**Last Revised: 04/29/2024**

# 2025 Level 1 - Alternative Investments

## Alternative Investment Features, Methods, and Structures

a. describe features and categories of alternative investments

b. compare direct investment, co-investment, and fund investment methods for alternative investments

c. describe investment ownership and compensation structures commonly used in alternative investments

## Alternative Investment Performance and Returns

a. describe the performance appraisal of alternative investments

b. calculate and interpret alternative investment returns both before and after fees

## Investments in Private Capital: Equity and Debt

a. explain features of private equity and its investment characteristics

b. explain features of private debt and its investment characteristics

c. describe the diversification benefits that private capital can provide

## Real Estate and Infrastructure

a. explain features and characteristics of real estate

b. explain the investment characteristics of real estate investments

c. explain features and characteristics of infrastructure

d. explain the investment characteristics of infrastructure investments

## Natural Resources

a. explain features of raw land, timberland, and farmland and their investment characteristics

b. describe features of commodities and their investment characteristics

c. analyze sources of risk, return, and diversification among natural resource investments

## Hedge Funds

a. explain investment features of hedge funds and contrast them with other asset classes

b. describe investment forms and vehicles used in hedge fund investments

c. analyze sources of risk, return, and diversification among hedge fund investments

Dr. Mark put all six learning modules in one video.

# Introduction to Alternative Investments

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AI - anything other than long-only publicly-traded investments in stocks, bonds, and cash

- not just assets but strategies/approaches (i.e. HF/PE)
- typically involve active management (more inefficient pricing)

Characteristics/
- narrow specialization of mgrs.
- low correlations of returns with traditional investments
- limited historical risk and return data
- unique legal and tax considerations
- higher fees → mgmt. + performance fees
- concentrated portfolios
- restrictions on redemptions

Offer (potentially)
- broader diversification
- enhanced returns (risk-adjusted)
- increased income through higher yields (pub. vs. pr., illiquid)

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Categories/

- Hedge Funds - private investment vehicles
  - can use traditional investments
  - absolute return investments (most commonly)

(Private Capital)

- Private Equity - direct investments or through PE funds
  - PE funds → private or public-to-private
    → majority typically involve LBOs
  - VCs → invest in start-ups (small portion of PE mkt.)
- Private Debt → debt provided to private entities

- Real Estate - directly or indirectly
  - private CRE equity/debt
  - public RE equity/debt

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Categories/

- Natural Resources
  - Commodities - futures, ETFs
  - Agricultural Land - farmland (lease or cropshare)
  - Timberland - natural forests or managed tree plantations
- Infrastructure - capital intensive, long-lived assets
  - intended for public use and provide essential services
- Others - Tangibles (art, wine, collectibles)
  - Intangibles (patents, litigation actions)

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Fund Investing → investor contributes capital to a fund
→ fund makes investments
→ involves mgmt. + performance fees

Co-Investing → investor in a fund has the right to invest directly in the same assets

Direct Investing → no intermediary, typically large and more sophisticated investors

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| | Advantages | Disadvantages |
|---|---|---|
| Fund investing | ■ Fund managers offer investment services and expertise<br>■ Lower level of investor involvement compared with the direct and co-investing methods<br>■ Access to alternative investments without possessing a high degree of investment expertise<br>■ Potentially valuable diversification benefits<br>■ Lower minimum capital requirements | ■ Costly management and performance fees<br>■ Investor must conduct thorough due diligence when selecting the right fund because of the wide dispersion of fund manager returns |
| Co-investing | ■ Investors can learn from the fund's process to become better at direct investing<br>■ Reduced management fees<br>■ Allows more active management of the portfolio compared with fund investing and allows for a deeper relationship with the manager | ■ Reduced control over the investment selection process compared with direct investing<br>■ May be subject to adverse selection bias<br>■ Requires more active involvement compared with fund investing, which can be challenging if resources and due diligence experience are limited |
| Direct investing | ■ Avoids paying ongoing management fees to an external manager<br>■ Greatest amount of flexibility for the investor<br>■ Highest level of control over how the asset is managed | ■ Requires more investment expertise and a higher level of financial sophistication compared with fund investing and co-investing, resulting in higher internal investment costs<br>■ Less access to a fund's ready diversification benefits or the fund manager's sourcing network<br>■ Requires greater levels of due diligence because of the absence of a fund manager<br>■ Higher minimum capital requirements |

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Due Diligence: Direct Inv. - requires considerable expertise
Fund Investing - skill in manager selection
Co-Investing - can rely on DD performed by the fund

Exh. #3

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- most funds are structured as limited partnerships

GP - general partner → fund manager - unlimited liability

LP - limited partner → investor - limited liability as long as they do not get involved in day-to-day operations)

- governed by a Limited Partnership Agreement (LPA)
  - may also be side letters: agreements between the GP and certain LPs that exist outside the LPA

e.g./
- extra reporting
- first right-of-refusal (for co-investments)
- fee matching

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- Infrastructure - public-private partnerships
- Real Estate funds - unitholders (trusts)
- JVs - direct real estate

