

Speculating on Speculation

Oil Markets in 2012...

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See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures

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14 December 2011



Oil in 2012 – A Year of Tail Risks...

- **Citi is raising its oil price expectations for 2012.** In our base case we now expect Brent to trade in a range of \$100 to \$120 and to average \$110 for the year. This is in line with the bull case in our previous forecast, which has come about due to better than expected demand and much worse than expected supply. Going forward, our global supply and demand balances are moderately bearish for 1Q12, as is our price outlook, but from then on we expect stronger balances and prices. We are not very optimistic on oil demand growth, modeling just +0.8-m b/d in 2012 and +1-m b/d in 2013, based on Citi's GDP expectations of 3.0% and 3.6% (PPP-adjusted) respectively. We are, however, optimistic on supply, forecasting 1.1-m b/d of non-OPEC supply growth, and coupled with the return of Libya this requires a cut by OPEC of some 500-k b/d if they want to keep the market tight and prevent a return to inventory builds. We think OPEC recognizes this reality, and take recent statements from OPEC members about how high their recent production has been as posturing in preparation for the upcoming quota reallocation.
- **Beyond supply and demand, our base case expects oil prices to be supported by several other factors: geopolitical risks, Russian domestic demand, the rise of the non-OECD, higher macro correlations, and inflation tail risks.** Citi's views warrant cautious optimism on risk assets (our global equity strategists are targeting a 20% gain in the MSCI AC World equity index, which should be supportive for oil). Monetary expansion would be supportive for commodity prices in general, and Citi is expecting QE3 in the US, rate cuts in Europe and a return to an easing cycle in China. Finally, geopolitics is expected to be a dominant theme in oil markets throughout 2012 and 2013.

OPEC may have some work to do in 2012...but risks to supply loom large

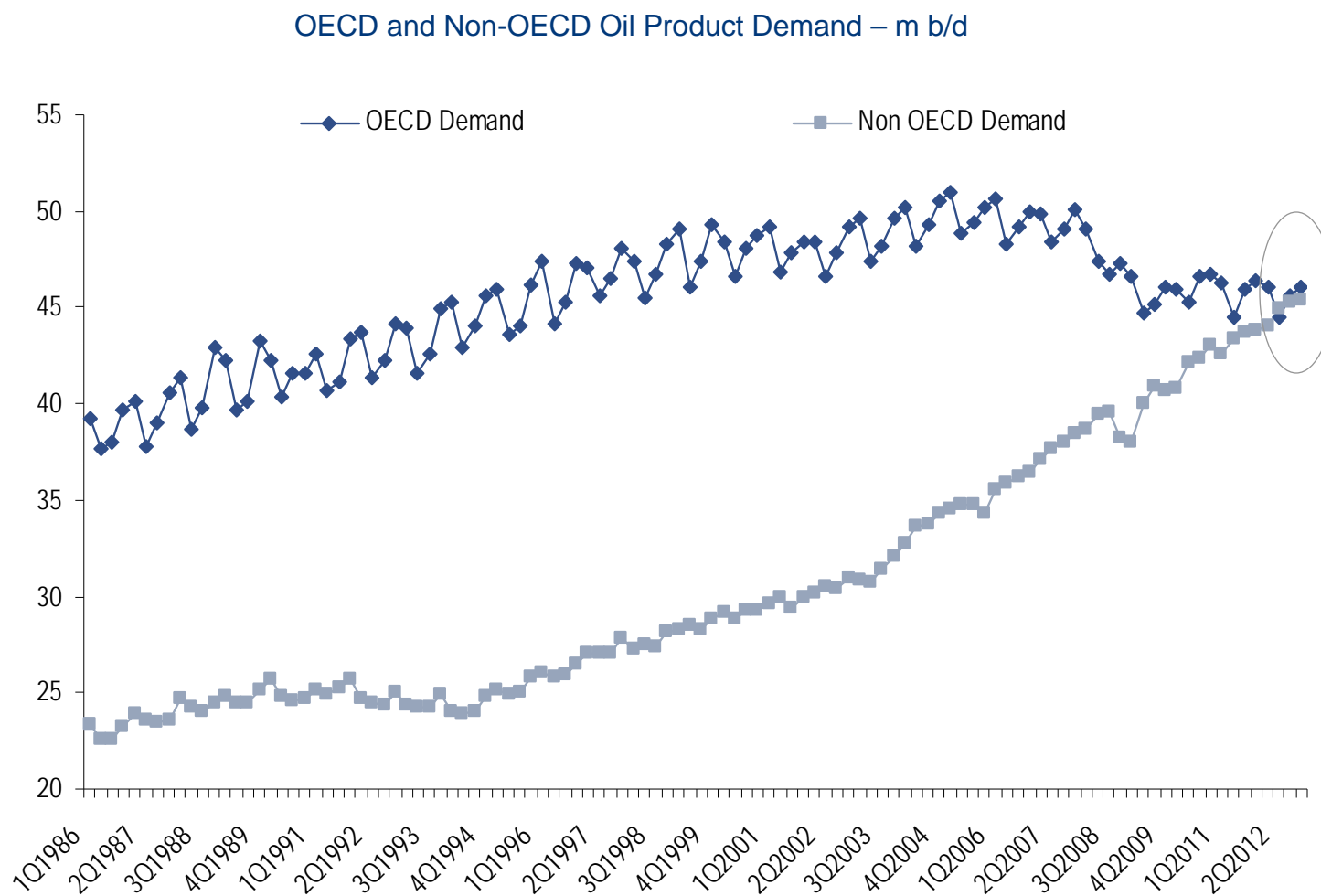
- **We think the world is operating with about 2.5-m b/d of spare production capacity, virtually all of which is in Saudi Arabia, with the rest scattered around other core Gulf OPEC members.** Absent any supply disruptions, we expect to see a marginal increase in spare capacity, but the margin remains so slim and the potential disruptions so numerous that we believe risks are slanted heavily to the bullish side of the ledger. Tensions between Israel and Iran top the list, but an EU embargo on Iranian oil, sanctions on Syria, succession and the possibility of strife in Saudi Arabia, elections in Venezuela and Angola and ongoing violence in Nigeria and Yemen are on the list but do not complete it.
- **Our base case is constructive for oil prices.** Our bull case, to which we assign a 25% probability, is that one of the many possible geopolitical risks to supply comes to fruition, in which case we expect oil prices to spike higher and to take a real toll on the global economy. Our bear case comes from a disintegration of the Euro (something our economists estimate is a 5% probability event), or a hard landing in China. Either of these would take oil down more than a peg or two.

