### Valuation approaches - Income approach

#### Valuation method #1: Direct capitalisation method

- Value = $V_0 = \frac{NOI}{cap\ rate}$
- Capitalisation rate = Cap rate = Discount rate – Growth rate
- All risk yield (ARY) = $\frac{Rent_1}{Rent_1 - Rent_2}$
- Net operating income (NOI) = Operating income – Depreciation

### Valuation approaches - Cost approach

#### Valuation method #2: DCF

1. **Step 1: Estimate MV of land (sales comparison approach)**
2. **Step 2: Estimate building's replacement cost (based on current construction cost and standards + builder/developer's profit)**
3. **Step 3: Deduct physical deterioration (curable and non-curable) functional obsolescence, location obsolescence and economic obsolescence**
   - Physical deterioration: wear and tear of the building overtime
   - Functional obsolescence: loss in value from defects in design and impair building's facilities (estimated by capitalising the decline in NOI)
   - Location obsolescence: occur when location no longer optimal. Part of the loss might already be reflected in MV of land
   - Economic obsolescence: occur when new construction is not feasible under current economic conditions

#### Valuation approaches - Sale comparison approach

Value of subject property = sales prices of comparable properties ± adjustments for differences

- Highest and best use: the use that produces highest implied land value
- Due diligence in private equity real estate investment: to confirm the fact + condition, to lower the risk of unexpected legal and physical problems
- Appraisal-based indices: combine valuations of individual properties that can be used to measure market movements – could compare performance with other asset classes
- Transaction-based indices: constructed using repeat-sales index and hedonic index

#### Appraisal-based indices

- **MCREIF Property index (NPI):** popular index in US. NCREIF calculate return as follows:

  \[
  \text{Return} = \frac{\text{NOI} - \text{CAPEX} + (\text{End market value} - \text{ Beg. market value})}{\text{Beg. MV}} = \frac{\text{NOI}}{\text{Beg. MV}} + \frac{\text{End MV} - \text{Beg. MV} - \text{CAPEX}}{\text{Beg. MV}} = \text{current yield} + \text{capital return}
  \]

  Cons of appraisal-based indices:
  - Actual transactions occur before appraisals → appraisal-based indices tend to lag actual transaction → smooth the index
  - Appraisal lag → lowe correlation with other asset classes

#### Transaction-based indices

- **Repeat-sale index:** rely on repeat sale of same property → regression is developed to allocate change in value each quarter
- **Hedonic index:** require only 1 sale → regression is developed based on changes in property characteristics (age, location, etc.)

### Due diligence

- Confirm OPEX by examining bills
- Review CF statements
- Obtain environment report → identify possible contamination
- Physical / Engineer inspection → identify structural issues + Check condition of the building system
- Inspect the title and other legal documents for deficiencies
- Survey the property → confirm the boundaries + identify easements
- Verify compliance with zoning laws, building codes and environment regulations
- Verify payment of taxes, insurance, special assessments and other expenditures

#### *(*) Tentants are required to pay all expenses → ARY = cap rate

#### *(*) Cost approach is considered the upper limit of value since an investor would never pay more than the cost to build a comparable building
**Life cycle of commodities**

**Life cycle of crude oil**
1. Drill well → 2. Extract crude → 3. Transport + storage for few months → 4. Refine into various fuels (gasoline, heating oil, diesel oil, jet fuel) → 5. Transport to customers

**Life cycle of natural gas**
1. Extract → 2. Transportation to consumer thru pipeline / or cooled to liquid form and transported by ship

**Life cycle of industrial metals**
1. Extract ore → 2. Smelted into the quality of metal required by end users
2. Economies of scale due to large, efficient mining and smelting operations → most efficient running near capacity → producers hesitant to decrease production when price falls

**Life cycle of livestock**
1. Raise → 2. Slaughter (chickens: after weeks; hogs: 6 months; cattle: few years) → 3. Freezing for storage and international trade

**Life cycle of grain**
1. Plant → 2. Harvest (5+ months after planting) → 3. Storage
2. Lag between investment in new capacity and increase in supply
3. Delivered futures contracts are available on dates to coincide with the harvest