Compensation/

- management fee → 1% to 2% of AUM (HF) or committed capital (PE)
- performance fee (incentive fee, carried interest)
  - based on excess return above a hurdle rate

e.g./ 20% of return above a hard hurdle rate
or 20% of total return if soft hurdle is met

- may also be consulting and monitoring fees for certain types of PE (i.e. LBO)

- typically, GPs do not earn performance fees until LPs are made whole and hurdle rate exceeded

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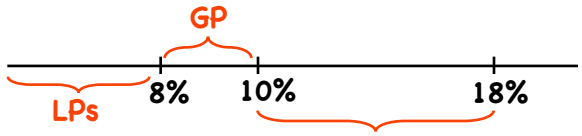
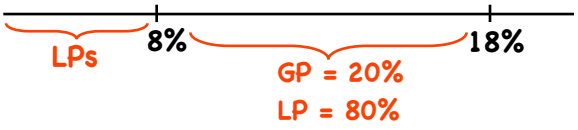
## Catch-up clause (PE) : e.g. 18% IRR, 8% HR

with:




GP = 2% + 1.6%
= 3.6%

without:




GP = 2%

- **High-Water Mark (HF):** highest value used to calculate an incentive fee
  - incentive fees are only available above this level
  - possible that LPs have different HWMs depending on when they invested
- **Distribution Method (PE) → waterfall**
  1/ Deal-by-deal (or American)
  2/ Whole-of-fund (or European)

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## • Distribution Method (PE) → waterfall

| Investment No. | Year | | Amount ($mm) | | Profit | | |
|---|---|---|---|---|---|---|---|
| | Invested | Sold | Invested | Sold | $mm | % | GP at 20% |
| 1 | 1 | 4 | $10 | $20 | $10 | 26.0% | $2 |
| 2 | 2 | 5 | $20 | $35 | $15 | 20.5% | $3 |
| 3 | 2 | 7 | $40 | $80 | $40 | 14.9% | $8 |
| 4 | 3 | 7 | $20 | $20 | - | - | - |
| 5 | 3 | 8 | $35 | $25 | ($10) | neg | ($2) |
| 6 | 4 | 9 | $25 | $20 | ($5) | neg | ($1) |
| 7 | 5 | 9 | $30 | - | ($30) | neg | ($6) |
| 8 | 5 | 10 | $20 | - | ($20) | neg | ($4) |
| Total | 1 | 10 | $200 | $200 | - | - | - |

**Deal-by-Deal**

**called a clawback**
(LPs made whole on inv. #8)

| Investment No. | Year | | Amount ($mm) | | Profit | | |
|---|---|---|---|---|---|---|---|
| | Invested | Sold | Invested | Sold | $mm | % | GP at 20% |
| 1 | 1 | 4 | $10 | $20 | $10 | 26.0% | - |
| 2 | 2 | 5 | $20 | $35 | $15 | 20.5% | - |
| 3 | 2 | 7 | $40 | $80 | $40 | 14.9% | - |
| 4 | 3 | 7 | $20 | $20 | - | - | - |
| 5 | 3 | 8 | $35 | $25 | ($10) | neg | - |
| 6 | 4 | 9 | $25 | $20 | ($5) | neg | - |
| 7 | 5 | 9 | $30 | - | ($30) | neg | - |
| 8 | 5 | 10 | $20 | - | ($20) | neg | - |
| Total | 1 | 10 | $200 | $200 | - | - | - |

**Whole-of-Fund**

- both end with the same outcome

(LPs made whole on inv. #6)

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Hedge Funds/

- Characteristics
  - creatively (actively) managed, involved in one or more asset classes and geographic regions, use of leverage, short positions, and derivatives
  - goal is to generate high returns on an absolute or risk-adjusted basis
  - very few investment restrictions
  - private investment partnership open to a limited number of accredited investors
  - lightly regulated
  - minimum investments
  - restrictions on redemptions
    - hard lockup - no redemptions
    - soft lockup - redemption for a fee (penalty)
    - notice periods - 30 to 90 days notice of a redemption

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Hedge Funds/

- Fund-of-Funds:
  - invest in HFs
  - DD expertise + manager diversification
  - better able to negotiate redemption or fee terms
  - 1% mgmt. fee, 10% incentive fee on top of underlying HF fees

- all HF fees have moderated over time
  HF : 1.3% mgmt. fee + 15.5% incentive (avg.)
  FoF: 1% flat or 50 bps mgmt. + 5% incentive (avg.)

