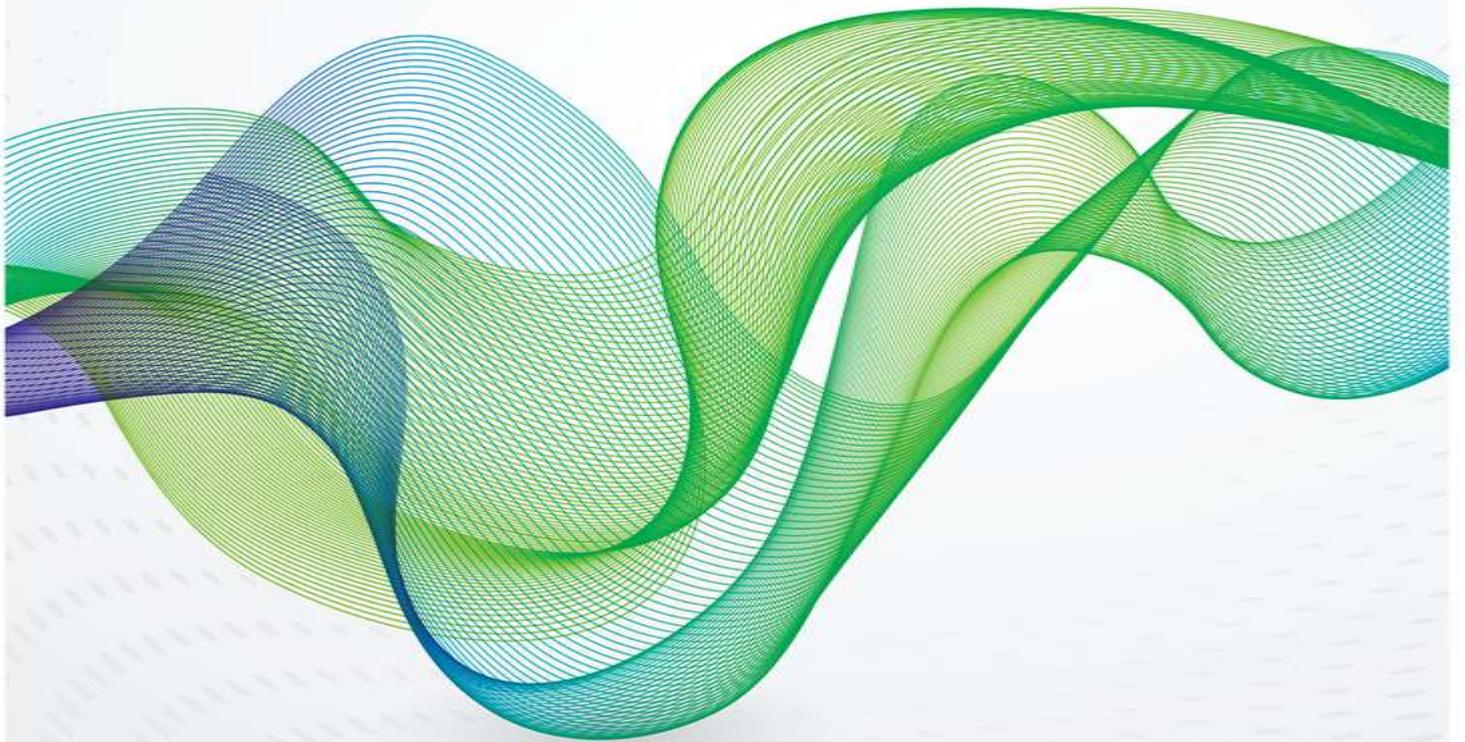




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# Oil Benchmarks Under Stress



OXFORD ENERGY COMMENT

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## Introduction

The massive demand shock hitting the oil market is exposing some of the cracks in oil benchmarks, oil price assessment processes, and the relationships between the physical and financial layers of the oil market. As argued previously, the futures and forward prices eventually had to converge with the fundamentals in the prompt physical market.<sup>1</sup> These fundamentals were, and are still, pointing to a more distressed oil market, overwhelmed by oversupply and running out of storage space. Despite these stresses the oil market continued to cope, with differentials doing most of the stretching with time spreads for the main benchmarks such as Brent and WTI, which reached historical records, incentivizing traders to store crude in more expensive places; physical differentials cut sharply allowing producers to find a home for their barrels; and futures-physical spreads such as Dated Brent to futures Brent widening to reflect the value of the physical barrel and provide clear signals to producers to shut in production and keep their oil underground.

