

Value Creation by Midstream MLPs

IOC and NOC Sector Update

Value Creation 2006 - 2015

University of Houston, C.T. Bauer College of Business

Student Research Project

This report is developed solely for the purpose of class discussion. Cases and reports do not represent endorsements by the faculty or the C.T. Bauer College of Business on effective or ineffective management.

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1. Introduction

1.1 Research Objectives

This report documents the findings of a research project undertaken by students in the C.T. Bauer College of Business MBA program at the University of Houston.

In 2012, student research classes investigating Integrated International Oil Companies (IOCs) and National Oil Companies (NOCs) found that highest total shareholder returns (TSR) from 2002-12 were delivered by those companies that invested most aggressively in organic growth, measured as Capital Expenditures/ Total Assets.

In August 2014, global oil markets began a collapse that took oil prices from above \$100/Barrel to less than \$50/ Barrel by the end of the first quarter of 2015; prices briefly recovered to \$60/B then fell to below \$40/B over the second half of 2015. IOC and NOC share prices declined sharply, and their leaders announced their intention to return to their 1990s play book of capital discipline, cost reduction and efficiency improvement, expressing a belief that prices would stay “lower for longer” and that the drivers of shareholder value had changed.

Accordingly, the C.T. Bauer College of Business convened a new research class to investigate what the new drivers of shareholder value might be, whether the companies were fairly valued at the end of 2014, and what strategic lessons should be learned from this most recent stage of the oil and gas commodity cycle. The purpose of the project was to update the findings of earlier reports to take into account the collapse of oil prices in 2015.

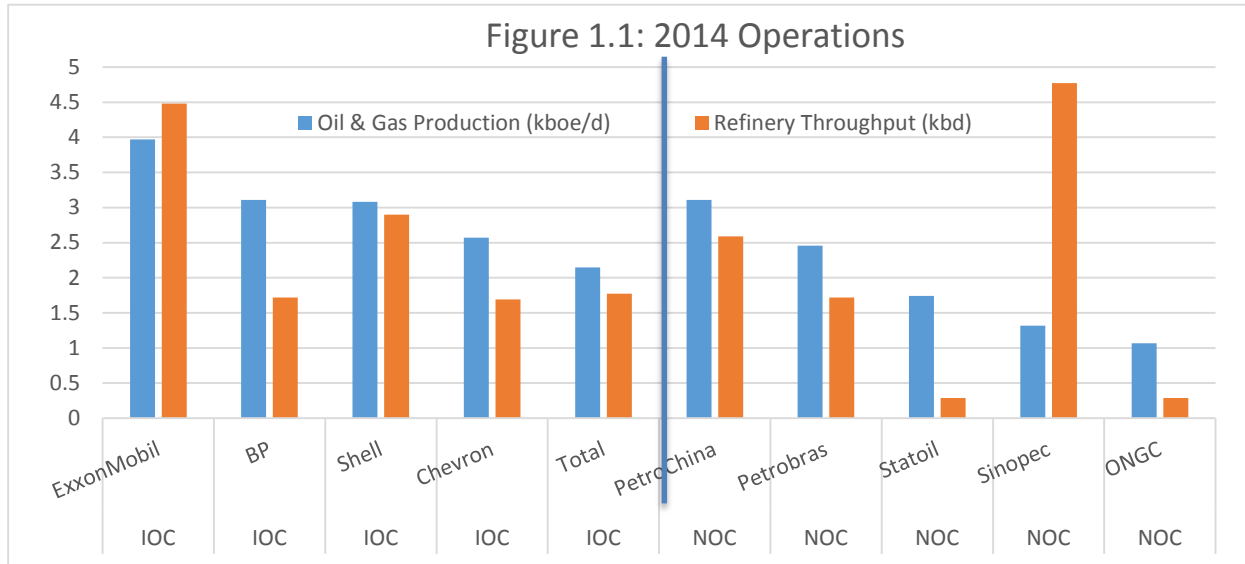
Prior reports have covered as well as the Super-majors and National Oil Companies, Independent Oil & Gas Producers, Independent Refiners, Oilfield Service and Midstream Companies, and Power Generators. The intent has been to create a vehicle that will complement the capabilities within the C.T. Bauer School of top tier academic research with experience-based knowledge of the challenges facing energy companies. Through this integration and our long time frame looking back and forward at least five years, we hope to provide a set of analyses and commentaries that will supplement existing reports available from financial institutions and will be useful both to financial institutions and to the companies studied.

We hope that these reports will deepen the relationship between the University of Houston and energy companies in Houston and beyond, creating opportunities for mutually beneficial dialogue.

1.2 The IOC and NOC Sectors

The Integrated Oil Companies (IOCs) studied comprised the five largest oil companies with upstream (oil and gas exploration and production) and downstream (oil refining and petrochemicals) business segments. The National Oil Companies (NOCs) studied included the five largest NOCs with majority government ownership and minority public shares quoted on international stock exchanges. Together, they are the largest publicly quoted oil and gas companies (Figure 1.1):