Base Case Scenario for 2012...

Base Case Supply-Demand Balance														
<i>m b/d</i>	2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	2012	2013	12v11	13v12
Demand														
OECD Demand	46.2	46.3	44.6	45.6	46.9	45.8	46.2	44.4	45.3	46.4	45.5	45.5	-0.3	-0.1
Non-OECD Demand	42.1	42.8	43.6	43.7	44.1	43.6	43.9	44.8	44.9	45.3	44.7	45.8	1.1	1.1
Total Demand	88.3	89.1	88.2	89.3	91.0	89.4	90.1	89.1	90.1	91.7	90.3	91.3	0.8	1.0
Supply														
Non-OPEC														
Crude	48.7	48.9	48.3	48.6	49.3	48.8	49.4	49.4	49.8	50.1	49.7	50.3	0.9	0.7
Other	3.9	3.8	4.0	4.0	4.1	4.0	4.1	4.2	4.2	4.3	4.2	4.4	0.2	0.3
Total Non-OPEC	52.6	52.7	52.3	52.6	53.4	52.7	53.5	53.6	54.0	54.3	53.9	54.8	1.1	0.9
OPEC														
Crude	29.5	30.0	29.4	30.0	30.3	29.9	30.7	30.0	30.0	30.1	30.2	30.4	0.3	0.2
Other	5.3	5.8	5.8	5.9	6.0	5.9	6.2	6.2	6.3	6.3	6.2	6.4	0.4	0.1
Total OPEC	34.8	35.8	35.2	35.9	36.3	35.8	36.9	36.2	36.3	36.4	36.4	36.8	0.6	0.3
Total Supply	87.4	88.5	87.5	88.5	89.7	88.5	90.4	89.8	90.3	90.8	90.3	91.5	1.8	1.2
Stock Change	-0.8	-0.6	-0.7	-0.8	-1.3	-0.9	0.3	0.6	0.1	-0.9	0.0	0.2		
Crude Oil Prices														
Brent (\$/bbl)	80.3	105.0	117.4	113.3	109.7	111.4	105.0	110.0	110.0	115.0	110.0	120.0	-1.3	10.0
WTI (\$/bbl)	79.4	93.5	102.2	89.7	93.8	94.8	95.0	100.0	100.0	105.0	100.0	113.0	5.2	13.0

Source: Citi Investment Research and Analysis estimates

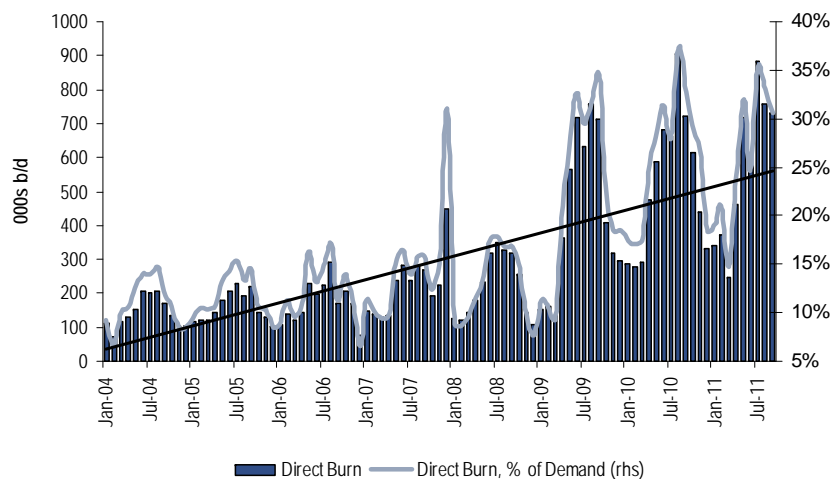
Consumption growth in the future appears to be an EM story...



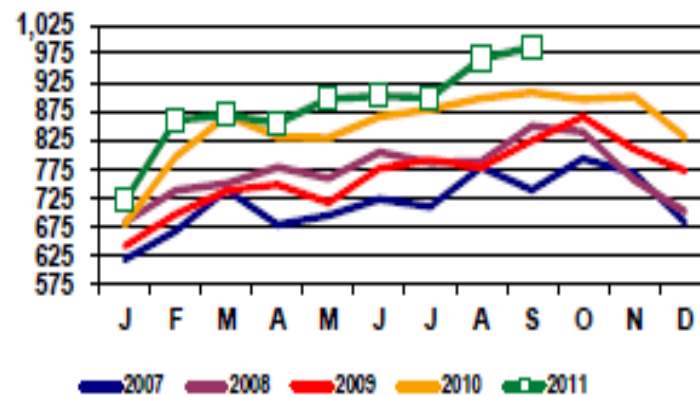
...from the Kingdom of Saudi Arabia to China to Brazil....

Where seasonality in the oil markets has become a meaningful issue for Non-OECD states...

Saudi Crude Burn exceeds 900-k b/d in summers...



...as gasoil demand in Brazil continues to grow...



Should risk-on/risk-off dominate 2012 like it did in 2011...equity markets could help buttress oil prices as correlations have risen meaningfully since 2008...

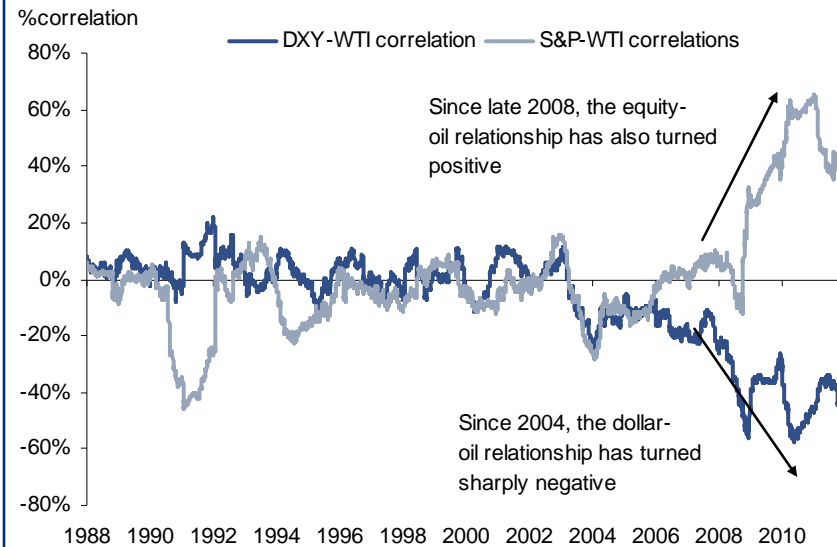
Citi is bullish global equity markets...