## The Shock of Negative Pricing

The collapse of the futures May WTI price and the negative pricing on April 20 epitomizes the extent of the stresses in the system but also exposes the vulnerabilities of some oil benchmarks to the current shock, the pricing assessment methods, and our understanding of what these benchmarks really represent. Since the light sweet crude oil (WTI) futures contract is physically settled, the futures contract should converge to the physical spot price at expiry. Also, WTI futures should reflect the value of WTI in a specific location, Cushing Oklahoma, and nowhere else. Given that WTI is the most liquid oil futures contract, it has been widely used for risk management and speculation and listed on various exchanges. It has attracted large number of players, including retail investors who want to get exposure to oil, often through Exchange Traded Funds (ETFs). Also, many of the Price Reporting Agencies (PRAs) use WTI as the underlying index for pricing physical crudes. All these features give the contract a global status and it constitutes a key part of the international oil pricing system, but, not necessarily the status of a global oil benchmark even in the aftermath of the US shale revolution and the lifting of the US crude export ban which saw the US turn into one of the world's largest crude exporters.

The cause of the sharp movements in WTI prices and time spreads and the negative pricing we have witnessed is rooted in fundamentals: A massive negative demand shock which is testing the ability of the oil market to store all the crude arriving into the market, particularly in Cushing. For storable commodities negative prices can happen, if someone ends up with a commodity and the demand for that commodity disappears, and it can't be stored in a specific location, the owner of that commodity has to pay someone to take it off their hands. On April 20, even a contango of over \$50 per barrel for storing crude for less than a month was not incentivizing buyers to pick up the crude. Terry Duffy, the Chairman and CEO of the CME Group, argued in a recent interview that it was key to 'allow the market to go to a price that is reflecting the fundamentals of the product. The futures market worked to perfection'.<sup>2</sup>

But can this be the full explanation of this phenomenon? Not everyone is convinced. Continental's executive chairman Harold Hamm sent a letter, dated Tuesday, April 21, to the U.S. Commodity Futures Trading Commission (CFTC) asking the regulator to probe whether 'potential market manipulation, failed systems or computer programming failures' were responsible for the extreme negative pricing.<sup>3</sup>

Such calls for investigation should not come as a complete surprise. In extreme market conditions such as those currently being witnessed, when demand for crude has dried up and storing the commodity in a specific location is not possible (i.e. demand is totally inelastic), pushing even small amounts of crude into Cushing would have caused spot prices to collapse. A set of traders with access to storage there

<sup>1</sup> See B. Fattouh and A. Imsirovic (2020), 'Shocks and Differentials: How are oil markets coping?' OIES Energy Comment, Oxford: Oxford Institute for Energy Studies.

<sup>2</sup> CNBC, 'CME boss says his exchange is not for retail investors and it's 'no secret' futures can go negative', 22 April 2020 <https://www.cnbc.com/2020/04/22/cme-boss-says-his-exchange-is-not-for-retail-investors-and-its-no-secret-futures-can-go-negative.html>

<sup>3</sup> Reuters, 'Oil exec and Trump ally Hamm seeks U.S. probe of oil price crash', 22 April 2020.