HF Strategies/

- Equity Hedge:
  - public equities, long and short positions, derivatives
  - bottom-up or top-down approach
  - quantitative or fundamental

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HF Strategies/ • Equity Hedge

a) Market Neutral: identify over and under-valued securities
- take long and short positions, target $\beta = 0$
- typically use significant leverage

b) Fundamental Long/Short growth:
- identify companies expected to exhibit high growth and capital appreciation for long positions
- short companies under downward pressure
- typically net long

c) Fundamental Value - identify undervalued companies (unloved) for long positions
- possibly short overvalued growth
- typically long-biased ($\beta > 0$), value + small-cap factor exposure

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HF Strategies/ • Equity Hedge

d) Short-biased: short overvalued equity with no or some long exposure (index ETFs)

e) Sector-Specific: manager expertise in a particular sector

• Event-Driven - seek to profit from defined events, typically changes in corporate structures
- bottom-up, security specific analysis

a) Merger Arbitrage: long the target, short the acquirer
- deal spread narrows as closing date approaches
- typically use leverage
- risk → deal may fall through

b) Distressed/Restructuring: securities of companies in or near bankruptcy

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HF Strategies/ • Event-Driven

b) Distressed/Restructuring:
- buy debt at discount that is expected to have a higher recovery rate (money good)
- buy debt that is expected to become the new equity of the restructured company (fulcrum securities)

c) Special Situations: - equity of companies restructuring other than M&A or bankruptcy

d) Activist: take large enough positions to affect change (divestitures, capital distributions, mgmt. change)

• Relative Value - seek to profit from pricing discrepancies between related securities

a) Convertible Bond Arbitrage - buy the bond, sell the stock

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HF Strategies/ • Relative Value

b) Fixed-Income (general) • long/short trades between 2 issuers, between 2 issues at different parts of the capital structure, or between different parts of an issuers YC

c) Fixed-Income (ABS, MBS, HY) - higher coupon + relative mispricing between securities and assets backing them

d) Volatility - long/short market volatility

e) Multi-Strategy - combinations of strategies above

• Macro and CTA Strategy/ macro: top-down approach to identify economic trends
- use all asset classes, long and short
- managed futures (a.k.a. commodity trading advisers) - primarily trade futures contracts on commodities and beyond (eq./fix.-inc./forex)

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**Private Capital** - funding provided to companies not sourced from public markets

- Private Equity/ - investments in private companies or public companies with the intent to take them private

a) LBOs (Leveraged Buyouts)
- acquire public companies or established private companies with a significant %'age of the purchase price financed through debt
- target's assets serve as collateral
- target's cash flows expected to service the debt
- MBO - current mgmt. involved in the buyout
- MBI - management buy-in: new mgmt. involved in the buyout

b) Venture Capital - investments in private companies with high growth potential
- typically start-ups or young companies
- active involvement in portfolio companies

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b) Venture Capital

i) formative stage
- pre-seed capital/angel investing • idea stage
  • typically F/F and not VC
- seed stage - support product development and marketing efforts
  • earliest VC stage
- early stage - moving towards operations but pre-revenue

ii) later-stage financing - post-revenue, pre-IPO
- support growth

iii) mezzanine financing - prepares a company to go public
- bridge financing

- equity investments typically made through convertible preferred shares
- later stage may involve convertible debt

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c) Other PE strategies/

• growth capital - minority stakes in more mature companies to expand or restructure operations, enter new markets, or finance major acquisitions

Exit Strategies/

a) Trade Sale: sale to a strategic buyer
- auction or private negotiation
- immediate cash exit for the PE fund
- higher valuation from a strategic buyer (vs. financial buyer)
- lower costs that IPO
- lower levels of disclosure

-/ • possible opposition by mgmt.
• less attractive to employees
• limited # of strategic buyers
• lower valuation than IPO

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Exit Strategies/

b) IPO
• highest valuation
• mgmt./staff buy-in
• publicity for the PE firm
• future upside if PE firm retains shares

-/ • high costs
• long lead times
• high disclosure requirements
• lockup periods that require PE firm to hold shares for a period of time
• potential weak market on IPO

c) Recapitalization - lever up the portfolio company, pay a dividend to the PE firm
- not a true exit but still a liquidity event

d) Secondary Sale - sale to another PE firm

e) Write-off/Liquidation

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Private Debt: debt provided by investors to private entities

a) Direct Lending: typically senior secured
- carry higher rates than public debt
- many loans will be leveraged loans

(e.g. Lend $20M at 6%, borrow $10M at 4%, $10M equity)

b) Mezzanine Loan: subordinate to senior secured but senior to equity
- often used for LBOs, recapitalizations and acquisitions
- higher rate than sen. sec. and may also have equity kickers

(warrants, options, conversion rights)

c) Venture Debt: provided to start-up or early stage companies
- typically convertible or has warrants

d) Distressed Debt: buying the debt of mature companies with financial difficulty that have prospects for turnaround

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e) Other:
- CLOs - private debt that becomes securitized into various tranches of credit quality and equity
- unitranche debt - partially secured debt - lower than senior secured but above senior unsecured
- real-estate debt - mortgage
- infrastructure debt
- specialty loans, e.g. litigation loans

Risk/Return → PE/
- PE riskier than public equity plus illiquid, should offer higher return
  - but is it higher risk-adjusted return?
    - historical data problematic
      - self report, ∴ subject to survivorship bias which overstates returns
      - lack of market prices leads to understatement of volatility

