

## **Energy and Commodity Markets**

Hello my name is Derek Taylor and I would like to welcome you to this video lesson which forms part of the advanced online three month Institutional Trader Programme developed by Knightsbridge Trading Academy in association with London Stock Exchange Group Academy. This lesson is divided into four modules.

Module 1 is a refresher and recap on the Global Commodity Markets. Then in module 2 we look at the Commodity Derivatives, specifically Futures contracts.

The third module explores commodity forward pricing, forward curves and Roll Yield and finally the fourth module which looks at Commodity Indices and ETF's. Where appropriate examples and case studies are used.

Now let's turn to **Module 1**.

### **Module One**

#### **A Historical Perspective**

In the USA pre-1850, goods were shipped using the Great Lakes. The first market/exchange developed in Buffalo, servicing the cities of the Eastern Seaboard, where the goods would be exchanged for cash. On the "spot".

When the railways finally linked East and West, most of the routes came through Chicago and the "markets" now relocated to Chicago. This led to the establishment of the Chicago Board of Trade, where buyers and sellers of agricultural commodities could meet and trade.

What if the price of the goods that you produced as a farmer fell before you could deliver them to market? Or, as a user of commodities, how did you protect yourself from price rises?

Imagine a cattle rancher in Kansas. His cows may not be ready for transport for 3 months. But he can go to his closest town, where there is a railway, and running beside the railway is a telegraph. He can telegraph ahead and agree a fixed price for his cattle, to be delivered in Chicago in 3 months' time.

Therefore, locking in his profit margin and bringing financial certainty to his business, family and employees.

These early “forward contracts” were used from 1851, and were effectively early OTC (Over The Counter) transactions. They were individually tailored between counterparties, but did not really allow the underlying obligations to be easily sold on to another party.

By 1865, the Chicago Board of Trade introduced formalised “futures contracts”. A futures contract uses standardised quantities of specific commodities, for settlement at a specific future date. The only variable is the price, which means that they can easily trade between multiple buyers and sellers at a regulated exchange.

Within 5 years, 90% of trades using “futures contracts” were for speculation, rather than physical delivery.

### **Global Commodity Exchanges**

Globally there are around 64 major commodity exchanges trading more than 90 commodities.

- ❖ **Hard commodities** are typically natural resources that must be mined or extracted, such as gold, rubber and oil, whereas
- ❖ **Soft commodities (softs)** are agricultural products or livestock such as corn, wheat, coffee, sugar, soybeans and pork.

### **The Top 10 traded commodities are:**

1. Crude oil
2. Coffee
3. Natural gas
4. Gold
5. Wheat
6. Cotton
7. Corn
8. Sugar

9.Silver

10.Copper

*Are you surprised that coffee is the second largest traded commodity in the World? More than Gold or Wheat.*

### **Commodity Prices and Units**

This page is a freely available website called markets insider, from business insider.com., showing spot prices from Monday 13<sup>th</sup> March 2017 and also showing the units that these commodities are traded in.

It does not show the Agriculturals only because of limitations of screen size.

### **Coffee**

Here is a current chart for coffee, with data coming from the ICE market, showing price action, MACD, RSI and Volume.

Very useful, but.....

### **Commitment of Traders**

This information, shows the long/short positions of traders, which can be very helpful when taken in context with price action, and especially volume. Giving us a good perspective of volume, open interest and therefore how the market is positioned.

### **Coffee, but which coffee?**

These are 5 year charts comparing the price of the 2 major coffee futures contracts.

On the left, the coffee C futures contract is the US futures contract for Arabica coffee, and the contract on the right, the UK traded Robusta contract, although both contracts are traded at ICE Singapore, London and New York, across the global timezones.

One might ask why Arabica trades at \$138.75, but Robusta trades at \$2157.00. The reason is that the Arabica contract is priced on US cents per pound (weight) and the Robusta contract is US dollars per metric tonne weight.