could push higher volumes of crude and cover their position in the futures market. Those with long positions in futures, some of which are financials, not having experience in taking delivery or access to storage, may have exacerbated the price decline as they rushed to liquidate their contracts. But this may not explain the magnitude of the price move. At a differential of over \$50 per barrel for the May 2020/June 2020 spread, long players could have taken the delivery of May contract by immediately moving the oil from Cushing into alternative storage available – the US Gulf Coast for example. Then they could have delivered it back to Cushing in June. The magnitude of the differential would have easily paid for all the storage, pipeline, and time value of money expenses. This indicates that some panic, as well as inexperience with the delivery mechanism in the WTI contract, may have been involved.<sup>4</sup> It remains to be seen whether any of these factors were in play in the severe negative pricing of WTI, but the extent of the problem of liquidating contracts through physical delivery in the current environment of storage limits at Cushing was certainly known, and was not a surprise, at least not to the CME and the US regulators.

Others have pointed to a more fundamental problem with the design of the WTI futures contract itself. For instance, according to Argus, the dislocation

‘points to a fundamental flaw in the design of its (CME’s) WTI contract, in particular the rules restricting physical delivery to Cushing. Normally, this does not impede delivery for WTI futures contracts. But pipeline access to and storage at Cushing is almost impossible to obtain for next month, while capacity is still available elsewhere.... Since CME knew this might happen — writing to clearing firms and clients two weeks earlier to say options contracts could handle negative pricing — the exchange could have acted to avoid disorderly pricing by ensuring that all open contracts could make or take delivery and closing out any that could not’.<sup>5</sup>

## Wider Repercussions

Whether the extreme price movement in WTI May represents flaws in the WTI contract or disorderly liquidation, the repercussions are wide and extend beyond the US. For instance, the negative pricing of the May WTI contract had its impact on crude import prices into the US, even for those crude exporters that don’t use WTI as their main benchmark. In 2009, Saudi Arabia, Kuwait, and Iraq shifted from WTI to the Argus Sour Crude Index (ASCI) for pricing their crude exports into the US. The ASCI is a volume-weighted average of all trades for Mars, Poseidon, and Southern Green Canyon (SGC), crudes that are produced in the US Gulf coast. One of the main reasons for the shift to ASCI was precisely to protect the pricing of their crude against the impact of severe dislocations of WTI at Cushing due to bottlenecks in infrastructure. Also, the US Gulf coast crudes were more representative of the type of crude oil (medium sour) exported by these countries. However, given that CME’s settlement of WTI futures constitutes the underlying fixed price for the ASCI, the protection is only partial (see Figure 1). For instance, while Mars went from +\$1.75 on April 17 to +\$11.00 on April 20, Mars ended the day with a negative \$26.63, as the index against which the physical differential is applied (i.e. WTI futures), dropped sharply on the day.<sup>6</sup>

The negative pricing revealed the cracks and tensions within the existing pricing systems. On Monday April 20, Middle East exporters who use ASCI as a benchmark and whose crudes are not landlocked, had to settle for deeply negative prices for that day. This represents a failure of the benchmark as it did not accurately reflect the value of the crude on the day. No producer would willingly sell a waterborne crude with storage options (including underground) at a negative number.

This reveals a deeper fundamental issue related to the relationship between the futures and physical prices. To derive the absolute physical prices PRAs tend to rely on the highly liquid futures contracts, but these, in turn, are expected to converge to physical prices.