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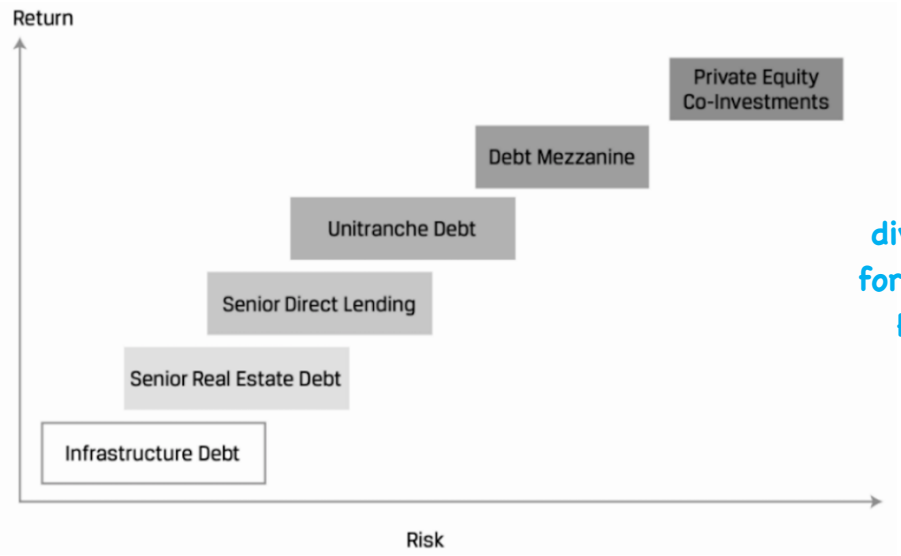
• Risk/Return - PD/ • illiquidity, higher POD, private market inefficiencies lead to potential higher return but with higher risk




• moderate diversification benefits for stocks/bonds
P → .47 to .75

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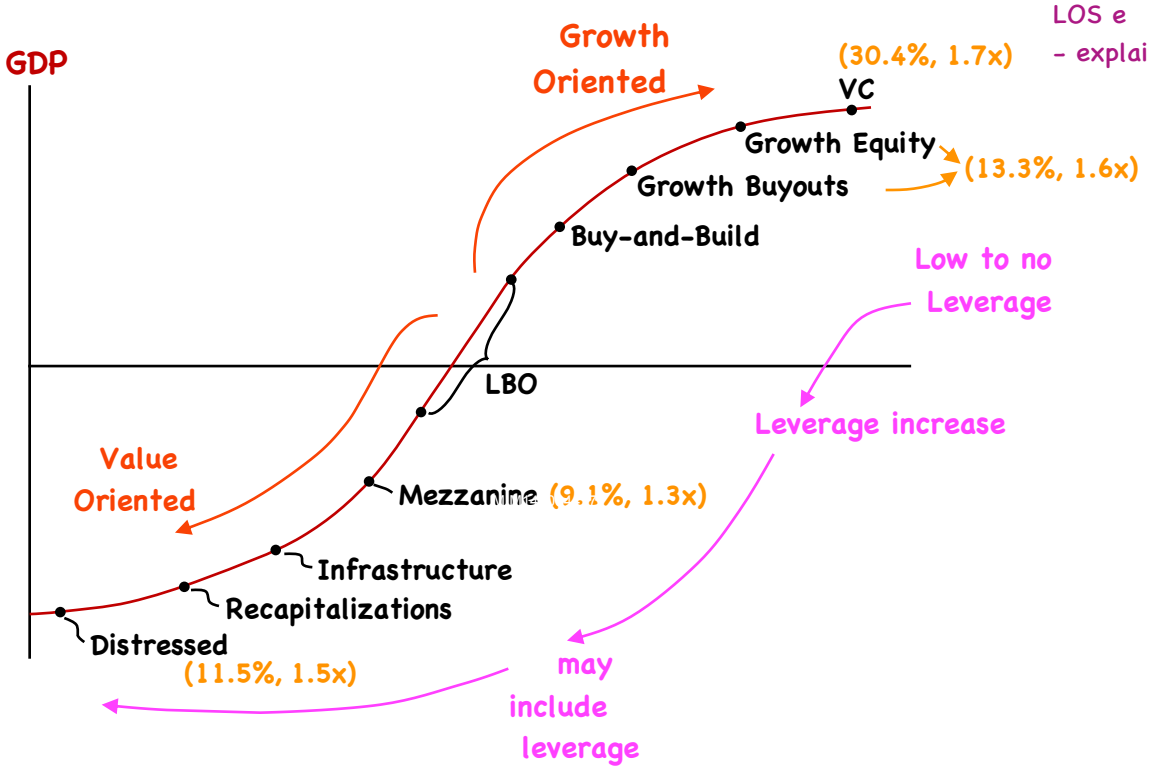

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- Natural Resources/
  - commodities and raw land used for farming and timber
  - hard → those that are mined/extracted
  - soft → those that are grown/cultivated
  - timberland → ownership of land and harvesting of trees for lumber (income + cap. gain)
  - farmland → leased or crop shared

Characteristics/

i) commodities - physical standardized products
- cap. gains (price) returns

e.g. precious/base metals, energy, agriculture, cash crops
- each may be divided further by physical location and grade or quality

- commodity indexes typically use futures prices rather than spot prices
- different indexes have different constituents with different weights

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i) commodities
- traded either physically (rare) or through ETFs/futures

