Competitive challenge for oil majors: sustaining the rate of technology innovation

After a lustrum of economic turmoil, how have the oil majors come through, and what comes next? Ruud Weijermars^{*} analyzed a time series of corporate performance indicators and suspects a future playfield where innovation rates may be slowing.

The performance of the oil majors provides a fairly good bellwether for the petroleum industry as a whole, because of their vertical integration of assets with a worldwide span. The past decade followed an episode of megamergers between former oil giants. The corporate profits of the merged majors have risen in the first half of the past decade, but became depressed as the Great Recession took its toll. This report highlights the spread in past performance between the three US incorporated majors (Exxon, Chevron, Conoco) and the three EU incorporated majors (Shell, BP, Total). The book value of all majors has taken a hit, except for Chevron, which has made a remarkable recovery. The future outlook for the petroleum business is briefly assessed based upon oil and gas price forecasts and financial market futures. If the cash flow in the petroleum business remains healthy, technological innovations can progress unabated to ensure peak oil can be moved further ahead in the future. However, declining cash flows due to recessional oil and gas markets would bring closer the peaking of oil, because diminished oil majors can no longer bear the cost of timely innovations. This article explores which scenario is the more likely.

Profitability spreads

Any company's capacity to generate value growth – oil majors included – can be comprehensively measured by its return on capital employed (ROCE). The average corporate profitability for the peer group of oil majors (ExxonMobil, Chevron, Shell, ConocoPhillips, BP, and Total) has seen some sharp bends and



Figure 1 Peer group profitability (ROCE) versus Brent oil price (annual average 2001–2011; Alboran Research, EIA, and 10-K filings SEC).

twists over the past decade (Figure 1). The 10-year average ROCE for the peer group stands at a formidable 16% over the period 2001–2011, which is nearly double that recorded for the preceding decade. However, the Great Recession of 2008/2009 has dented the peer group's annually averaged ROCE, and followed

the decline in global oil and gas prices. The close match between the global oil price development and ROCE trends has been recognized in earlier studies (Osmundsen et al., 2005, 2006). The profitability of the oil majors remained depressed during 2009 and early 2010 as oil prices receded, and followed three



Figure 2 Spread above and below peer group ROCE (2001-2011) (Alboran Research and Gurufocus).

* Alboran Energy Strategy Consultants & Department of Geotechnology, Delft University of Technology, Stevinweg 1, Delft 2628 CN, The Netherlands. E-mail: r.weijermars@tudelft.nl



Figure 3 Share price development (in US\$) for oil majors between December 2007 and September 2011. US majors are shown on the left and EU majors are in the right column (Alboran Research and Morning Star).

years (2006–2008) of ROCEs already depressed by rising cost of new oil field development (Figure 1). But the spectacular recovery of the oil price in the second half of 2010 and 2011 has provided support for a slow recovery of the corporate ROCEs. Still, the pressure remains high to further restore the majors' ROCEs to 2005 peak levels.

Taking a closer look at the competitive peer group of oil majors, one can note a considerable spread in their performance over the past decade. For example, ExxonMobil has consistently outperformed its peer group: Exxon's annual ROCEs are well above the peer group's mean ROCE (Figure 2). In contrast, ConocoPhillips consistently under-performed over the same decade. Chevron's ROCE, at times, reached up to 10% above the peer group average but its profitability remains volatile. Similar swings are seen in the ROCEs of Shell and Total, but these are less volatile in amplitude than Chevron's. As was to be expected, BP has seen considerable drops away from the average oil major ROCE, particularly in 2010, when the Macondo disaster occurred.

Share price swings

The share prices of all the majors began to slide after the oil price peaked in July 2008. Figure 3 tracks their share price erosion over the nearly four years passed between December 2007 and September 2011. These time-series maps of share prices show that of all the majors, only Chevron has recapped its lost share price value, while the others are still trading below their mid 2008 highs. The polar plots ('Antarcticamap-resembling') of Figure 3 were first introduced in an earlier assessment of the impact of the recent recession on the oil majors (Weijermars, 2010).

Beta values

The oil majors have traditionally been regarded as stable stocks, performing with a volatility that remains below that of the market's average. Betas are a reliable measure of stock volatility relative to the S&P index, which has a beta equal to 1 by definition. Figure 3 includes the betas for the peer group of majors as per 31 September 2011, and compares these betas with those of 31 September 2009 (as in Figure 6 of Weijermars, 2010).

