



Oil futures versus physical markets

How are they related?

Part 1: link between spot and futures prices





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1 Introduction

Everybody who is active in the oil industry knows that financial futures markets are linked to physical oil markets and that they determine to some extent the behavior of players in that market. But what is the logic behind these links, how do they exactly influence markets and most importantly, how can one anticipate on changes in market fundamentals? This is the mystery that we will try to unravel in this e-paper.

The explanation of this vast subject has been cut into three e-papers. One will cover the linkage between spot and futures prices, one will cover the effect of the forward curve on physical markets and the last e-paper will cover the effect of crack spreads on market players.

This e-paper focuses on links between spot and futures prices. We will start our investigation by determining what links are present and how this drives fundamentals. We will look at some examples which highlight the interplay between futures and physical markets. Based on this analysis we will discuss what a trader should monitor in order to get a broad view of the market structure and what is needed to be successful.

2 Links between spot and futures prices

Futures and spot prices are linked in various ways. We will discuss the most important links that drive market fundamentals. First of all we look at the convergence theorem of spot and futures prices. Afterwards the influence of the forward curve is discussed and last but not least we will give insights into how crack spreads drive the behavior of market players.

2.1 Convergence

The clearest link is by design of the futures contract. Futures contracts can be traded until the contract expires. If a company has an open position in the respective contract at expiration, then this will result in a physical transaction. A long position at expiry will result in the obligation to buy oil and a short position will result in the obligation to sell oil. The quantity, delivery time and place are specified in the contract. Because anyone trading futures contracts can always decide to hold the contract until expiry this results in the **convergence of futures and spot prices** at the expiry date. See figure 1 for a graphical representation of this principle.

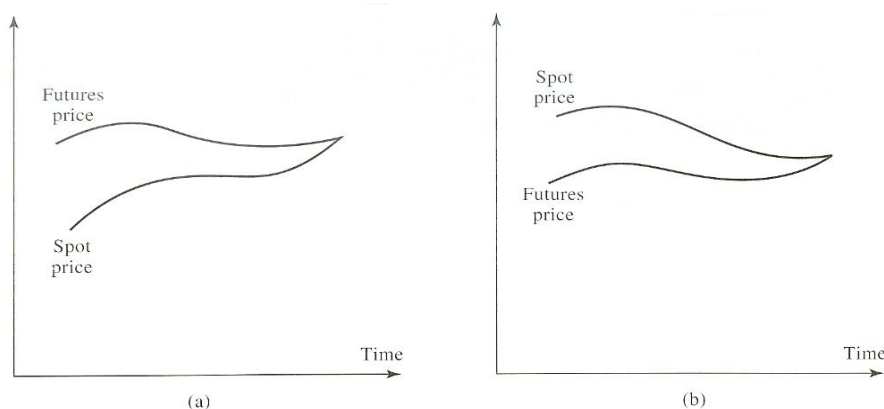


Figure 1: convergence of spot and futures oil product prices

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If this convergence would not hold then traders can take advantage of this situation and make large profits. Sometimes such situations occur but arbitrage mechanisms prevent large deviations between futures and spot prices.

2.2 Benchmarking

Futures markets have been created to manage price risk in commodity markets. By having a position of similar size but opposite to the physical position price risk can be eliminated. Oil futures exchanges began business back in the 1980's and since then trading volumes have exploded. Current trading volumes on oil futures exchanged are multiples of trading volumes in physical markets. Because of this and because futures are used to hedge price risk oil traders prefer to price transactions in physical market relative to futures prices. Futures prices act as a so-called **benchmark**.

2.3 Spot-futures spreads

The difference between benchmark futures prices and physical oil product spot prices is called the 'differential'. For instance gasoil, diesel and jet-kerosene ARA spot prices are priced against ICE gas oil front month futures prices. Differentials can also vary and cannot be hedged using futures. This is called the basis risk and therefore differentials, which are essentially the **spot-future spread**, are also very important. In figure 2 the paths of gas oil and diesel spot-future spreads are depicted.

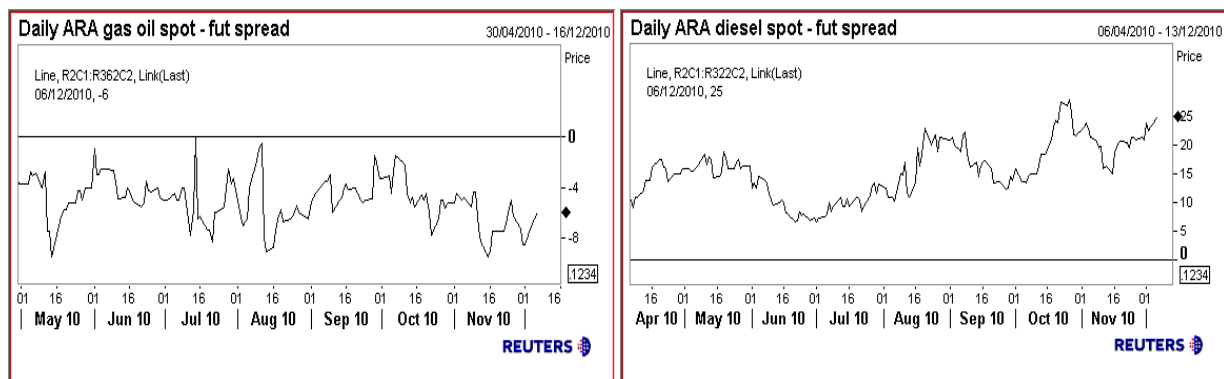


Figure 2: gas oil and diesel spot-future spreads

3 The Big picture

Now that we know what links exist between futures and physical markets it is a good idea to summarize the insights so far. We have learned that:

- spot prices and corresponding futures prices converge at expiry
- futures prices are used as benchmark prices in physical markets
- spot-future spreads correspond to the basis risk of a futures hedge

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Other relations will be explained in part 2 and 3 of this e-paper.

Oil traders need to monitor these indicators below because it gives a picture of market fundamentals:

- Oil futures prices:
 - NYMEX WTI/Crude Light
 - NYMEX RBOB gasoline
 - NYMEX Heating oil
 - ICE Brent crude
 - ICE Gas oil

- Spot-futures spreads
 - ARA gasoline – NYMEX RBOB
 - ARA gas oil – ICE Gas oil
 - ARA diesel – ICE Gas oil
 - ARA jet – ICE gas oil

The key to success in oil markets is not only to monitor these indicators but to anticipate on changes and make plans for possible scenarios that can emerge. You can profit from resulting dynamics and beat the market before it beats you. The window of opportunity is short so: **Be prepared to take action!**

4 More information

Specifically for oil traders PJK has developed **market analysis reports** for the Northwest European oil products markets. We monitor and report on the highlighted indicators and our reports support scenario planning. Furthermore our advanced knowledge of market mechanisms complemented with our econometric experience can be utilized to your advantage by providing a platform to see how different scenarios influence oil markets. With this information **scenario planning** is improved drastically. Finally companies can profit from market dynamics instead of being a victim of it.

If you want to learn more about these subjects or wish to be supported with your daily oil market analysis or with market research then you can always contact PJK International. PJK has more than thirty years of experience in this field and has helped many companies with its knowledge. Contact details can be found in the header of this document.

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