ONYX
CAPITAL GROUP

Shale Crude Oil Benchmark:
Methodology

Abstract

The current availability of a liquid and accurate hedging tool for Shale production is insufficient. This document considers the available contracts, their liquidity, and their appropriateness to act as a hedging tool. The Onyx Shale Crude Oil Index uses a basket of contracts which provides a more comprehensive and basis-reducing method for Shale producers to hedge.

Introduction

The U.S., over the past 5 years, has become the number one oil producer in the world producing an average of around 13 million bpd, with around 60-70% of that coming from the shale sector.

Due to the different extraction methods of conventional oil versus shale oil, the oil extracted has different properties. Due to this, shale oil does not tend to track WTI crude oil prices accurately enough to suffice as a hedge.

When referring to 'properties' we refer to the crude's sulfur content and density (API), and so the construction of the index is based on the specification of the oil. Due to basis risk, the location of the fields will also be taken into account.

For a typical barrel of shale oil, the API is similar to a typical barrel of WTI crude at around 48 API. The main difference in the two barrels lies in their sulfur content. Shale sulfur content is around 0.10%, whereas the sulfur content of WTI crudes is around 0.40% for WTI Cushing and Midland, and 0.15% for WTI Houston.

Proposal

Onyx Shale Index = 30% <u>WTI Midland</u> + 30% <u>WTI Houston</u> + 40% <u>C5</u>

Justification

We assume that the largest shale fields are in the following order:

1. Permian (West Texas) at 1.3m bpd
2. Eagle Ford (South Texas) at 1.2m bpd
3. Marcellus (Appalachian Basin) at 0.5m bpd
4. Niobrara (South Dakota, Colorado, Nebraska, and Wyoming)
5. Barnett (Texas)

As the weighing of production is heavily skewed to only two fields, it makes sense to use the Permian and Eagle Ford as the representative fields for Shale production in the United States.

Hence, we can conclude that the most relevant contracts will be those that have a basis of Texas.

Therefore, due to the oil specification and location, we will use the WTI contracts as the main instrument in hedging for Shale production as they are priced basis Texas.

When deciding between the 3 West Texas contracts, Cushing, Midland and Houston, we must consider a few things. Firstly, what is the difference in liquidity between the contracts, and how will the serve to promote the liquidity of the benchmark. Secondly, what is the specification difference between the contracts, and which one mimics a Shale barrel's specification most closely. Lastly, what is the geographical (or basis) difference between the contracts and which one is priced closest to the shale oil basins and therefore mimics the same operational (in terms of pipelines and other transport) concerns.

WTI Midland is the closest proxy to the Permian Basin, and so, for geographical purposes it will be used in the weighting.

The WTI Houston inclusion is due to the favourable sulfur content over other WTI specifications Cushing and Midland, and hence, it is the crude contract which is the closest in overall specification, with an API of 42.05 and sulfur content of 0.15%.

As stated, the due to the major difference between a shale barrel and a WTI barrel being the low sulfur content of shale oil, it makes sense to have some representation of low sulfur in the index. Over any other normally extracted crude oil, we assume that in any normal barrel, the shale oil will yield higher percentage weighting of low sulfur products. Hence, we include a 40% weighting of C5 into the calculation. The reason C5 is the most representative of all available light-end product contracts is because of its condensate nature which mirrors that of shale oil.

Conclusion

This document discusses the need for a better hedging strategy for Shale oil producers, and has considered a more effective hedging method based on three major components:

1. Basis
2. Specification
3. Liquidity

After consideration, the index is a better reflection of Shale prices and can track the prices closer than any other vanilla swap available, and therefore presents as a better hedge for shale oil producers.

Product	**Contract Name**
WTI Houston	WTI Houston (Argus)
WTI Midland	WTI Midland (Argus)
C5	Mont Belvieu Natural Gasoline (OPIS)

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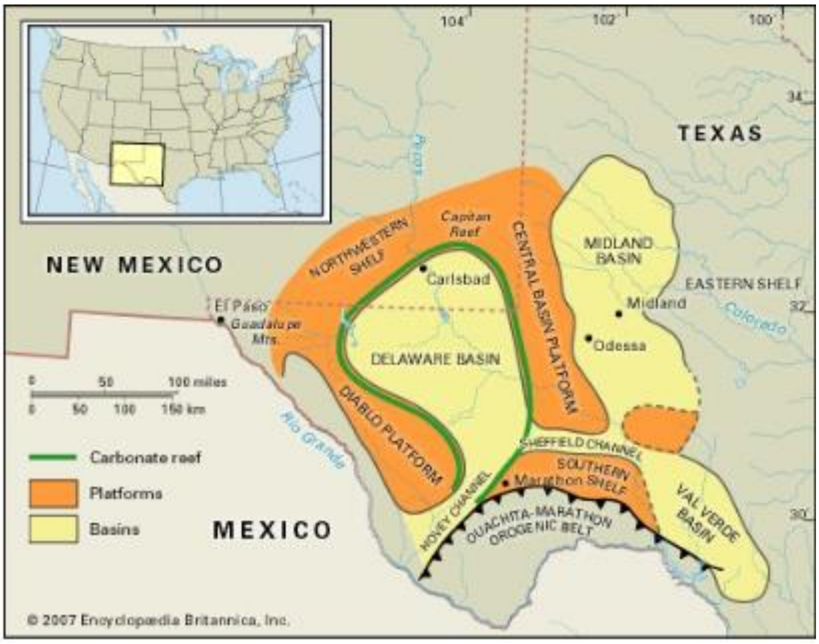

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