The stocks of all majors have become more volatile than two years ago, as their betas have increased. For example, the stocks of BP and Conoco have even become more volatile (betas of 1.16 and 1.11) than the already volatile overall market averaged at beta =1. Beta values traditionally indicate a share's relative risk premium as compared to returns for an average 'market' portfolio (Lumby and Jones, 2003). In times of economic growth (bull markets) the return on equity for investors is theoretically higher for high risk stocks (large beta stocks). However, the stocks of Conoco and BP have delivered lower than expected shareholder returns over the past few years. In contrast, stocks of Exxon and Chevron with betas of <<1 are 'less risky' than the market and - in times of high economic uncertainty (bear markets) - these stocks remain relatively attractive to prudent investors.

Market capitalization

The longer term volatility in book value of the majors is represented by the annual change in their market capitalization. Figure 4 shows the time series for market capitalization over an



Figure 4 Market capitalization (book value) of oil majors between 1994 and 2011 (Alboran Research and Wikinvest).

18-year period. The marked jump in capitalization of nearly all majors in the late 1990s is not due to organic growth, but due to mega-mergers: Exxon-Mobil in 1999, Chevron-Texaco in 2001, ConocoPhillips in 2001, BP-Amoco in 1998, and Total-Fina-Elf in 1999. The mergers have enabled these companies to advance their organic growth. Only Shell has grown largely organically over the past two decades, by project development without any mega-mergers.

What becomes clear, though, from the time series in Figure 4 is the rapid erosion of book value since the onset of the recession by the financial crisis of 2008. As profits for the peer group of majors were already under pressure since 2007, investors have lowered their valuation of these energy stocks accordingly. Only Chevron has recouped the lost asset value and even added new book value in 2011. The European majors have market capitalizations that have regressed to values seen last over a decade ago. The US majors have generally held up firmer book values, which may be attributable in part to retaining more value for reinvestment in the company by share buy-backs, rather than paying out dividends like their European counterparts do.

Debt gearing

The tactics to sail through the latest recession include a broad spectrum of measures. One of the tools is to increase the debt gearing to assist restructuring cost and continue new capital investment projects in spite of declining profits during the recession. All majors have increased their debt-gearing ratio over the past few years, with the exception of Chevron, which at 8% attained the lowest debt-to-equity ratio in its peer group in 2011. Exxon and Shell are at 21% and 22% debt gearing, respectively. The 2011 debt gearing of Conoco, BP, and Total is at 33%, 32%, and 34%, respectively. Figure 5 shows how the debt-gearing average for the peer group has generally risen since its low of 2007.

The eroded share prices, declining book values, increased debt gearing, and higher stock volatility are all signs of recessional market conditions for the oil majors. Oil majors face times of increasing uncertainty and their principal business income will depend on volatile product volume, threat of higher opportunity cost, and lower profit margins. The least controllable, external impact factors - with the highest sensitivity to corporate profit margins - are the world's oil and gas prices. These are crucially affecting corporate profits, which is why we need to review the future oil and gas price scenarios.

Oil prices

The world's leading price benchmarks for crude oil, the US WTI and European Brent, have been nearly identical in value for several decades. Figure 6 shows the 14-year curve of their daily prices, which first peaked in July 2008 and then again in April 2011.

What is a relatively new phenomenon is the considerable price gap that has developed since fall 2010 between US crude and EU crude. Figure 7a plots the growing price gap between WTI and Brent. The price gap (or spread), plotted in Figure 7b, could widen further, unless the geopolitical forces pushing Brent up are removed. The reason why WTI cannot rise as fast as Brent is ascribed to the volume of Canadian, Bakken, and Mid-Continent oil pouring into Cushing, the physical oil hub for much of US oil in Oklahoma, with no easy way out. Unless a pipeline is built to move crude oil physically from



Figure 5 Average debt gearing or leverage (debt-to-equity ratio) for the peer group of oil majors (Alboran Research and Gurufocus).



Oklahoma to the Gulf Coast, the WTI oil glut will remain. Producers are reluctant to commit to a pipeline as everyone is waiting for someone else to pay. Tanker trucks and rail car transportation of crude toward Texas refineries cushions a further price spread – but there is too little capacity to ease the oversupply to Cushing.

So what do we know about future oil prices? The IEA (Paris) regularly releases updates of its oil demand forecast. Figure 8 shows the latest forecast with 2009 lows in world oil consumption and rising demand for 2010 and 2011 to nearly 90 million bbl per day. More demand means firm prices, unless the global economy falters again.

The US Energy Information Administration has published rather accurate mid- and long-term price scenarios in the past (see Weijermars, 2010). Figure 9 shows the latest price scenario based on the EIA's proprietary equilibrium model of the market forces. These models suggest oil prices will stay firm even in the mid- and long-term. Nonetheless, EIA states in their Short Term Energy outlook (EIA, 2011) that there is a significant downside risk for oil prices if economic and financial market concerns become more widespread or take hold. If the economic outlook does not weaken further, crude oil refiner acquisition costs will rise from \$100 in 2011 to \$107 per barrel in 2012.