$F_0 > S_0$, futures curve is upward sloping - contango

$F_0 < S_0$, futures curve is downward sloping - backwardation

- some ETFs try to avoid contango markets

ii) Timberland/Farmland:

Timberland - income stream based on sale of trees/wood
- factory and warehouse (growth ~ 5%/yr.)
- return from growth, commodity price, cap. gains

Farmland - row crops and permanent crops (nuts, fruits)
- must be harvested regardless of price
- return from quantities, price, land

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Risk/Return/

- Commodities - price return, diversification, inflation protection but with high volatility
  - price affected by supply and demand - each commodity has its own drivers of supply and demand
  - supply moves in long cycles (30 year supercycles)
  - demand changes much faster than supply
- Timber/Farmland - price appreciation + yield
  risk = weather, climate, global supply

Diversification benefits:

- Commodities - hedge against inflation
  - low correlation with other asset classes
- Timberland/Farmland - low/no correlation with stocks/bonds
  - does add ESG considerations to a portfolio

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Instruments/ Commodities

- derivatives - forwards, futures, options, swaps
- Exchange-traded products (funds or notes) - futures or physical
  - may use leverage, be long or short
- Managed futures (CTA)
- Specialized funds - private energy partnerships, energy MFs,

- Timberland/Farmland
  - Investment funds (REITs) or private funds

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Real Estate/

- owner-occupied → residential housing
- commercial → rental properties leased to tenants (including residential)
  → income producing
- Investments can be direct or indirect, equity or debt

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Real Estate/

- bond-like long-term income + equity-like capital gains
- low correlation with other asset classes
- inflation hedge (income and property value)

- direct investing requires large capital investments, illiquid markets, location sensitive, high transaction costs, low diversification, professional property management, specialized expertise by area

| | Debt | Equity |
|---|---|---|
| **Private** | ■ Mortgages<br>■ Construction lending<br>■ Mezzanine debt | ■ Direct ownership of real estate: ownership through sole ownership, joint ventures, separate accounts, or real estate limited partnerships<br>■ Indirect ownership via real estate funds<br>■ Private REITs |
| **Public** | ■ MBS (residential and commercial)<br>■ Collateralized mortgage obligations<br>■ Mortgage REITs<br>■ ETFs that own securitized mortgage debt | ■ Shares in real estate operating and development corporations<br>■ Listed REIT shares<br>■ Mutual funds<br>■ Index funds<br>■ ETFs |

- basic forms of real estate investments

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- Direct Real Estate Investing/
  - purchasing a property or making a loan
  - each can be levered

+/ - control (tenants, lease, when to sell, what to buy, CAPEX)
- taxes → depreciation and interest tax shield
  - may be possible to be CF positive but taxable inc. neg.

-/ - property management, large capital investments, expertise required

- Indirect Real Estate Investing → pooled investment vehicles, public or private
  - LLPs, MFs, REITs, ETFs
    - equity
    - mortgage (mREITS)

- Mortgages - loans against property
  - fixed or floating, fully/partially amortizing, residential or commercial
  - private or public (MBS)

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- Private Fund Investing Styles
  - infinite-life open-ended funds
    - investors can enter and exit at any time
    - offer exposure to core real estate (well-leased, high quality)
    - stable returns, primarily from income
  - core-plus strategies
    - non-core markets (secondary or tertiary cities) or properties with slightly higher leasing risk (hotels, nursing homes)
  - finite-life closed-end funds
    - value-added → require modest redevelopment, upgrades or repositioning
    - opportunistic → development or major redevelopment

    - involves the selling of the real-estate asset

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REITs/ - eliminates double corporate taxation as long as REIT distributes 90%-100% of taxable rental income

- may also require 75% or more of income produced by real estate assets (property, debt) or 75% or more of net income

- investors gain liquidity, lower trading costs, and better transparency

Characteristics/

1/ Residential Property - owner-occupied, typically leveraged equity position

2/ Commercial Real Estate - suitable for investors with long investment horizons and low liquidity needs
- requires day-to-day active mgmt.
- debt typically limited to a max. loan-to-value (LTV) ratio ~ 75%
- property cash flows critical to service debt

3/ REITs - mREITs - invest in mortgage securities
- equity REITs - invest in properties

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Characteristics/ 4/ MBS - covered in fixed income

Risk/Return Characteristics/

- Real Estate Indexes
  - listed REIT indexes - basically like any other equity index, also investable
- Private investment performance
  - based on either funds or underlying property performance
  - indexes are not investable
  - most property-based indexes are appraisal-based which smooths out volatility
  - fund indexes rely on self-report (sample selection bias)
- Repeat-sales indexes - transaction-based
  - more reliable the greater the number of sales per period
  - sold properties may not be representative of the entire market (a form of sample selection bias)

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Risk/Return Characteristics/

- Risks →
  - interest rate risk
  - economic conditions (leasing, rates)
  - operating risk (costs)
  - financial risk (leverage, securing debt)

Diversification/ ~ 50% of returns (private core, listed real estate) derived from income

~ moderate correlations with equities and bonds

- question remains → does public RE overstate volatility or does private RE understate volatility

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Infrastructure/ assets intended for public use, mostly financed, owned and operated by governments