Equity Outlooks

		01-Dec-11	End 2012 Target	Change
US	S&P 500	1245	1375	10%
Pan Euro	DJ Stoxx	238	280	17%
UK	FTSE 100	5489	6200	13%
Japan	Topix	740	980	32%
Australia	S&P/ASX 200	4229	4900	16%
Emerging World	Emerging World	959	1225	28%
World	MSCI AC World	302	360	19%

Source: Citi Investment Research and Analysis

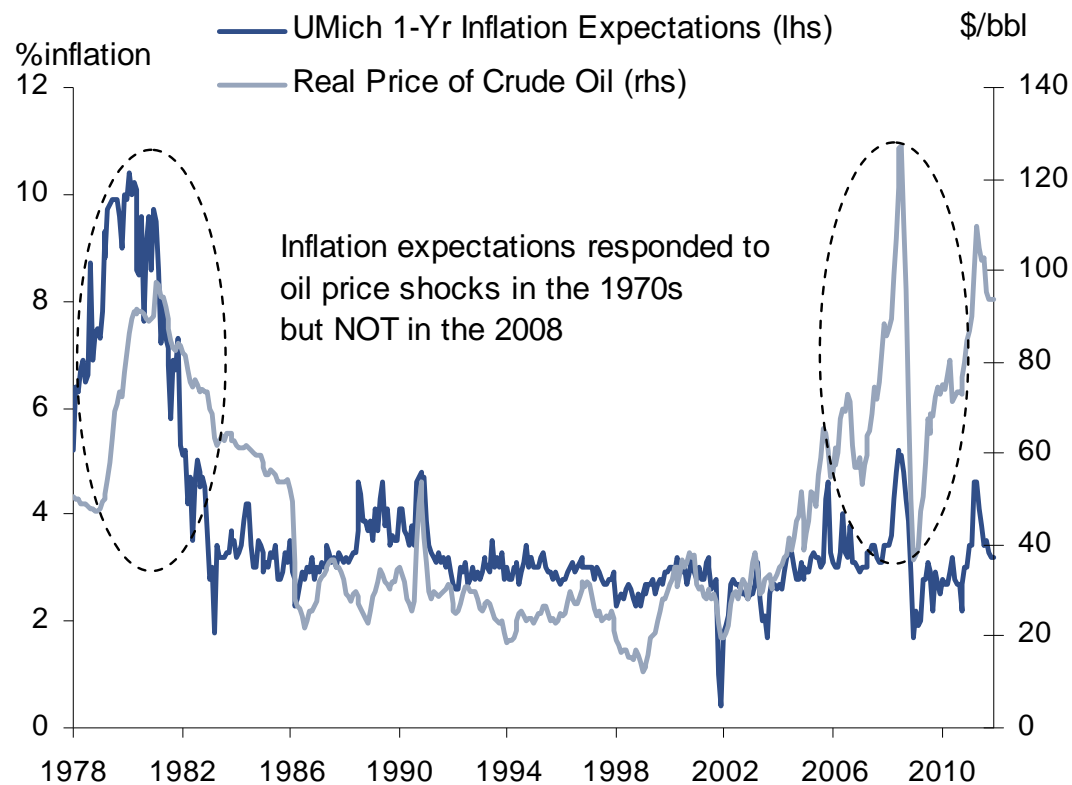
Oil-Dollar and Oil-Equity Daily Correlations



Can oil prices rise on inflation expectations as they did in the 1970s?

...interestingly enough, oil has become less useful as a hedge against inflation because stable inflation expectations have limited the degree to which higher headline energy prices affected broader price levels...But a destabilization of inflation expectations remains a critical tail risk as central banks continue to inject unprecedented amounts of liquidity into the global economy. M1 money supply as a % of GDP has surpassed 63%, the highest level since the 1980s. If expectations indeed un-anchor, nominal oil prices may respond disproportionately, fueled further by higher financial flows....

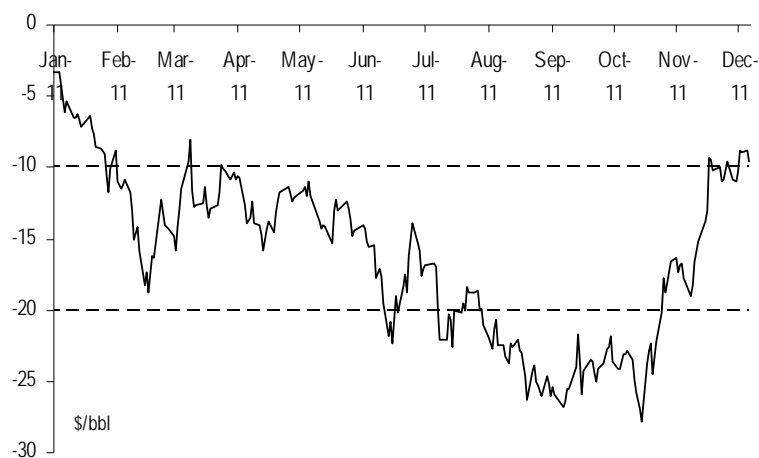
Real oil prices and inflation expectations (1978-present)



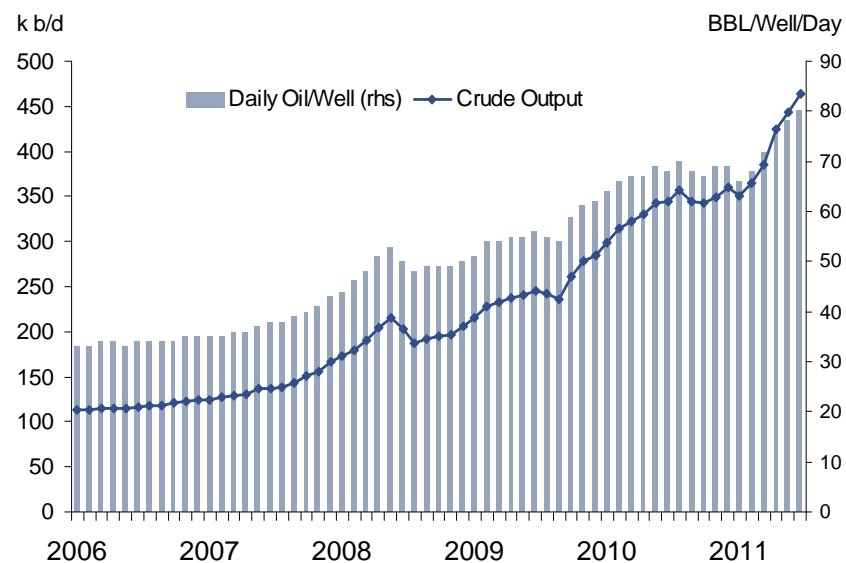
WTI-Brent Spread Still Prone to Blow Out in 2012...