Meanwhile, the higher Brent price puts the European economy at a competitive disadvantage relative to the US, which enjoys a nearly 25% discount Figure 6 Oil price development (in US\$) for EU North Sea Brent and US West Texas Intermediate (Alboran Research and EIA).

on WTI crude relative to Brent crude (Weijermars, 2011a), while these oils have similar chemistries.

Gas prices

Natural gas prices are subject to regional market dynamics and may differ considerably in the world's major gas markets. Figure 10a plots the US Henry Hub gas price relative to WTI spot, which reveals that gas trades at a calorific discount relative to oil. Oil calories generally enjoy a price premium over gas calories. Figure 10a also shows that US natural gas prices declined rapidly when oil prices dropped during the 2008/2009 recession, and have not recovered since. The US spot gas price has declined to about \$4/mcf and has become progressively decoupled from the oil price. The reason why US gas prices remain depressed in spite of rising oil prices is that domestic production of unconventional gas in the US and Canada has led to oversupply in the North American gas market.

In contrast, gas prices in Continental Europe are still dominated by oilindexed long-term contracts (Weijermars and McCredie, 2011). Figure 10b shows how the six month delay in the price adjustment mechanism held Continental European gas prices firm in the first months of the oil price collapse in autumn 2008. However, the oil indexing of Continental European gas prices ensures that these rise in step with the recovery of global oil prices. The European and US gas markets in effect have become decoupled which results in a large price differential between these two major gas markets: EU gas trades at over twice the price paid for US spot gas. This worsens Europe's competitive disadvantage with respect to North America in terms of fossil fuel prices (Weijermars, 2011a).

The rest of the world has been slow to follow the example of North America in developing unconventional gas resource potential (tight gas, shale gas, and coalbed methane). Without the development of that potential, regional gas prices are set to rise well above \$10/ mcf in Europe, while Asian markets will be driven by LNG prices with Japanese contracts rising well above \$20/mcf.

Meanwhile, US gas prices in the short-term need to see the results of gas rigs being scaled down. Figure 11a shows how oil rig counts have overtaken gas rigs once again: oil rig count is up, gas rig counts are down (Weijermars, 2011b). Figure 11b shows that only the Eagle Ford and Granite Wash see enhanced drilling activity, all other major shale gas plays are seeing declines in drilling rates. This will eventually lead to a lower gas output and higher US gas prices.

The short-term gas price forecast (with seasonal swings in step with the demand cycle) is given in Figure 12a.



Figure 7 a) Oil prices for Brent and WTI since 2010 diverge. b) The price discount of WTI relative to Brent increased over the past 18 months (IEA and Deutsche Bank).



The baseline is set by the NYMEX gas future contracts, and the higher scenarios emanate from Deutsche Bank economists, projecting a median US gas price of \$6/mcf by 2015. Much more volatile price scenarios may unfold when production capacity is shut in and if cash flow problems lead to the demise of major shale gas players (Weijermars, 2011b). Figure 12b shows the mid- and long-term gas price scenarios by the US Energy Information Administration. The model assumes shale gas will keep prices relatively low for the next few decades.

Oil and gas business outlook

The oil majors have up to now acted as innovation motors for the global oil industry. Their future strength will determine if they can continue to play their role as drivers of petroleum industry innovation. The data analyzed here showed that profit margins of the oil majors have eroded over the past six years. Debt levels are rising and corporate risks have grown due to volatility in the global economy and a shift to riskier prospects.

With new opportunities for developing large oil prospects dwindling, all majors have resorted to replacing part of their portfolios of profitable (but depleted) legacy oil reserves with (less profitable) gas reserves. However, the current profitability of gas assets is not only lower, but also more volatile than that of the legacy oil assets, as has been demonstrated by the steep gas price decline in the US over the past few years. The outlook for future oil prices promis-

Figure 9 Oil price (annual averages;

real, inflation adjusted historic pric-

es) in 2009 forward models by the

Energy Information Administration

(EIA, 2010). The AEO 2011 model is

the reference scenario.

remain under short-term pressure and trade at a significant calorific discount with respect to oil, as detailed at length elsewhere (Weijermars and McCredie, 2011; Weijermars, 2011a).

es firm returns on investment. Gas prices

The present analysis suggests we have entered an era reigned by a new strategy paradox in the oil industry. As majors adapt to the demands and opportunities of the future markets, profit margins will stay under duress even as oil prices reach all time highs in real terms. The responsiveness to the changing business environment is likely to increase the corporate risk profile. Companies must counter this trend by minimizing their exposure to future chaos and strive to retain control. This may mean a reversal from globalization towards a renewed focus on asset development in friendly jurisdictions, accompanied by a more conservative spending pattern on capital projects. As a result, the rate of technology transfer from oil majors to emerging national oil companies will likely slow down.