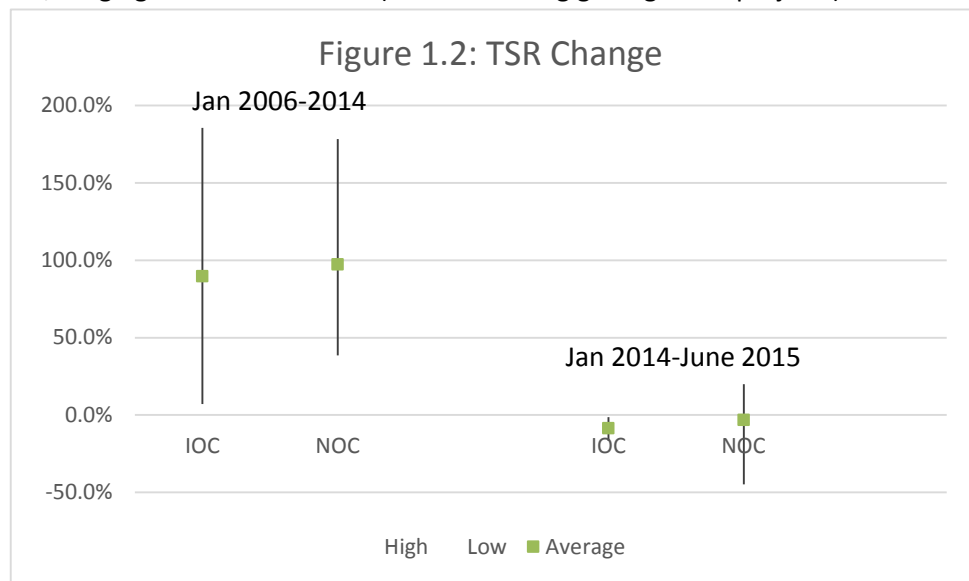
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Most of the companies produced more hydrocarbons in barrel of oil equivalent per day (kboed) than the volume of crude oil they refined, with the exceptions of ExxonMobil and Sinopec.

Over the period January 2006 to January 2014, IOCs' total shareholder returns (TSR) increased by an average 90% (Figure 1.2), ranging from a low of 7% (BP – depressed by the Macondo disaster) to a high of 185% (Chevron – boosted by heavy investment in growth projects). Over the same period, NOCs' TSR increased by an average 97%, ranging from a low of 39% (ONGC – lacking good growth projects) to a high of 178% (Sinopec – as an attractive vehicle for investment in the mainland Chinese economy).

In the period January 2014 through June 2015, oil prices collapsed and IOCs' TSR decreased by an average 9%, ranging from a low of negative 17% (BP – still depressed by



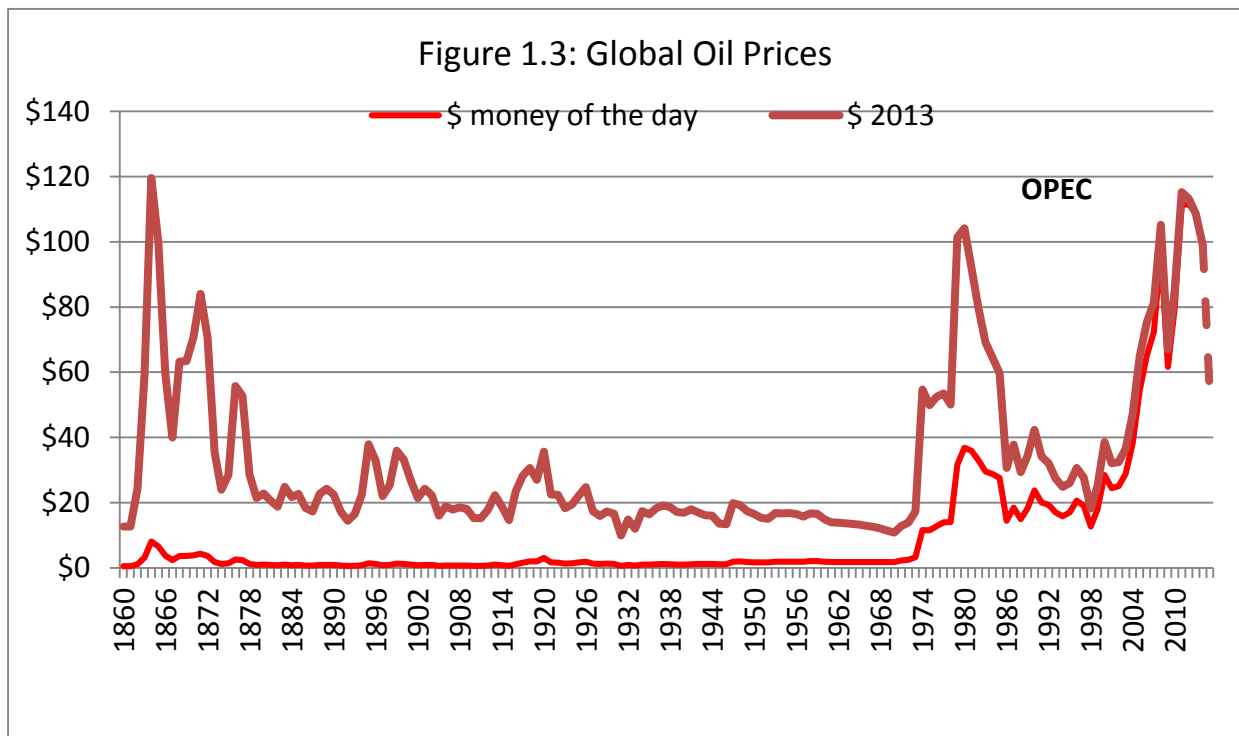
Macondo) to a high of negative 1% (Shell). Over this period, NOCs' TSR declined by an average 3%, ranging from a low of negative 45% (Petrobras – reeling from corruption scandals) to a high of positive 20% (ONGC, benefiting from significant acquisitions).

