Contango vs Backwardation

The price quoted for a commodity is often the cash or spot price, but even more often it's the price of the active month futures contract traded on a futures exchange—and those prices tell only a part of the story when it comes to the value of a commodity.

How are Futures/Forwards Priced ?

For Forwards (Using Annual compounding)

1.2 Equity Index Futures Pricing

The fair price of the equity index futures contract is:

$$(7) \qquad F = S\left[1 + \frac{r_M t}{360}\right] - D$$

where
S – equity index,
r_M – annualized risk-free rate,
t – days to expiration,
D – value of dividends.

For Futures (Using continuous compounding)

Forward contract with intermediate payments

For futures which also consist of dividend payoffs, storage and inventory costs, insurance costs, etc, these also have to be taken into consideration in a similar manner. Let's consider a future which pays a divided at time $t = t_1$.

Consider the following portfolio:

Transaction	Now	t_1	Expiry
Buy Spot	$-S_0$	0	S_T
Borrow money at rate r	S_0	0	$-e^{rT}S_0$
Sell futures contract	0	0	$F_0 - S_T$
Receive Dividend	0	D	0
Reinvest Dividend at R	0	$-D$	$De^{R(T-t_1)}$
Net proceeds	0	–	$F_0 - e^{rT}S_0 + e^{R(T-t_1)}D$

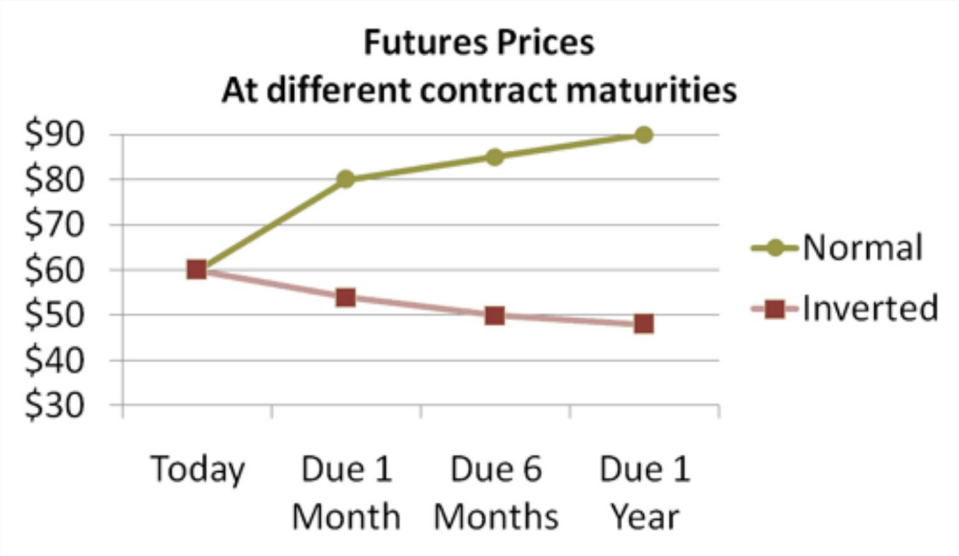
This is a portfolio that is designed to payout $F_0 - e^{rT}S_0 + e^{R(T-t_1)}D$ on expiry. As before, this will be arbitraged to a price of 0. Hence, the current future price can be determined as

