Swing Oil Production and the Role of Credit

Hilary Till
Contributing Editor, *Global Commodities Applied Research Digest;* and
Solich Scholar, J.P. Morgan Center for Commodities, University of Colorado Denver Business School

Jan-Hein Jesse
Editorial Advisory Board Member, *Global Commodities Applied Research Digest;* and
Founder, JOSCO Energy Finance and Strategy Consultancy, Amsterdam

Introduction

In order to understand swing production and the role of credit, this digest article will cover the following five topics:

(1) The paper begins with the classic definition of a swing producer and notes that North American tight oil (shale) producers would not normally fit this strict definition.

(2) The article then argues that advances in well-production estimation techniques naturally led to an explosion of creative financing solutions for investing in shale. As a result, the appetite of credit markets for taking on shale-production risk became a key driver for the outlook on North American oil production.

(3) Next the paper proposes that we *might* be able to refer to shale producers as swing producers as long as we loosen the definition of swing producer to be one in which there are fairly uniform production decisions that take place over up to a 12-month timeframe.

(4) The article then notes that at some point geological constraints (much more than the credit cycle) could come back into play and the baton would thereby pass back to the Middle East Gulf oil producers as the undisputed swing producers.

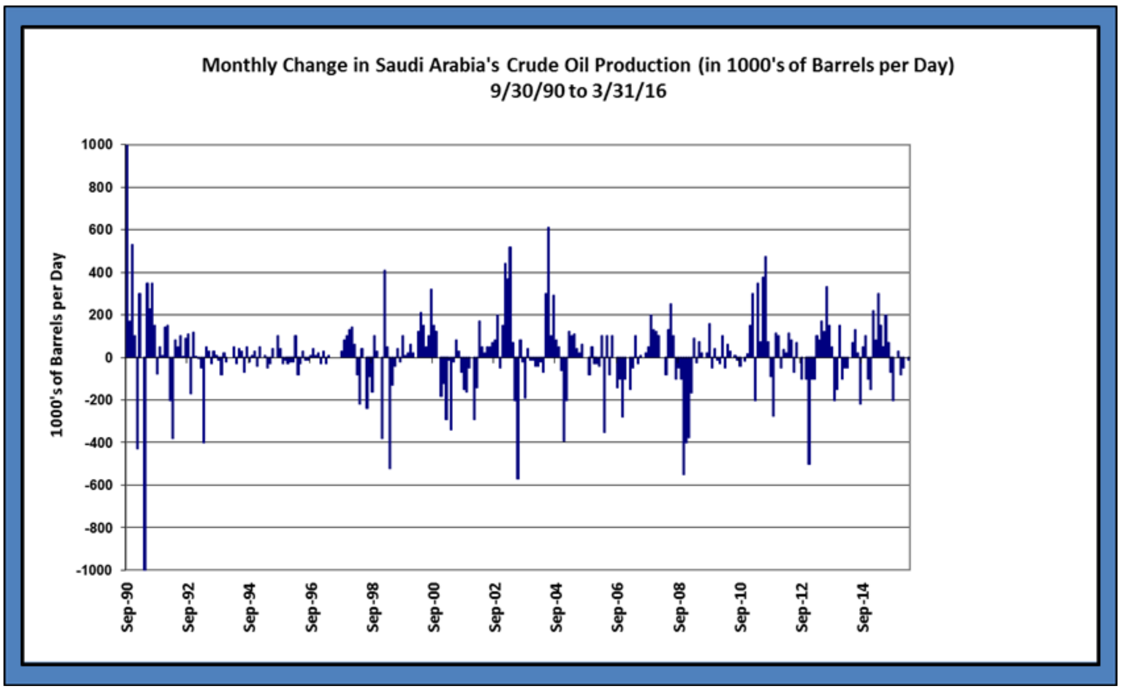
(5) Lastly, the paper returns to a shorter-term perspective and estimates that the price level where shale companies can comfortably operate *en masse* is currently at about $65 per barrel, which would provide an acceptable internal-rate-of-rate, across projects. But even if oil does recover to $65, there may not be an immediate recovery in production since the response of capital markets would likely be much more cautious than when shale companies were viewed as bullish growth opportunities, analogous to the tech stocks of the late 1990s. We would conclude that this makes shale producers quite imperfect "swing producers."

Strict Definition of Swing Producer

Historically, Gulf Producers Fit the Strict Definition of Swing Producer

We usually think of a swing producer as one that "has a large market share, spare capacity, and very low production costs, and … is capable of acting strategically … to raise and lower production to affect the price, as described by Coy (2015). And historically, Gulf producers fit this definition. At least in the past, Saudi Arabia has been able to change production up or down by 1 million barrels per day within a month. This is illustrated in Figure 1.

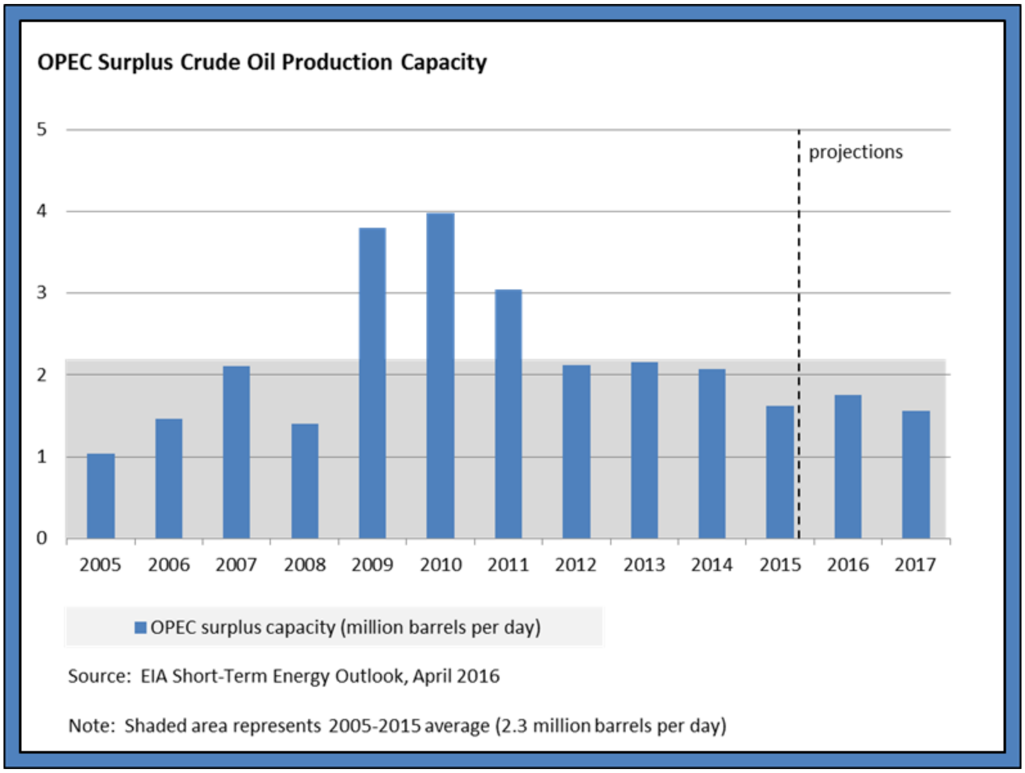
Figure 1
Capable of Acting Strategically



Source of Data: The Bloomberg.