2012 it looks likely that it will remain a choppy period for the differential—one not necessarily biased to a systematic narrowing but rather a period where the ‘arb’ could find a floor of about \$8-\$10/bbl, and remain prone to a blow out wider. The fundamental drivers for this view are the same as they were during this past year’s bumpy ride: growing North American production point to a supply imbalance favoring an inventory build in the US inland PADD II area including at Cushing, Oklahoma, the delivery point for NYMEX crude. Rampant new production of light sweet WTI within the US mid-continent will unlikely find an immediate home in the current refinery system despite potentially weaker inland demand and an insufficient pipeline, rail, truck and barge evacuation infrastructure.

WTI-Brent Spread, YTD



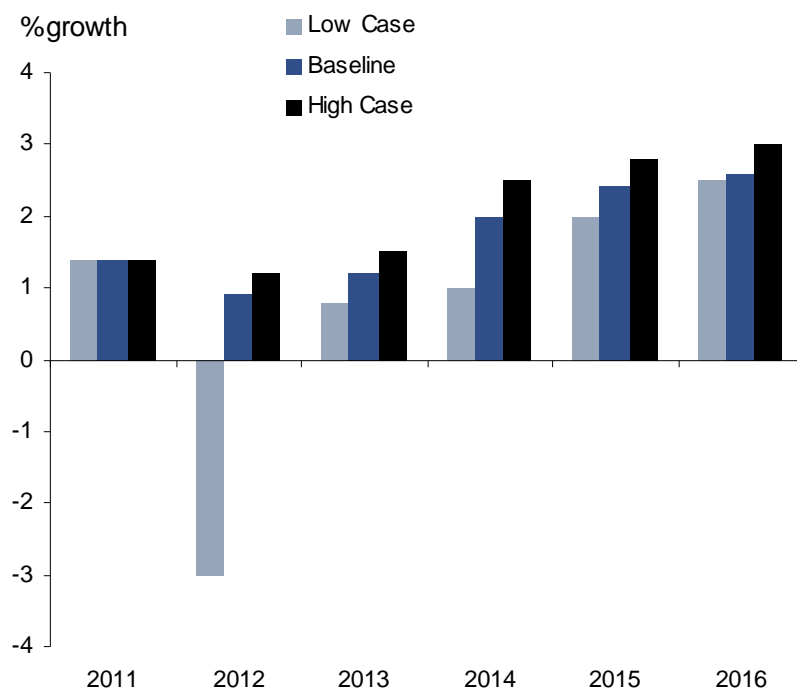
North Dakota Production Scaling New Heights...



Macro risks and uncertain scenarios

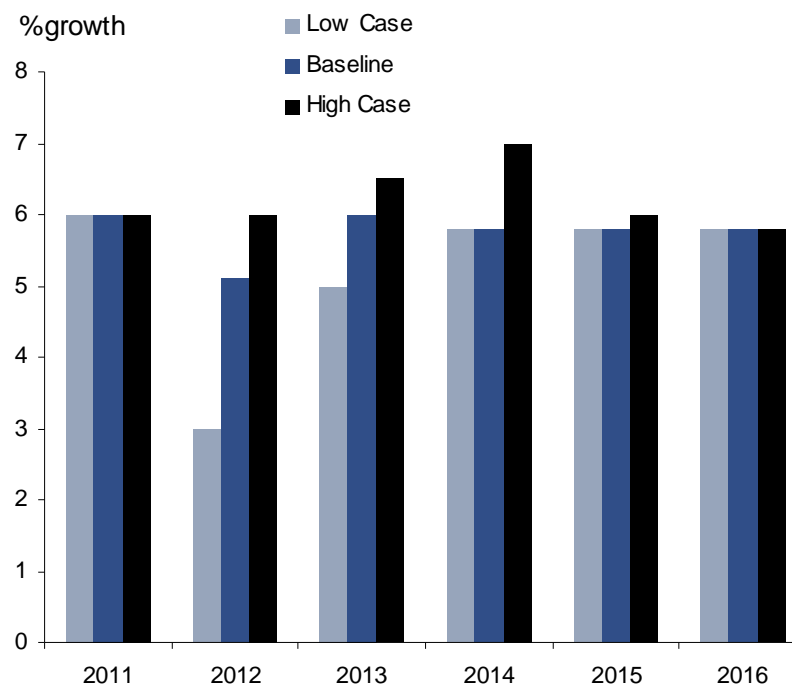
An uncertain economic outlook is the largest risk to the demand story, with global real GDP growth seen at 2.5% for 2012

Baseline, Low, and High Economic Scenarios for OECD



Source: Citi Investment Research and Analysis

Baseline, Low, and High Economic Scenarios for Non-OECD

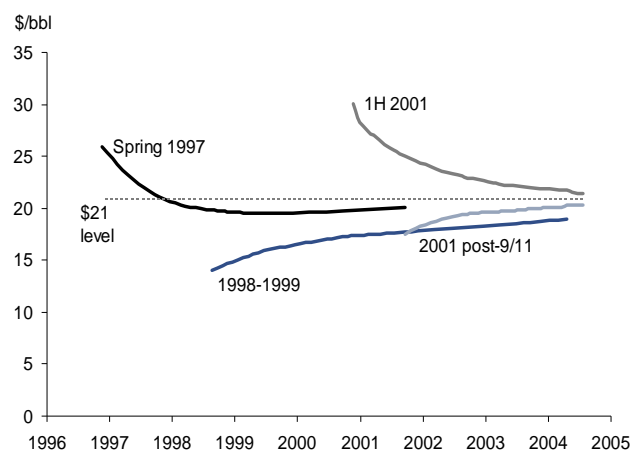


Source: Citi Investment Research and Analysis

Longer-term oil prices I

Our view is that it is reasonable to put a cap on long-term (5-10yr) prices at \$92/bbl, or the recent level of deferred WTI and Brent prices – this is based on several different indicators outlined here

