

# The European Market for Crude Oil



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- Benchmark Crude Oils
- Refining Process
- Price Spreads between different Crudes
- Forwards and Futures
- The Physical Market
- Hedging Instruments
- Conclusions



# Which Oil Price ?

- There are a huge number of grades, but only a few benchmarks:
- West Texas Intermediate (WTI) is traded on the NYMEX (since 1979)
- North Sea crude oil: Brent/BFO (Brent, Forties, Oseberg) is traded on the International Petroleum Exchange (IPE) London (since 1988)
- The OPEC publishes a price for a basket consisting of a number of local benchmarks (e.g. Dubai Fateh).
- Other local benchmarks, e.g. Asia-Pacific:  
Tapis (Malaysia)



# Refining Process

- **Simple distillation:**
- Crude oil is heated and put into a distillation column - different products can be recovered at different temperatures.
- Lowest temperatures: naphta (used in the chemical industry) and gasoline (lighter and more valuable products)
- Middle temperatures: kerosine, heating oil/diesel fuel (middle distillates)
- Highest temperatures: residual fuel oil (heaviest products)
- **Downstream processing:**
- Catalytic crackers and cokers use the heavy distillates to produce lighter products.
- Hydrotreaters remove sulfur.

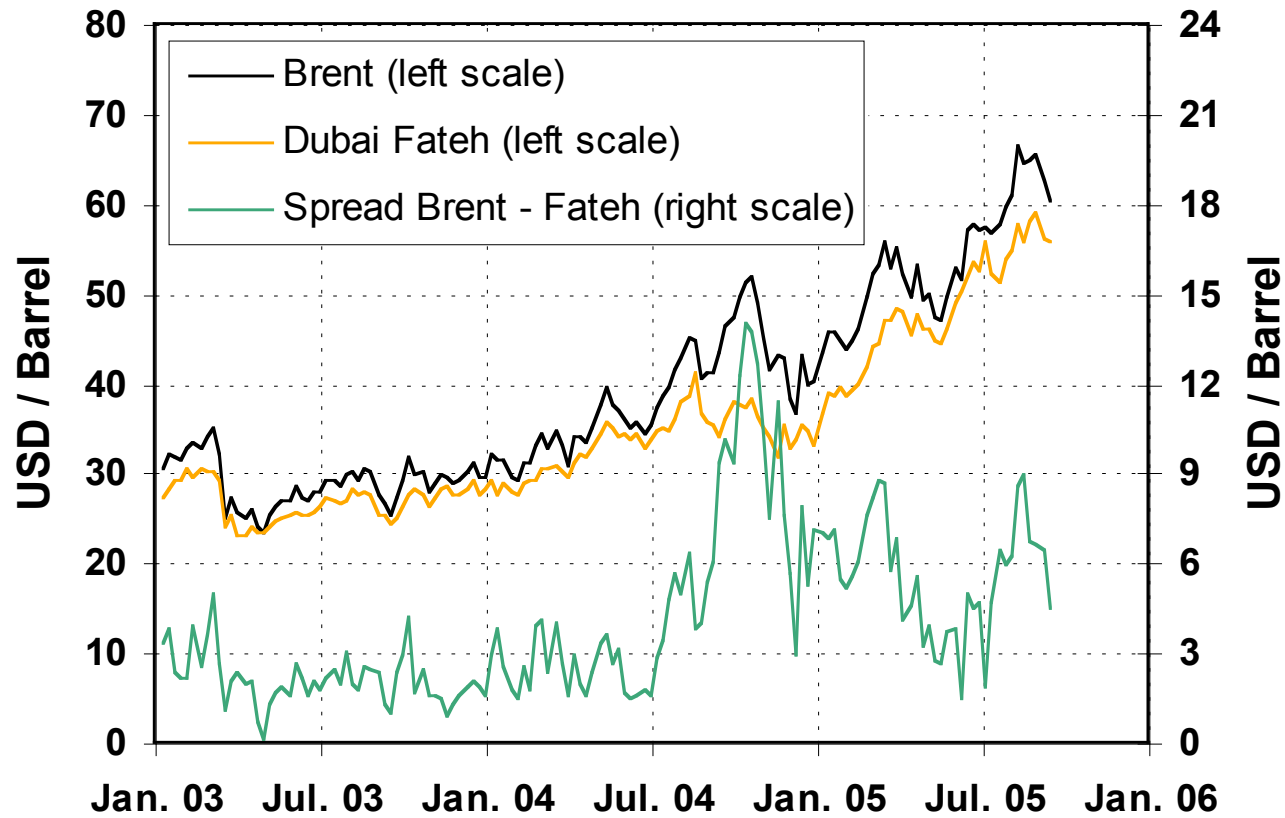


# Price Spreads between different Crudes

- Price differentials between crude oils reflect the relative ease of refining.
- Less dense (“lighter”) crudes (e.g. WTI and Brent) yield easily a higher fraction of more valuable products than “heavy” crudes (e.g. Ural oil).
- “Sweet” Crudes with less sulfur content (e.g. WTI and Brent) need less processing than “sour” crudes (e.g. Dubai Fateh).
- Refinery shortages widen the spread between more valuable crudes and cheaper ones.



# Brent versus Dubai Fateh



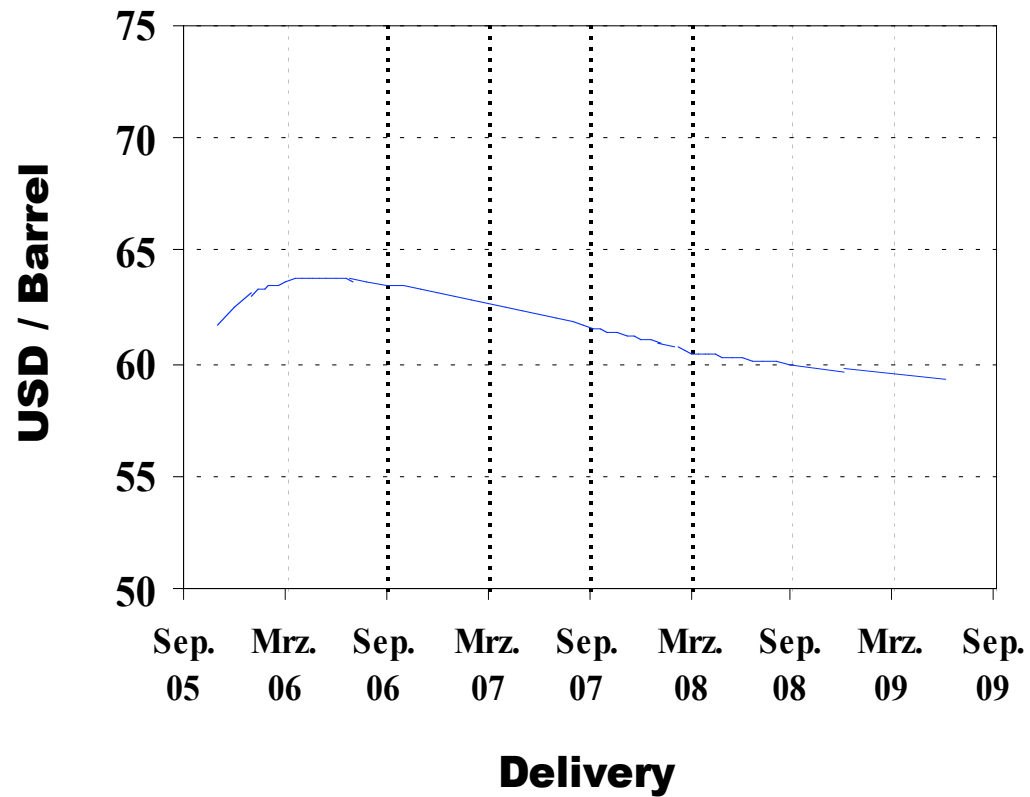


# Forward Prices for Crude Oil

- Price of oil depends on the delivery date.
- **Example for a forward trade:**
- Yesterday a counterparty A (e.g. a producer) sold 600,000 Barrel Brent Oil with delivery in December 2005 to counterparty B.
- They agreed on the price. No cash flows were exchanged.
- Assuming that today's oil price is higher, counterparty A made a loss because if it wants to buy back the oil, it has to pay a higher price.
- Calculation of the current value of the trades is called "Mark to Market".
- At maturity of the forward: delivery and payment or cash-settlement.