"Spare capacity refers to production capacity less actual production; it quantifies the possible increase in supply in the short-term," explained Khan (2008). According to EIA (2014), "Saudi Arabia historically has had the greatest spare capacity. Saudi Arabia has usually kept more than 1.5 - 2 million barrels per day of spare capacity on hand for market management." OPEC surplus crude oil production capacity is illustrated in Figure 2 on the next page. Friedman (2016) notes that "Saudi Arabia accounts for about two-thirds of the spare capacity" in OPEC.

Figure 2
Sufficient Spare Capacity



Source of Graphic: U.S. Energy Information Administration (2016b).

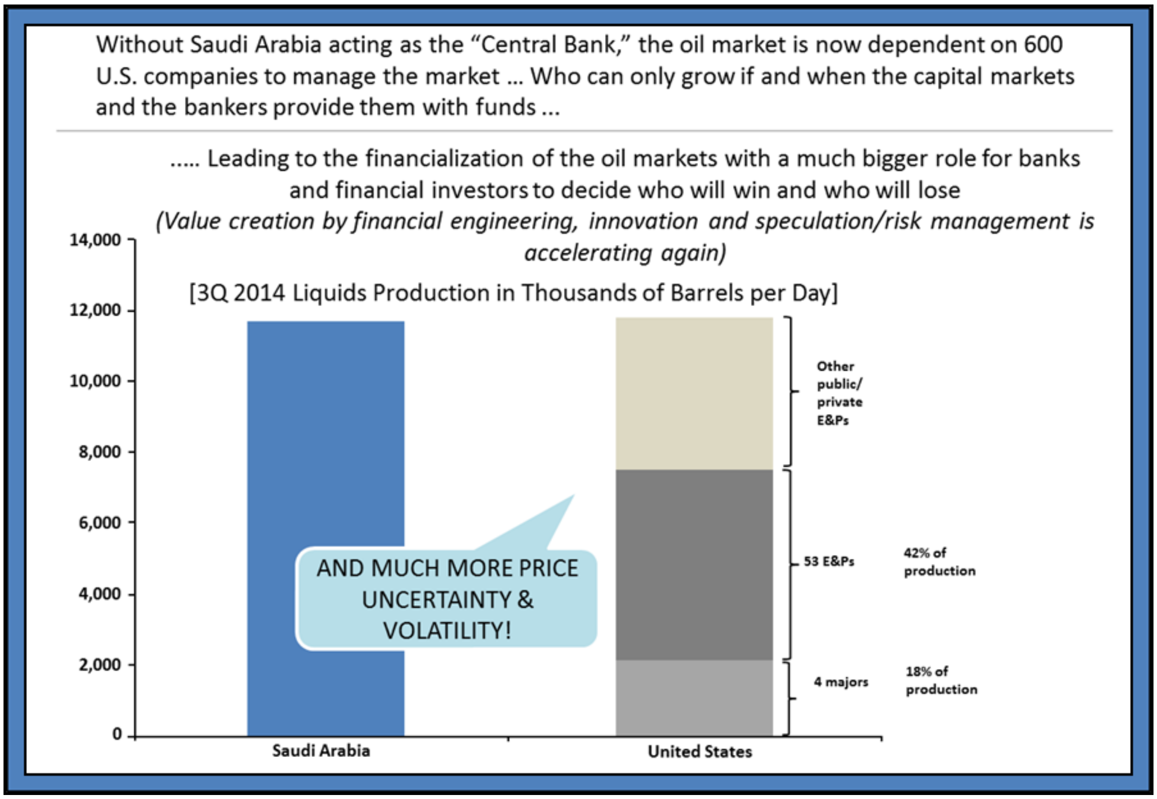
We should note that analysts also refer to "effective spare capacity," which is defined as the volume of oil that can be (1) brought to market on a discretionary basis within weeks; can be (2) produced continuously for more than 3 months; and (3) is of a quality that it can be refined into valuable oil products by numerous refineries. It may be that actual effective spare capacity levels are even lower than what is presented in Figure 2.

At any rate, from the summer of 2014 through at least September 2016, OPEC Gulf producers shook off their traditional role of balancing the oil market. As described in Till (2015), the Gulf oil producers had (until 2014) acted as the central banker of the oil market and had essentially provided a free put to the marketplace in preventing a free fall in oil prices, even in the face of new oil production, particularly from the United States. Arguably, one might compare the current price environment to 1986 when Saudi Arabia and other Gulf producers apparently decided upon prioritizing market share, according to Gately (1986).

Light Tight Oil Producers Do Not Fit the Strict Definition of Swing Producer

One would not normally include Light Tight Oil (LTO) producers in the swing producer category. The reason for this statement is because "U.S. production cannot be controlled by governments. It's the result of a competitive market with hundreds of companies and tens of thousands of investors making as many decisions," as explained in Citi Research (2016) and as illustrated in Figure 3.

Figure 3
Oil Market is Now Dependent on 600 U.S. Companies to Manage the Market



Source of Graphic: Based on Jesse (2016), Slide 13, whom in turn cited Goldman Sachs.

New Technology: New Financing Solutions

Technological Advances

One noteworthy aspect of LTO producers has been how tightly their success has been bound up in capital-market innovations (or perhaps, more accurately, adaptions.) First of all, "even though hydraulic fracturing has been in use for more than six decades," quoting EIA (2016a), it took further technological advances in both horizontal drilling and hydraulic fracturing to lead to the significant increase in oil production in the U.S. that we have witnessed over the last 5 years. As further explained in Barclays Equity Research (2016), "hydraulic fracturing … has been around since the late 1940s, early 1950s, and horizontal wells … really came into their prime in the late 1970s, early 1980s. [We have taken these] … two old technologies … and [combined] them … in a novel way, [so] we now have a tool that engineers can use to extract … large volumes of hydrocarbons that exist in these unconventional reservoirs."