A deceleration of innovation speed would mean that the point of conventional peak oil, which could occur as early as mid 21st Century, moves closer rather than further away. BP's authoritative Statistical Review [2011] estimated worldwide fossil fuel 2010 reserves to last just another 46 years for oil, 58 years for gas, and 112 years for coal (Figure 13). Oil production may be extended for a couple of decades if heavy oil and oil shale can be produced economically



Figure 10 a) US gas price (Henry Hub) plotted against WTI oil price development over 10-year period between January 2001 and December 2010 (start and finish data points marked by flags). b) European BAFA gas price against Brent oil spot gas for the same 10-year period. Tracks show shifts in the relationship based on monthly price averages. (Alboran Research, German BAFA, and original spot market data).

Figure 8 Oil demand forecasts by the International Energy Agency (IEA and Deutsche Bank).

(11V) (5008)



Figure 11 a) Weekly counts for gas and oil rigs in the US (Baker Hughes, Bloomberg Finance, and Deutsche Bank); b) Rig counts for the seven major shale gas plays in the US (US Smits Bits, HPDI, and ARC Financial Research).



Figure 12 a) Forward short-term price curve for US spot gas for the Henry Hub reference point based on NYMEX futures and slightly higher projections by the Deutsche Bank (Bloomberg Finance, NYMEX, and Deutsche Bank); 12 b) Gas price projections (annual averages; real, inflation adjusted historic prices) according to 2009 long-term forward model by the Energy Information Administration (EIA, 2010). The AEO 2011 model is the reference scenario.



Figure 13 Fossil fuel reserve-to-production ratios (*P/R*), current proved reserves divided by current annual production, become shorter every year. (After BP, 2011).

Visit www.earthdoc.org

(IEA, 2011). Gas production peaks near the end of this century, even when shale gas extraction is economically successful (NPC, 2011). All of which means that the oil and gas companies which now dominate the world's top ranks of global corporations will by the end of the 21st Century have largely re-oriented their business portfolios to focus on other energy sources. That is, unless technology innovation enables an accelerated access to new hydrocarbon reserves in an environmentally acceptable manner. Sustained investment in technology development remains essential to exploit previously inaccessible hydrocarbon resources, a key factor in reducing the probability of sharp increases to future energy prices (IEA, 2011). It seems the real energy transition has only just begun.

References

- BP [2011] Statistical Review of World Energy. www.bp.com/statisticalreview, June 2011.
- EIA [2010] Energy Outlook. US Department of Energy, Energy Information Administration. http://ei-01.eia.doe.gov/oiaf/ieo/ pdf/0484(2010).pdf.
- EIA [2011] Short Term Energy Outlook. US Department of Energy, Energy Information Administration, August 2011. http://205.254.135.24/steo/steo_full.pdf.
- Lumby, S. and Jones, C. [2003] *Corporate Finance* (7th ed.). Cengage Learning, formerly Thomson Publishing.
- IEA [2011] Resources to Reserves. International Energy Agency. http://www.iea.org/ papers/2011/Flyer_RtoR2011.pdf.
- NPC [2011] Prudent Development Realizing the Potential of North America's Abundant Natural Gas and Oil Resources. National Petroleum Council, www.npc.org.
- Osmundsen, P., Asche, F., Misund, B. and Mohn, K. [2005] Valuation of International Oil Companies – The RoACE Era. CESifo Working Paper, Series No. 1412, 1–22.
- Osmundsen, P., Asche, F., Misund, B. and Mohn, K. [2006] Valuation of International Oil Companies. *The Energy Journal*, **27**(3), 49–64.
- Weijermars, R. [2010] Tracking the impact of recession on oil industry supermajors and timing of sustained recovery. *First Break*, 28(1) 33–39.
- Weijermars, R. [2011a] Trans-Atlantic energy prices show need for realignment. Oil & Gas Journal, 109(23) 26–33.
- Weijermars, R. [2011b] Price scenarios may alter gas-to-oil strategy for US unconventionals. Oil & Gas Journal, 109(1), 74–81.
- Weijermars, R. & McCredie, C. [2011] Gas Pricing – Lifting the Price. *Petroleum Review*, 65 (770), 14–17.

Catch up with EAGE Conference papers? They're waiting for you at EARTHDOC! The online database for geoscientists