Swing Oil Production and the Role of Credit: A Synthesis of Best-in-Class Research Views

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EDHEC pursues an active research policy in the field of finance. EDHEC-Risk Institute carries out numerous research programmes in the areas of asset allocation and risk management in both the traditional and alternative investment universes.
In order to understand swing production and the role of credit, this working paper will briefly cover the following five topics:

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

(2) Next, the article 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 is now the key driver of the outlook for North American oil production.

(3) The paper then proposes that we might be able to refer to shale producers as swing producers as long as we loosen the definition of a swing producer to be one in which there are fairly uniform production decisions that take place over a 6-month to 12-month time frame. And importantly, the outlook for this year’s U.S. oil production declines is likely key to whether global oil markets rebalance or not.

(4) Next the article notes that while our short-term focus is properly on the credit cycle, at some point it may be that geological constraints will come back into play and the baton would thereby pass back to the Middle East Gulf oil producers as the undisputed swing producers.

(5) Because the timing of the recovery of oil prices is so uncertain, the paper concludes that an investor should only express a bullish view on oil prices within the context of a balanced asset allocation.

**Strict Definition of a Swing Producer**

Historically, Gulf Producers Fit the Strict Definition of a 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 on the next page.

*Figure 1: Capable of Acting Strategically*

![Monthly Change in Saudi Arabia’s Crude Oil Production (in 1000's of Barrels per Day)](chart.png)

*Source of Data: 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 the 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. Friedman (2016) notes that “Saudi Arabia accounts for about two-thirds of the spare capacity” in OPEC.

Figure 2: Sufficient Spare Capacity

But it appears that for the time being OPEC Gulf producers have shaken off their traditional role of balancing the oil market. As described in Till (2015b), 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 prioritising market share, according to Gately (1986).

Light Tight Oil Producers Do Not Fit the Strict Definition of a 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.
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.”

Now, 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 “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). Anderson continued (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.”
Customisable Financing Solutions

Thanks to advances in seismic imaging and geophysical modelling, 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. As long as one has a set of credible oil price forecasts across time, one can then value a shale company’s oil reserves along with the size and timing of cash flows from production. This means that very customisable financing solutions became available for numerous relatively small producers, investors, and lenders, who specialised in onshore oil projects. Please see Figures 4 and 5.

**Figure 4: Various Forms of Capital, Depending on Reserve Characteristics**

**OIL AND GAS INVESTMENT RISK SPECTRUM**

The reserve characteristics, taken together with the size and maturity of the issuer, drive the form of capital required for growth.

![Image of OIL AND GAS INVESTMENT RISK SPECTRUM]

Author’s Source: Prudential Energy Finance Group.
Source of Graphic: Clouser (2014), p. 11

**Figure 5: Capital Choices**

<table>
<thead>
<tr>
<th>Proved Reserves</th>
<th>Equities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secured/Unsecured Fixed Rate Debt</td>
<td>Sr. Secured/Uncured Fixed Rate Debt</td>
</tr>
<tr>
<td>Yield Range: 3.5% - 7.0%</td>
<td>Coupon: 8% - 12%</td>
</tr>
<tr>
<td>$10-$200 million Investment</td>
<td>No Royalty or equity linked component</td>
</tr>
<tr>
<td>$10-$100 million Investment</td>
<td>Targeted return typically in the mid-to-high teens</td>
</tr>
<tr>
<td>Secured/Unsecured</td>
<td>Secured/Uncured</td>
</tr>
<tr>
<td>$50-$100 million Investment</td>
<td>$10-$50 million Investment</td>
</tr>
</tbody>
</table>

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

Now this brief description leaves 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. This description also leaves out how much leverage an investor or bank should tolerate for onshore oil exploration-and-production (E&P) companies. 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 should add, though, 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 modelled 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. In contrast, there is now an aversion in the capital markets for E&Ps to so significantly outspend cash flow.

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

Source of Data: Bloomberg.

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 are penalising highly leveraged E&P companies, as shown in Figure 7. 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.
Goldman Sachs Equity Research (2016) argued, “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 Figure 8.

**Figure 8: Leverage is Substantially Elevated in 2016/17, but Should Normalise in 2018**

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

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). Please see Figure 9.

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

Sources of Data: IHS

**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 favourable 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).

A Swing Producer ... But With a Delay

But as noted by Barclays Commodity Research (2016), “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 bumpy."

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.

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

[Graph showing WTI 12-24 Time Spread and YoY Production Growth 9 Months Later]


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

U.S. Shale Oil Production Might Peak This Decade

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.

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

[Graph showing U.S. Shale Oil Production Growth Curve]

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. ... [It 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?


Conclusion

The investment implication of this concluding research view is potentially quite optimistic regarding the future prospects for oil prices. But because the timing of the recovery of oil prices is so uncertain, an investor should exercise due care in the type of investment chosen to express a bullish view and preferably choose one that limits the downside risk of such an investment, as shown in Figure 13.

Arguably, one should consider an oil investment only within the context of a balanced asset allocation. A balanced asset allocation takes advantage of fixed-income investments that can hedge deflationary scenarios, when oil investments tend to do poorly, and also makes use of equity investments that can hedge oil-market-share-price-war scenarios, when oil investments also tend to do poorly, as covered in Till (2015b).

Figure 13: “Conditionally Entered” vs. “Unconditionally Entered” Brent Crude Oil Futures (Excess) Returns End-January 1999 through End-December 2014

[The calculations underlying this chart were performed by Joseph Eagleeve, Premia Research LLC.]
Source: Till (2015a), Slide 37.
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