

BACKWARDATION AND THE SURGE IN COMMODITY INVESTMENTS: OPEC'S POLICY DILEMMAS RECONSIDERED ¹

1. While being agnostic about the global economy, oil market analysts have convincingly contended that the prospect for the oil market is likely to be driven more by supply-side rather than demand-side factors. Against this challenging outlook, the shift of oil futures from an exceptionally long contango (a market condition in which a futures price is higher in the distant delivery months than in the near delivery months) to backwardation (the opposite market condition) must have left OPEC with mixed feelings: relieved and yet worried. Backwardation, which is associated with a decline in crude oil inventories, would normally make OPEC feel more comfortable. However, because low inventories and backwardation are correlated with higher commodity futures returns, they are likely to attract more interest from institutional investors. Although different from active speculation, commodity investment plays a similar role in futures markets and, as a result, can contribute to moving oil prices beyond what the market fundamentals would justify.

2. This commentary seeks to gain insight into the current structure of oil futures markets and the implications of backwardation on commodity investment. It further discusses the strategies that focus on petroleum futures contracts and the risk they contribute to market stability. The commentary concludes by reconsidering the kernel of the policy dilemmas facing OPEC.

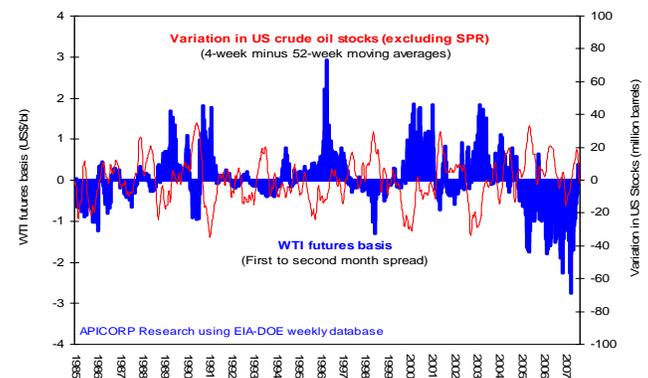
From contango to backwardation

3. Oil market analysts have described the recent shift from contango to backwardation as a "return to normality" (at the time of writing the shift was more consistent for WTI than for Brent). This qualification stems from the observation that, by comparison to other commodities, crude oil futures contracts trade in backwardation more often than not. How exactly often does that happen can be inferred from simple statistics. Over the last two decades or so, the percentage time in backwardation for the WTI futures market, which happens to be the dominant and most transparent market, has been estimated at around 63% (see Figure further below).

4. As a matter of fact, contangos and backwardations have alternated in cycles closely related to changes in inventories. During the last contango, which persisted for about 30 months until the end of July 2007, global inventories had built up to record levels.² Despite OPEC's response to cut its production twice in November 2006 and February 2007, OECD commercial inventories (a convenient proxy for global inventories) stood at around 4,178 million barrels (mb) by the end of the second quarter of 2007, 67 mb above their 5-year average.³ There is evidence, however, that US crude oil inventories (excluding those in the Strategic Petroleum Reserve), which built up more robustly, have come down since. End-of-August statistics from the EIA-DOE point to a 7% decline from end-of-June peak of 354 mb. The drawdown was set in motion by local imbalances following return onstream of temporarily suspended refineries, and by seasonal factors tuned to the higher gasoline demand for the US summer driving season. A further contributing factor might have been an atypically negative WTI-Brent spread, which closed arbitrage trade between the North

sea and the US Gulf Coast. The drawdown signaled tight supplies. The resulting premium for immediate delivery shifted, through time arbitrage, the term structure of WTI futures prices into backwardation.

5. The extent to which inventory changes are related to changes in the term structure of futures oil price is best established by taking a longer term view. In keeping to the US market, the Figure below suggests a link between the variation of US inventories and the WTI futures basis defined as first to second month spread in futures contract prices. In order to smooth out volatility and seasonality, changes in inventories have been calculated as the difference between the 4-week and 52-week moving averages. A close look at the resulting graph shows that, for the most part, a positive basis (backwardation) concurs with lower levels of inventories. Conversely, a negative basis (contango) concurs with higher levels of inventories.