- growing share being financed privately through public-private partnerships (PPPs)

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Infrastructure/
- lease assets back to the gov't., sell assets to the gov't., or hold and operate the assets

• Investment characteristics/
  • stable long-term cash flows, inelastic demand, adjusts for inflation
  • significant capital investment
  • monopolistic and regulated
  → high barriers to entry
  • long operational lives
  • strategically important
  → allows for
  • highly leveraged financial structure
  • defined risks

Categories/
  • Social - directed towards human activity (education, health care, social housing, correctional facilities)
    - income derived from lease payments called availability pmts.
    - based on the ability of the asset to provide the service

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Categories/
  • Economic

1/ transportation assets - roads, bridges, tunnels, airports, seaports, rail
- income based on usage - tolls, fees, charges
(thus has market risk)

2/ ICT assets - stores, broadcasts, transmits information or data
(telecom towers, data centers)

3/ Utility and energy assets - generate and transmit power and produce potable water
(solar, wind, waste-to-energy)

- may also be classified by stage of development
  • greenfield investments - need to be developed
    - build to sell, build to lease, build to operate
    - financial investors + strategic investors

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Categories/
- brownfield investments - existing assets
  - privatized, sale and leaseback, sale from greenfield project
  - financial or strategic investors

Forms of Investment/
- direct investment - provides control, large capital investments, concentration risk, liquidity risk
- indirect investment - infrastructure funds, ETFs, company shares
  - through equity (77%) or debt
  - publicly-traded infrastructure securities
  - master limited partnerships (MLPs)

Diversification/
- income + some growth
- some inflation protection, low exposure to GDP growth issues

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- Risk/Return Characteristics

| Higher-Risk Profile | Medium-Risk Profile | Lower-Risk Profile |
|---|---|---|
| Greenfield projects without guarantees of demand upon completion—e.g., variable electricity prices, uncertain traffic on roads and through ports | Mostly brownfield assets (with some capital expenditure requirements) and some greenfield assets (with limited construction and demand risk) | Brownfield assets with mitigated risks—e.g., fully constructed with contracted/regulated revenues |
| Located in OECD countries and emerging markets | Located primarily in OECD countries | Located in the most stable OECD countries |
| High weighting to capital appreciation | Mix of yield and capital appreciation | High weighting to current yield |
| **Target equity returns of 14%+** | **Target equity returns of 10%–12%** | **Target equity returns of 6%–8%** |

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Issues in Performance Appraisal/ AI are generally actively managed (although there are passive choices)

- Sharpe ratio - requires normally distributed returns
  - return profiles tend to be asymmetric and skewed
  - standard deviation is not a good measure of dispersion

∴ SR is not a good measure of risk-adjusted return

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## Issues in Performance Appraisal/

- **Sharpe Ratio** - regardless of shortcomings, ratios of 1-2 are targeted
  - higher is a signal of significant volatility smoothing
    (model-based pricing, short-option strategies)
- **Sortino Ratio** - return relative to only downside volatility

- both do not consider the correlation of the AI program with the rest of the portfolio
  - may improve risk/return relationship in a portfolio context (or not)

- **Treynor Ratio** - measure of excess average return relative to its beta to a relevant benchmark
  - the lower the $\beta$, the higher the TR

(note: $\beta$ is historical and may be different in the future)

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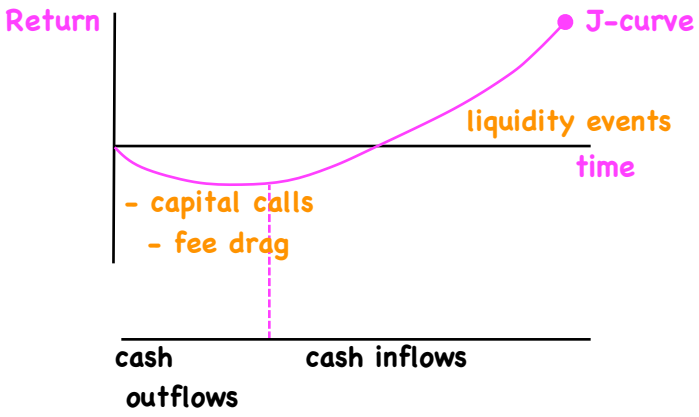
## Issues in Performance Appraisal/

- **Calmar Ratio** $\dfrac{-\text{avg. annual compounded return (over 3 yrs.)}}{\text{maximum drawdown}}$
  ↳ max. loss peak to trough
- **MAR** = $\dfrac{\text{avg. comp. ret. (full history)}}{\text{average drawdown}}$

## PE/RE Performance Evaluation




- measurement of success depends far more on the timing and magnitude of cash flows in and out of investments
- use of IRR as a key metric (since timing of CFs are a key part of the investment decision)

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## PE/RE Performance Evaluation

- MOIC - multiple of invested capital (money multiple)

$$\frac{\text{Distributions} + \text{NAV}}{\text{Paid} - \text{in} - \text{Capital}}$$

- ignores timing of CFs

- less emphasis placed on correlation benefits over shorter periods
  - NAV may not reflect short-term changes in value thus understating volatility
  - appear to deliver smooth returns over time thus making PE/RE appear less correlated than they actually are