By way of further clarification, one should also note that shale oil resources had already been known for decades. However, they had been uneconomic with then prevailing technology. In addition, we should not even refer to the "exploration" of shale oil resources since they had already been known to be in the ground. Instead, what we are witnessing is the *exploitation* of these resources to turn them into "reserves."

Shale's "Finance Friendly" Factors

With traditional projects, very "large upfront commitments" are required; in contrast, "the risk profile" is quite different with Light Tight Oil projects, according to Ashraf and Satapathy (2013). In fact, the authors noted: investments can be made at "a few wells at a time."

Other factors which make LTO projects much more "finance friendly" than traditional projects include (a) the reduction in "country risk" since "shale production has been concentrated in the United States," and (b) the "production profile" of shale projects, which have "strong initial production levels, but decline very rapidly, so … [one] could say they pay out early," as explained by Anderson (2016). Continued Anderson (2016): "[F]rom a financing perspective, the great bulk of the positive cash flows occurs early in each project's life. This is preferred from a general risk and discounting perspective, but also figures very importantly … [in] hedging efforts, as the oil [derivatives] market … offers liquidity only out about 2-3 years or so. So there's a better match between forward market liquidity and the shale production profile vs. the conventional production profile."

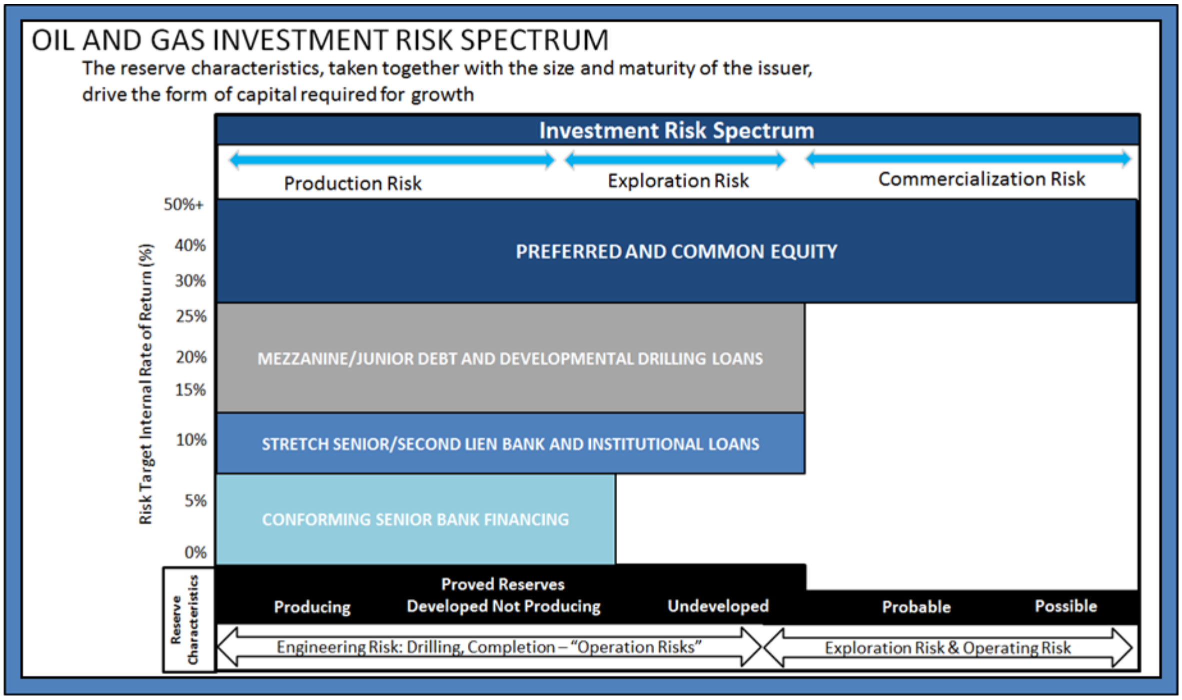
Customizable Financing Solutions

Thanks to advances in seismic imaging and geophysical modeling, reservoir engineers can now estimate the quantity of oil or gas that is potentially recoverable from a reserve or well, along with the discovery's initial production and decline rates. What we are highlighting here is not so much the ability of the engineers to actually get the oil that is stuck in narrow shale formations, but rather their ability to know with a *high degree of confidence* how much is there and how it is going to come out, if and when they decide to go after it.

Given the high degree of confidence in the production profile of shale projects, then as long as one has a set of credible oil price forecasts across time, one can value a shale company's oil reserves along with the size and timing of cash flows from production. This means that very customizable financing solutions became available for numerous relatively small producers, investors, and lenders, who specialized in onshore oil projects. Please see Figures 4 and 5 below.

Figure 4

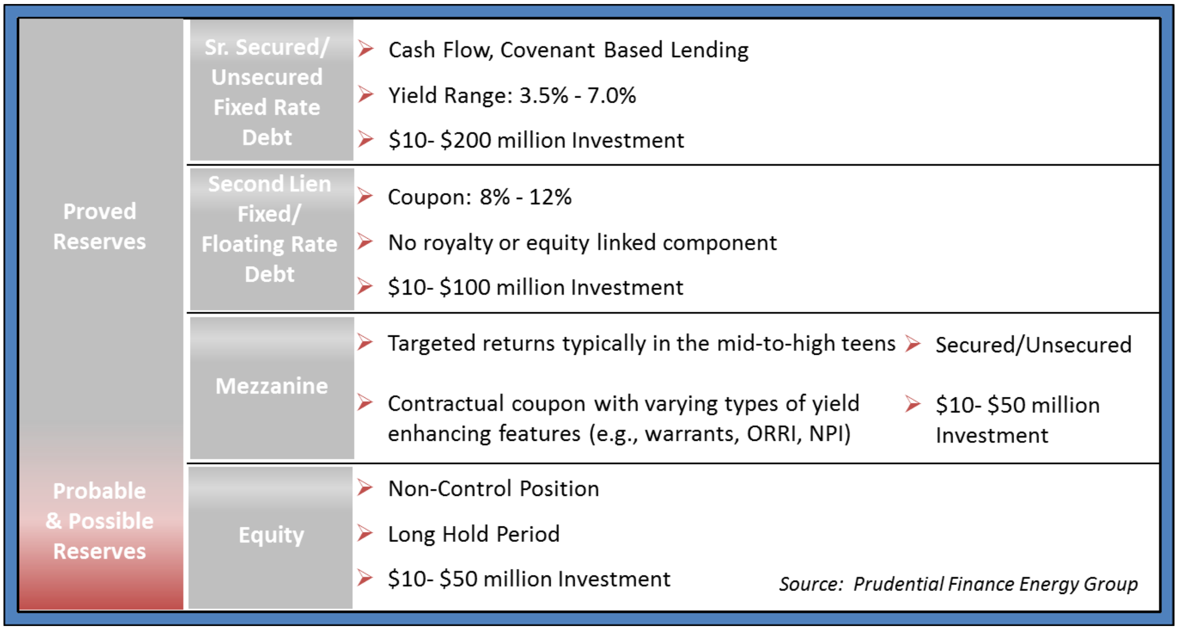
Various Forms of Capital, Depending on Reserve Characteristics