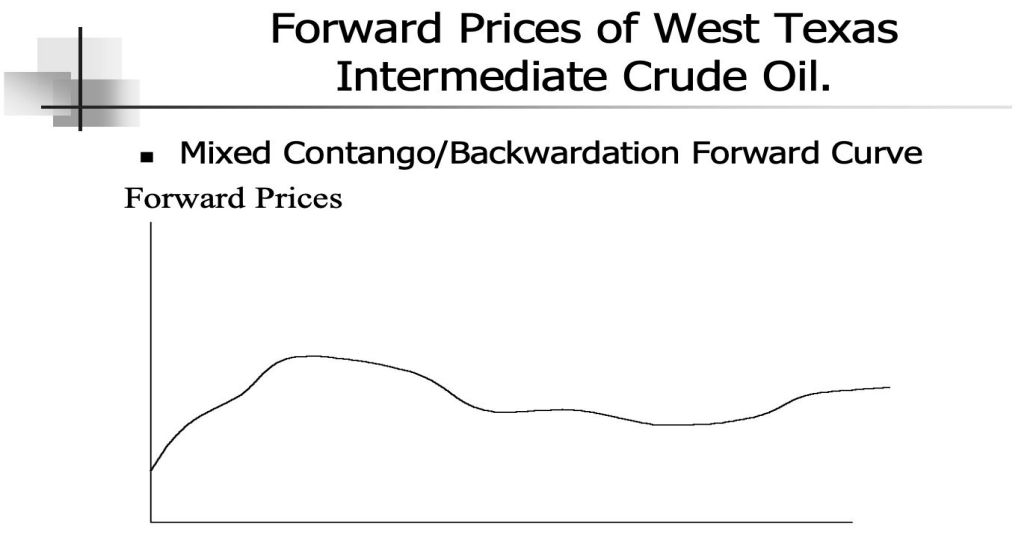
$$F_0 = e^{rT}S_0 - e^{R(T-t_1)}D$$

Forward Curve

- The forward curve is a function graph in finance that defines the prices at which a contract for future delivery or payment can be concluded today.
    - For example, a futures contract forward curve is prices being plotted as a function of the amount of time between now and the expiry date of the futures contract (with the spot price being the price at time zero).

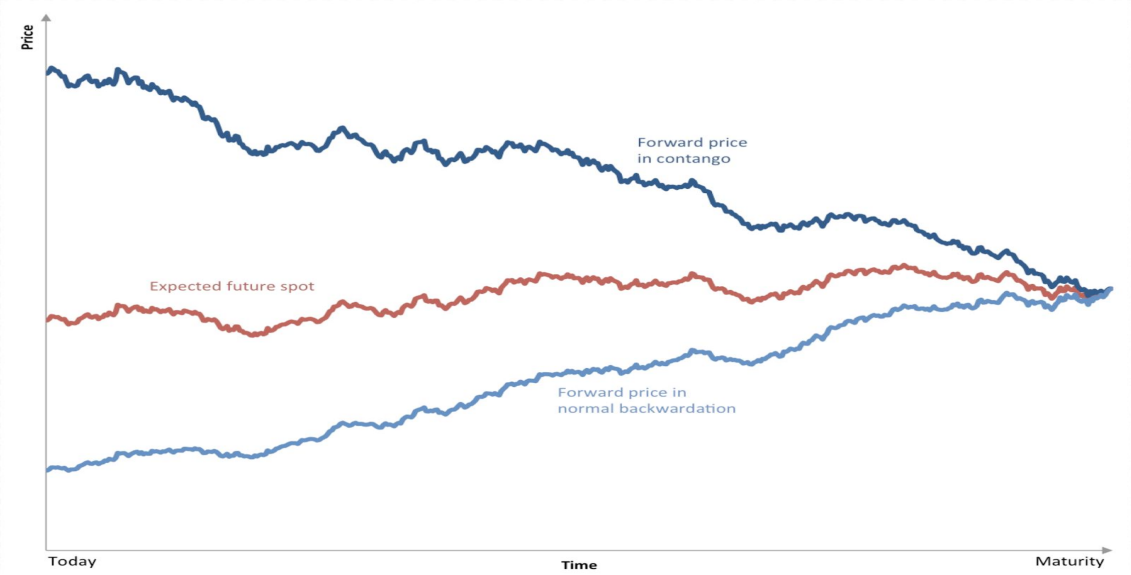
- The traditional crude oil futures curve, for example, is typically humped: it is normal in the short-term but gives way to an inverted market for longer maturities.





Convergence Property

- As we approach contract maturity—we might be long or short the futures contract—the futures price must move or converge toward the spot price. The difference between the two is the **basis.**
- That's because, on the maturity date, the futures price must equal the spot price. If they don't converge on maturity, anybody could make free money with an easy **arbitrage.**
- A convenience yield is an implied return on holding inventories.



Contango

- **Contango** is when the futures contracts are trading at a premium to the spot price, i.e. the futures price is above the expected future spot price.
- Because the futures price must converge on the expected future spot price, contango implies futures prices are falling over time as new information brings them into line with the expected future spot price.
- A contango market is often confused with a normal futures curve.
- If short-term interest rates were expected to fall in a contango market, this would narrow the spread between a futures contract and an underlying asset in good supply. This is because the cost of carry will fall.

Why contango?

- A surplus in a commodity will generally express itself as a contango when it comes to calendar spreads.
- The theory behind contango is that abundant supplies on a close horizon do not guarantee abundant supplies in the more distant future. In fact, if supplies are extremely high, producers might cut back on future production. The surplus will then decrease and prices will rise by virtue of less production.
- In commodities, contango markets also exist because financing, storage, and insurance of abundant supplies cause those progressively higher futures prices by virtue of the need to carry surplus inventories. (Cost of carry). With commodities, the cost of carry generally includes storage costs and depreciation due to spoiling, rotting, or decay in some cases.