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These results illustrate two important findings:

1. Oil and gas is a cyclical industry: when supplies are perceived to be scarce and prices are high, new opportunities open up for organic growth investments by the industry; the companies that move quickly to capture these opportunities are favored by investors and deliver high TSR. As these investments bear fruit and high prices suppress energy demand, supplies become perceived as abundant, prices fall and yesterday's growth strategies are no longer favored. The cycles are confusing to consumers and damaging to producers, their service sector and to employees, but in the absence of a moderating force appear to be inevitable. Therefore, companies need to attempt to "see around corners" possible changes in the business environment and show restraint in reacting to the peaks and valleys of the cycles.
2. Oil and gas is a risky industry at the interface of geology, politics and human frailties. Difficult subsurface conditions and human errors combined to destroy enormous value for BP and its investors. Brazilian politics and human frailties destroyed enormous value for Petrobras and its investors. Managing these risks and the human architecture of the firm are paramount in creating value for oil and gas companies.

Price cycles have been a feature of the industry since its inception (Figure 1.3). Prior to 1930, prices were quite volatile as demand grew sharply and occasional large new discoveries provoked price collapses. Following a "state of insurrection" in 1931, the Texas Railroad Commission was empowered to control Texas production and successfully stabilized U.S. prices. Internationally, massive discoveries in the Middle East were controlled by "the Seven Sisters" (precursors to the IOCs) and international prices steadily declined in constant dollars through 1970.



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OPEC was formed in 1960 to assert the rights of producer countries and in 1973 its Arab members took advantage of a tightening global market to embargo several countries and reduce production in response to the Yom Kippur war between Israel and Arab states. Prices increased sharply. In 1979, the Iran-Iraq war caused supply disruptions, further tightening of supplies and another sharp price increase. Demand fell as oil was priced out of power generation and heavy industrial markets, and new sources of oil were developed in the North Sea, Mexico, Egypt, Brazil and the USSR. A fifteen-year price trough ensued from 1985 through 2000. Then prices rose again as Chinese oil demand expanded rapidly with its industrializing economy, while oil companies were slow to expand investment in response to a changing business environment.

What is perhaps less widely recognized is that oil demand grew 8 Million B/D from 2004-14, but production in countries with production growth has to increase by 17 Million B/D, to make up for production losses of 9 Million B/D in countries with declining production (Table 1.1).

Table 1.1: Countries with Declining Production 2004-14

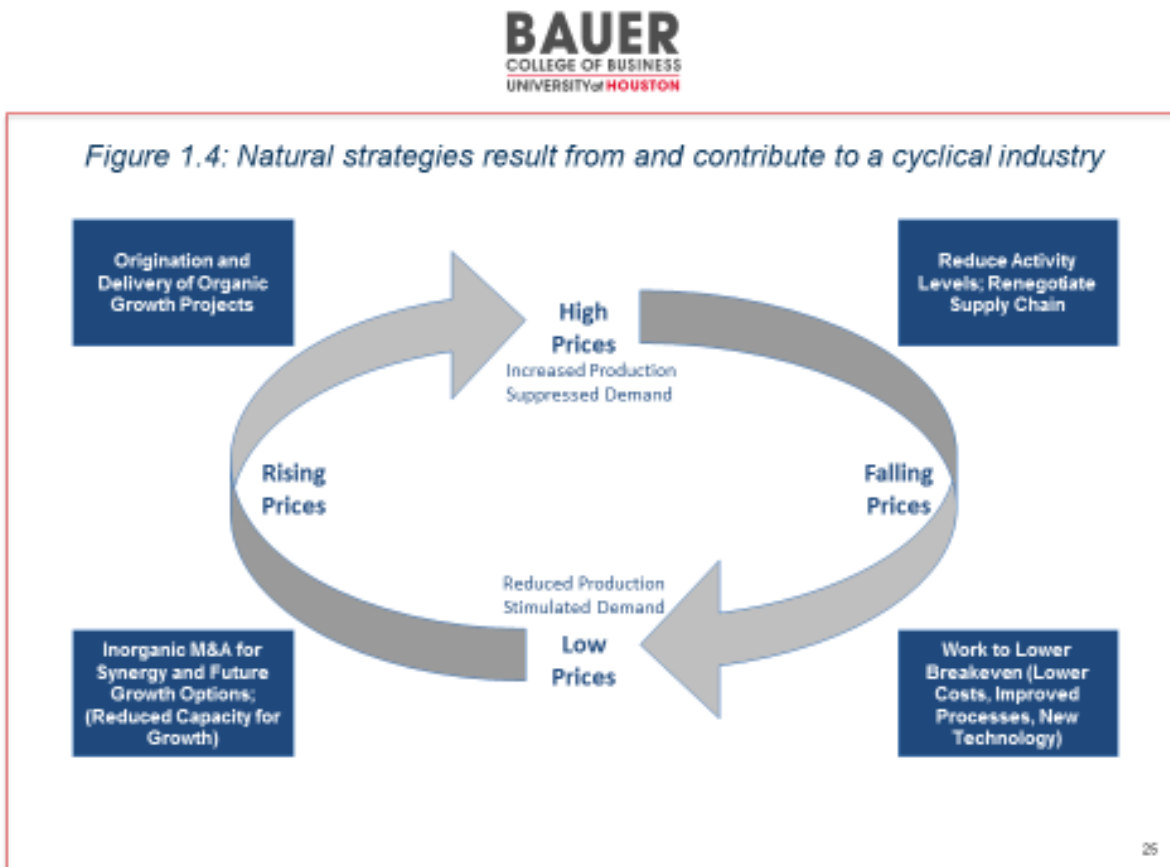
Region	Decline (MBD)	Primary Cause
Europe/ Eurasia	2.9	Aging North Sea fields
Americas	1.9	Government policies in Mexico, Argentina, Venezuela
Middle East	1.3	Disruptions in Iran, Syria, Yemen
Africa	2.0	Disruptions in Libya and Nigeria; asset maturity in Algeria
Asia-Pacific	0.7	Maturity in Indonesia, Malaysia and Australia
Total	8.8	