Author's Source: Prudential Energy Finance Group.

Source of Graphic: Clouser (2014), p. 11.

Figure 5
Capital Choices



Abbreviations: ORRI stands for Overriding Royalty Interest, and NPI stands for Net Profits Interest.

Source of Graphic: Clouser (2014), p. 13.

With the "greater production timing certainty afforded by shale wells[,] relative to conventional [sources,] this can make a portfolio of shale wells look like a dividend-throwing 'cash cow' …", further explained Anderson (2016).

Much Different Leverage Levels Than Previously

In addition, the fact that shale oil barely has any exploration risk, and that shale oil (and natural gas) exploitation has rapidly become an industrialized production process, led to the following consequence: banks and the capital markets became more confident in lending money to these entrepreneurial companies than they had in the past for the development of conventional oil and gas fields. Hence, these oil and gas companies could borrow much more and leverage up their balance sheets to levels "standard" oil companies would not and cannot do. Where the "standard" oil companies would have leverage of say 20-30% maximum, much smaller shale oil companies have had leverage percentages of easily above 50%, especially if deferred tax liabilities are included. The criteria to define how much banks and bond markets are willing to lend are therefore also very different than for large traditional oil field developments.

Complicating Factors in Valuations

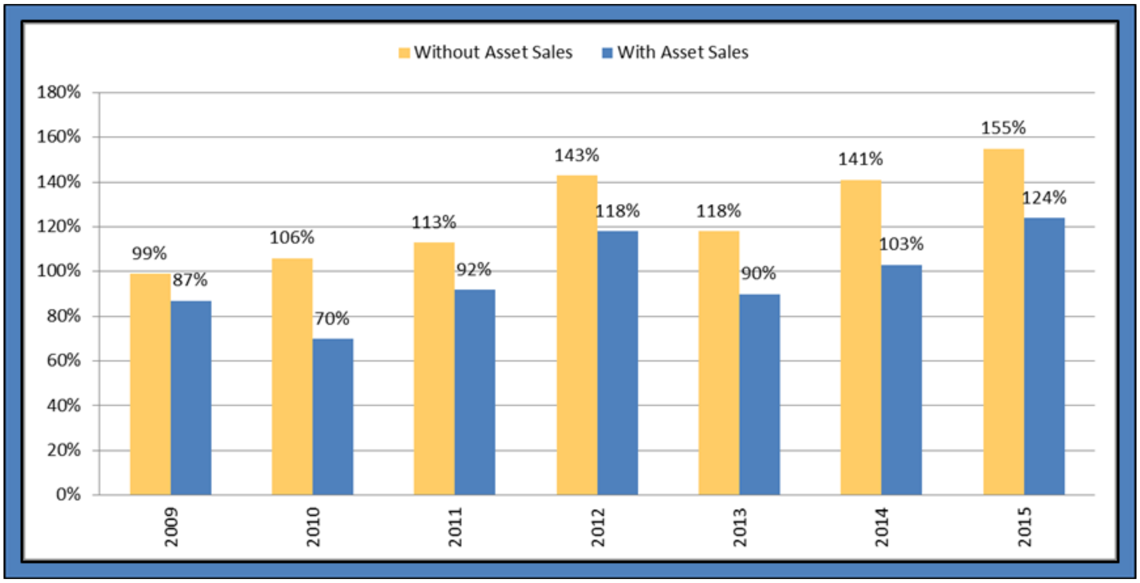
We should add that this article's brief descriptions and explanations regarding shale-production financing solutions have left out a number of complicating factors such as determining (a) which oil price forecasts should be used in valuing reserves, (b) at what periodicity should reserves be revalued, and (c) which discount rate on cash flows should be applied in valuations. But the key point here is that as long as the complex models for estimating well production could be assumed to be accurate, this opened up a whole host of financial engineering solutions for the development of North American onshore oil. One more caveat is that in order for these financing solutions to be economically valid, one has to also be able to assume that assets can be liquidated at a project's modeled valuation.

Distinguishing Between the Credit Cycle and the Commodity Cycle

Given how crucial financial engineering has been to the boom in U.S. oil production, where we are in the credit cycle is essential to understanding production plans, going forward. As a result, Barclays Credit Research (2016) advised: "[W]e think investors need to distinguish between the commodity and credit cycles …"

During the oil investment boom, E&Ps significantly overspent cash flow from operations, as shown in Figure 6 on the next page. In contrast, there is now an aversion in the capital markets for E&Ps to so significantly outspend cash flow. However, in the next oil-price upswing, outspending operational cash flows may very well happen again although perhaps to a less aggressive level, as covered later in this article.

