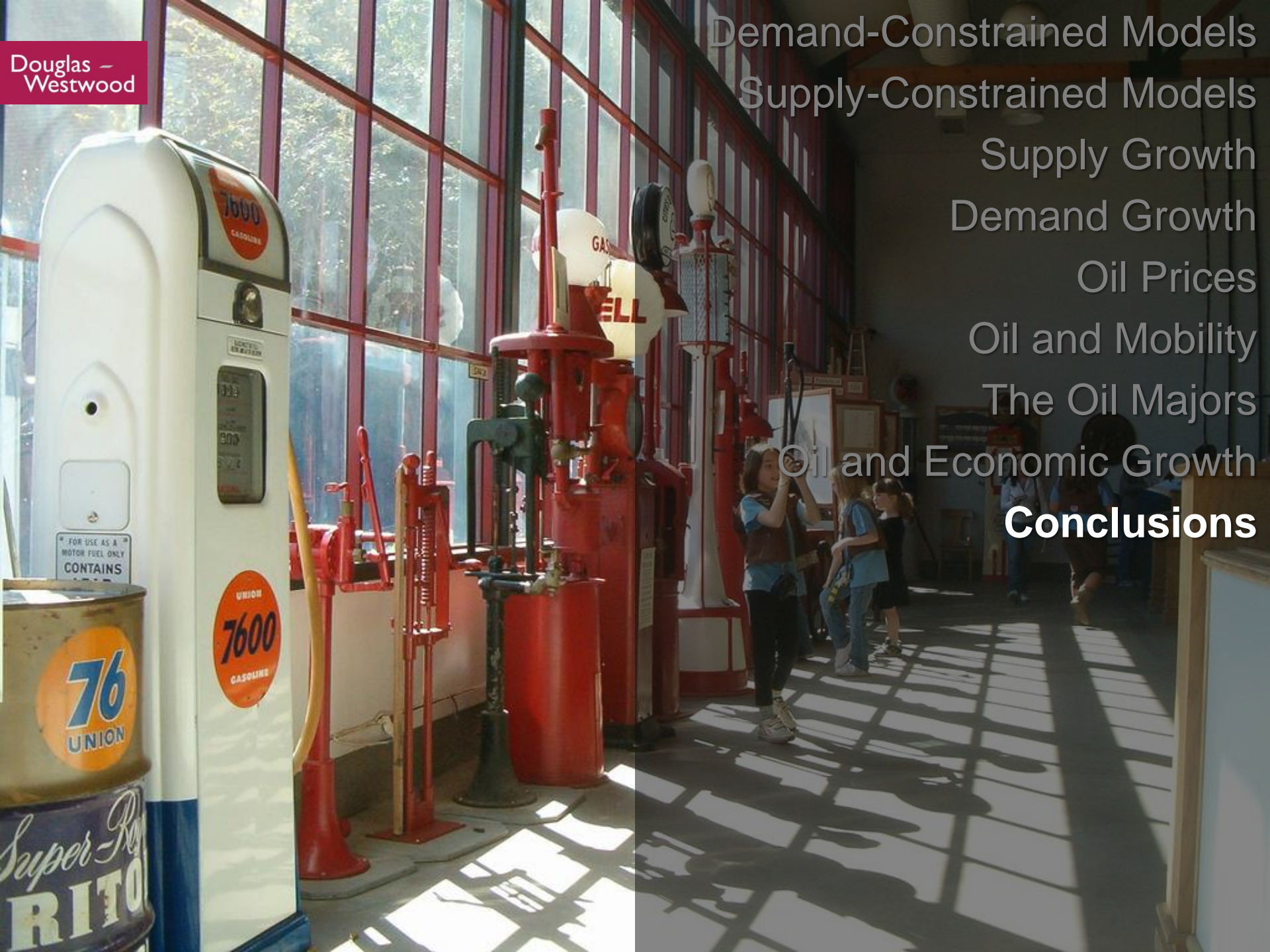
Source: IMF WEO 2013, Statoil Energy Perspectives 2013