A very rough conversion would put Arabica at \$3060 per metric, in comparison to Robusta at \$2157. Robusta is cheaper to produce and used mainly for instant coffee.

### ***Why has 2016 seen a spike in Robusta prices?***

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Supply, demand and the weather factors in here. World coffee consumption has increased dramatically, led by the USA, China and India. Inventories have been squeezed, especially in Brazil

World coffee production in 2016/17 is forecast 3.7 million bags higher than the previous year to 156.6 million bags (60 kg). Brazil accounts for roughly 1/3<sup>rd</sup> of global output. Arabica output in Brazil more than offsets lower Robusta production in Brazil, Vietnam and Indonesia. Global consumption is forecast at a record 153.3 million bags, drawing ending inventories to a 5 year low.

Brazil's Arabica production is forecast to jump 9.5m bags to 45.6m as yields improve, based on ideal weather conditions. Following last year's sharp decline, Robusta production is expected to drop to a 10 year low due to above average temperatures and prolonged dry spells in the growing regions.

### **Supply Demand and the Weather**

The market price of any commodity is the balance of supply and demand. Financials are affected by economic news, politics etc.

But with Commodities, the weather can have a dramatic impact.

**El Niño** is a cyclical warming of the ocean waters in the central and eastern tropical Pacific that generally occurs every 3 to 7 years. It is linked with changes in air pressure and high-level winds that can affect weather worldwide.

### **Commodity Prices and Financial Markets**

The effects are many, but to name a few:

1. Rising Global Population – ***(Moon landing 1969, 3.6bn, 2017 7.4bn) creating upward pressure on food and raw materials.***

2. Rising consumer demand and Industrial growth-China/India
3. Low correlation with bonds and equities – ***the markets tend to move against each other, therefore offsetting risk.***
4. Commodities are correlated with inflation and changes in expected inflation.
5. Equities can fall to zero, but not so for commodities – ***the price of gold will never fall to zero***
6. There is no credit risk on a commodity - ***unlike shares or bonds***
7. Relatively high returns to financials - ***especially in times of war and terrorist activity***
8. Traded by Hedge funds and Investment Banks, Commodity Traders – Glencore, Mercuria, Trafigura
9. Institutional Investors such as pension funds and sovereign wealth funds can invest and gain exposure through ETF's - ***The rise of Exchange Traded Funds have made commodity market access much easier.***
10. Most commodities trade in US dollars which is generally displays negative correlation to commodity prices.

***e.g. If the price of the dollar weakens then anyone who is not USD based can buy gold cheaper. Actually the price of gold rises.***

**Most commodities trade in US dollars creating a currency risk to non-dollar domestic currencies.**

### **Example: Supply and Demand Factors**

At the present the market is focussed on OPEC quotas vs US supply.

US inventories are a crucial factor.

The top chart shows US inventories from 1984-2016.

The bottom chart shows Cushing storage capacity versus Cushing inventories.

Clearly showing the importance of inventory capacity.

This brings us to the end of Module one.

## **Module Two**

### **Commodity Derivatives**

*A Derivative product can be a tool for risk management or a means to speculate. For risk mitigation or risk taking. The instrument itself can be bought or sold on an exchange or Over The Counter (OTC). There may be a premium payable for the product or it may be zero cost, and it may have one settlement or many.*

*There are many variations to the basic “vanilla” derivatives, but essentially they break down into three key financial techniques, they are:*

- Futures
- Options
- Swaps

*Premiums are only required for option based derivatives and these are priced through a sophisticated computer model with multiple inputs.*

*Derivatives have two distinct markets for execution*

1. *Exchanges, where trading takes place using standardised contracts for size and expiry date.*
2. *The OTC market. Over the counter, where counterparties to a transaction can agree bespoke and non- standard terms. In effect a “tailored” contract.*

*We are not looking at Options or Swaps in this programme, but we will look at Exchange traded futures contracts and their equivalents in the OTC market which are called Forward contracts. They are actually both the same.*

### **Futures and Forward Contracts.**

#### **A futures contract is:**

*“A legally binding contract to buy or sell a given face amount of a specified asset at an agreed price on a specific date or range of dates in the future”*

The major benefits of futures:

- Easy to buy or sell
- Allow for shorting
- Leveraged
- Liquid-cheap
- Exchange-traded (ICE, NYMEX etc.)