Figure 6
E&Ps Significantly Overspent Cash Flow:
Historical E&P Outspend (Capex as % of Cash Flow)



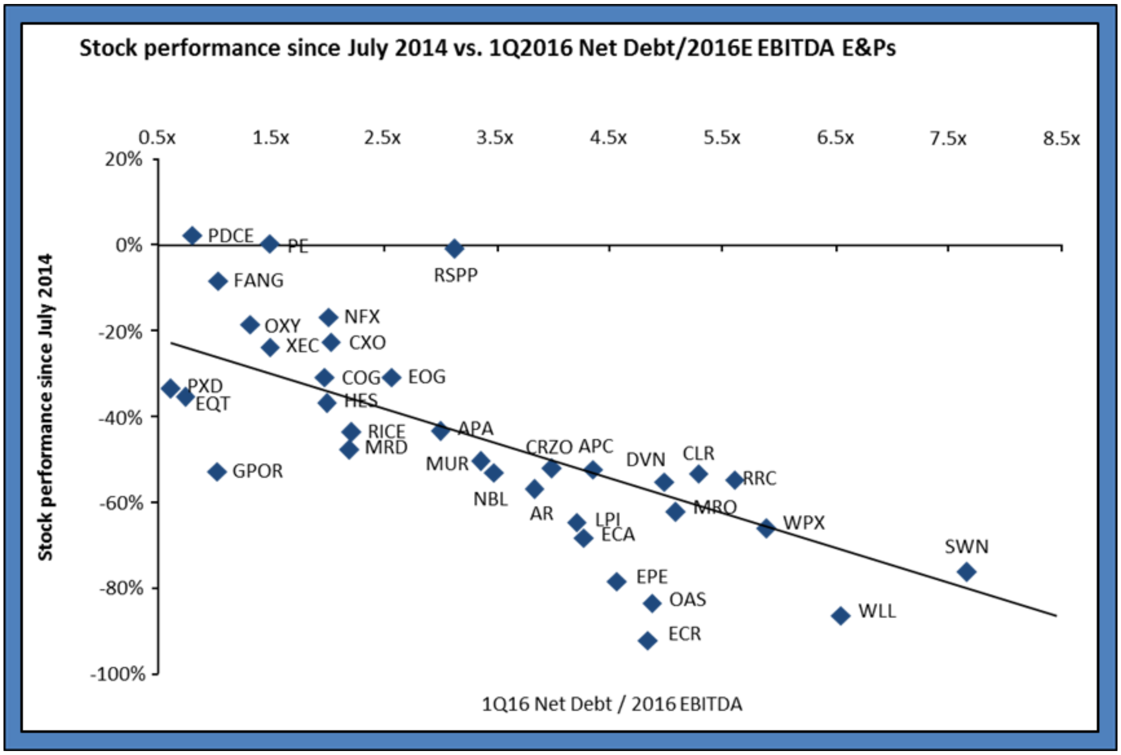
Source of Data: The Bloomberg.

Source of Graphic: Morgan Stanley Research (2016), Exhibit 22.

As Morgan Stanley Research (2016) reinforced, "amid a prolonged cyclical trough, E&P balance sheets are stressed as credit, … [Master Limited Partnership], and asset markets have tightened and combined to force the industry toward cash-flow neutrality."

Similarly, equity investors have penalized highly leveraged E&P companies, as shown in Figure 7 on the next page. Therefore, these companies will likely be focused on deleveraging efforts, including sales of non-core assets.

Figure 7
Balance Sheet Strength Continues to be Primary Point of Emphasis for Investors

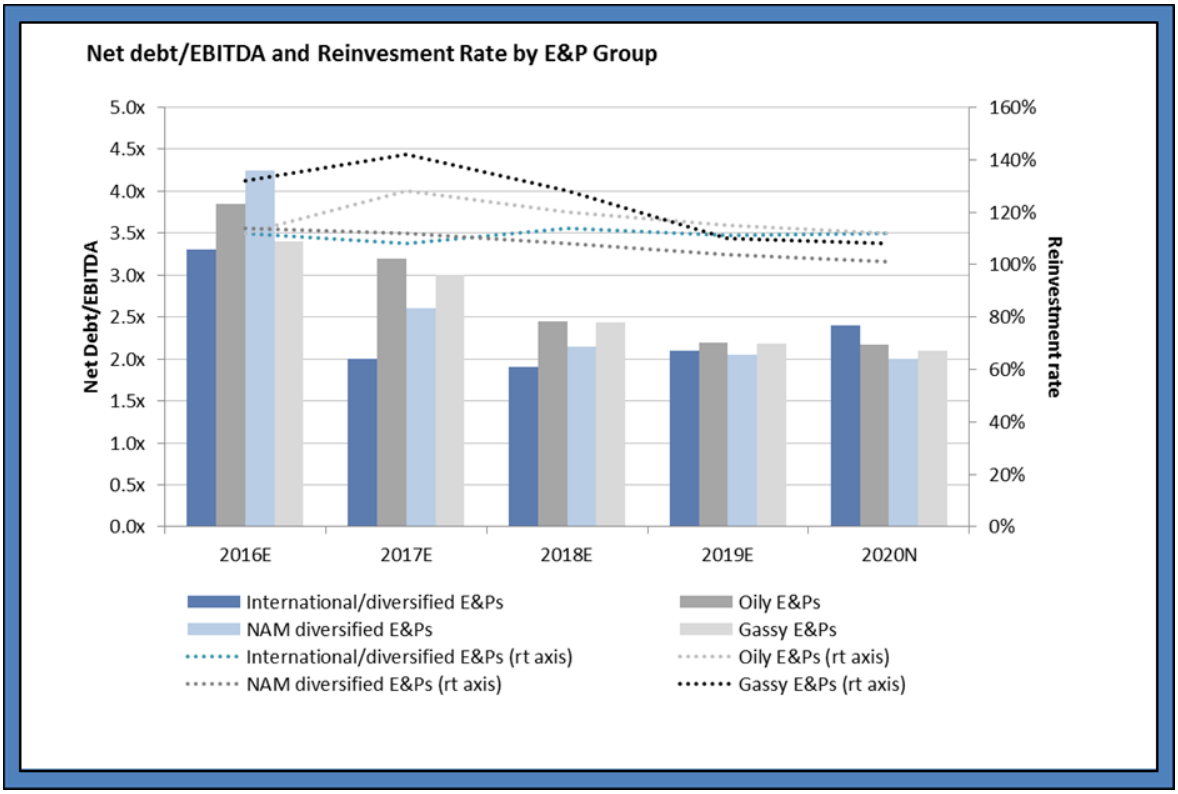


Sources of Data: FactSet and Goldman Sachs Global Investment Research.

Source of Graphic: Goldman Equity Research (2016), Exhibit 10.

Argued Goldman Sachs Equity Research (2016), “We believe investors and E&P’s remain focused on deleveraging efforts … We see non-core asset sales, discounted debt repurchases/exchanges and equity offerings as ‘tools in the toolbox.’” Please see Figures 8 and 9 on the next two pages.