To help their executives “see around corners” and to educate the public, BP and ExxonMobil publish annual outlooks of the future demand and supply of energy over the next 20-30 years that are informative and comprehensive. Shell publishes occasional booklets of scenarios that consider possible discontinuities in technologies, political and social structures and how these might change the business of energy. The oil companies do not project prices on grounds that they are unknowable. The International Energy Agency produces its own World Energy Outlook, which covers similar ground and includes price as well as supply and demand projections for a set of future scenarios primarily differentiated by the assumed severity of global climate change policies. The Energy Information Administration of the U.S. Department of Energy also publishes an Annual Energy Outlook that also proposes future price paths based on a continuation of current energy policies. Unfortunately, none of these sources address the phenomenon of cycles.

With hindsight, it is easy to explain that oil prices fell in 2014 and 2015 because global oil demand growth was dampened by a restructuring of the Chinese economy; a decade of increasing prices encouraged independent oil companies to invest in new technologies that were spectacularly successful in increasing North American oil shale production while lowering its cost; and Saudi Arabia responded with a policy that echoed its actions in 1986 to defend its market share.

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Hindsight also provides some insights into how the natural strategies of oil companies at different stages of the cycle both result from and contribute to the birth of the next cycle stage (Figure 1.4).



If this interpretation is correct, the natural strategies at the end of 2015 are to respond to very low prices and lower breakeven costs of all new resource development projects by renegotiating supplier prices, deploying new technology and optimizing business processes. As the dust settles and the range of price uncertainty narrows, a new round of industry consolidation should follow as the bid-ask gap becomes more manageable and companies grow oil and gas reserves inorganically by acquisition. Then, as acquisition targets become fully valued, companies should again favor organic growth through capital projects. If only we knew the periodicity and amplitude of the next price cycle!

2. Summary of Conclusions

Our analysis broadly supports the dynamics of the cycle portrayed in Figure 1.4. Our prior study identified strong investment in organic growth projects as the primary driver of shareholder value for both IOCs and NOCs. This relationship weakened in the period 2006-14 and has reversed in 2014-2Q15:

- The drivers of IOC TSR shifted over the oil price cycle:
 - 2002-12, the market valued strong organic growth
 - 2006-13, the market valued growth in dividends per share and low debt supported by high return on assets, active portfolio management manifested by low growth in revenues, and continuing investment in new capital projects for organic growth
 - 2014-2Q15, the market was calling for retrenchment in organic growth and risk reduction, but appeared tolerant of higher IOC debt

- The drivers of NOC TSR also evolved:
 - 2002-12, the market focused on demonstrating professional management after successful IPOs, and responded well to strong organic and inorganic growth
 - 2006-13, the market was looking for inorganic growth in revenues with increasing dividends per share at moderate risk
 - 2014-2Q15, the market wanted lower risk and lower debt, with continued growth in dividends per share: private investors are now potentially at odds with the strategic goals and financial constraints of government owners

- Based on intrinsic value at the end of 2014 calculated using financial models of the IOCs and NOCs:
 - Among the IOCs, BP, Total and Shell appeared undervalued and Chevron and ExxonMobil overvalued relative to calculated intrinsic value. Shell has been further devalued since its withdrawal from Arctic exploration.
 - Of the NOCs, Statoil and ONGC appeared overvalued and Petrobras (burdened by corruption scandals) undervalued relative to calculated intrinsic value.

As the dust settles and the range of price uncertainty narrows, a new round of industry consolidation should follow as the bid-ask gap becomes more manageable; IOCs are the natural predators at the top of the oil industry company food chain and might be expected to gobble up poorly capitalized but resource rich independent oil and gas shale operators. The strategic dilemma is whether the IOCs have or can learn the capabilities required to create value in the fast moving shale oil development business, where successful competitors are fast and agile. ExxonMobil has shown a way, by keeping XTO largely separate from the mother ship after its acquisition. BP has rather belatedly separated its North American business from its core exploration-based business.

Nevertheless, the strategies, culture and values, decision rules, performance management and talent development philosophies of the successful independents differ substantially from those designed to originate and deliver megaprojects at which the IOCs excel; it is not clear that IOCs can compete in the shales without prejudicing their core business or vice versa, but they are probably going to have to try.

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NOCs are likely to be cash strapped, unable to simultaneously satisfy public and government investors' demand for dividend increases and governments' demands for global resource capture. In the 1990s, the solution to this dilemma turned out to be full privatization.

Slowing investment from IOCs and NOCs should result in lower oil and gas production and an eventual price recovery. The timing and amplitude of the price increase will depend on the pace of demand growth, the longevity of growth from the North American shale plays and on whether the shale revolution can be exported from North America. IOC executives are publicly preparing for prices to be "lower for longer", implying a belief that the answers are: slow; long; and possibly.