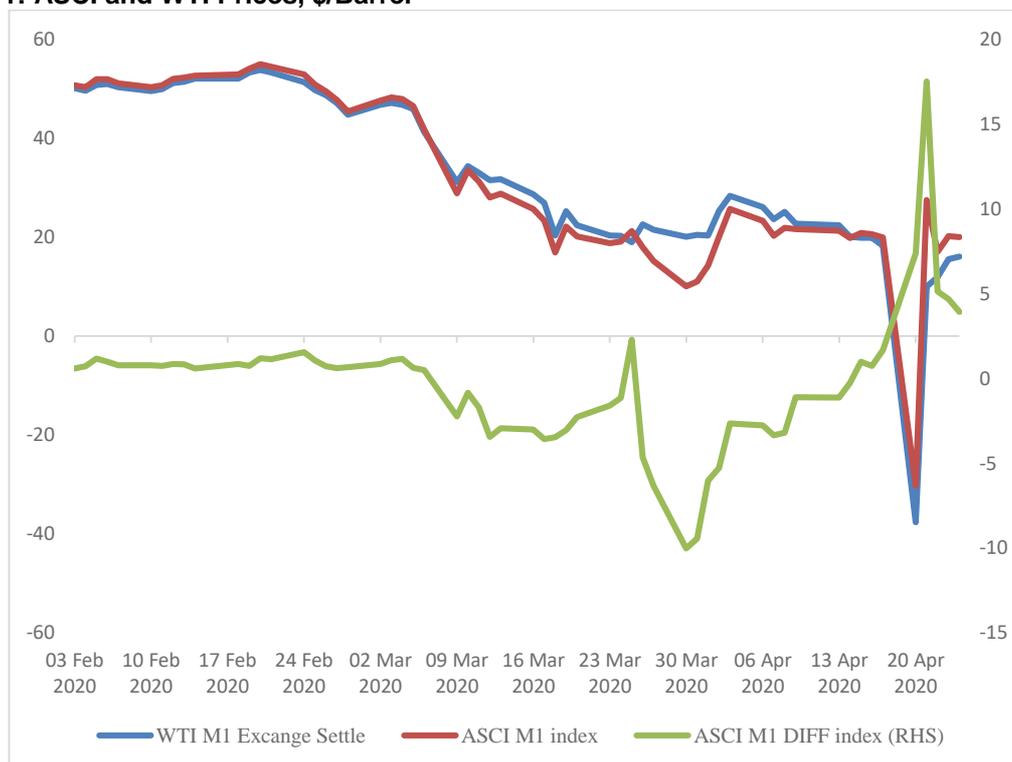
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<sup>4</sup> Reuters, ‘Losses on Bank of China crude oil investment product could hit \$1.3 bln-report’ Reuters News, 26-Apr-2020 07:59:06 AM.

<sup>5</sup> Argus Global Markets, ‘Disorderly Conduct’, Volume L, 18, 24 April 2020

<sup>6</sup> Jeff Kralowetz, ‘US physical crude differentials resist financial price dive’, 21 April 2020, <https://www.argusmedia.com/en/blog/2020/april/21/us-physical-crude-differentials-resist-financial-price-dive>

**Figure 1: ASCI and WTI Prices, \$/Barrel**



Source: Argus

PRAs also need to look into their price assessment processes. ASCI benchmark is a good example. The physical month for May WTI extended for the period March 26 to April 24 and while the May contract could have been used for pricing during this period, as the contract approaches expiry, liquidity is falling, and volatility rising. The inclusion of futures price settlements just before contract expiry, especially currently when physical delivery is constrained and storage facilities are fully booked, will only distort the true value of the physical crudes that underlie the benchmark. Marking these physical deals against the next WTI contract, well before the front month expires could be a possibility to overcome this problem.<sup>7</sup> In addition, between the time the May contract expires (for instance 21 April for the May 2020 contract) and the delivery schedule is finalized (24 April), how prices are assessed during this period is extremely important and the roll may be exaggerated by the current WTI dislocation. Another reason that ASCI went negative was a lack of ‘time-stamps’ for the physical deals of the three sour grades in the index, in relation to WTI, at the time of trades.<sup>8</sup>