A forward contract is a future traded OTC (over the counter)

## **Commodity Hedging Techniques**

### **Terminology**

*Let's examine some of the common trading jargon/terminology:*

#### ***"Long" the Physical***

*A company, which produces oil or has purchased crude and is holding it (the physical cargo) in storage for delivery or usage at a later date.*

#### ***"Short" the physical:***

*A company with an obligation to deliver crude at a future date at a fixed price when it does not already own the physical (oil).*

#### ***"Long" the Future***

*A client who has purchased futures to open a position.*

#### ***"Short" the Future***

*A trader who has sold futures without previously owning them, known in the market as short-selling*

*In order for a company to hedge oil price risk it would need to take an equal and opposite position, so if they are "long" the physical they will need to "short" the futures and vice-versa.*

### **Short the underlying, long the future**

A **manufacturer** needs to buy raw materials (short) is worried that prices will rise, before he can buy, so hedges by buying futures.

*If prices do rise, the loss on the underlying is offset by the profit on the long futures position. But conversely, if prices fall then the manufacturer gains on buying the cheaper underlying raw materials, but loses on the hedge.*

*The manufacturer has in effect “locked” in the price of the raw materials, preventing loss but losing the opportunity to gain if raw material prices cheapen. Most manufacturers would prefer the certainty or a guaranteed price by managing the price risk.*

### **Long the underlying, short the future**

A **producer** (long the underlying) is worried that prices will fall, so hedges by selling futures.

*If prices do fall, then the producer of the underlying must sell at a lower price and therefore makes a loss. But the futures short hedge makes an offsetting profit, effectively guaranteeing the producer’s selling price.*

*Of course, if the price of the underlying commodity does rise, then the short hedge becomes a cost.*

*Futures contracts and forward contracts “lock” in the price and therefore eliminate price risk.*

### **Example of a Brent Futures Trading Transaction**

*At the beginning of October a trader feels that the price of Brent Crude will rise, as year-end approaches and the weather turns colder. The current price in the Spot (or “wet”) market is US\$ 48.90 per barrel, and the implied forward rate for Dec Brent is US\$ 50.00, the markets are already factoring in a rise in prices. He wishes to make a profit from predicting a short-term upward movement in prices. His trading amount is US\$ 5 million. This is equivalent to 50 contracts at today’s rates (\$5m/ \$100,000). One contract is 1000 bbls x today’s price = 1000 x \$100, so \$100,000.*

**Action:** Buy 50 Dec Brent Crude futures on ICE at the current trading level of 50.00

**Outcome:** On the last business day before the 15th day preceding the 1st December, the price for the Dec futures contract is trading 54.75 (on a Platts



basis). The trader decides to close out his position, so he will need to Sell 50 Dec Brent futures, at the closing level of 54.75. He elects for cash settlement.

**Profit or Loss?** *The view on the market was correct and Brent prices rose. Our trader has made a profit.*

Opening futures level                      50.00 (bought)

Closing futures level                      54.75 (sold)

**Profit**                                      **4.75 or 475 ticks.**

*What is this profit worth in real money?*

*The trader has made a profit of {50 contracts x 475 ticks x US\$ 10 each tick} a total of US\$ 237,500.*

This brings us to the end of Module Two

## **Module Three**

### **Forward Pricing**

If there is a shortage in the market the current spot price will be higher (bid up), also creating a backwardated market. This reflects the “convenience yield effect” – meaning, I will pay up for the asset now rather than risk it being unavailable in the future.