6. A more extensive interpretation of the pattern of contango and backwardation is offered by the traditional theory of storage. In its simplest formulation, the theory explains futures prices in terms of the cost of storage, interest rates and a convenience yield (the benefits accruing from holding inventories). A contango provides inventory holders with an incentive to build up inventories since expected higher future spot prices would compensate them for the total cost of carrying their inventories. The convenience yield justifies inventory behaviour during periods of expected decline in future spot prices. In a backwardated market, a positive futures basis (henceforth referred to as the "roll yield") implies that the convenience yield is higher than the costs of storage and interest rate. It further implies that, in a context of tight supplies, the convenience yield is likely to increase high enough to shift the term structure into backwardation.

7. A further extension of the above theoretical framework to include hedging demand from risk-averse market participants is needed for the following section on commodity futures investment. Suffice to say for the moment that the theory of storage has been extended to predict a link between the levels of inventories, the shape of the futures curve, and the expected futures risk premiums settled between hedgers and futures investors and speculators.

Commodity futures investment strategies

8. An increasing number of academic and empirical research have demonstrated the superior performance of commodity futures investments in terms of historical risk-return profile, inflation-hedging properties, and portfolio diversification benefits. As a result, these investments have rapidly developed as an attractive

¹ This commentary has been prepared by Ali Aissaoui, Head of Research at APICORP, for publication in *MEES* 50:37, dated 11 September 2007. The opinions are those of the author only.

² For a critical analysis of the differing interpretations of the causes and consequences of the last contango, see: Fattouh, Bassam, (2006), "Contango Lessons", *Oxford Energy Comment*, Oxford Institute for Energy Studies, September 2006. Published in *MEES* 49:48 dated 27 November 2006.

³ OPEC Secretariat (2007), *OPEC Monthly Report*, August 2007.

alternative to traditional asset classes. Most recently, an empirical study by Gorton, Hayashi and Rouwenhorst (Gorton et al., 2007)⁴ analyzed commodity futures returns using an extended version of the theory of storage and an extensive inventory database. The authors found that the level of inventories is a key determinant of the commodity futures risk premiums. As concisely summarized in the Table below, the compensation for assuming the price risk of short hedgers is higher at low inventory levels. In addition, compared to a high inventory portfolio, the low one displays less volatility and implies a higher so-called Sharpe ratio (the closer to 1 the ratio is, the better is the return per unit of risk).

Period from December 1990 to December 2006	Equally Weighted Index	High Inventory Portfolio	Low Inventory Portfolio
Annualized Returns	8.98%	4.62%	13.34%
Volatility	8.93%	11.27%	10.80%
Sharpe Ratio	0.55	0.05	0.86

Source: Gorton et al. (July 2007)

9. In contrast to the above, but without contradicting it, Wall Street investment analysts have tended to derive their views and investment strategies from Keynes-Hicks classical theory of "normal backwardation". Similarly to the theory of storage, "normal backwardation" views futures markets as basically risk-transfer mechanisms whereby investors and speculators earn a risk premium for assuming future spot risk that commodity producers and industrial consumers are willing to hedge. The difference is that the theory of storage, in its extended form, relates risk premiums with the levels of inventories, while "normal backwardation" attributes risk premiums to hedging "pressures".

10. Therefore, in seeking to attract funds from passive, mostly institutional, investors, investment banker analysts focus on "backwardation" strategies, which implies positive roll yields. A roll yield is the futures basis earned by investors as (rolled forward) futures contracts draw to a close and futures price converge to the spot price. However, two other sources of returns contribute to the overall return. The first is the spot yield, which derives from the appreciation of the spot price of the underlying commodity. The second is the collateral yield derived from investing (assumingly in US Treasury Bills) the cash collateral used to settle investors' positions over time.

11. Commodity Investment strategies are implemented through a variety of investment vehicles mostly linked to a composite index of commodities. The longest-running Goldman Sachs Commodity Index (GSCI) provides a traditional benchmark for the above returns. GSCI is world-production-weighted with petroleum contracts varying around 60% of the total. Its returns since inception have been estimated to be 3.9% for the roll yield, 1.8% for the spot price appreciation, and 6.4% for the collateral yield.