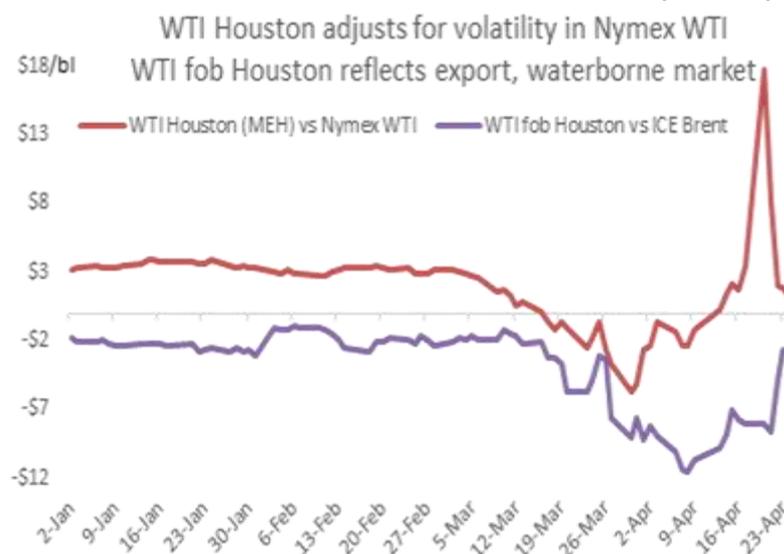
Finally, PRAs should intensify efforts towards waterborne WTI contracts. One candidate could be WTI fob Houston, which reflects cargoes that are loaded for export at the US Gulf Coast. As seen in Figure 2 below, the differential of WTI fob Houston price to ICE Brent was more stable than the pipeline-based grades such as WTI Houston (MEH) in the period when WTI prices went into negative territory. The WTI Houston (MEH) only partly compensated for the slump in the futures and while it was almost \$18 per barrel higher than the futures price, its value was still negative. Identifying an appropriate waterborne WTI contract is a long-term project that applies to all the market players and this task is far from straightforward.<sup>9</sup>

<sup>7</sup> However, this proposal has its problems. Switching to second month ahead of the expiry of the contract would imply that for about a third of the trading month, the price would not be matching the current market, as post-expiry you still have three full days before nominations.

<sup>8</sup> Though not all market participants would support putting in motion any particular stopgap measure if prices go negative.

<sup>9</sup> Storage in the Houston area is far more limited than in Cushing. However, storage on ships is an alternative and virtually limitless.

**Figure 2: Evolution of WTI Fob Houston in relation to Benchmarks (\$/Barrel)**



Source: Argus

## Demand Shock Exposing Vulnerabilities

The current imbalance did not spare the Platts Oman contract either. For many years, Platts Oman was setting half of all the Middle East formula pricing for Asia. However, there was a fundamental problem with it. Platts already included Oman in its Dubai assessment and saw a separate Oman quote as superfluous. However, as long as Saudi Arabia and other Middle East producers had Oman in their formulae, Platts had to keep it. Very few (if any<sup>10</sup>) derivative products used the assessment and Platts 'window' trades saw few, if any Oman trades. In comparison, Dubai Mercantile Exchange (DME) Oman daily settlements were generally based on at least one or two million barrels of Oman futures<sup>11</sup> trades. For this reason, from October 1, 2018, Saudi Aramco changed their price formula to include DME Oman futures settlement, instead of Platts Singapore assessment for the grade.<sup>12</sup>

On January 4, 2016, Platts added Murban as an alternative delivery crude in its Dubai and Oman crude oil benchmarks.<sup>13</sup> Traditionally Murban traded at significant premium both to Oman and Dubai grades, and the addition of Murban was seen only as a 'safety valve' in case of a market squeeze, and probably never to be needed. However, the current demand shock has had a major impact on gasoline use and this product is the major part of each barrel of Murban crude produced. With negative gasoline and naphtha margins, Murban premium has taken a major beating<sup>14</sup> as can be seen in Figure 3. Unexpectedly, Murban started setting the price of both Dubai and Oman in the Platts assessment as the cheapest crude in the basket.

<sup>10</sup> Prior to PDO moving to Oman OSP based on DME settlements, there was a liquid 'MOG' Oman derivatives swap market which was essentially a forward 'bet' on the Oman OSP relative to Dubai swaps.

