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HIGHLIGHTED HANDOUT

FIN730

Investment Analysis & Portfolio Management

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VU STUDY HANDOUT

FIN730

Investment Analysis & Portfolio Management

This handout covers the full investment process: valuation of securities, risk-return measurement, modern portfolio theory, asset pricing models, bond and equity analysis, derivatives, and performance evaluation - the professional toolkit for managing investments.

12 lecture-wise topics | key terms | exam pointers

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UNIT 1: INVESTMENT FOUNDATIONS

Lecture 1: The Investment Environment

Learning Objectives

- Define investment and its objectives
- Classify financial assets
- Describe the investment process

Key Terms & Definitions

Investment

Committing funds now for uncertain future returns.

Real vs Financial assets

Productive capacity vs claims on real assets.

Risk-return tradeoff

Higher expected return demands bearing higher risk.

Investment commits current funds to **uncertain** future payoffs - speculation and gambling differ in analysis depth and risk control, not just intent. **Objectives**: capital growth, income, **preservation**, liquidity, tax efficiency - ranked per investor (a retiree vs a young professional). **Constraints**: horizon, liquidity needs, regulations, taxes, unique circumstances.

Asset classes: money market (T-bills), **bonds** (fixed income), **equities** (residual claims), **derivatives** (options, futures), **alternatives** (real estate, commodities, private equity). **Real assets** (factories) generate wealth; **financial assets** allocate claims on it - finance serves production.

The **investment process**: (1) set objectives/constraints (**investment policy statement**), (2) analyze securities, (3) construct portfolio, (4) monitor/rebalance, (5) measure performance. Professionals document everything in the **IPS** - amateurs trade on tips.

- **IPS first**: objectives + constraints before any security is picked.
- **Risk has two faces**: volatility and permanent loss - manage both.
- **Diversification** is the only free lunch in finance.
- **Match horizon to volatility**: equities for decades, bills for months.

VERY IMPORTANT — Exam Pointer

Very important: draft the key sections of an Investment Policy Statement.

Section Summary

Investing is goal-driven allocation under uncertainty, disciplined by a written policy.

Lecture 2: Risk and Return Measurement

Learning Objectives

- Compute holding-period returns
- Measure risk via variance
- Compare risk-adjusted metrics

Key Terms & Definitions

Holding-period return

HPR = (P1 - P0 + D) / P0.

Standard deviation

Square root of return variance - the standard risk proxy.

Sharpe ratio

(Rp - Rf) / sigma_p: excess return per unit of total risk.

Return: HPR over one period; multi-period via **geometric (time-weighted)** compounding - arithmetic averages overstate long-run wealth. **Annualize** with (1+HPR)^(1/n)-1. **Real return** = nominal minus inflation (approx). **Expected return** = probability-weighted scenarios.

Risk: **variance/standard deviation** of returns (total risk), **beta** (systematic risk), **downside** measures (semi-variance, **VaR**: "99% confident losses won't exceed Rs X daily"). **Risk aversion** (concave utility) explains why investors demand **risk premia** - the equity premium puzzle debates its size.

Risk-adjusted: **Sharpe** (total risk), **Treynor** (beta), **Jensen's alpha** (excess over CAPM), **Sortino** (downside only), **Information ratio** (active return / tracking error). Compare funds on these, never raw returns.

- **Geometric mean** for multi-period wealth; arithmetic for single-period expectation.
- **Sharpe = (Rp-Rf)/sigma**: memorize and interpret.
- **VaR** is a quantile, not a maximum - it says nothing about tail beyond.
- **Never rank funds by raw return**.

Example

Fund A: 15% return, 20% sigma; Fund B: 10%, 8% sigma; Rf 5%. Sharpe A = 0.5, B = 0.625 - B is better per unit of risk despite lower return.

VERY IMPORTANT — Exam Pointer

Very important: compute Sharpe ratios and explain why risk adjustment changes rankings.

Section Summary

Measure return geometrically, risk as dispersion, and always compare risk-adjusted.

Lecture 3: Financial Markets and Trading

Learning Objectives

- Describe market structure
- Explain order types
- Discuss market efficiency

Key Terms & Definitions

Primary vs Secondary market

New issuance vs trading of existing securities.

Bid-ask spread

Dealer's buy-sell difference; a transaction cost and liquidity measure.

Efficient Market Hypothesis

Prices reflect available information (weak/semi-strong/strong).

Primary: IPOs/SEOs raise capital (underwriters, book-building, greenshoe). **Secondary**: exchanges (PSX) and OTC provide **liquidity** and price discovery. **Market makers** quote bid/ask, earning the **spread**; narrower spreads = more liquid. **Indices** (KSE-100) benchmark performance.