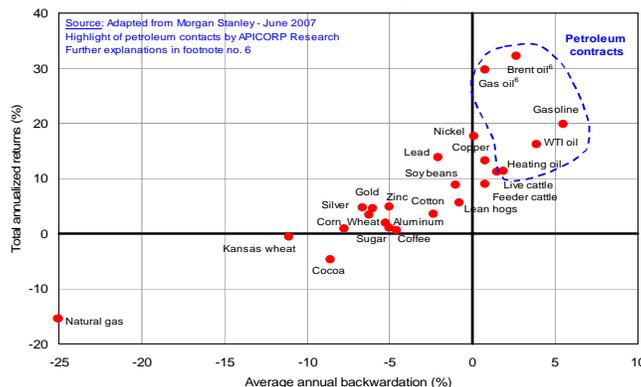
12. New products, such as the Deutsche Bank Liquid Commodities Yield Indices Optimum Yield (DBLCI-OY), have recently been introduced to tackle the dynamic nature of commodity term structures.⁵ However, the underlying correlative reference model remains the same. It is typically illustrated in the Figure below, which plots the total annualized returns on individual collateralized futures contracts of various commodities as a function of their historical backwardation (relative futures basis).⁶ The Figure

⁴ Gorton, Gary B. et al. (2007), "The Fundamentals of Commodity Futures Returns", Yale ICF Working Paper No. 07-98, July 2007. Link to the full text: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=996930

⁵ This consists of rolling into futures contracts that either maximizes the positive roll yield in backwardation or minimizes the negative roll yield in contango. Ref. Lewis, Michael et al. (2006), "DBLCI-OY: Technology To Tackle Term Structure Dynamics", Deutsche Bank, June 2006.

⁶ Figure communicated by Morgan Stanley. The original is sourced to data from GSCI and Morgan Stanley Commodities. According to the source, further analysis on historical data on Brent (1989) and Gas Oil (1986) indicated returns more in line with the other petroleum contracts.

suggests that backwardated commodities, chief of which petroleum products (excluding natural gas), tend to generate higher returns.



13. To sum up the above discussion, it is important to note that investments in backwardated commodity futures offer potentially higher returns over long periods. Passive investors are expected to focus on commodity baskets weighted heavily towards petroleum. Although their time horizon, risk profile and investment strategies are different from active speculators, the investment vehicles they use transact in the same manner on the futures. As a consequence, their soaring activity is likely to add considerably to the destabilizing effect of speculation and present OPEC with yet another policy dilemma.

OPEC's policy dilemmas reconsidered

14. In the aftermath of the oil crisis of 1998, when prices dipped below US\$10/bl, OPEC's apparent policy response was aimed at altering the prevailing contango and forcing inventory drawdowns. How this policy has evolved as OPEC has grown aware of the risks posed by increasing speculative investments is not clear. Some OPEC observers have most recently contended that, in order to discourage speculative flows into the futures markets, OPEC reversed its policy to support the last contango, adding that it only had second thoughts when US inventories reached a record level late in 2006.⁷ While there is ample evidence to support the claim that the huge inventory overhang in the US market prompted OPEC's first output cut in November 2006, the argument that it had contributed, in a deliberate policy move, to contrive a contango may be mere conjecture.

15. It remains consistent, however, to say that the risks to oil market stability nowadays are likely to be higher in backwardation than in contango. Even assuming a constant appreciation of spot prices (spot yield), the negative roll yields generated by contango tend to inhibit commodity investors. By contrast, the positive roll yields achieved in a backwardated market offer greater prospect of realizing higher returns. In such a case, a surge in commodity investments will only lead to more speculative activities and increase, as a result, the likelihood of renewed oil price spikes and greater volatility. Obviously, OPEC has no interest in such economically damaging oil price behaviour.

16. The suggestion that OPEC's policy dilemma is one of choice or decision between contango and backwardation may be worthy of debate. In the current circumstances, however, a more genuine dilemma for OPEC's policy makers is how to encourage backwardation and lower inventories without letting passive commodity investors and active speculators compromise their efforts to stabilize the oil market. As with any dilemma, there is no easy solution and certainly not if OPEC's sole policy instrument, which is limited to quantitative adjustments to output, is inappropriate.

⁷ Blas, Javier, (2007), "Crude futures prices in spotlight", Financial Times Online, July 23, 2007.