



## 2024 Level 2 - Alternative Investments

| Learning Modules  | Page |
|---|------|
| Introduction to Commodities and Commodity Derivatives         | 2    |
| Overview of Types of Real Estate Investment                   | 20   |
| Investments in Real Estate through Publicly Traded Securities | 30   |
| Hedge Fund Strategies   | 37   |
| Review  | 48   |

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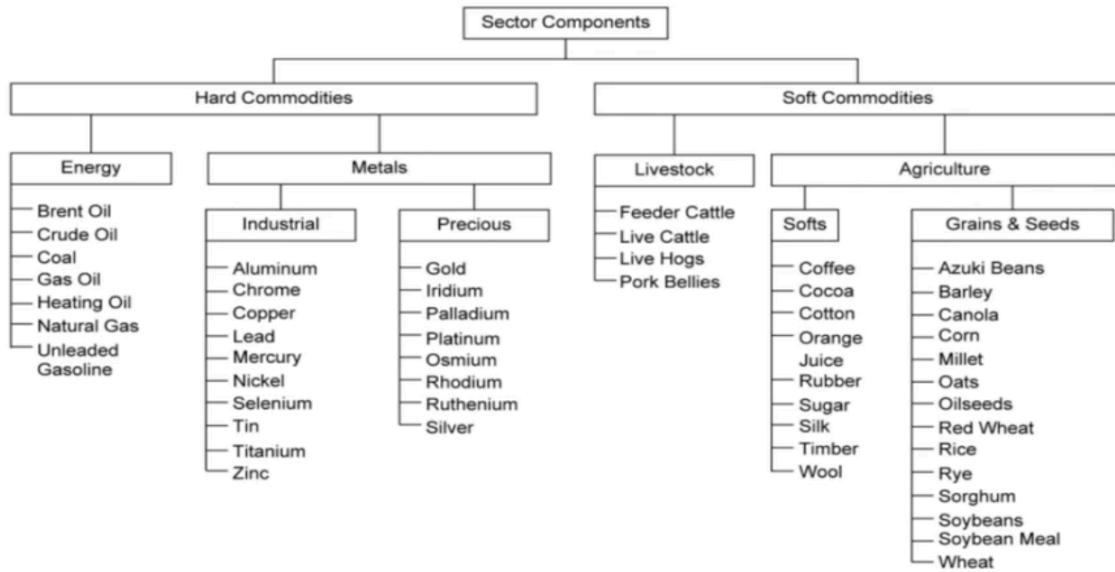
## **Introduction to Commodities and Commodity Derivatives**

- a. compare characteristics of commodity sectors
- b. compare the life cycle of commodity sectors from production through trading or consumption
- c. contrast the valuation of commodities with the valuation of equities and bonds
- d. describe types of participants in commodity futures markets
- e. analyze the relationship between spot prices and futures prices in markets in contango and markets in backwardation
- f. compare theories of commodity futures returns
- g. describe, calculate, and interpret the components of total return for a fully collateralized commodity futures contract
- h. contrast roll return in markets in contango and markets in backwardation
- i. describe how commodity swaps are used to obtain or modify exposure to commodities
- j. describe how the construction of commodity indexes affects index returns

## Commodities

⇒ **Commodity** - a physical good attributable to a natural resource that is tradeable and supplied without substantial differentiation by the general public  
 - trade in physical (spot) & futures/forward markets

Page 1  
LOS a  
- compare



- potential for diversification benefits in a multi-asset class portfolio due to low (historically) correlation w/ bonds & stocks (some possible inflation hedging benefits)
- derive their value from use as a consumable or as inputs to the production process

Page 2  
LOS a  
- compare

Sectors/ as per Thompson Reuters/Core Commodity CRB Index

- Energy
- Industrial (base) metals
- Livestock
- Grains
- Precious Metals
- Softs (cash crops)

1. Energy - most economically valuable sector

1) Crude Oil - must be refined to be useful

- different grades
    - ✓ Brent - North Sea
    - WTI - US
    - ✓ Bonny Light - Nigeria
    - ✓ Mayan Crude - Mexico
- (trade at varied prices)

## 1. Energy

Page 3  
LOS a  
- compare

- 1) **Crude Oil** - low in density & flows freely at room temperature ⇒ **Light**
- easier to process, yielding more valuable gasoline & diesel
  - low in sulfur content ⇒ **Sweet**
  - weather → temporary impact (e.g. hurricane)
- as economies grow, oil demand increases (availability of oil at affordable prices also facilitates growth)
- drivers of supply & demand
- technology → extraction
  - politics → refining
  - business cycle → usage
- e.g./ shale oil - supply availability due to extraction technology  
electric vehicles, solar - reduce demand for oil products  
US & Canada - ban offshore drilling in Arctic waters