- Quartile Ranking - performance against cohort of peer investments with same vintage year (year funded)

- RE managers also evaluated by the cap. rate being earned on properties

$$\text{NOI}/\text{Property Value}$$

- Capital loss ratio = $\frac{\text{capital loss}}{\text{total invested capital}}$
  - probability of permanent impairment of an investment

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LOS i
- describe

## Hedge Funds/

- Leverage - performance measures won't capture use of leverage but it may be critical to the strategy

- Illiquidity and Potential Redemptions - valuations are important for calculating performance and NAV
  - redemptions have to be met at NAV, so NAV should reflect liquidation effects

Level 1 asset pricing - exchange-traded, publicly available pricing
Level 2 - broker quotes
Level 3 - mark-to-model
- use of bid for long positions, ask for short positions (L1/L2)
- funds typically have 2 NAVs - performance / redemption

- Tail-events - low probability, high severity events
  - stress testing, scenario analysis used

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- describe

## Hedge Funds/

- redemptions increase during times of poor performance
- funds charge redemption fees or suspend redemptions during stress times
- notice periods allow orderly liquidations
- lock-up periods allow time for a strategy to work

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LOS j
- calculate
- interpret

## Custom Fee Arrangements

1/ Fees based on liquidity terms and asset size
- longer lockups = lower fees
- larger investment = lower fees

2/ Founder's shares - entitle early investors to a lower fee structure (e.g. first $100M)

or/ - early investors get a lower fee once a certain level of AUM is reached

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## Custom Fee Arrangements

3/ Either/or fees - 1% mgmt. fee or 30% incentive above the hurdle, whichever is greater
- if the 1% mgmt. fee is paid, it reduces the 30% incentive fee for next year

- HF databases and indexes report performance net of fees (fees can differ by investor, so each investor may realize a different return)

Example 4, 5, 6

## Introduction to Digital Assets

a. describe financial applications of distributed ledger technology

b. explain investment features of digital assets and contrast them with other asset classes

c. describe investment forms and vehicles used in digital asset investments

d. analyze sources of risk, return, and diversification among digital asset investments

# Introduction to Digital Assets

## Distributed Ledger Technology

A database, shared among potentially infinite numbers of entities in a network
↳ each entity has a matching copy of the digital database

Elements: Digital ledger - digital record of current and past transactions
Consensus mechanism - process by which entities (nodes) agree on state of the ledger
= transaction validation + agreement on ledger update

Features: Cryptography - Algorithmic process to encrypt data
Smart contracts - self-executing programs e.g. automatic execution of contingent claims

A means to create, exchange, and track ownership of financial assets

Benefits: accuracy, transparency, security of records, faster transfer, P2P interactions

Drawbacks: 'technology is not fully secure', energy required to verify activity

## Distributed Ledger Technology

Blockchain (a type of DL)

Transactions recorded sequentially in blocks - which are then chained:

Blocks will be added to chain after validation via a consensus protocol e.g. PoW, PoS

Proof of Work (PoW)

Miners must solve a cryptographic problem to validate blocks and add to chain

- blocks are hashed (using double SHA-256) to give a hash value
- the hash value must meet certain criteria to be accepted
- it probably won't - so a unique number in the block (nonce) is changed, and the miner tries again. And again … billions of times
- malicious attackers would need to control 51% of computing power to add a fraudulent transaction

Proof of Stake (PoS)

Validators pledge capital to vouch for a block's validity

A majority of other validators must attest to the block's validity

## Distributed Ledger Technology

DLT can take the form of either Permissionless or Permissioned networks

- open to anyone who wishes to make a transaction
- all users in the network can see all transactions
- any network participant can perform all network functions

- members might be restricted from participating in certain activities
- permissions used to allow varying levels of access

| | | |
|---|---|---|
| Speed: | slower as a large number of members need to reach consensus - reduced speed and scalability | faster as limited number of members authorized to validate |
| Cost: | many members required to validate, not cost effective | more cost-effective |
| Decentralization: | decentralized | partially centralized |
| Access: | membership unlimited | membership limited |
| Governance: | decentralized (members) | centralized |

## Distributed Ledger Technology

### Applications of DLT to Financial Services

Creation of Digital Assets: assets that exist only as an electronic record with rights to buy, use, or sell

Cryptocurrencies (Bitcoin, Altcoins, Central Bank Digital Currencies)

- units used to transfer or store value
- allow near-real-time transactions between parties without requiring an intermediary
- lack physical form, not backed by central bank or monetary authority
- typically have self-imposed limit on amount issued - to maintain value (!)