# Forward-Curve Brent Oil



Quelle: Reuters, IPE





# Future Trading at the IPE

- Synthetic “mini tanker” of 1,000 Barrel.
- **Example for a future trade:**
- I sold yesterday 10 December-05-future contracts (“10 lots”) at the IPE at 64.00 USD/Barrel.
- Yesterday’s closing price for that future at the IPE was 65.50 USD/Barrel.  
Margening: I had to pay  $1.50 \text{ USD/Barrel} \times 10 \text{ lots} \times 1,000 \text{ Barrel} = 15,000 \text{ USD}$  to the IPE (Mark to Market).
- Assuming that today’s closing price is 65.00 USD/Barrel, I obtain 5,000 USD from the IPE. Overall loss is 10,000 USD.
- At maturity of the future (November 15<sup>th</sup>):  
Final margening with the IPE Index which monitors the 21-day-forward market -  
or exchanging a future for physical.



# Trading Cargoes: the 21-day-Forward Market

- The terminal for Brent Oil is Sullom Voe (Shetland Islands).
- Producers tell the operator well in advance how much oil they want to deliver for a particular month.
- They can sell contracts (600,000 Barrels) for a particular delivery month to other market participants (consumer, traders). They agree on the price but no cash flows are exchanged.
- Operator finalizes loading schedule and tells the producer when they should deliver (3-day-window).
- Producers/Sellers of a contract have to tell their counterparty 21 days in advance when the cargo will be loaded.



# The Spot Market: Dated Brent

- 21 days before delivery of a cargo a “Daisy chain” of notices (to buyers of 21-day-forwards for the adequate delivery month) might be initiated.
- A holder of a contract who received notice at the last possible moment before the expiration period at 5 p.m. and was unable to require another purchaser to take delivery was said to have been “five o’clocked”.
- After that a cargo is “Dated Brent”.
- It is used as the benchmark price for spot transactions.
- However, price indications for that (e.g. Reuters) are almost never drawn from the actual market but from a slowly varying spread between the IPE future and that market.



# Is the Oil Market well designed ?

- Paul Horsnell, Oxford Institute for Energy Studies:  
“A major feature of the Brent market is that it works extremely well as long as one does not think about it too hard.”
- The oil market was not designed but grew by the need of producers and consumers (hedgers).
- Oil market is the larger than any other energy market -  
IPE is a highly liquid market (0.1% bid offer spread).
- On the basis of IPE prices there is a huge OTC-market for tailor made hedging instruments.



# Examples for OTC-Hedging-Instruments

- Cash settled OTC-forwards or swaps (multi-forwards) on special dates
- Hedger buys a cash settled option (call) with at-the-money strike and a fixed maturity. At maturity, the hedger gets a payment which increases linearly with the market price of oil = insurance. On falling oil prices the option expires worthless.
- Zero-cost structures, e.g. buy a call with higher strike and sell a put with lower strike than the current oil price (own contribution and a finite participation on falling prices).
- Contract for differences (CFDs)  
paying the difference between  
Dated Brent and 21-day-  
forward-prices



# Conclusions

- The european oil market serves all participants (producers, consumers, traders).
- A market with an exchange is much more efficient than one without (e.g. steel).
- Speculators/traders serve the market because they provide liquidity.
- The influence of speculators is limited:

“He that sells what isn’t hisn  
Must buy it back or go to prisn.”



- Hedgers act as speculators too, because they have to decide when to hedge.