Backwardation

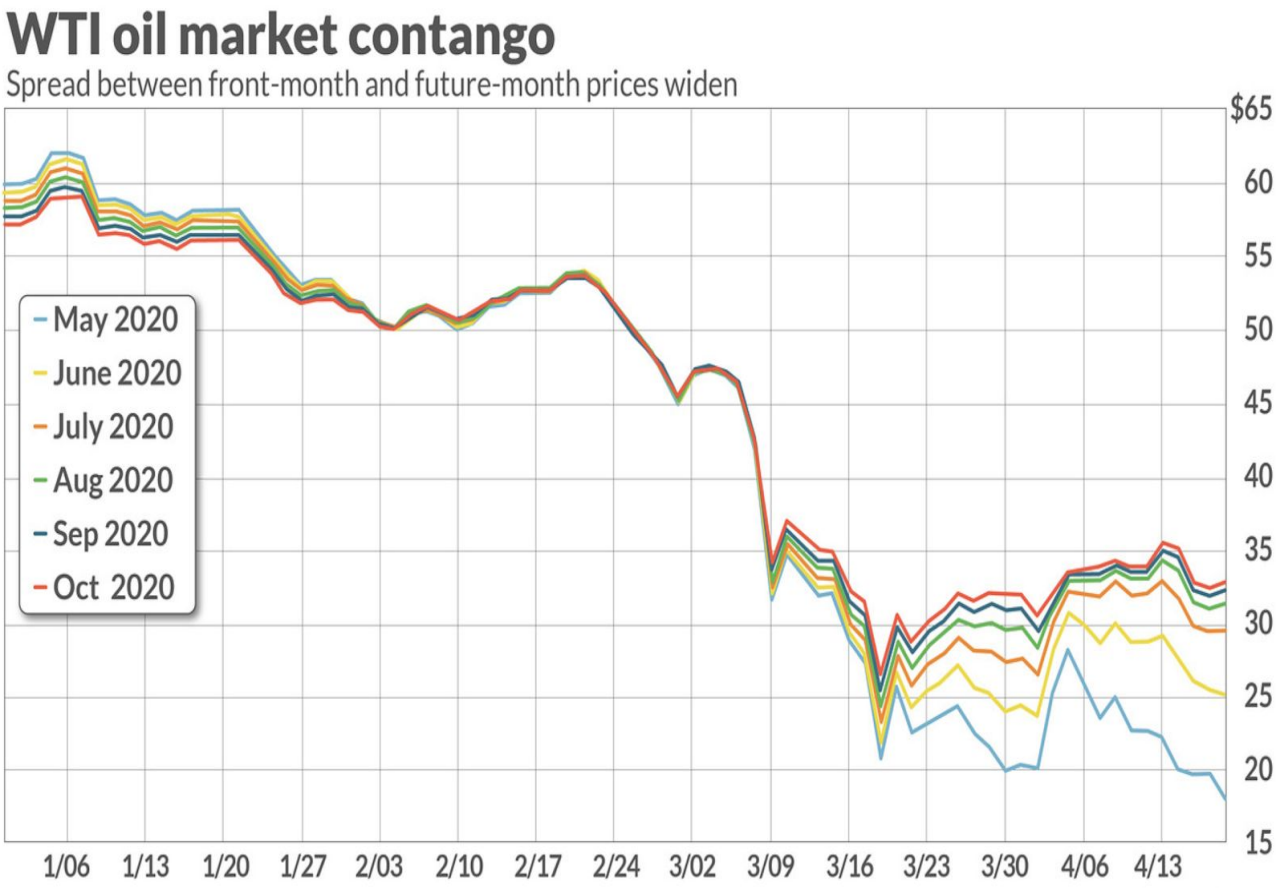
- Normal backwardation, also sometimes called backwardation, is the market condition wherein the price of a commodities' forward or futures is trading below the expected spot price at contract maturity.
- The resulting futures curve would typically be downward sloping (i.e. "inverted"), since contracts for further dates would typically trade at even lower prices.
- It means there is the expectation that the current price is too high and the expected spot price will eventually fall in the future. For example, when futures contracts have lower prices than the spot price, traders will sell short the asset at its spot price and buy the futures contracts—for a profit—driving the expected spot price lower over time to converge with the futures price eventually.

Why Backwardation?