Long-term (60-month) deferred prices



Source: Bloomberg, CIRA

- Long-term 60-month deferred prices stayed around the \$21/bbl level from the mid-1980s through 2002
- Starting in 2003, companies expanded upstream capex, pushing up costs, until stabilizing after the 2008-09 price crash
- For the past two-years, long-term 60-month deferred prices have hovered in the low \$90-range (nominal \$)

Average finding and development (F&D) costs

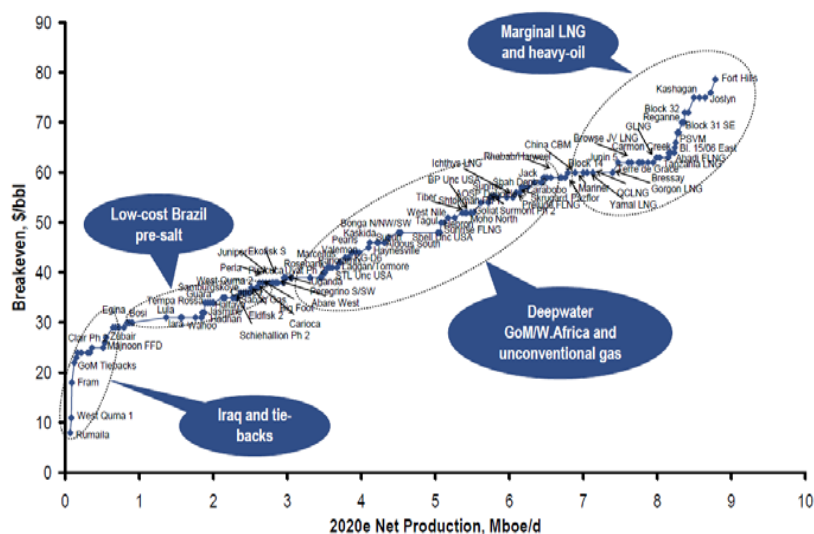
- Deferred oil prices have historically been around 3x average F&D costs (Morris Adelman, MIT energy economist)
- From the mid-1980s to 2002, average F&D costs were ~\$7/bbl, with deferred oil prices at ~\$21/bbl, or 3x F&D costs
- But more recently, F&D costs have risen to \$17-18/bbl, while deferred oil prices are averaging ~\$90/bbl, or 5x F&D costs
 - Higher average per barrel resource taxes that escape reported F&D costs
 - Less data available today due to growth of NOCs and private companies domiciled in looser regulatory regimes
 - Higher price volatility could require higher returns to compensate

Longer-term oil prices II

Our view is that it is reasonable to put a cap on long-term (5-10yr) prices at \$92/bbl, or the recent level of deferred WTI and Brent prices – this is based on several different indicators outlined here

Marginal costs point to a stable \$50-60 range, \$90 top

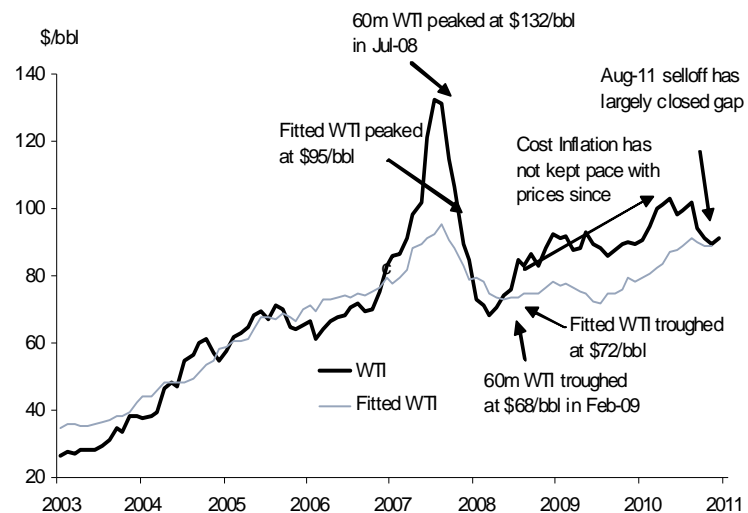
- Two separate and distinct “marginal cost” areas: (1) deepwater offshore and non-conventional tight oil, and (2) expensive non-conventional plays and expensive oil sands projects



* Break-even is NPV zero at 10% discount rate
Source: Citi Investment Research and Analysis

Citi's proprietary cost index sees \$75-80 deferred prices

- Provides direction on fundamental “fair value” of WTI deferred prices



Source: US BLS, Bloomberg, Citi Investment Research and Analysis

Expecting the unexpected I: Seasonal/political Calendar 2012

When it comes to tail risk events impacting oil prices and curve structures, 2012 looks like it could make 2011 look like a calm, normal year