Orders: **market** (immediate, price risk), **limit** (price control, execution risk), **stop-loss**. **Margin** trading leverages (and magnifies losses); **short selling** borrows to sell high, buys back low - theoretically unlimited loss. Settlement cycles (T+2) and circuit breakers manage system risk.

EMH: **weak** (past prices reflected - technical analysis futile), **semi-strong** (all public info - fundamental analysis futile), **strong** (all info). Evidence: most active managers underperform indices net of fees. **Anomalies** (January, momentum, value) challenge EMH; **behavioral finance** (overconfidence, herding, loss aversion, disposition effect) explains persistent mispricing.

- **Liquidity = low spread + depth + immediacy**.
- **Limit orders control price; market orders control execution**.
- **EMH forms**: know what each says is useless.
- **Behavioral biases** (herding, loss aversion) create the anomalies.

VERY IMPORTANT — Exam Pointer

Exam pointer: state the three EMH forms and one investment implication of each.

Section Summary

Markets provide liquidity and price discovery; efficiency is the benchmark that active strategies must beat.

UNIT 2: PORTFOLIO THEORY

Lecture 4: Modern Portfolio Theory

Learning Objectives

- Explain diversification math

- Construct the efficient frontier
- Find the optimal portfolio

Key Terms & Definitions

Efficient frontier

Set of portfolios with maximum return per risk level.

Correlation

Co-movement of returns (-1 to +1); diversification needs < +1.

Capital Allocation Line

Risk-free asset + risky portfolio combinations.

Markowitz (1952): portfolio variance = weighted covariances - with **correlation < 1**, combined risk is below the weighted average. **Diversification** eliminates **unsystematic** (firm-specific) risk; **systematic** (market) risk remains. ~20-30 stocks diversify most unsystematic risk.

Efficient frontier: for each risk level, the max-return portfolio (quadratic optimization). Add the **risk-free asset**: the **CAL** from Rf tangent to the frontier gives the best Sharpe - the tangency = **market portfolio**. **Separation theorem**: all investors hold the same risky mix, differing only in Rf allocation by risk aversion.

Optimal portfolio: tangency of investor's **indifference curves** with the CAL. **Criticisms**: estimation error (garbage in), single-period, variance as risk, ignoring skewness/taxes. Practice: **Black-Litterman** blends market equilibrium with views; **risk parity** budgets risk equally.

- **Correlation < 1** is the entire mathematical basis of diversification.
- **Only systematic risk is priced** - diversifiable risk earns no premium.
- **Separation theorem**: one risky mix for all, leverage via Rf.
- **Estimation error** is MPT's practical enemy - shrink estimates.

Example

Two stocks, each sigma 20%, correlation 0.3: 50/50 portfolio sigma = ~15.6% < 20% - same expected return, less risk. That gap is the free lunch.

VERY IMPORTANT — Exam Pointer

Very important: prove with numbers that diversification reduces risk when correlation < 1.

Section Summary

MPT turns diversification into math: the frontier, the tangency portfolio, and separation.

Lecture 5: CAPM and Factor Models

Learning Objectives

- Derive CAPM intuition
- Estimate beta

- Extend to multi-factor models

Key Terms & Definitions

CAPM

E(Ri) = Rf + beta_i [E(Rm) - Rf].

Beta

Cov(Ri,Rm)/Var(Rm): systematic risk measure.

Security Market Line

Graphs expected return vs beta; mispricing = distance from SML.

CAPM (Sharpe-Lintner-Mossin): in equilibrium, expected return compensates only **systematic risk**: E(Ri) = Rf + beta[E(Rm)-Rf]. **Beta** > 1 amplifies market moves; **SML** plots it - assets above are **undervalued** (positive alpha). Assumptions: single period, homogeneous expectations, no frictions - all false, yet the model organizes thinking.

Estimating beta: regress stock returns on market returns (slope = beta); adjust (Blume: toward 1.0) since extremes mean-revert. **Characteristic line** R_i = alpha + beta R_m + e. Fundamental beta from business/financial risk when no history exists.

Beyond CAPM: **Fama-French 3-factor** (+ size SMB, value HML), **Carhart** (+ momentum), **5-factor** (+ profitability, investment), **APT** (multiple macro factors, no market portfolio needed). Factors explain most return variation - "alpha" often repackaged factor exposure (**smart beta**).

- **CAPM formula**: memorize and compute required returns.
- **Beta from regression slope**; adjust extremes toward 1.
- **Alpha** = return above the SML prediction - true skill (or luck).
- **Factors**: size, value, momentum, profitability explain returns.

Example

Rf 8%, market premium 7%, stock beta 1.3: required return = 8 + 1.3(7) = 17.1%. If your analysis forecasts 20%, the stock plots above the SML - buy.

VERY IMPORTANT — Exam Pointer

Very important: compute required return via CAPM and interpret alpha vs the SML.