- A backwardation starts when the difference between the forward price and the spot price is less than the cost of carry (when the forward price is less than the spot plus carry), or when there can be no delivery arbitrage because the asset is not currently available for purchase.
- This is the case of a convenience yield that is greater than the risk free rate and the carrying costs.

- In a state of backwardation, futures contract prices include compensation for the risk transferred from the underlying asset holder to the purchaser of the futures contract.
- If there's a short-term or long-term supply shortage in a commodity, chances are the market structure will tend toward backwardation. Higher nearby prices might constrain demand or elasticity while at the same time encouraging producers to increase production as fast as they can to take advantage of higher prompt delivery prices.

WTI Contango

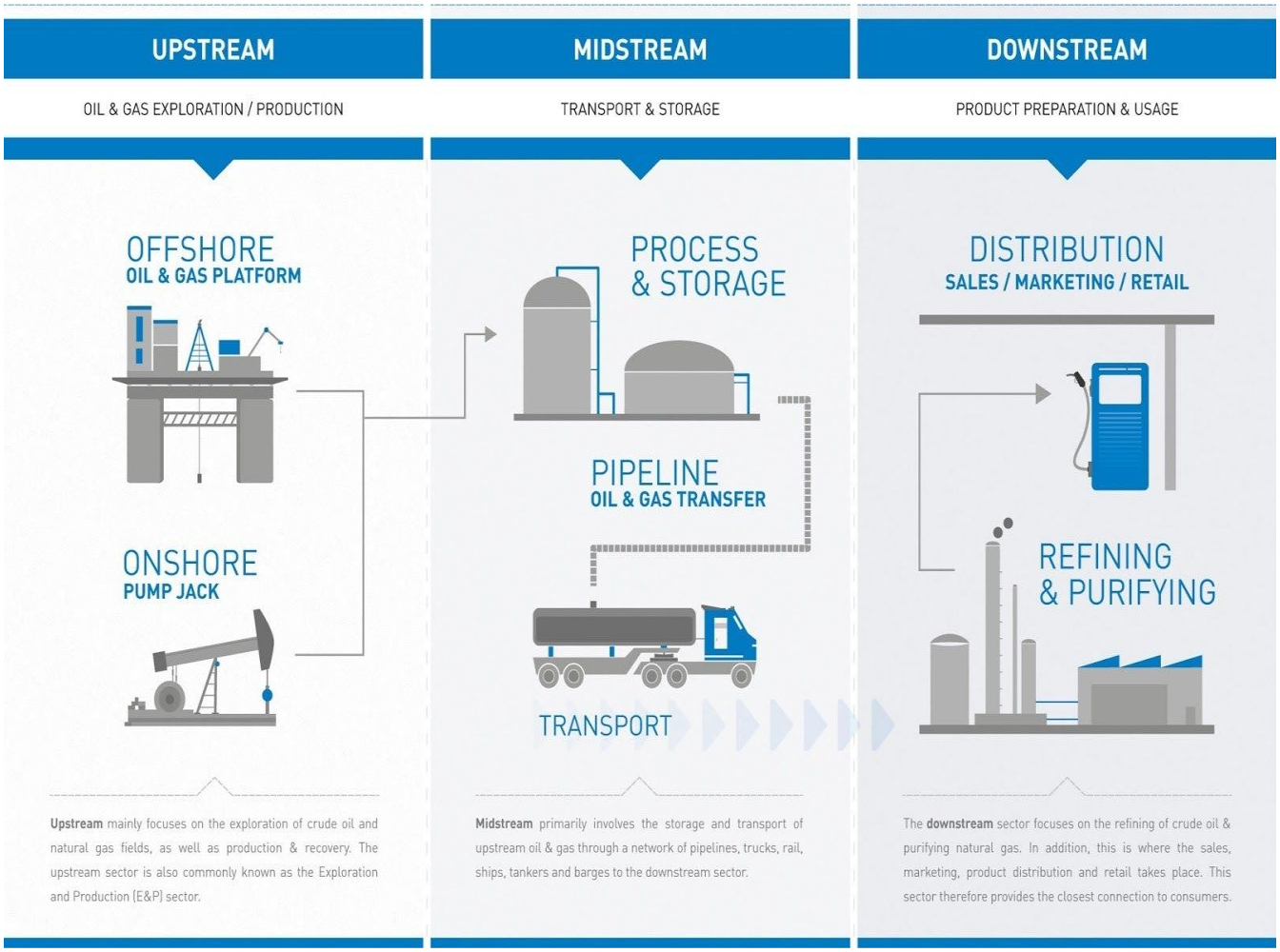


Brent Contango

Expectations

- Oil is expected to fall till the storage issues and the current glut are resolved.
- Oil production cuts will complement the price higher. Demise of the US-Shale industry due to huge losses and bankruptcy will also drive the prices higher.
- Long term outlook on oil remains positive with estimates that oil should more than double in Q3/Q4 on back of increased global demand and eradication of Covid.
- Oil has been rallying with the market off late, after initial falls and negative prices of May WTI forward, as the market sentiment is positive on hopes of discovery of effective meds and re-opening of transportation/lockdowns in countries.

