The shale revolution - impact on the global oil and gas market

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Brief intro to the oil market
Drivers of the oil price

Financial markets
- Economic growth & Monetary policy
- USD
- Inflation expectations
- Asset prices

Short-term Supply/Demand
- Inventory levels
- OPEC goals and discipline
- Non-OPEC prod./E&P capex
- Current demand

Long-term Supply/Demand
- OPEC target price and spare capacity
- Non-OPEC production growth
- Emerging Markets’ demand
- Renewable energy and regulatory changes

Geopolitical risk

Illustrative – not meant to be exhaustive

Short-end of forward curve
Long-end of forward curve

Source: PIRA, Nordea Markets
Oil price – vital driver of the activity on the Norwegian Continental Shelf

<table>
<thead>
<tr>
<th>11/02/2013</th>
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USD/barrel

Source: Nordea Markets and Reuters Ecowin
Speculators do not set the price trend, but magnifies the price movement

USD and the oil price, don’t take the correlation for granted...
Oil demand: Depends on economic growth, population growth, living standard and urbanisation

Source: IEA, Nordea Markets
Transportation sector accounts for more than 50% of global oil consumption and this share is expected to increase.

Note: Other includes non-energy use, including feedstocks for industry.

Source: IEA
Growth perspectives for the Light Duty Vehicle fleet in selected regions

Source: IEA
Oil production (MMB/D) by country

OPEC Share of World Crude Oil Production 2011
- OPEC Members: 34%
- Non-OPEC Countries: 66%

Largest Non-OPEC Oil Producers
- Russia
- China
- USA
- Canada
- Mexico
- Brazil
- Venezuela
- Angola
- Indonesia

Source: BP Statistical Review of World Energy & OPEC
Worldwide upstream oil and gas investment and upstream investment cost index

Investment:
- In nominal terms
- Adjusted for upstream cost inflation ($2011)

Index (right axis):
- IEA crude oil import price
- Upstream import investment cost

* Budgeted spending.

Notes: The IEA Upstream Investment Cost Index (UICI), set at 100 in 2000, measures the change in underlying capital costs for exploration and production. It uses weighted averages to remove the effects of spending on different types and locations of upstream projects.

Source: IEA databases and analysis based on industry sources.
Oil reserves in the Middle East and North Africa, account for more than half of the world’s oil reserves - in % of global oil reserves

Source: BP and Nordea
World’s top net oil exporters - only 2 politically stable

Azerbaijan
Kazakhstan
Canada
Qatar
Algeria
Venezuela
Norway
Angola
Iraq
Nigeria
Kuwait
UAE
Iran
Russia
Saudi Arabia

OPEC spare capacity at uncomfortably low levels

Implied OPEC effective spare capacity and Brent price forecast

Effective spare
Effective spare (f'cast)
Brent 1.pos, rhs
Brent (f'cast), rhs

OPEC spare capacity at uncomfortably low levels
US oil production necessary to counter natural decline and increasingly unstable production – especially in MENA

10 largest oil exporter in the world today may have a net export deficit in 2017 – who will cover the gap?

Source: PIRA, IEA, Nordea Markets
Oil exporters’ budget breakeven oil prices to increasingly affect oil price formation

USD/barrel

Source: PIRA
US shale oil production and the US economy
What triggered the shale revolution? Increasing oil/gas prices and a technology breakthrough

Hydraulic Fracturing and Horizontal Drilling
Shale oil revolution necessary to counterbalance supply-side disturbances outside North America
US shale oil production can turn US into the world’s largest oil producer by the end of this decade

Oil import as a share of GDP

Source: PIRA
Rapid US crude production growth 2010-25 reflects shale crude development and higher oil prices

Source: PIRA
US crude imports – number of suppliers increased
Canada’s market share growing

Fuel efficiency and energy conservation

Source: EIA
Shale oil is not a low-cost oil

Shale oil well type curve – need constant drilling of new wells to level production

Source: PIRA and Reuters Ecowin
Existing and proposed mid-continent crude oil pipelines
World oil supply – still fields yet-to-be found to cover expected future oil demand growth

Source: IEA
US shale gas production – cheap gas can boost US industrial growth
Unconventional gas plays in North America – impressive growth in shale gas production the last few years

Enough to satisfy more than 100 years of consumption at current rates

Source: IHS CERA

Nordea
Shale gas accounts for more than 35% of total US production

Source: PIRA
US proposed liquification sites and nearby shale gas plays

Source: PIRA
Price spreads expected to narrow as natural gas market becomes more transparent and global

Source: PIRA
Initial assessment of shale gas resources in 48 major shale basins in 32 countries indicates large potential

Source: U.S. Energy Information Administration
US outlook for natural gas-intensive industries, especially chemicals and manufacturing industries will benefit from cheap gas
Economic and employment contribution of unconventional gas in the US

By 2015 the annual contribution of unconventional gas activity to GDP near USD 200bn

From 2010 to 2035 the employment contributions of the conventional gas industry more than double

Direct contribution: Impact on the core producing industries such as exploring, producing, transporting and delivering to downstream elements or providing onsite services

Indirect contribution: Impact on the supply chain and their supplier industries

Induced contribution: Expenditure induced impact through household income

Source: IHS
EU 27 import of natural gas - % of extra EU imports by country of origin

Russia: 33.0% (2010), 33.0% (2011)
Norway: 27.8% (2010), 26.6% (2011)
Algeria: 14.2% (2010), 12.9% (2011)
Qatar: 5.2% (2010), 11.0% (2011)
Nigeria: 3.2% (2010), 4.3% (2011)
Trinidad and Tobago: 1.1% (2010), 1.1% (2011)
Egypt: 1.0% (2010), 1.0% (2011)
Libya: 2.7% (2010), 0.7% (2011)
Other third countries: 11.8% (2010), 9.4% (2011)

Source: Eurostat
Norwegian export of natural gas split on:

- Tyskland 24.5%
- Nederland 11.0%
- Frankrike 12.0%
- Italia 6.4%
- Nederland 11.0%
- Spania 3.5%
- Danmark 3.3%
- Tsjeckia 2.7%
- Østerrike 1.3%
- USA 0.4%
- Andre 1.4%
- Storbritannia 27.3%
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