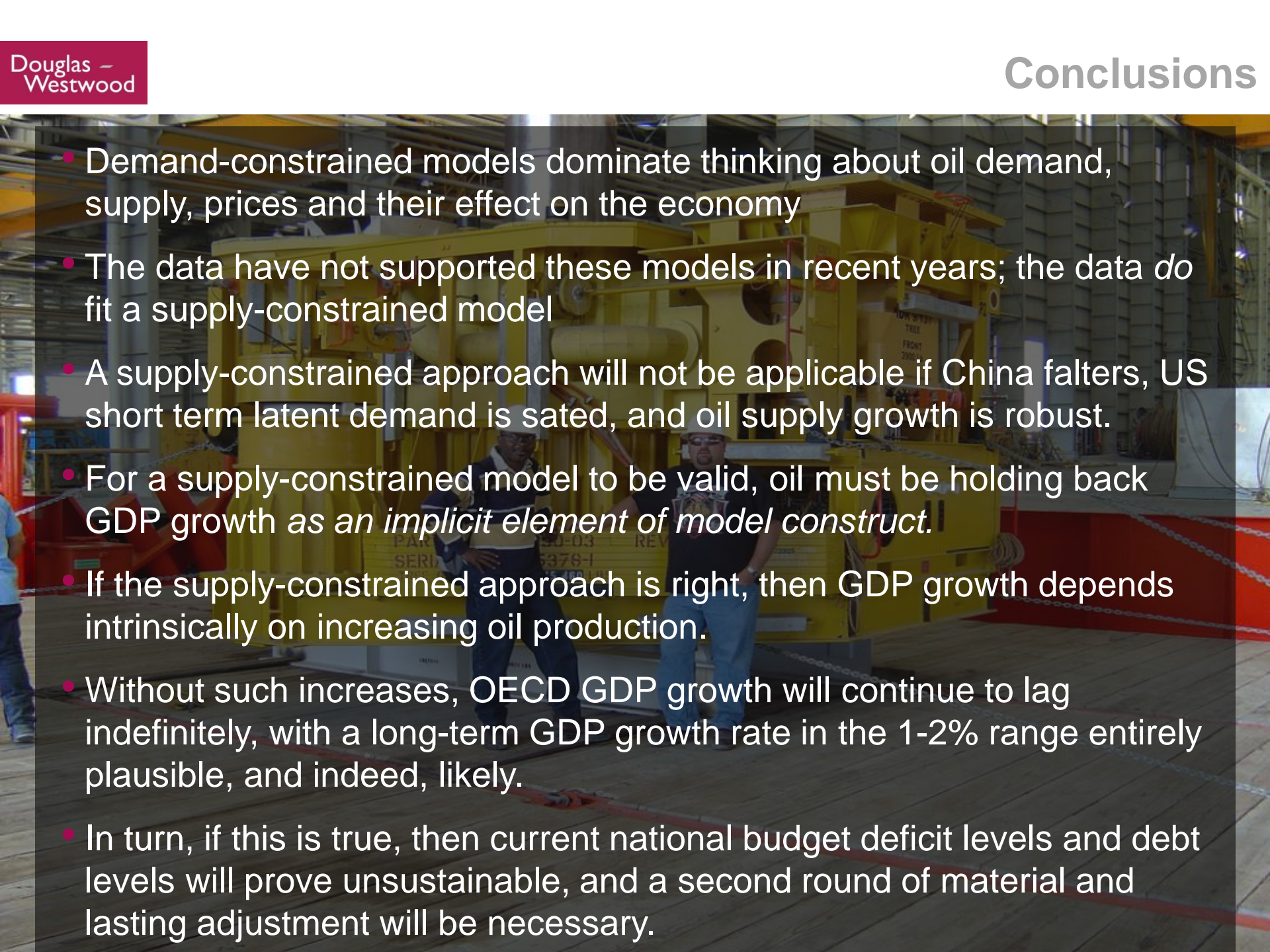
EU / Europe GDP Growth Rates

Source: IMF WEO 2013, Statoil Energy Perspectives 2013

- Statoil sees a much darker future than the past
- Long-term growth rates down 1% compared to pre-recession period
- Why such pessimism?
- Failed states?



Demand-Constrained Models
Supply-Constrained Models
Supply Growth
Demand Growth
Oil Prices
Oil and Mobility
The Oil Majors
Oil and Economic Growth
Conclusions

- 
- Demand-constrained models dominate thinking about oil demand, supply, prices and their effect on the economy
 - The data have not supported these models in recent years; the data *do* fit a supply-constrained model
 - A supply-constrained approach will not be applicable if China falters, US short term latent demand is sated, and oil supply growth is robust.
 - For a supply-constrained model to be valid, oil must be holding back GDP growth *as an implicit element of model construct*.
 - If the supply-constrained approach is right, then GDP growth depends intrinsically on increasing oil production.
 - Without such increases, OECD GDP growth will continue to lag indefinitely, with a long-term GDP growth rate in the 1-2% range entirely plausible, and indeed, likely.
 - In turn, if this is true, then current national budget deficit levels and debt levels will prove unsustainable, and a second round of material and lasting adjustment will be necessary.

Thank you



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