Upstream vs Downstream Companies



Upstream Companies

- The upstream oil and gas segment is also known as the exploration and production (E&P) sector because it encompasses activities related to searching for, recovering and producing crude oil and natural gas.
- The upstream segment is all about wells: where to locate them; how deep and how far to drill them; and how to design, construct, operate and manage them to deliver the greatest possible return on investment with the lightest, safest and smallest operational footprint.
- It is a highly capital-intensive, highly risky, and highly regulated business. Upstream investments are high-risk, given that results of every well drilled are unpredictable. Additional risk arises from safety and environmental issues.

Types of upstream oil and gas companies

- **Integrated oil companies**
    - These are "wellhead to end user" operations that span the upstream, midstream, and downstream segments of the oil market.
    - **ExxonMobil** is the biggest publicly traded integrated oil company in the world. It operates one of the largest E&P businesses, with assets spanning the globe, a growing midstream segment, and a meaningful downstream portfolio.
    - That diversification helps mute some of the impacts of oil price volatility, since their downstream assets benefit from lower prices.

- **Independent E&P companies**
    - These companies focus primarily on the upstream segment, they make most of their money by producing oil and gas.
    - They're much more susceptible to changes in oil prices since their earnings tend to rise and fall with commodity prices.

- **Diversified oil-field service companies**
    - They're akin to a one-stop shop for developing oil and gas resources.
    - In addition to providing a variety of much-needed services, they often manufacture mission-critical equipment

- **Pure-play oil-field service or equipment companies**
    - These companies focus on one aspect of the service sector. Some, for example, only own and operate offshore drilling rigs. Others provide services specific to completing newly-drilled oil wells, or they produce sand used in fracking wells.
    - This focus on one aspect of the oil-field service sector enables these pure plays to make lots of money during boom times. But they can be much more susceptible to trouble when market conditions deteriorate.

Investing in upstream stocks

- Investors need to be mindful of which upstream stocks they buy because oil price volatility enhances risk.
- In order for exploration and production of crude to be commercially viable, the price needs to be high enough to make sense from a financial standpoint.

- One of the better ways to reduce this risk is by focusing on larger, more diversified companies. Their scale and diversification should help mute some of the impacts of the inevitable ups and downs of the oil market.

Downstream Companies

- The downstream sector focuses on the last link in the industry's value chain by turning raw materials like crude oil and natural gas into higher-valued products such as fuels and petrochemicals.
- They're less sensitive to oil price volatility, which enables them to generate more free cash flow that they tend to return to investors.
- **Marketing and distribution** companies transport and sell the finished petroleum products to end users. Examples of marketing and distribution companies include retail gas stations, home heating fuel delivery companies, and natural gas distribution utilities.
- Most downstream companies make money on the spread between what they pay to buy raw materials such as crude oil, and the price at which they sell higher-valued refined products or petrochemicals. Because of that, most downstream companies make more money when oil and natural gas prices are lower, because they can buy these raw materials or feedstocks at cheaper prices.

Types of downstream oil and gas companies

- Companies only operate in the downstream segment, with some focusing on one activity (refining, chemicals, or distribution and marketing). These pure-plays on either the downstream sector or one of its activities give investors the opportunity to make outsized profits when market conditions are strong.
- However, when the environment weakens, which tends to happen as commodity price volatility increases, it can put pressure on the profits and stock prices of downstream companies. Eg: Marathon Petroleum, Phillips 66

Investing in downstream stocks

- These companies typically cash in during periods of lower prices, which makes them a great option to pair with the stock of an oil-producing company since the

performance of the downstream company's stock should help smooth out some of the oil price volatility that comes with investing in the upstream sector.

- Downstream companies tend to generate lots of free cash flow because refineries aren't as capital intensive as oil fields, meaning refiners don't have to invest as much money to maintain their operations.
- Downstream companies with more excess cash can return to shareholders via dividends and stock buybacks.

Comparison