## 1. Energy

Page 4  
LOS a  
- compare

- 2) **Natural Gas** - can be used directly  
(heavier compounds - NGLs - are also extracted)  
liquids
- categorized as either:
- a) **associated gas** - coming from an oil well (a co-product of oil)  
can be: - sold in spot markets
- burned off
  - re-injected into the oil field to maintain pressure (keeps extraction costs low)
- b) **unassociated gas** - on its own (where oil is not present)
- Storage/transportation cost high → need to keep gas under pressure
  - **liquefied natural gas (LNG)** - for transport by ships
  - must be cooled to **-260°F**
- primary demand - electric generation
- also weather dependent
  - cooling
  - heating

## 1. Energy

### 3) Refined products – heating oil, gasoline, jet fuel, propane, etc...

- refined products typically have a short shelf life (availability measured in days)
- refineries typically located on major coastlines & ports (that is where the oil is delivered)
- planned refinery maintenance → switch over from summer gas (typically low demand periods) to winter gas

## 2. Grains/ · Corn · Soybean · Wheat · Rice

- can be stored season over season (sometimes multiple seasons)
- some crops can be grown multiple times/yr.
- levels of heat & precipitation determine yields & acreage (droughts kill, floods drown)

## 3. Industrial (base) Metals/ can be stored for years

- mined ore that is processed into  
copper, aluminum, nickel, zinc, lead, tin & iron

used in production, construction, infrastructure

- supply is weather insensitive, but demand may be affected
- tied very closely with GDP growth
  - political issues → strikes, development approval, environmental concerns, regulation

## 4. Livestock/ · hogs · cattle $\begin{cases} \text{feeder} \\ \text{live} \end{cases}$ · sheep · poultry

- depends on low cost inputs (feed) i.e. grains
- high grain costs lead to short-term oversupply as herds are slaughtered (mid-term price increases)
- tied to GDP growth (especially in emerging/developing economies)

#### 4. Livestock/

Weather - affects health & weight

- winters tough for cattle, heat & humidity tough for hogs
- limits weight gain

- disease
  - avian flu
  - mad cow disease
  - porcine epidemic diarrhea virus (PEDv)

price effect uncertain

- fear of consumption can drive prices down
- lost supply can increase prices

#### 5. Precious Metals

- straddle monetary & industrial world

- gold, silver, platinum ⇒ act as stores of value

- also used in jewelry, auto parts, electronics

(makes up about 50% of demand, other than gold)

- high storability

Page 7

LOS a

- compare

#### 6. Softs (cash crops) · cotton, coffee, sugar, cocoa

- called 'cash crops' since they are grown to be sold,  
not consumed for subsistence

- primary source - countries close to the equator

- weather is an important supply factor, global growth  
is an important demand factor

Page 8

LOS a

- compare

## Commodity Production Life Cycle

Page 9  
LOS b  
- compare

- will reflect (and amplify) changes in storage, weather political/economic events that shift demand & supply

- Short life cycle ⇒ rapid adjustment
- long life cycle ⇒ limits ability of market to react

⇒ Energy/

crude futures reflect both → demand for crude

Extraction    Transportation    Storage    Refining    Transportation  
 50-100 days    1-10 days    days to a few months    3-5 days    5-20 days

natural gas can be consumed at this stage  
 - trading in futures will reflect pricing just prior to this point

consumption of crude oil products begin  
 - futures reflect pricing at this point

Page 10  
LOS b  
- compare

⇒ Energy/

- Refineries - affect demand for crude & supply of oil products
  - ↓
  - costly to build - long lead times - built to a specific oil grade
- Pipelines - affect supply of oil & market reach
  - ↓
  - costly to build, long lead times
- Exploration - affects supply of crude

- over 120 different grades of oil

- 2 most traded futures contracts
  - ↳ Brent
  - ↳ West Texas Intermediate (CL)

- both 1000 barrels

- contracts for gasoline - RB - 42,000 gallons
- nat. gas - NG - 10,000 MBTU
- heating oil - HO - 42,000 gallons



⇒ **Livestock/ poultry - a few weeks**  
 hogs - a few months  
 cattle - a few years

sow gives birth after summer heat → 6 mos. to get slaughter weight (soymeal & cornmeal) <sup>HE</sup>

1-2 years - feeder cattle (grass fed) ⇒ 6-12 months → LE (feed lot → corn-based diet) ~ 1200 lbs. <sup>GF</sup>

⇒ **Grains/**

|  |                        | Corn      | Soybeans | Wheat* → hard winter wheat |
|--|------------------------|-----------|----------|----------------------------|
| <b>northern hemisphere (North Am.)</b> | Planting               | April–May | May–June | Sept–Oct                   |
|  | Growth                 | June–Aug  | July–Aug | Nov–Mar                    |
|  | Pod/Ear/Head Formation | Aug–Sept  | Sept     | April–May                  |
|  | Harvest                | Sept–Nov  | Sept–Oct | June–July                  |

Page 13  
LOS b  
- compare

⇒ **Grains/ - demand for grains is year round**  
 - storage facilities supply year round  
 ⇒ need to understand old crop vs. new crop for futures trading (inventory) (coming harvest)