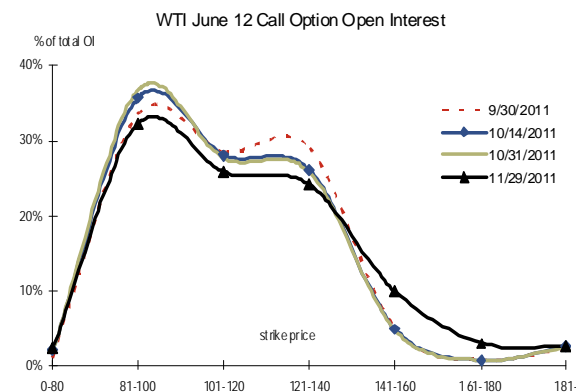
- **Winter/spring – weather in the northern hemisphere** – so far, 2011 has been exceptionally mild – will there be a cold snap before end of winter?
- **Summer gasoline** – a tight US/Atlantic basin market is expected in 2012, due to refinery closures (>1-m b/d) in the Atlantic Basin, limiting make of summer RBOB with its tight RVP specifications; a US stimulus package could put additional froth on summer demand
- **January 23 +15 days – Chinese New Year ends** in early February, signaling the beginning of a period of commodity restocking
- **March 4 - Russian Presidential elections** – PM Putin's loss of supermajority in Russia's Duma after the December 4th ballot should mean more stimulus ahead of the Presidential election
- **March 29 – Iranian Parliamentary elections** – growing antagonism between the unelected Supreme Leader and the elected President could lead to constitutional change eliminating direct elections for the President, which could spur more domestic discontent
- **April – Republic of Korea parliamentary elections** - relations between North and South are one of the critical issues at stake with bearish or bullish consequences depending on who wins
- **April 22 – French Presidential elections (round 1)** – an unpopular President looks likely to run on greater control over speculation in commodities, Euro systemic risk.
- **June – Egyptian Presidential elections** – will Islamist party victories in November's parliamentary elections be reflected in direct vote for the President? What are the consequences for Egyptian-Israeli, Egyptian-Saudi, Egyptian-Palestinian relations?
- **July 1 – Mexico Presidential and legislative elections** – shale reservoirs south of Eagle Ford, deepwater Gulf of Mexico could see Mexican oil and gas production climb. At least one candidate is in favoring of amending the country's constitutional obstacles to foreign investments in oil and gas
- **July – India Presidential elections** – subsidies for gasoline are an issue, given higher crude costs and higher subsidy costs and ongoing politicization of food and fuel inflation; rupee depreciation also pushes up costs of imported oil
- **September – Angola Parliamentary elections** – output could rise by ~400-k b/d between last November and next April; with IMF pressure to raise revenues, pre-election politics point to no restraints on production; output could rise to 1.9- to 2.0-m b/d
- **October – Chinese leadership transition begins** – new leaders to take office after Chinese New Year 2013; in preparation, additional economic stimulus measures are expected, bullish for bulk commodities, base metals, ags and oil
- **November 6 – US Presidential election** – oil prices could be critical to who wins, and further quantitative easing could be in the works before hand
- **December – Republic of Korea Presidential elections**

Expecting the unexpected II: Tail Risks

Investor sentiment at year-end remains largely bullish

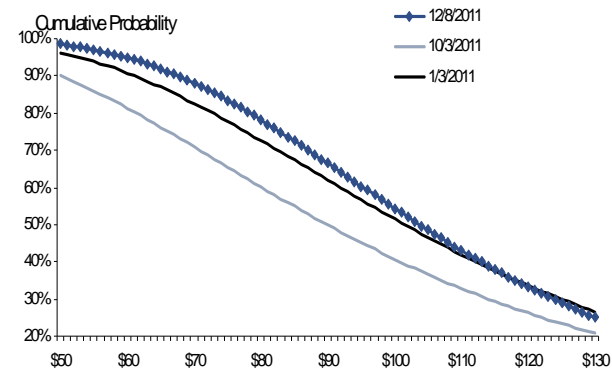
- Since early 2010, out-of-the-money call option open interest for Dec-12 delivery with strike prices between \$100-140/bbl rose substantially, skewed toward upside price risk
- After the Libyan disruption, they jumped upwards significantly as investors prepared for an upside price breakout
- In 3Q'11, as global economic growth prospects were at risk, open interest faded
- The distribution of open interest in deep out-of-the-money calls for June 2012 have increased, as perceived risk of an Iran-related disruption is heightened
- Correspondingly, the option-implied probability that Dec-12-dated WTI would exceed \$100/bbl by delivery has surged over 50% as of December 8, 2011, up both from the 40% low in October and up year-on-year

WTI June 12 call option distribution of open interest sees moves to \$140-180/bbl strike prices



Source: Bloomberg, Citi Investment Research and Analysis

Option-implied probability of Dec-12 WTI exceeding minimum price at delivery



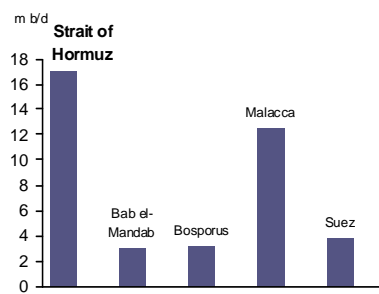
Source: Bloomberg, Citi Investment Research and Analysis

Expecting the unexpected III: Key Bullish Risks

Bullish tail risks are focused on the MENA region

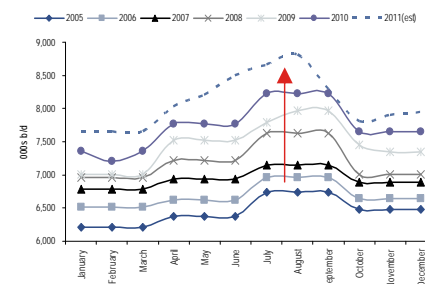
1. **Iran** – an EU embargo, the attacks on the UK embassy, and two explosions at military sites recently with little information concerning whether the perpetrators are foreign or domestic – all suggest a disruption could be likely; could the 17-m b/d of oil flows through the Strait of Hormuz be at risk?
2. **Saudi Arabia**
 - Shrinking spare capacity and delays in capacity expansion
 - Potential attack on critical oil facilities at Abqaiq or Ras Tanura
3. **Collapsing OPEC output**, particularly in Iran and Venezuela
4. **Rampant demand growth in OPEC countries** – rapid population growth and subsidies for oil products erode exportable surpluses; could rise by 1.5-m b/d between 2010-2015, 2-m b/d between 2015-2020
5. **Contagion of disruptions to other light, sweet oil producers** – Algeria and Nigeria produce a combined 3.7-m b/d of similar quality oil to Libya – light, sweet crude is readily refined into low-sulfur transportation fuels

The Strait of Hormuz is a key oil chokepoint



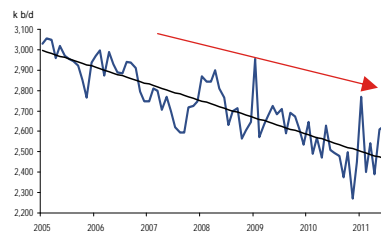
Source: EIA, Citi Investment Research and Analysis

Middle East oil demand has grown 1-m b/d between 2005-10

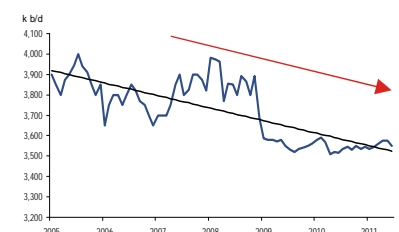


Source: EIG, Citi Investment Research and Analysis

Iranian and Venezuelan production has been in decline



Source: EIG, Citi Investment Research and Analysis



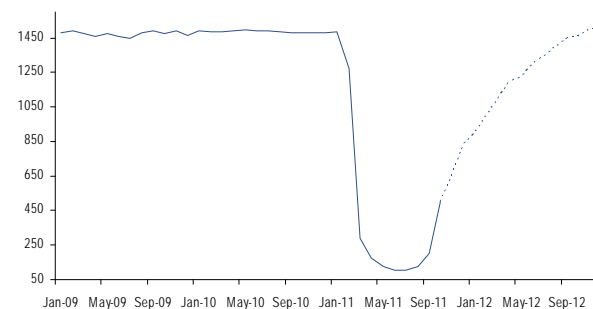
Source: EIG, Citi Investment Research and Analysis

Expecting the unexpected IV: Key Bearish Risks

...can influence prices...