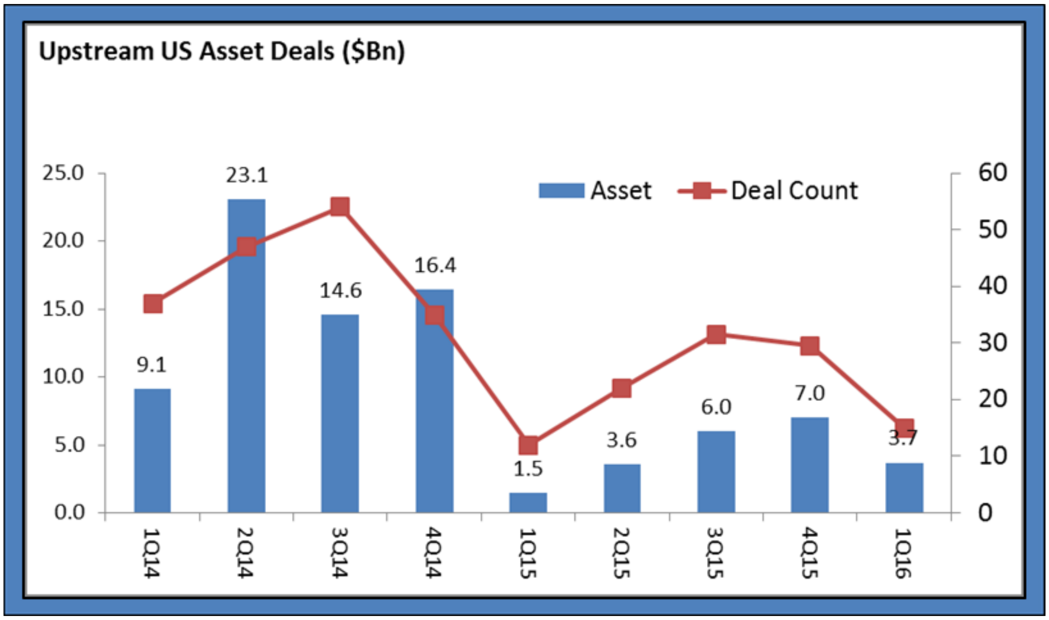
Figure 8
Leverage is Substantially Elevated in 2016/17, But Should Normalize in 2018



Sources of Data: Company data and Goldman Sachs Investment Research.

Source of Graphic: Goldman Equity Research (2016), Exhibit 11.

Figure 9
E&P Asset Deals will Accelerate in a Recovery



Source of Data: IHS

Source of Graphic: Morgan Stanley Research (2016), Exhibit 66.

Essentially, future production will have to be financed at "levels of cash flow outspend" that keep a company's "financial leverage consistent with historical levels," according to Morgan Stanley (2016).

Shale as an Imperfect Swing Producer, But Perhaps Only in the Short-Term Future

“The Swing Producer in the Making”

Now, one could argue that the “[r]elatively short response time and favorable economics will likely make U.S. unconventional production the primary global ‘swing’ production when future oil growth is required, as many other forms of conventional oil production take 3-5+ years to respond materially to price signals,” as proposed by Morgan Stanley Research (2016).

By way of further explanation, the large difference between the development of shale oil and other conventional and unconventional oil is the amount of time and capital needed from the date that a final investment decision (FID) is made until the date that oil is actually produced. In the case of shale oil, this can be a matter of three to six months and a couple of million dollars per well with an aggregate supply of 750,000 barrels per day occurring in 15 to 18 months. In contrast, to deliver this supply from other types of oil-field developments takes at least five years.

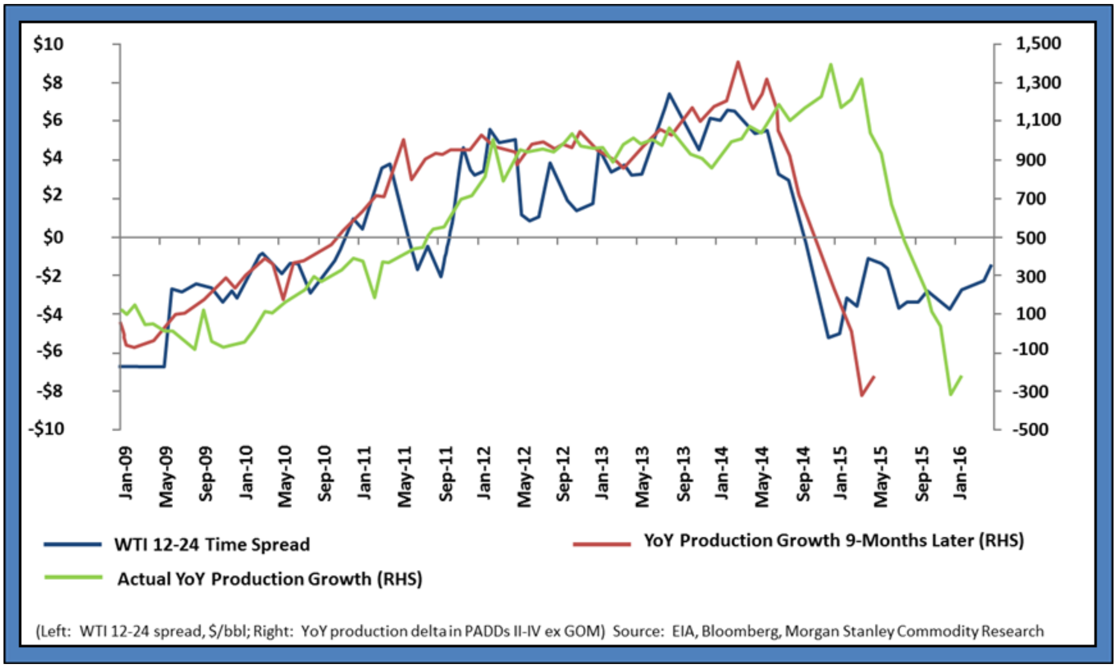
A Swing Producer … But With a Delay

Does this short-response time make North American shale oil the new swing producer? Perhaps, but imperfectly so. Barclays Commodity Research (2016) explains that “U.S. supply is falling m/m and will not act like a light switch. Just as it was slow to react on the way down, its response on the upswing will likely be lumpy.”

Essentially, shale can only be seen as an imperfect swing producer because of the delays in responding to demand, whether it is because of the time it takes for service capacity additions or because of the impact of hedging.