⇒ **Softs/ commodities in this sector differ significantly**  
 e.g./ coffee

| Month           | Jan     | Feb     | Mar     | Apr | May | Jun     | Jul     | Aug     | Sep     | Oct     | Nov     | Dec     |
|-----------------|---------|---------|---------|-----|-----|---------|---------|---------|---------|---------|---------|---------|
| Brazil          |         |         |         |     |     |         | Harvest | Harvest | Harvest | Harvest | Harvest |         |
| Central America | Harvest | Harvest | Harvest |     |     |         |         |         |         | Harvest | Harvest | Harvest |
| Vietnam         | Harvest | Harvest | Harvest |     |     |         |         |         |         |         | Harvest | Harvest |
| Java            |         |         |         |     |     | Harvest | Harvest | Harvest | Harvest | Harvest |         |         |
| Kenya           | Harvest | Harvest | Harvest |     |     | Harvest | Harvest |         |         | Harvest | Harvest | Harvest |
| Jamaica         | Harvest | Harvest | Harvest |     |     |         |         |         |         |         |         | Harvest |

- harvested somewhere all year round (best are from high-altitude plantations, picked in middle of harvest)

Page 14  
LOS b  
- compare

⇒ **Softs/** - newly planted trees take about

3-4 years to produce

- once picked, laid out in sun for 2-3 weeks to dry

(dry method ~ 50%)

Page 15

LOS b

- compare

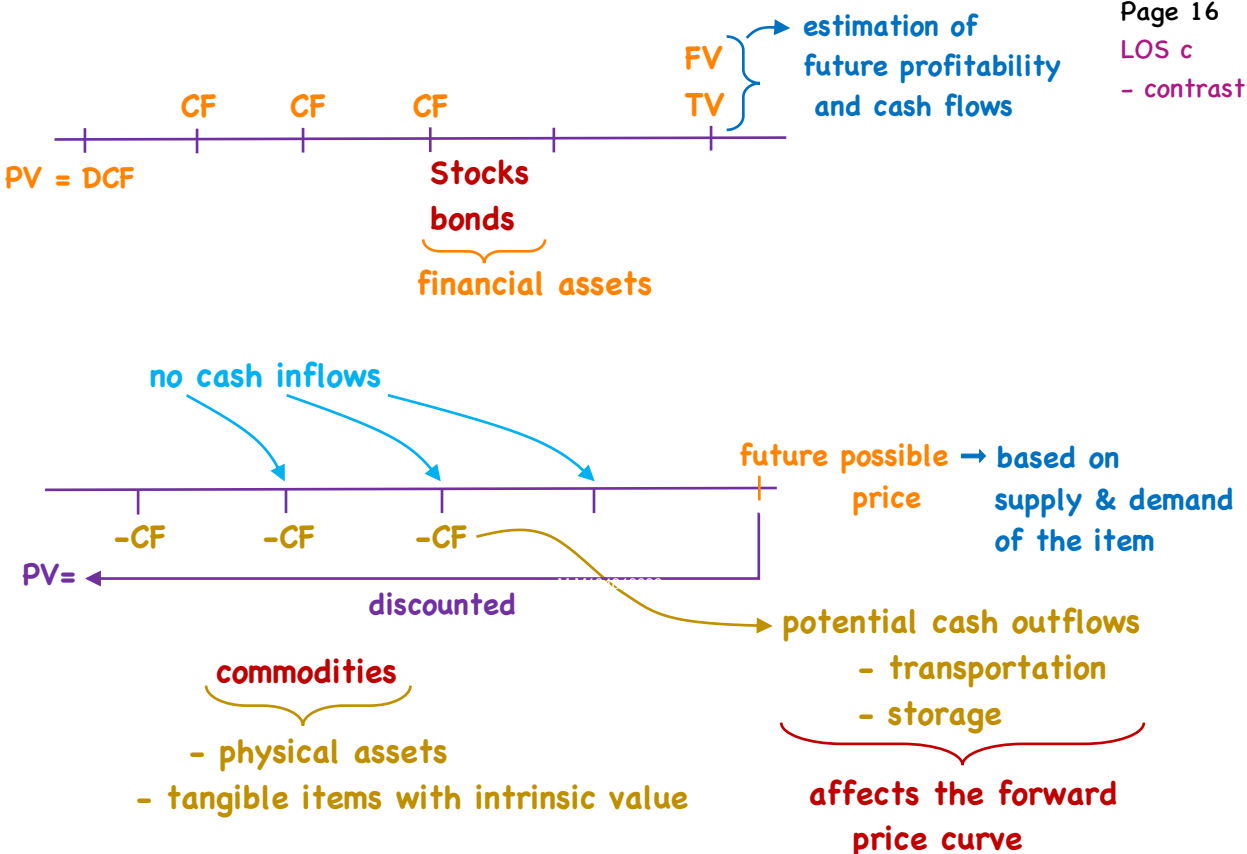
or/ soaked in water to remove pulp, bean then fermented

12-48 hours, then dried 24-36 hours

- then shipped - roasting done by buyer before shipping to sales points

2 main varieties {  
 - **robusta** - lower quality, less flavour  
     → futures traded in London  
 - **arabica**  
     → futures traded in New York

## Valuation



Page 16

LOS c

- contrast