Section Summary

CAPM prices systematic risk; factor models complete the picture of what drives returns.

Lecture 6: Portfolio Construction and Rebalancing

Learning Objectives

- Set strategic asset allocation
- Apply tactical tilts
- Rebalance systematically

Key Terms & Definitions

Strategic asset allocation

Long-run target weights from objectives (stocks/bonds/cash).

Tactical asset allocation

Short-run deviations exploiting expected mispricing.

Rebalancing

Restoring target weights periodically or on bands.

SAA is the highest-impact decision (Brinson: allocation explains ~90% of return variability): set stock/bond/cash weights from horizon, risk tolerance, and capital-market expectations. **Glide paths** (target-date funds) de-risk with age. **Core-satellite**: passive core + active satellites.

TAA: temporary tilts (overweight equities when cheap) within IPS bands - requires genuine forecasting skill; most investors should keep tilts small. **Dynamic strategies**: CPPI (floor protection), constant-mix (contrarian rebalancing).

Rebalancing: calendar (quarterly) or **band-based** (drift > 5% triggers) - it systematically **sells high, buys low**, controlling risk. Costs: taxes, transactions - use new cash flows first. **Tax-loss harvesting** adds value in taxable accounts.

- **SAA dominates outcomes** - get the stock/bond split right first.
- **Rebalance bands** beat rigid calendars on cost.
- **Rebalance with cash flows** to minimize taxes/costs.
- **Document tilts** in the IPS with size limits.

VERY IMPORTANT — Exam Pointer

Exam pointer: a 60/40 portfolio drifts to 75/25 in a bull run - explain the rebalancing trade and its benefit.

Section Summary

Set strategic weights, tilt modestly, rebalance mechanically - discipline beats prediction.

UNIT 3: SECURITY VALUATION

Lecture 7: Bond Valuation and Analysis

Learning Objectives

- Price bonds
- Explain yield measures
- Manage interest-rate risk

Key Terms & Definitions

Yield to maturity

IRR equating price to discounted cash flows.

Duration

Weighted-average time to cash flows; price sensitivity measure.

Convexity

Curvature of price-yield relation; second-order adjustment.

Pricing: P = coupon x annuity factor + face/(1+y)^n. Price **falls when yields rise** (inverse relation); longer maturity and lower coupons = more sensitive. **YTM** assumes hold-to-maturity and reinvestment at YTM - a promised, not guaranteed, yield. **Current yield**, **YTC** (callable), **realized** yield variants.

Term structure: **spot rates** price zero-coupons; **YTM** is their average. Theories: **expectations** (long = expected future shorts), **liquidity preference** (term premium), **segmentation**. **Credit spread** = corporate yield minus sovereign - widens in stress.

Risk management: **Macaulay duration** (years), **modified duration** = Mac/(1+y) -> % price change ~ -D_mod x delta_y. **Convexity** corrects for large moves (prices rise more than they fall). **Immunization**: match duration to horizon to lock in returns; **dedication** matches cash flows exactly.

- **Price-yield inverse**; sensitivity rises with maturity, falls with coupon.
- **Modified duration** estimates % price change per 1% yield move.
- **Immunize** by matching duration to investment horizon.
- **Credit spreads** are the market's fear gauge.

Example

10-year bond, modified duration 7.5: yields rise 1% -> price falls ~7.5%. A 2-year note (duration ~1.9) falls only ~1.9% - maturity drives risk.

VERY IMPORTANT — Exam Pointer

Very important: compute price change from modified duration and explain immunization.

Section Summary

Bonds are discounted cash flows; duration quantifies rate risk and enables immunization.

Lecture 8: Equity Valuation

Learning Objectives

- Apply DDM
- Use relative valuation
- Estimate growth and required return

Key Terms & Definitions

Dividend Discount Model

P0 = D1/(k-g): value as discounted dividends.

Free Cash Flow

Cash available to all investors (FCFF) or equity (FCFE).

P/E, P/B, EV/EBITDA

Relative multiples vs comparables.

DDM: constant-growth **Gordon model** P0 = D1/(k-g) (needs k>g; g from retention x ROE). Multi-stage for high-growth then stable phases. **FCF models**: FCFF discounted at **WACC**, FCFE at cost of equity - better when dividends don't reflect capacity. **Residual income**: book value + discounted abnormal earnings.

Relative valuation: **P/E** (trailing/forward; PEG adjusts for growth), **P/B** (banks, asset-heavy), **EV/EBITDA** (capital-structure neutral), **P/S**. Compare vs history, peers, market - control for growth, risk, ROE differences. Multiples embed the same DCF economics; they don't avoid forecasting.

Inputs: **k** from CAPM; **g** = retention ratio x ROE (sustainable), capped by economy growth long-run. **Sensitivity**: value is hypersensitive to k-g - a 1% error swings value hugely. Triangulate: DCF + multiples + scenarios; **margin of safety** (Graham) guards error.