Export of the shale revolution will be difficult and will require changes to international fiscal terms, including incentives for surface rights owners to support drilling, and development of a vibrant local oilfield service and midstream development ecosystem. In this low probability scenario, prices could be "lower for much longer" as they were from 1933-1970, and IOCs may be redirecting capital from the upstream to the downstream. More likely is another upwards price cycle beginning by 2020.

And that's what makes the oil and gas industry so perpetually interesting: always at the intersection of global economics, technology and politics and with huge strategic choices that will create or destroy substantial value. In the words of Edward Gibbon "the winds and the waves are always on the side of the ablest navigators". Decisions made over the remainder of this decade will determine which companies are led by the ablest navigators.

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3. Corporate Value Drivers

Students undertook a simple statistical analysis to understand the drivers of total shareholder returns over the two time periods: January 2006-14 and January 2014-July2015. Our previous analysis of the period 2002-12 suggested that IOCs and NOCs formed a single set with the primary driver of TSR growth being a company's investment in organic growth, measured as average capital investment/ total assets. For the time periods selected for this analysis, we found that IOCs and NOCs were no longer a single set and the drivers of TSR had diverged.

3.1. IOCs

We summarize our findings for IOCs on Table 3.1, and pay most attention to the drivers with highest correlation coefficient (green shading), and moderate coefficient (orange shading).

Table 3.1: IOC TSR Growth Drivers - Correlation Coefficients

	2006-2014	2014-2Q15
Revenue Growth	(0.75)	0.33
Capex/ Total Assets	.56	(0.48)
EBITDA/ Total Assets	0.51	(0.22)
Beta	(0.37)	(0.53)
Divi/ Share Growth	0.91	(0.17)
Total Debt/ EV	(0.73)	0.60

IOCs' TSR drivers changed markedly from the 2006-14 period to the more recent 2014-2Q2015 period (Figure 3.1). The organic growth driver that was prominent in the earlier 2002-12 period weakened in 2006-14 and was reversed in the price collapse of 2014-2Q15

During 2006-2013:

IOCs' TSR was driven by low revenue growth, high dividend/share growth and low debt/ Enterprise Value.

High Capex/ Total Assets and EBITDA/ Total Assets were also influential.

- *The implication is that the market valued growth in dividends per share and low debt supported by high return on assets, active portfolio pruning manifested by low growth in revenues, while investing in new capital projects for organic growth*

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During 2014-2Q15

Higher debt was positively correlated to higher IOC TSR; lower beta and lower capex/ total assets appeared to be influential.

- *The implication is that the market was calling for retrenchment in organic growth and reduction in risk, but was tolerant of higher debt for IOCs.*

3.2. NOCs

The class undertook a similar analysis for NOCs and found that TSR growth for NOCs was influenced by different drivers than IOCs (Figure 3.2).

Table 3.2: NOC TSR Growth Drivers - Correlation Coefficients

	2006-2014	2014-2Q15
Revenue Growth	0.45	0.30
Capex/ Total Assets	(0.28)	0.05
EBITDA/ Total Assets	(0.16)	0.04
Beta	(0.57)	(0.89)
Divi/ Share Growth	0.73	0.59
Total Debt/ EV	0.00	(0.52)

During 2006-2013:

NOCs TSR was driven by dividend/share growth; revenue growth, and low beta were also influential. Capex/ Total Assets, EBITDA returns on assets and debt levels were not drivers of TSR.

- *The implication is that the market was looking for inorganic growth by NOCs with increasing dividends per share at moderate risk. The relationship of TSR growth to Capex/ Total Assets was not statistically significant but was directionally negative.*

During 2014-2Q15

Low beta was the primary driver of TSR; continued growth in dividends per share and low debt also appear to be influential.

- *The market wanted lower risk and lower debt, with continued growth in dividends per share: potentially, private investors may now be at odds with the goals of government owners.*

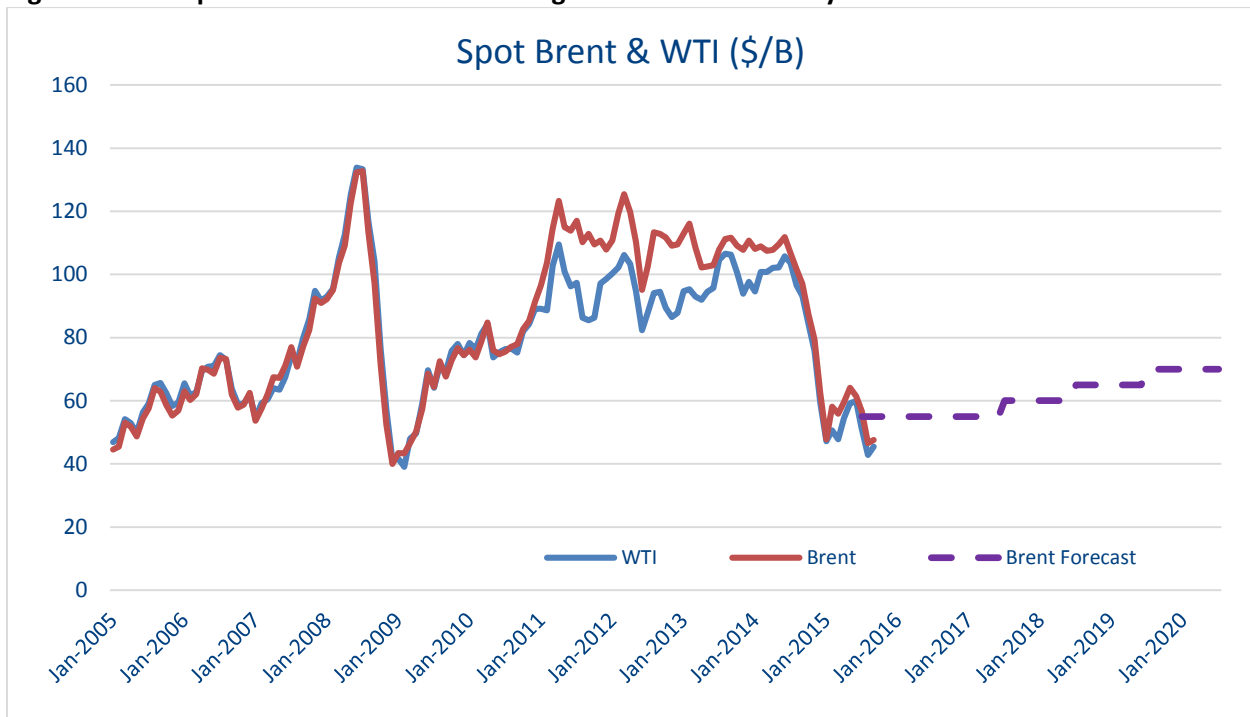
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4. Corporate Financial Valuations