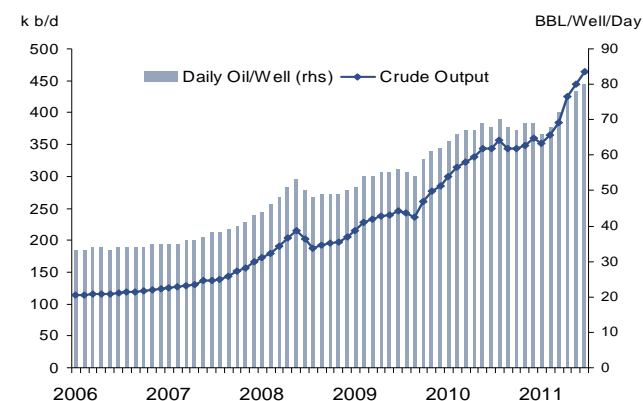
- **Libyan oil revival**
- **Iraq on the march**
- **A combination of double-dip recession and continued Saudi production at current levels**
- **Chinese economic shock**
- **Accelerated US oil independence**

Libyan production has reportedly reached 840-k b/d according to NOC or half of its pre-conflict 1.5-m b/d level



Source: EIG, CIRA estimates

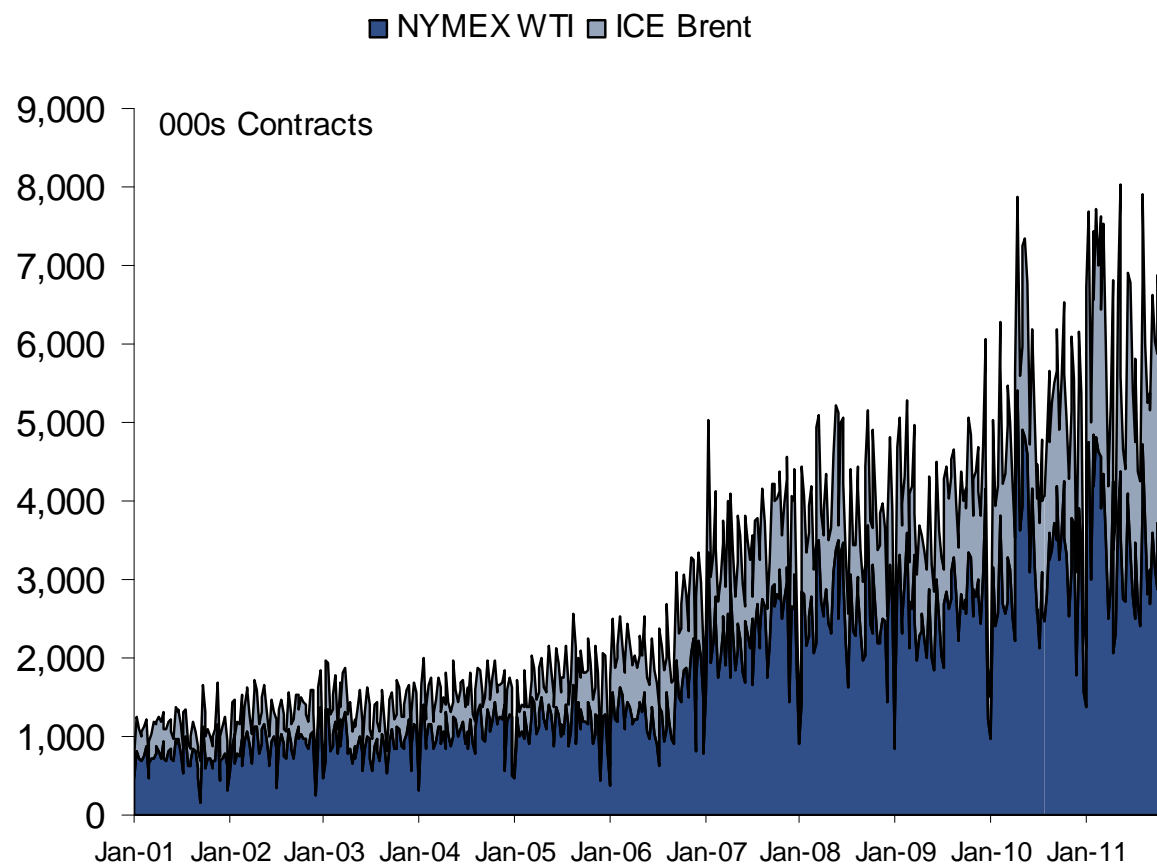
US potential can be seen in rising North Dakotan production, up over 120-k b/d y-o-y as of September 2011, driving US onshore output gains