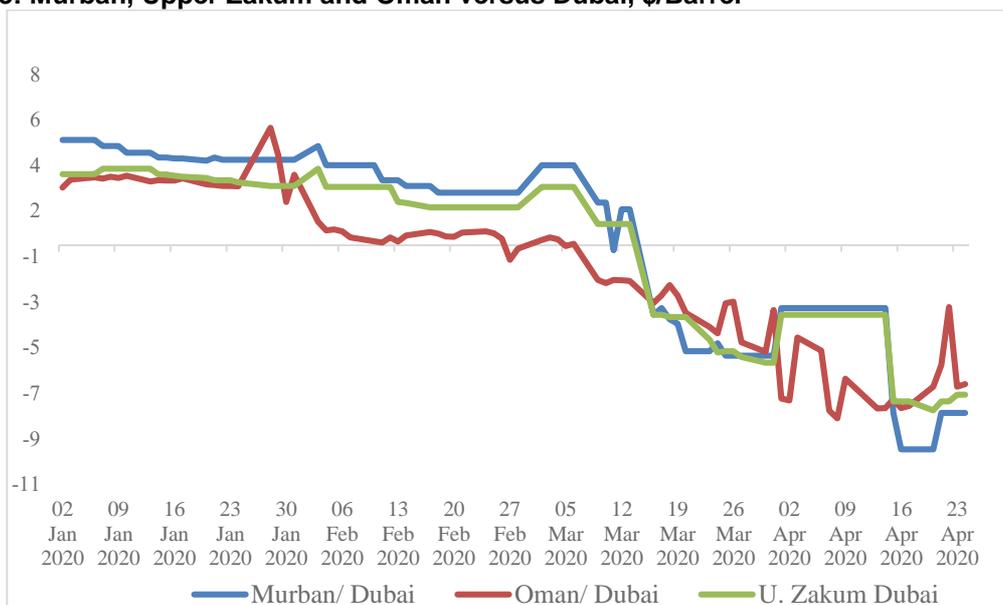
<sup>11</sup> The contract is physically delivered.

<sup>12</sup> See A. Imsirovic (2018), 'What Next for Asian Benchmarks? – A Footnote'. OIES Energy Comment, Oxford: Oxford Institute for Energy Studies.

<sup>13</sup> For details, see: [https://www.spglobal.com/platts/plattscontent/\\_assets/\\_files/en/our-methodology/methodology-specifications/apag-crude-methodology.pdf](https://www.spglobal.com/platts/plattscontent/_assets/_files/en/our-methodology/methodology-specifications/apag-crude-methodology.pdf)

<sup>14</sup> PLATTS: 3--New York 89: Platts Crude: WTI Midland: Chinese major heard bought June/July delivered cargoes at ICE Brent minus \$10-11/b, DES 9:12: - Platts, 22-Apr-2020 01:12:53 PM

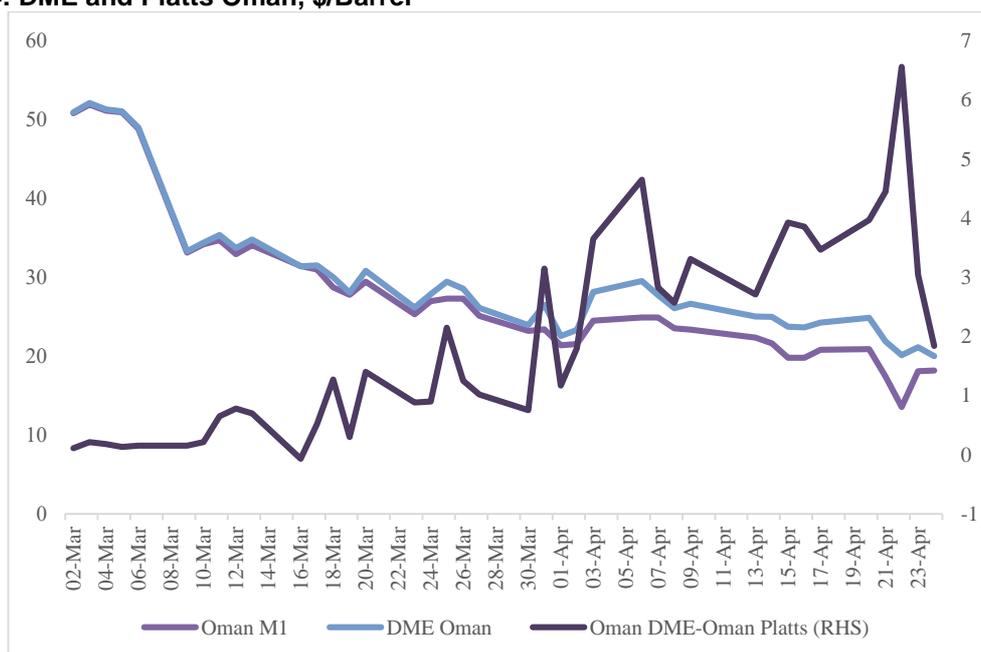
**Figure 3: Murban, Upper Zakum and Oman versus Dubai, \$/Barrel**