Cash flow models were constructed to value the companies at end 2014:

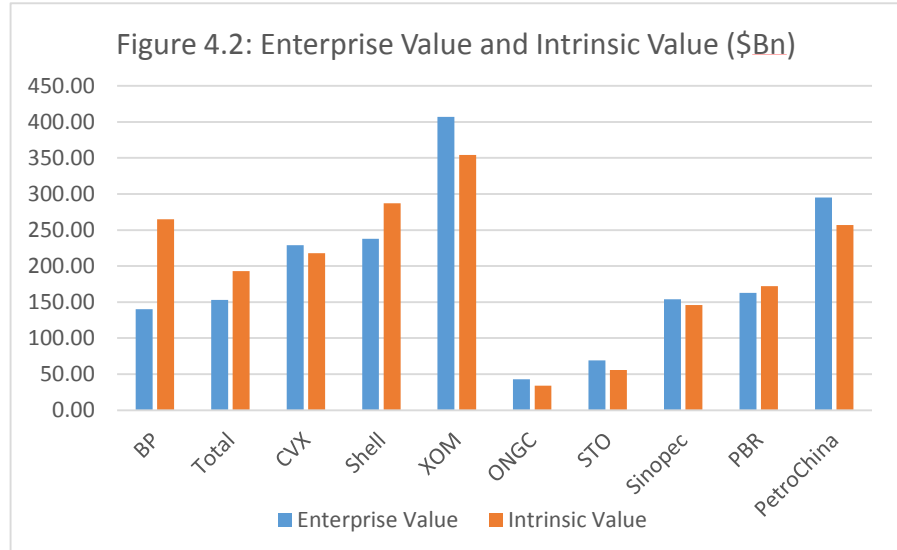
- Cash flows were projected for three segments:
 - ✓ Upstream (global exploration and production)
 - ✓ Downstream (refining and marketing, sometimes including chemicals)
 - ✓ Other (the difference between the total corporation and the sum of upstream and downstream)
- The models incorporated a structure and assumptions that were common across the companies studied:
 - ✓ Companies were valued assuming a slow price recovery and operating costs linked to the forecast price of Brent crude oil. Production growth was set for each sector after reviewing past performance and future development plans at 2% p.a. for IOCs (projects under construction) and 0% p.a. for NOCs (limited prospects and funding issues, but 2% p.a. for Petrobras in light of its large pre-salt finds).
 - ✓ Refinery throughputs and gross margins were held at average 2010-14 levels.
 - ✓ “Other” in many cases represented inter-segment transfers and was held at historical levels.
 - ✓ Capital expenditures as a percent of cash from operations was linked to the company’s past practices relative to the price of Brent crude oil.
- Net present value of free cash flows were calculated using each company’s weighted average cost of capital with terminal value based on the perpetuity growth methodology.

Figure 4.1. Companies Were Valued Assuming a Slow Price Recovery



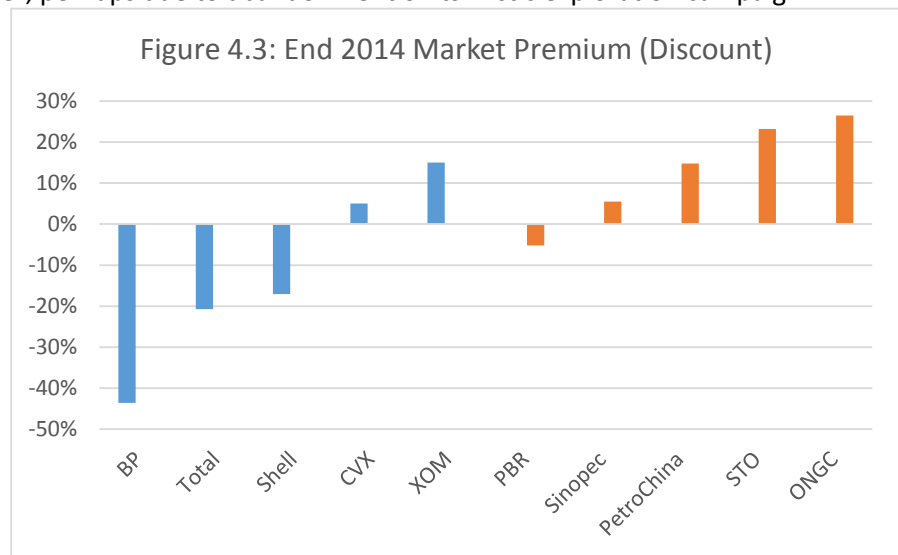
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Intrinsic Values calculated by our models at end 2014 were broadly compatible with market based Enterprise Values (Figure 4.2). The assumptions in our model, including price recovery, appear broadly consistent with market valuations, though NOCs appear overvalued compared to IOCs.