**Life cycle of softs**
1. Plant → 2. Harvest (up to 4 years after plant for the 1st harvest) → 3. Transport + store in warehouse → 4. Roasted by local roaster → 5. Deliver to end-users / retail sales outlets

**Commodity market analysts**
- Informed investors, either produce or use the commodity
- Reduce risk by long / short futures contracts

**Participants in commodity futures markets**
1. **Hedgers:**
   - Invest in long / short futures contracts
   - Protect against price movements in underlying commodity

2. **Speculators:**
   - Reduce risk by long / short futures contracts
   - Informed investors, either produce or use the commodity

3. **Arbitrageurs:**
   - Buying, selling, storing the physical commodities when the difference between spot and futures price is too large / too small, due to the actual cost of storing the commodity

4. **Commodity exchange**
   - Futures price > Spot price + Storage cost → buy and store commodity + short futures
   - Futures price < Spot price + Storage cost → selling commodity + long futures

5. **Commodity market analysts:** non-market participants, use information to analyse for various entities
6. **Commodity regulators:** regulate the commodity market

**Theories of commodity futures markets**

1. **Insurance theory:** Commodity producers want to reduce price risk → drives down futures price
   - Producers’ hedging behaviour > Consumers’ hedging behaviour
   - Down pressure > Up pressure → Backwardation
   - Producers’ hedging behaviour < Consumers’ hedging behaviour → Up pressure > Down pressure → Contango
   - Disadvantages:
     - Producers typically face more concentrated price risk than consumers
     - Both producers and consumers may be speculators, not just hedgers

2. **Hedging Pressure theory:**
   - Commodity producers want to reduce price risk → drives down futures price
   - Producers’ hedging behaviour > Consumers’ hedging behaviour
   - Down pressure > Up pressure → Backwardation
   - Producers’ hedging behaviour < Consumers’ hedging behaviour → Up pressure > Down pressure → Contango
   - Disadvantages:
     - Hedging pressure is not observable → cannot directly test the hypothesis

3. **Theory of storage:**
   - Storage costs > Convenience yield → Contango
   - Storage costs < Convenience yield → Backwardation
   - Contango market: longer-dated futures are trading @ lower price → buy more contracts to hold the value of long position
   - Backwardation market: longer-dated futures are trading @ higher price → buy less contracts to hold the value of long position

**Basis / Calendar spread / Contango / Backwardation**

- **Basis** = spot price - futures price
- **Calendar spread** = Nearer futures price - Further futures price
- **Contango / Backwardation** = Nearer futures prices are lower @ dates further in the future (Basis & Calendar spread < 0)
- **Contango** / **Calendar spread** = Nearer futures prices are higher @ dates further in the future (Basis & Calendar spread > 0)

**Theories of commodity futures markets**

1. **Insurance theory:** Commodity producers want to reduce price risk → drives down futures price
   - Disadvantages:
     - Lack of empirical findings
   - Higher hedging costs → producers should reduce hedge size

2. **Hedging Pressure theory:**
   - Commodity consumers want to reduce price risk → drives up futures price
   - Differences between producers’ and consumers’ expectations / hedging behaviour
   - Producers’ expectations / hedging behaviour > Consumers’ expectations / hedging behaviour
   - Down market: Up pressure → Backwardation
   - Up market: Down pressure → Contango
   - Disadvantages:
     - Backwardation market: investors hedge with long futures → less futures contracts needed to hold the value of long position
     - Contango market: investors hedge with short futures → more futures contracts needed to hold the value of short position

**Total return for a fully collateralised commodity futures contract**

- To take position in futures, investor must post collateral
- Fully collateralised futures: Value of posted cash / accepted securities = notional value of futures contract

**Total return = Collateral return + Price return + Roll return**

**Collateral return (Collateral yield):** holding period yield on the T-bills, if T-bills are deposited as collateral

**Price return (Spot yield):** (Current return - Previous price) / Previous price

**Roll return (Roll yield):** gains / losses for rollover the position of the future when commodity derivative contract expires

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