Source: North Dakota State, CIRA

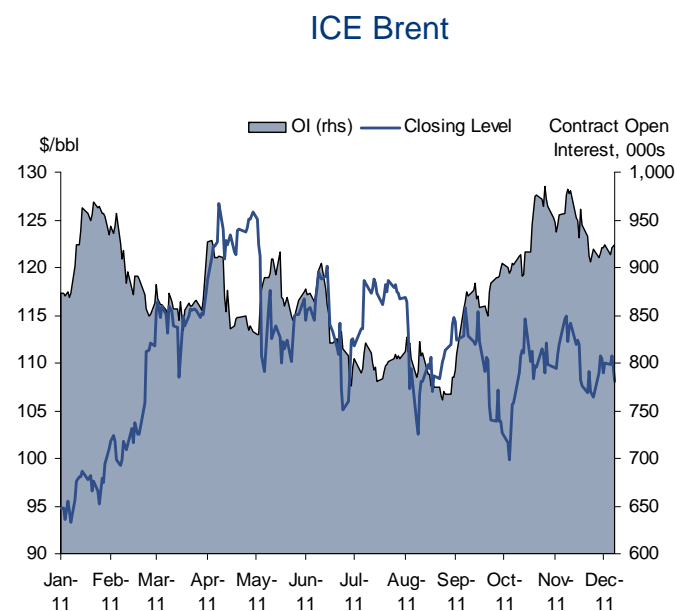
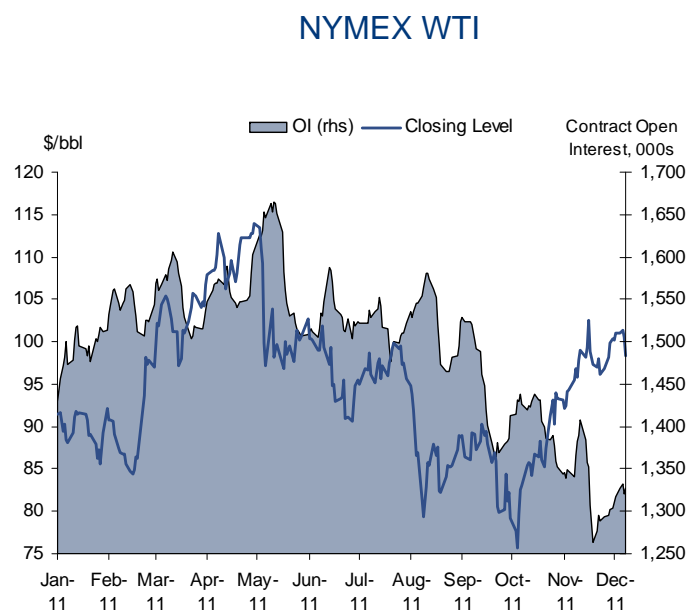
Market Scope: Oil Futures Aggregate Volume

Both sides of the Atlantic have seen a near 8-fold growth in trading activity since 2001...



Market Scope: Flat Price vs. Open Interest

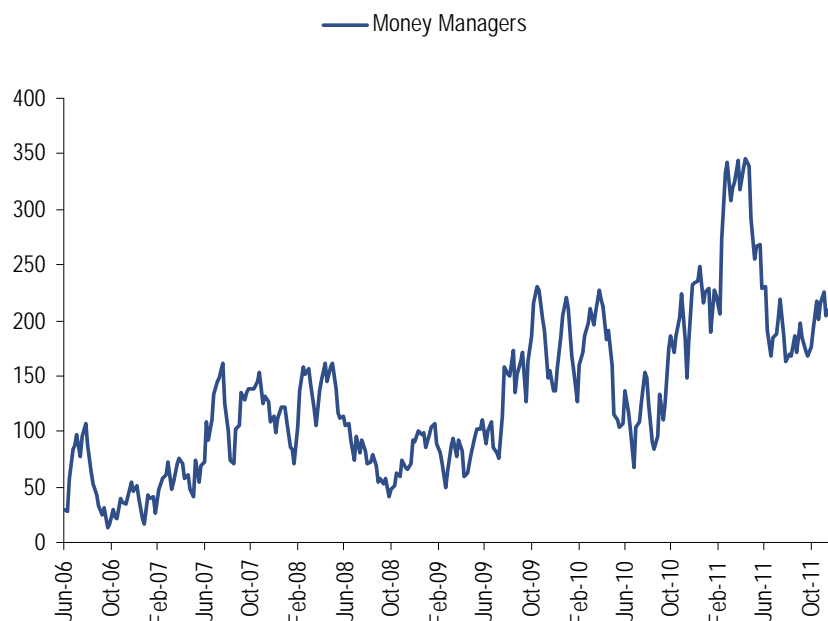
Could futures aggregate open interest for WTI and Brent converge in 2012? Brent is being allocated 5% to DJ-UBS Index (~\$90Bn AUM) at expense of WTI...and the waterborne crude remains in more robust backwardation...



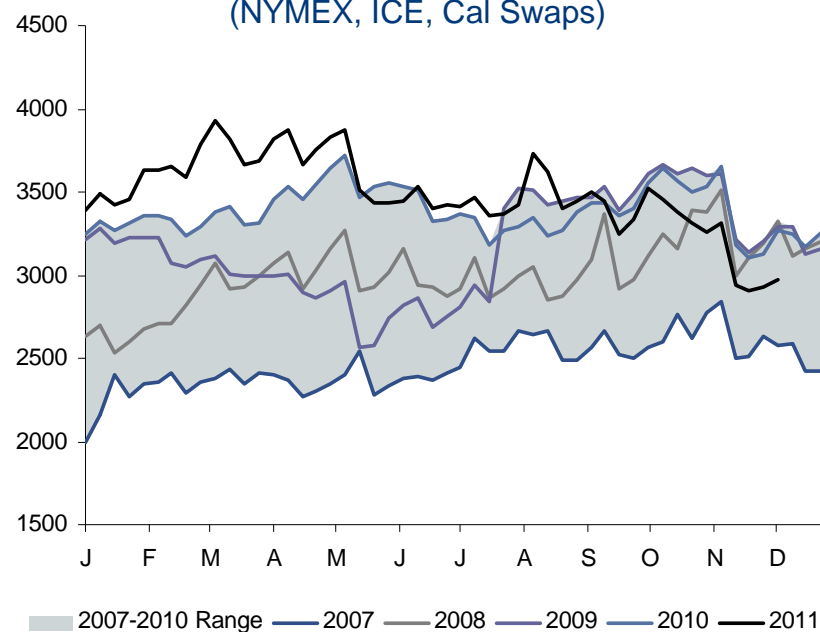
Market Scope: WTI still the most liquid oil contract in the world

Long positioning by the hedge fund and asset management community has been on an uptick during 4Q'11...

WTI – Managed Money Net Length (000s contracts)



WTI Futures and Options Open Interest (NYMEX, ICE, Cal Swaps)



Appendix A-1

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The research analyst(s) primarily responsible for the preparation and content of this research report are named in bold text in the author block at the front of the product except for those sections where an analyst's name appears in bold alongside content which is attributable to that analyst. Each of these analyst(s) certify, with respect to the section(s) of the report for which they are responsible, that the views expressed therein accurately reflect their personal views about each issuer and security referenced and were prepared in an independent manner, including with respect to Citigroup Global Markets Inc and its affiliates. No part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendation(s) or view(s) expressed by that research analyst in this report.

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