Source: Platts, DME

As a result, Platts Oman price started to reflect not Oman, but lower, Murban value. On April 17, for the first time ever, Murban was delivered into the Platts Oman contract.<sup>15</sup> Being significantly cheaper than Oman, Murban has dragged down the Platts Oman<sup>16</sup> assessment well below the physical Oman contract on the DME (see Figure 4). While this is fine at times of squeeze in a contract when prices are expected to be inflated, now it reflects the aberration caused by the demand shock.

**Figure 4: DME and Platts Oman, \$/Barrel**



Source: Platts, DME

<sup>15</sup> PLATTS: 100-- CRUDE MOC: First April convergence sees Murban declared on June Oman partials, 17-Apr-2020 04:47:18 PM Platts.

<sup>16</sup> An alternative view of the problem is that the 'very high DME Oman values are in fact out of step with the rest of the region's crude values'.



Just like the CME WTI contract, Platts Oman performed as expected – it did what it said ‘on the tin’ (the way it was specified). However, at least temporarily, this did not make them useful contracts. The demand shock and the extreme market conditions it created have mercilessly exposed its vulnerabilities and raised fundamental questions about the future of Murban as a benchmark. The new and highly anticipated ‘Murban’ futures contract on the ICE<sup>17</sup> exchange was announced last year, but it has since gone ‘on hold’. In theory, the contract showed a lot of promise<sup>18</sup>—however, apart from the compliance and technical considerations which are usual for setting up any new contract on the exchange, current volatile market conditions may dampen the appetite of all expected participants, including potential clearing members of the exchange. While this by no means implies the end of the contract, it is likely to be further delayed.

## Brent Insulated?

The Brent benchmark has remained relatively insulated from the dislocation of WTI, as Brent is a waterborne crude and is not constrained by the logistical problems encountered by the WTI contract. The Brent terminal at Sullom Voe has storage capacity of just over 30 million barrels. However, being a waterborne terminal, theoretical storage capacity for the contract includes all the shore tanks in North West Europe plus potential shipping storage. While we live in ‘unprecedented’ times when all records are being broken, it is highly unlikely that we shall see negative prices in the ‘Brent’ contract. The brunt of the demand loss is being taken up by the quality differentials and Dated Brent. Brent spreads have reflected the weakness of the front end of the market as well as the uncertainty of the demand recovery.<sup>19</sup> Both futures and physical contracts have remained reasonably aligned with EFP values remaining stable, around 10 cents per barrel.<sup>20</sup> However, the fact that Brent futures have passed on the heaving lifting of the fundamental oversupply to Dated Brent means that most physical players have to make sure that they have access to the full range of additional derivatives instruments, in order to manage risk. When managing the Brent price risk, the futures are simply not going to do the job. Contract for Difference (CFDs), Dated to Front Line (DFL) swaps and EFPs need to be used as well. Not all the players involved in the marketplace have access to them, or the expertise to use them. However, for those with full access to these instruments and understanding of the Brent complex,<sup>21</sup> the benchmark has performed well.