- Among the IOCs, Chevron and ExxonMobil appeared to be slightly overvalued at the end of 2014, while BP, Total and Shell were undervalued relative to our models' calculated intrinsic values
 - CVX and XOM may be seen as having more growth in their pipelines than the European companies
 - BP is still under the shadow of Macondo; Shell has uncertainties on the price/value of their planned acquisition of BG Group
 - Market Value corrected in 1H2015 for CVX (-12%), XOM (-9%) and BP (+5%), while Shell TSR fell further, perhaps due to abandonment of its Arctic exploration campaign.

- Among the NOCs, Statoil, ONGC and PetroChina appear overvalued and Petrobras undervalued relative to calculated intrinsic value:



- Petrobras' market value is under pressure due to corruption investigations
- Statoil and ONGC's valuations are difficult to understand.

Overall, NOCs are valued higher relative to modeled intrinsic value perhaps due to their strong positions in their home countries and perhaps by strong local support for their stocks or the desire of investors for investment opportunities in large cap developing country stocks.

5. Strategic Implications

5.1. IOCs

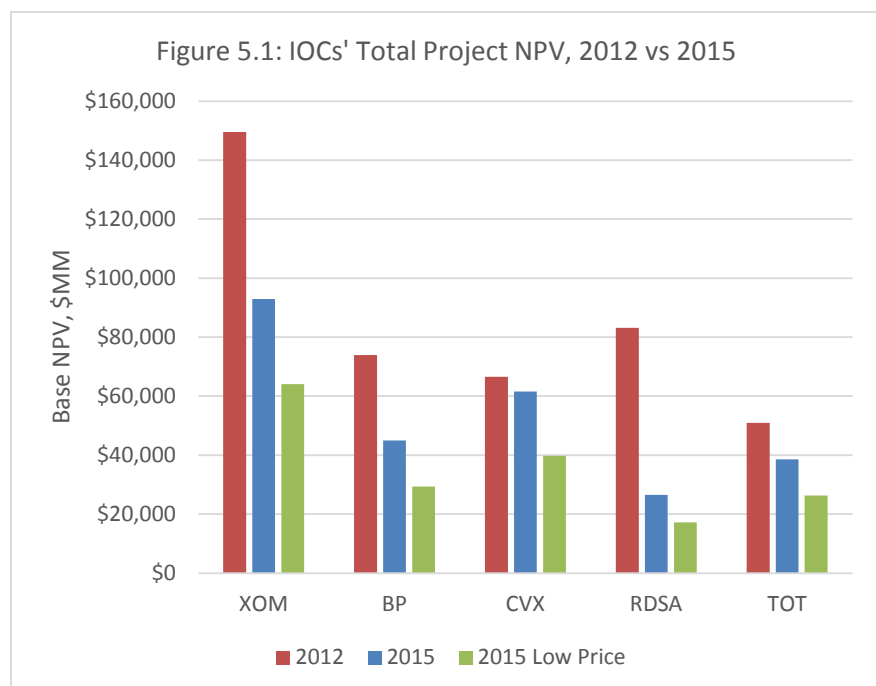
If Figure 5 is an accurate portrayal of the oil price cycle, then the natural strategies at the end of 2015 are to respond to very low prices and lower breakeven costs of all new resource development projects by renegotiating supplier prices, deploying new technology and optimizing business processes. Current senior leadership is familiar with the playbook, which was deployed effectively in the late 1980s and 1990s. However, there is a complication: IOCs have been taking aim at a portfolio of technically difficult opportunities in deep water, oil sands and LNG that has been economically undermined by the extraordinary success of independents in lowering the costs of shale oil and gas development. They remain at the top of the food chain in size and financial strength but are much lower on economics. Moreover, their investors expect and the IOCs have promised to deliver continued growth in dividends.

As the dust settles and the range of price uncertainty narrows, a new round of industry consolidation should follow as the bid-ask gap becomes more manageable; IOCs are the natural predators at the top of the oil industry company food chain. The strategic dilemma is whether the IOCs have or can learn the capabilities required to create value in the fast moving shale oil development business, where successful competitors are fast and agile. ExxonMobil has shown a way, by keeping XTO largely separate from the mother ship after its acquisition. BP has rather belatedly separated its North American business from its core exploration-based business. Nevertheless, the strategies, culture and values, decision rules, performance management and talent development philosophies of the successful independents differ substantially from those designed to originate and deliver megaprojects at which the IOCs excel; it is not clear that IOCs can compete in the shales without prejudicing their core business or vice versa.

The alternative for the IOCs might be to focus on defending their megaproject portfolio options and dividend policies over the next few years and wait for the shale phenomenon to play itself out, assuming that prices will then rise and allow their higher cost opportunities to be profitably developed. A problem with this strategy is that the project portfolio that they are now addressing is substantially smaller than it was at the end of 2012 (Figure 5.1).