Tokens (tokenization: substituting token for sensitive data)

- can be used to streamline process of verification for transactions involving physical assets

Non-Fungible Token (NFT): links digital assets to certificates of authenticity

Security Tokens: digitize ownership rights associated with publicly traded securities

e.g. Initial Coin Offering (ICO) raise capital by issuing digital tokens to buy future products

Utility Tokens: provide services within a network (only compensate for activities on the network)

Governance Tokens: votes on how networks are run (used in Permissionless networks)

## Digital Assets

Similarity with traditional asset types: emergence of indirect investment vehicles that invest in both differences:

Inherent Value: They do not have one. Price derived from anticipated appreciation due to:
- scarcity value
- potential ability to transfer value

Validating Transactions: digital assets → DLT  Physical Assets → Private ledger
↳ Permissionless v. Permissioned network
and PoW v. PoS can impact perceived value

A medium of exchange? Financial assets easily exchanged into fiat currencies
some digital assets (e.g. Bitcoin) used as a substitute for fiat currencies
e.g. Tesla ← limited acceptance as a medium of exchange in mainstream financial system
not legal tender, banned in some countries

Legal & Regulatory Protection: not much for digital assets

## Digital Assets

### Investible Digital Assets

Bitcoin: designed as an alternative to traditional currencies

Altcoins: ether: its network (ethereum) has a programmable blockchain, also known as 'Programmable Altcoins', 'smart coins', 'smart contracts'
↳ Automatically execute transactions

Stablecoins: designed to maintain a stable value - linked to other assets
- collateralized by a basket of assets

Asset-Backed Tokens - maintain price parity with target asset via tokenization
smart (algorithmic) stablecoins control available supply based on demand

e.g. TerraUSD - Pegged to USD
- backed by Luna
- collapsed
- Founder in all sorts of trouble

Meme Coins: "launched for entertainment purposes"

## Investment Forms and Vehicles

Indirect investment: via exchange-traded products and hedge funds

Direct ownership: requires a cryptocurrency wallet

### Cryptocurrency Exchanges

**Centralized exchanges:** Privately held
**e.g. FTX!** Most popular, offer volume, liquidity, price transparency
Trading is electronic, direct (no broker, dealer)
Hosted on private server → **security issue**

**Decentralized exchanges:** emulate blockchain's decentralized protocol
no centralized control mechanism, coordination or control
**Resistant to Attempted Attacks**
But - difficult to regulate
→ **Pump and dump - EMAX!**

## Investment Forms and Vehicles

### Risks of Direct Investment

**Fraud: Scam ICOs** e.g. Titanium , $21M , 4 yrs. 3M prison
**Pump and Dump** e.g. EMAX , $250M , $1.3M fine
**Market manipulation** 'cryptocurrency whales' - hold majority of currency
**Theft** $3.8 billion hacked in 2022
**Lost password** 20% of all Bitcoins lost or deserted in inaccessible wallets

### Forms of Indirect Investment

**Cryptocurrency Coin Trusts:** trade shares in trusts holding cryptocurrency
trade OTC and behave like closed-end funds
no wallet required, transparent trading
**but substantial fees**

**Cryptocurrency Futures:** e.g. CME CF Bitcoin reference rate
cash settled, tracks spot price of Bitcoin

**Cryptocurrency ETFs:** Replicate returns using cryptocurrency derivatives

## Investment Forms and Vehicles

### Forms of Indirect Investment

Cryptocurrency Stocks: e.g. Equity in publicly traded digital exchanges
Payment providers accepting cryptocurrencies
Corporations developing/manufacturing equipment for mining

Hedge Funds: some funds actively mine Bitcoin

### Digital Forms of Investment for Non-Digital Assets

Digital investments with an underlying non-digital asset from which it derives value

e.g. Asset-Backed Tokens: Tokenized Assets include gold, crude oil, real estate, equities
e.g. Fractional ownership of shares
- Digital representation of ownership - increases transparency
  - decreases record-keeping costs
- classed as securities by regulators
- issued on smart contract platforms - decentralized applications (dApps)

Decentralized Finance: DeFi "marketplace of dApps" - save time! Reduce Risk!

## Risk, Return, Diversification

### Digital Assets are considered Alternative Investments

Value based purely on price appreciation, no underlying cash flows
market demand for limited supply is significant driver of prices
e.g. Bitcoin: supply limited to 21 million coins "digital gold"
↳ High volatility, high return, low correlation with traditional asset classes

**Exhibit 9: Monthly Log-Returns for Bitcoin and Asset Class Benchmarks between January 2011 and January 2022**

| | Bitcoin in USD | S&P 500 Index Total Return | MSCI World Index Return | Bloomberg Global Aggregate Index |
|---|---|---|---|---|
| Average | 8.84% | 1.13% | 0.66% | 0.16% |
| Standard deviation | 0.32 | 0.04 | 0.04 | 0.01 |
| Coefficient of variation | 3.66 | 3.43 | 6.09 | 8.16 |

**Exhibit 11: Correlations between Monthly Log-Returns for Cryptocurrencies and Selected Asset Classes (January 2011 to January 2022)**

| | Bitcoin in US Dollars | S&P 500 Index Total Return | MSCI World Index Return | Bloomberg Global Aggregate Index |
|---|---|---|---|---|
| Bitcoin in US Dollars | 1 | | | |
| S&P 500 Index Total Return | 0.21 | 1 | | |
| MSCI World Index Return | 0.22 | 0.97 | 1 | |
| Bloomberg Global Aggregate Index | 0.14 | 0.25 | 0.33 | 1 |