The “lag between service capacity additions and production impact” is “frequently 6 months,” according to Morgan Stanley Research (2016). Further “history shows a 9-month lag between hedging and production,” again according to Morgan Stanley Research (2016), and as illustrated in Figure 10 on the next page.

Figure 10
WTI 12-24 Spread Reflects Hedging Behavior and Leads Onshore Production by 9 Months



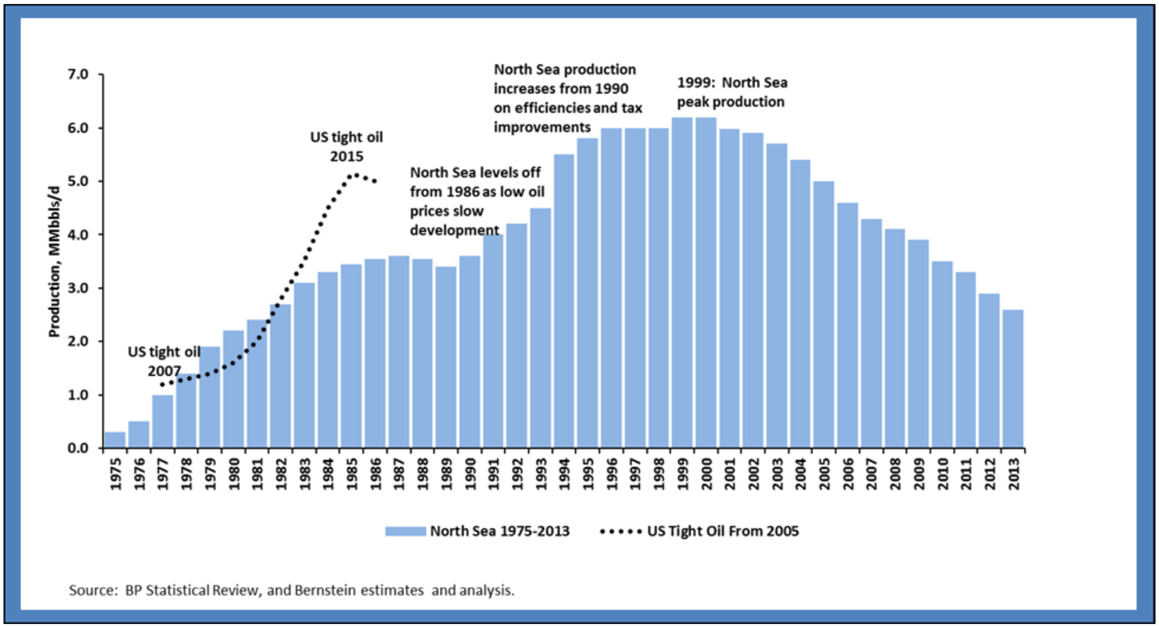
Source of Graphic: Morgan Stanley Research (2016), Exhibit 69.

Ultimately, the Gulf Producers, Though, Could (Unquestionably) Revert to Being the Key Swing Producer

<u>U.S. Shale Oil Production Might Peak This Decade</u>

In conclusion, one intriguing perspective to consider is if the growth in tight oil production peaks this decade. Notes Bernstein Global View (2016), "the growth in tight oil production is likely going to be slower going forward than it has been in the past," and as illustrated in Figure 11 on the next page.

Figure 11
U.S. Shale Oil Production Growth to Peak This Decade as It Approaches the Peak Production Level of the North Sea with a Smaller Resource Base

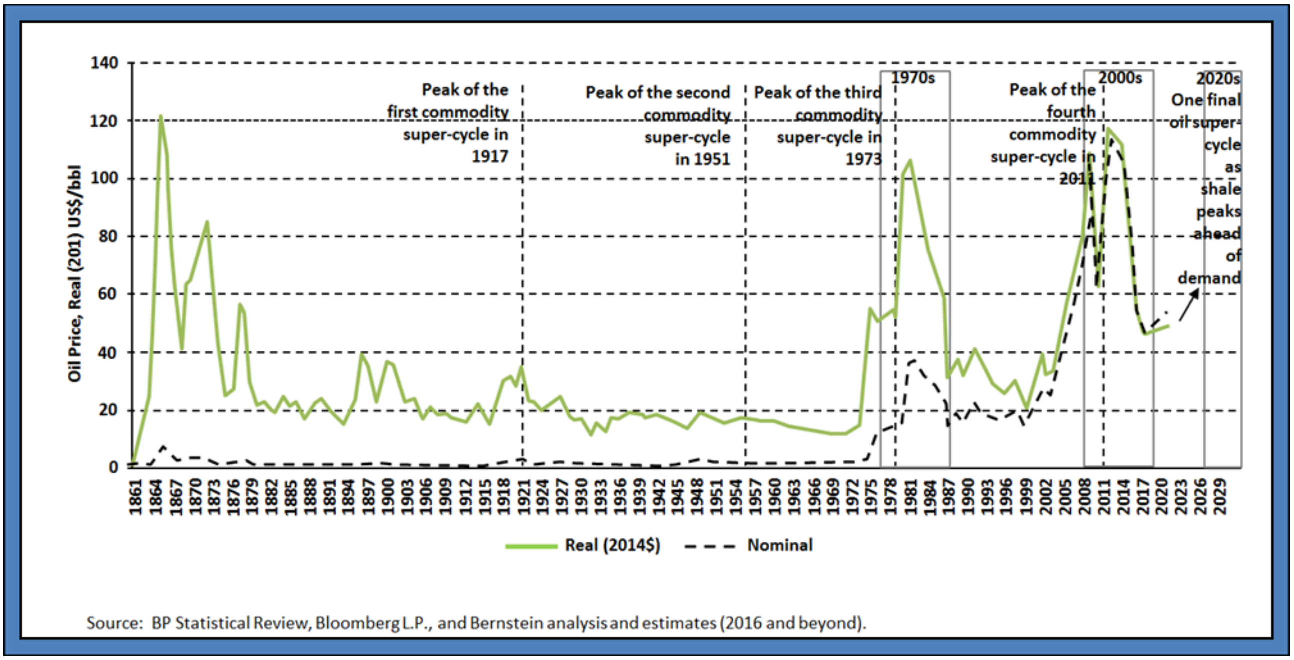


Source of Graphic: Bernstein Global View (2016), Exhibit 374.

OPEC Would Thereby Become the Dominant Force Again

Therefore, depending on global demand forecasts, "if tight oil does peak before demand does[,] it could result in another period of supply tightness as OPEC becomes a dominant force in supply, just as it did in the 1970s. … *[I]t is not inconceivable that we could be four or five years away from the start of the next super-cycle*," predicted Bernstein Global View (2016), and as illustrated in Figure 12 on the next page. [Italics added.]