Some of the projects identified by the companies in 2012 have been completed and some are no longer considered economic in a “lower for longer” price environment.

Among the IOCs at end 2014, ExxonMobil and BP have culled their active project



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portfolios most aggressively, resulting in a 40% reduction in NPV compared to 2012 assuming \$100/Bbl future Brent prices.

- Shell has cut almost 70%, but may have adopted stricter criteria for including potential projects than the other IOCs
- Chevron and Total have cut least.

If oil and gas prices are assumed to be 20% lower than the base case for the life of these projects, all the companies will lose approximately a further 40% in NPV, mitigated by any reduction in costs and increases in productivity.

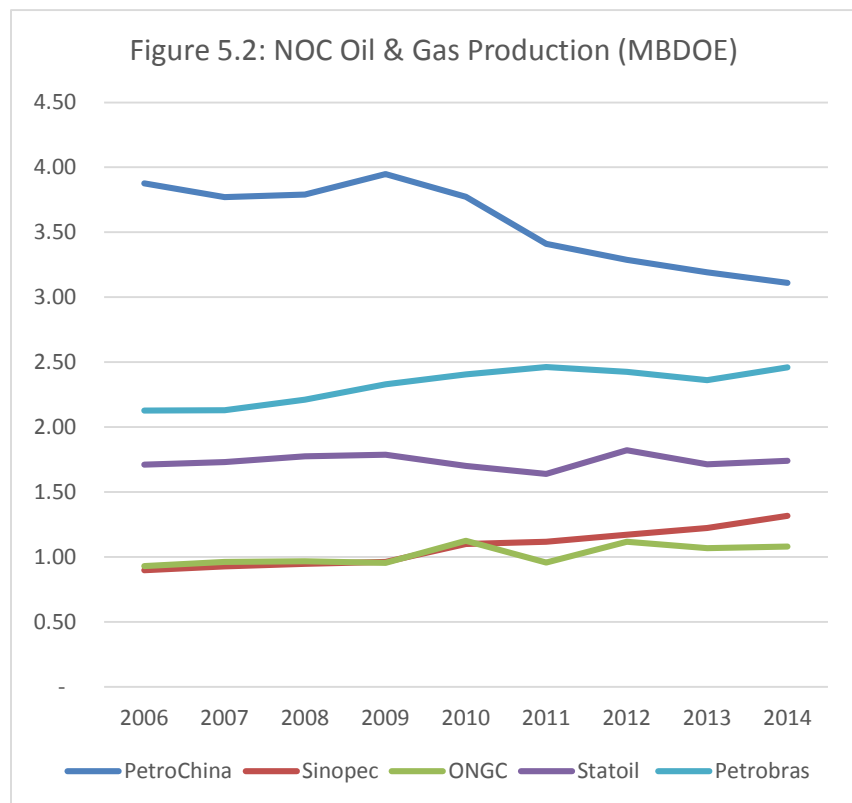
In a low price scenario, it is likely that growth will no longer be a driver of shareholder value since returns on new projects will not justify the risks. Cash will be directed to dividends. Therefore, the “wait and see” strategy might result in declining production, declining cash from operations and declining shareholder value before an oil shales slow-down leads to price recovery. The IOCs may prefer to follow the “if you can’t beat them, join them” maxim, acquire a sequence of independents to add oil and gas reserves and force themselves towards excellence in shale development.

In what seems to be a more likely scenario of rising prices in the 2020s, IOCs will need to resuscitate the projects that they had identified in 2012 but suppressed in 2014, so it will be important that they keep those options open.

5.2. NOCs

NOCs are caught between the desire of their public investors for growing dividends, and the desire of their government owners to fulfil various political goals. Only Petrobras of the NOCs increased production (Figure 5.2) significantly over the past decade. Despite spending billions of dollars on acquisitions, none of the other NOCs studied added materially to production.

NOCs rode the wave of rising prices through 2013, but now find themselves with high debt, high risk, less access to government funding and disgruntled independent



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shareholders. Their natural strategy will be to enhance financial governance, build world class leadership and operational capabilities and demand freedom from government mandates. However, their Boards of Directors are weak and lack the industry experience that would be required to challenge the incumbent and politicised executives. In the 1990s, the solution to this dilemma turned out to be full privatization.

With limited (if any) production growth from IOCs nor from NOCs, coupled with rising global demand, cancellation and deferral of higher cost growth projects and the decline of mature fields, North American shale plays will be asked to take on Saudi Arabia's traditional role as swing producer. How long they can do that is quite uncertain and it seems likely that oil prices will start another up cycle by 2020.

The timing and amplitude of the price recovery will depend on the pace of demand growth, the longevity of the North American shale plays and on whether the shale revolution can be exported from North America. IOC executives are publicly preparing for prices to be "lower for longer", implying a belief that the answers are: slow; long; and possibly. Export of the shale revolution will be difficult and will require changes to international fiscal terms, including incentives for surface rights owners to support drilling, and development of a vibrant local oilfield service and midstream development ecosystem. In this low probability scenario, prices may be "lower for much longer" as they were from 1933-1970, and IOCs may be redirecting capital from the upstream to the downstream.

And that's what makes the oil and gas industry so perpetually interesting: always at the intersection of global economics, technology and politics and requiring corporate leadership to place big bets with limited information about what surprises the future might hold.