## Is the Worst Yet to Come?

While some of the issues discussed here have short term fixes, others may take a long time to emerge. The extreme dislocation of the May WTI contract in its last two days of trading is an early warning of the extreme volatility and the sharp price movements that are still to come. While the impact of the OPEC+ cuts on balances will start being felt from May onwards, the scale of contraction in global oil demand is so large that pressure on storage facilities will continue for the next few weeks. Currently, the last line of defense is floating storage, but even the constraints on storing crude in tankers are starting to show and this has been reflected in the sharp rises in tanker rates. As storage can no longer act as a mechanism to absorb the excess supply, crude has to remain underground and production shut-ins have to accelerate in many parts of the world. This will also force ‘involuntary’ compliance among the OPEC+ group.

But these pressures on storage are also revealing the fractures in some of the benchmarks and the pricing mechanisms, and negative WTI pricing for the June contract remains a real possibility, especially as Cushing is expected to fill very soon. For landlocked crudes, regulators and exchange clearers should ensure an early and orderly mechanism to liquidate positions while PRAs using WTI futures as

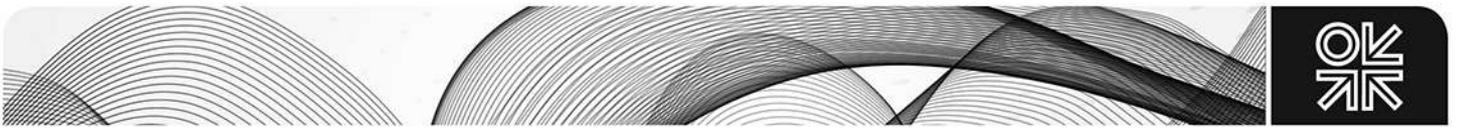
<sup>17</sup>[https://www.theice.com/murban?utm\\_source=adwords&utm\\_campaign=7010L00000gl9D&utm\\_medium=sem&qclid=EA1aIQobChMlMfzvg7al6QIVkuvtCh1KeQ8zEAAYASAAEqL4ifD\\_BwE](https://www.theice.com/murban?utm_source=adwords&utm_campaign=7010L00000gl9D&utm_medium=sem&qclid=EA1aIQobChMlMfzvg7al6QIVkuvtCh1KeQ8zEAAYASAAEqL4ifD_BwE)

<sup>18</sup> A. Mehdi, E. Muneeb, A. Imsirovic, and B Fattouh (2019), ‘Murban: A benchmark for the Middle East?’ OIES Energy Comment, Oxford: Oxford Institute for Energy Studies.

<sup>19</sup> For details of the mechanism of the price adjustment, see B. Fattouh and A. Imsirovic (2020) ‘Shocks and Differentials: How are oil markets coping?’ OIES Energy Comment, Oxford: Oxford Institute for Energy Studies.

<sup>20</sup> At the time of writing, June EFP is only 6 cents per barrel with later contracts being 10-12 cents.

<sup>21</sup> B. Fattouh and A. Imsirovic (2019), ‘Contracts for Difference and the Evolution of the Brent Complex’, OIES Energy Comment, Oxford: Oxford Institute for Energy Studies.



the underlying basis for pricing physical crudes should find ways to protect their benchmarks from these extreme dislocations. Market participants, especially financials and retail investors, should also appreciate the sophistication of these markets and should be fully aware when entering into an oil derivative contract what this entails.

While the market may expect the June WTI contract to price negatively again, an unlikely negative pricing of Brent would represent a much bigger event. In a recent note, Standard Chartered<sup>22</sup> noted that 'in the basic plotline of space-orientated Hollywood movies, the expiry of May WTI is the piece of the asteroid that breaks off and hits Earth earlier than the main segment'. Negative pricing of Brent would represent the main segment of the asteroid hitting the oil market.

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<sup>22</sup> Standard Chartered, Commodity Roadmap, 21 April 2020.