*‘the convenience yield reflects market expectations concerning future availability of the commodity. The greater the possibility that shortages will occur during the life of the futures contract, the higher the convenience yield’.*

If cost of carry is dominated by storage costs, the futures price will be above the spot price, and we refer to such a condition as "contango", whereas when the cost of carry is dominated by convenience yield, the futures price will be below the spot price, and this is the situation that the term "backwardation" is used to describe.

## Forward Pricing/Cost of Carry

Let us try and calculate the forward price of a cargo of CRUDE from first principles.

Underlying Purchase price (spot)

***Note: Convenience yield will have already been factored into the spot price by the market.***

Then the other elements of Cost of Carry, Funding, Storage, Insurance and Freight (in the red box).

These combined will give us the Forward Price.

Remember an OTC forward contract can be quoted to any forward date agreed between the counterparties. An exchange traded futures contract is for a specific amount and forward date. Otherwise the pricing is the same.

Under most circumstance the cost of carry will be Positive, resulting in a Forward price which is higher than SPOT. This market structure is known as **Contango**.

From time to time the market structure is reversed, in which case the Spot price is higher than the Forward price, then the structure is known as **Backwardation**

This can be very important, as it will determine the way a hedge will work. More about these terms shortly.

## Coffee Futures

This is the screen for ICE Arabica futures contracts from Mar 17 through until Dec 19. Please note the prices in the red box. Note how the successive futures contracts are priced higher the further out from spot.

## Coffee in Contango

The Futures prices from ICE Coffee have been used to construct a **Futures Curve**.

The **Futures Curve** reflects the normal “cost of carry” hence higher prices further out into the future.

### **Canola in Backwardation**

But with Canola (oilseed) the nearest to spot prices are higher and the futures prices are lower, known as backwardation.

So what’s the story?

*The oilseed market is currently providing an example of backwardation where short supplies in recent years encourage the market to punish sellers from carrying oilseeds in inventories. A market in backwardation suggests that supplies are currently short and buyers want the commodity now as opposed to the future. This also encourages sellers to sell now rather than hold, as the commodity is discounted in forward contract periods.*

*Remember “convenience yield” – meaning, I will pay up for the asset now rather than risk it being unavailable in the future.*

### **Futures Curves**

#### **CONTANGO**

When the forward or futures price is above the expected future spot price.

#### **BACKWARDATION**

When the forward or futures curve is below the expected future spot price.

*A commodity forward curve in contango is similar to a normal yield curve in the interest rate market. However, in the commodity markets, when you have buyers at the front end of the curve and sellers at the back end of the curve, this tends to move the curve into backwardation.*

*So, for instance, if the general view of the market is that prices will increase there will be a tendency for users to buy sooner, driving the front end of the curve. Meanwhile producers will want to sell later, driving the back end of the curve, and the forward curve moves from contango to backwardation.*

*If there is a sudden short term demand, which may be due to breaking news event, weather etc., the spot price will rise suddenly, while the prices at the*

*back end of the curve will not move as fast. Once again the curve will move into backwardation.*

## **Roll Yields and Futures Curves**

Roll Yield is an important component of commodity returns and will depend upon the shape of the futures curve i.e backwardated (downward sloping) or contango (upward sloping)

Assuming the price and shape of the futures curve remain constant and a long position in the futures contract is rolled:

- In backwardation, a more expensive contract will be sold and a cheaper contract purchased, creating a positive “roll yield” which can positively impact a long position in a futures contract.
- In contango, a cheaper contract will be sold and a more expensive contract purchased creating a negative roll yield, which can negatively impact a long position in a forward contract.

## **Capturing Roll Yield**

On the left chart

Rolling long futures contracts in backwardated markets continually locks in **profits** by selling the higher expiring contract and buying the lower forward contract.

On the right chart

Rolling long futures contracts in contangoed markets continually locks in **loss** by selling the cheaper expiring contract and buying the more expensive forward contract.