Figure 12
When Will the Next Oil Super-Cycle Be?



Source of Graphic: Bernstein Global View (2016), Exhibit 378.

But from a Short-Term Perspective, What is the Required Price Level (and Likely Timeframe) for a Recovery in Shale Oil Production?

In the meantime, returning to a shorter-term perspective, the estimated price level where shale companies can comfortably operate *en masse* is currently at about $65 per barrel, which would provide an acceptable internal-rate-of-rate, across projects, as discussed in Till (2016). As long as the capital markets, with all its many different financial participants, remain open to these companies, they can keep producing, despite a number of them massively overspending their free cash-flow.

In semiannual reviews by banks of the value of shale company oil reserves, some of the smaller companies in distress will likely not be refinanced and will have to go into Chapter 11 proceedings, but the majority will be fine since they have not utilized their full lending facilities, while the higher rated companies have not faced troubles in raising new equity (to refinance and repay debt and to finance future drilling.)

Even if oil recovers to $65, there may not be an immediate recovery in production since the response of capital markets would likely be much more cautious than when shale companies were viewed as bullish growth opportunities, analogous to the tech stocks of the late 1990s. As far as drilled, but uncompleted wells are concerned, there will be a delay due to the time it would take to assemble the required manpower for fracking the wells. Each of these considerations mean a collective aggregate delayed response of up to 12 months could occur before an improved price environment would have a meaningful impact on production.

In conclusion, if it were acceptable to loosen the definition of swing producer to be one in which there were fairly uniform production decisions over about a year timeframe, then in that case, it would be appropriate to refer to shale producers (and their lenders and investors) as the "new swing producers."

Endnotes

Hilary Till presented an earlier version of this article to the International Energy Forum (IEF) - Bank of Canada joint roundtable on "Commodity Cycles and Their Implications," which was held at the Bank of Canada in Ottawa on April 25, 2016, http://www.edhec-risk.com/about_us/news/RISKArticle.2016-05-10.4352. Ms. Till participated in the concluding panel discussion on the theme, "What Will Be the New Swing Producer? The Role of Credit Conditions," which focused on the role of credit markets in the stability of the oil market. This roundtable was co-organized by Dr. Bahattin Büyükşahin, Senior Policy Advisor, Commodities Division, Bank of Canada. Dr. Büyükşahin is also an Editorial Advisory Board member of the *GCARD*.

Ms. Till's IEF – Bank of Canada presentation is available here:
http://www.bankofcanada.ca/wp-content/uploads/2016/05/swing-production-role-credit.pdf.

Research assistance from both Katherine Farren, CAIA, of Premia Risk Consultancy, Inc., and Hendrik Schwarz is gratefully acknowledged. The authors are also grateful for expert comments from Thorvin Anderson, CFA. That said, the authors alone are responsible for all opinions (and any inadvertent errors and omissions.)

This article is provided for educational purposes only and should not be construed as investment advice or an offer or solicitation to buy or sell securities or other financial instruments.

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Author Biographies

Hilary Till
Solich Scholar, J.P. Morgan Center for Commodities, University of Colorado Denver Business School; and Contributing Editor, *Global Commodities Applied Research Digest*

Hilary Till is also a principal of Premia Research LLC, which designs investment indices that are calculated by S&P Dow Jones Indices and which are available here:
http://www.customindices.spindices.com/custom-index-calculations/premia/all.

Prior to Premia, Ms. Till was the Chief of Derivatives Strategies at Putnam Investments, and a Quantitative Analyst at the Harvard Management Company.

Ms. Till's additional academic affiliations include her membership in the North American Advisory Board of the London School of Economics and Political Science and her position as a Research Associate at the EDHEC-Risk Institute, http://www.edhec-risk.com, in Nice, France. Her published articles can be found here:
http://faculty-research.edhec.com/faculty-researchers/alphabetical-list/r-s-t/till-hilary-143898.kjsp?RH=faculty-gb1

In Chicago, Ms. Till is a member of the Federal Reserve Bank of Chicago's Working Group on Financial Markets; is an Advisory Board Member of DePaul University's Arditti Center for Risk Management; and has provided seminars (in Chicago) to staff from both the Shanghai Futures Exchange and the China Financial Futures Exchange.

Ms. Till has presented her analysis of the commodity futures markets to the following institutions: the U.S. Commodity Futures Trading Commission, the International Energy Agency, and to the (then) U.K. Financial Services Authority. Most recently, she was a panel member at both the U.S. Energy Information Administration's workshop on the "evolution of the petroleum market and [its] price dynamics" and the Bank of Canada's joint roundtable with the International Energy Forum on "commodity cycles and their implications." She is also the co-editor of the best-selling Risk Book (London), Intelligent Commodity Investing, http://riskbooks.com/intelligent-commodity-investing.

Ms. Till has a B.A. with General Honors in Statistics from the University of Chicago and an M.Sc. degree in Statistics from the London School of Economics and Political Science (LSE). She studied at the LSE under a private fellowship administered by the Fulbright Commission.

Jan-Hein Jesse
Founder, JOSCO Energy Finance and Strategy Consultancy, Amsterdam; and Member, Editorial Advisory Board, *Global Commodities Applied Research Digest*

Jan-Hein Jesse is an expert on commercial, financial, and technical aspects in the oil & gas, marine contracting, commodity trading, and the financial investment sector. Jan-Hein is the owner of JOSCO Energy Finance & Strategy Consultancy, advising oil (service) companies, banks, private equity, hedge funds, pension funds, oil trading companies and governments on a wide range of activities related to new business development, equity and debt capital products, finance, M&A, markets, industry trends and price formation. His career spans over 30 years including his roles as owner of JOSCO, CFO of Heerema Marine Contractors, Senior Manager at Royal Dutch/Shell, where he was responsible for the execution of large-scale acquisitions and divestments, and new business developments leading transactions over $1 billion, and Head of the Energy Finance department at ING Bank. During his career, Jan-Hein has lived in London and in Bahrain. He has travelled extensively (50+ countries) for business reasons, multiple times. He has a B.Sc. in Civil Engineering and Offshore Engineering at HTS Haarlem, and an M.B.A. at Nijenrode Business School, the Netherlands, which included the Wharton Business School Exchange Program in the U.S.