**BUT**, If you roll **short futures** positions in contangoed markets you can continually lock in **profits** by buying the cheaper expiring contract and selling the more expensive forward contract.

**Therefore, a positive Roll yield (cost of carry) will be achieved with a long futures position in a backwardated market and a short futures position in a contangoed market.**

### **Example: An optimised commodity strategy**

*A looming US infrastructure boom and OPEC supply cuts give commodity investors plenty of reason to be upbeat for 2017. Whilst the spot price of oil can drive headline news, investors typically have to gain exposure via futures.*

How can an optimised commodity strategy help investors better manage these return components and what are the key drivers for considering curve-optimising strategies?

Think of the two major factors, spot price movements and roll yields.

The upwards curve shift reflects the increase in spot prices on the back of a 5% cut in OPEC production. The flattening of the curve's shape, from steep contango in December 2016 to modest medium term backwardation in January 2017, signals a balancing of demand and supply expectations for 2018.

Normally an investor would buy front month rolling contracts (red dots) capturing the positive price rises. This position corresponds with the steepest section of the curve with the most expensive roll costs, significantly dragging on returns.

By contrast, an optimised roll strategy, focuses on managing roll yield by positioning on either the flattest section of the contango curve or the steepest section in backwardation. This can pick up positive yield roll, but the strategy is somewhat less sensitive to spot price fluctuations.

### **Summary: Curves and Roll Yields**

The **roll yield** is the yield that a futures investor captures when their futures contract converges to the spot price.

This is an old screen but clearly displays a number of markets in backwardation and contango. It also shows current and previous week rolls costs, reflecting changing "cost of carry".

**Note: Annualised costs are expressed as a positive. So a negative roll cost, as with Brent is actually a net 4.27% earning.**

This brings us to the end of Module Three

## **Module Four**

### **Commodity Indices**

Fund managers use indices to obtain exposure to commodities.

Producers/Consumers use indices to benchmark and hedge market risk, often with ETF's.

The major Commodity Indices are:

1. S&P Goldman Sachs Commodity Index (GSCI), an index weighted by global production rather than stock indices like the FTSE, which are weighted by the component shares market capitalisation.
2. Rogers International Commodity Index (RICI), which is a US Dollar based Total Return Index.
3. Thomson Reuters/CoreCommodity CRB Index

CRB = Commodity research bureau

basket of 19 commodities, with 39% allocated to energy contracts, 41% to agriculture, 7% to precious metals and 13% to industrial metals.

### **GSCI Spot and Total Return Indices**

Currently, the S&P GSCI contains 24 commodities from all commodity sectors: six energy products, five industrial metals, eight agricultural products, three livestock products and two precious metals.

**World production weighted.**

**Denominated in US\$.**

**Index futures contract quoted and traded on the CME.**

The S&P GSCI has a futures contract listed on the CME making it a truly public and transparent index.

**Used as a Performance benchmark**

Investors, asset managers and financial institutions may use the S&P GSCI to track performance, or as a benchmark for actively managed portfolios.

Note: The S&P GSCI™ Spot index tracks the price of the nearby futures contracts, not returns available to investors. It cannot be compared directly with the S&P GSCI™ Total Return index.

The S&P GSCI™ Total Return index measures a fully collateralized commodity futures investment that is rolled forward each month. The S&P GSCI™ Total Return is significantly different than the return from buying physical commodities.

### **The Commodity Super Cycle**

**Nikolai Dmitriyevich Kondratiev** (or **Kondratieff**, 4 March 1892 – 17 September 1938) was a Russian economist, He is best known for proposing the theory that Western capitalist economies have long term (50 to 60 years) cycles of boom followed by depression. These business cycles are now called "Kondratiev waves".

The 55 year peaks between Kondratiev peaks and bottom signal a respite to commodity prices until about 2025, but 2025-2035 could be a shocker if the historical trend holds. A respite could be attributable to more supply, China rebalancing and Western deflationary, de-leveraging and US dollar strength.

Thank you for watching and listening.