- **Gordon model**: P0 = D1/(k-g) - know assumptions and limits.
- **g = b x ROE**, capped by nominal GDP growth eventually.
- **Multiples need comparability** - adjust for growth/risk/ROE.
- **Triangulate and demand margin of safety**.

Example

D1 Rs 5, k 15%, g 6%: P0 = 5/(0.15-0.06) = Rs 55.6. If k were 16%, value drops to Rs 50 - sensitivity demands humility.

VERY IMPORTANT — Exam Pointer

Very important: value a stock with the Gordon model and explain its key sensitivities.

Section Summary

Equities are discounted future cash flows; multiples shortcut the same economics - triangulate.

Lecture 9: Fundamental and Technical Analysis

Learning Objectives

- Conduct top-down analysis
- Read financial statements for investing
- Evaluate technical tools

Key Terms & Definitions

Top-down analysis

Economy -> industry -> company sequence.

Ratio analysis

Profitability, liquidity, leverage, efficiency ratios.

Technical analysis

Price/volume pattern study for timing.

Top-down: macro outlook (rates, growth) -> **industry analysis** (Porter's five forces, life cycle: pioneer -> growth -> mature -> decline) -> **company** (competitive advantage/moat, management quality, earnings quality). **Bottom-up** stock-pickers invert the emphasis but still check macro risks.

Financial analysis: profitability (ROE = margin x turnover x leverage - **DuPont**), liquidity (current, quick), leverage (debt/equity, interest coverage), efficiency (receivable days), cash-flow quality (accruals vs cash). **Red flags**: rising receivables vs sales, frequent "one-offs", auditor changes, aggressive revenue recognition.

Technical analysis: **Dow theory**, trends, **support/resistance**, moving averages (golden/death crosses), **RSI** (overbought >70), MACD, volume confirmation, chart patterns (head-and-shoulders). Use for **timing** around fundamental convictions - never as the sole basis; EMH-weak-form evidence is mixed at best.

- **DuPont**: ROE = margin x turnover x leverage - find the driver.
- **Cash is fact, profit is opinion** - reconcile earnings to cash flow.
- **Porter's five forces** for industry attractiveness.
- **Technicals time entries**; fundamentals choose securities.

VERY IMPORTANT — Exam Pointer

Exam pointer: decompose ROE with DuPont and name two earnings-quality red flags.

Section Summary

Fundamentals select, financial analysis verifies, technicals time - in that order.

UNIT 4: DERIVATIVES AND PERFORMANCE

Lecture 10: Options

Learning Objectives

- Define option payoffs
- Explain put-call parity
- Describe basic strategies

Key Terms & Definitions

Call / Put

Right to buy / sell at the strike price.

Put-call parity

C + PV(X) = P + S (European, no dividends).

Black-Scholes

Option pricing from stock price, strike, rate, time, volatility.

Mechanics: **call** profits when S > X (payoff max(S-X,0) minus premium); **put** profits when S < X. **Moneyness**: ITM/ATM/OTM. **Intrinsic** value (S-X for calls) + **time value** (volatility x time). American exercisable anytime; European at expiry.

Put-call parity: C + PV(X) = P + S - the no-arbitrage link; violations are arbitraged away. **Black-Scholes** inputs: S, X, r, T, **sigma** (the only unobservable - backed out as **implied volatility**). **Greeks**: delta (price sensitivity), gamma, theta (time decay), vega (vol sensitivity).

Strategies: **protective put** (insurance), **covered call** (income on holdings), **straddle** (volatility bet), **spreads** (defined risk). Uses: hedging (farmer locks prices), speculation with limited loss, income. **Warning**: leverage and theta cut both ways - most retail option buyers lose.

- **Payoff diagrams**: draw call/put buyer and seller.
- **Put-call parity** - state it and use it to spot arbitrage.
- **Implied volatility** is the market's fear/uncertainty gauge (VIX).
- **Hedge with puts, earn with covered calls** - the two sensible retail uses.

Example

Own shares at Rs 100; buy Rs 95 put for Rs 4: worst case sell at 95, net floor 91 - portfolio insurance with a known premium.

VERY IMPORTANT — Exam Pointer

Very important: draw the protective-put payoff and explain put-call parity.

Section Summary

Options are insurance and leverage: price them no-arbitrage, use them to hedge or earn.

Lecture 11: Futures, Forwards and Swaps

Learning Objectives

- Distinguish forwards/futures
- Price forwards
- Explain swaps and hedging

Key Terms & Definitions

Forward / Future

OTC customized vs exchange-traded standardized delivery contracts.

Cost of carry

F = S x e^((r-q)T): spot plus financing minus yield.

Interest-rate swap

Exchange fixed for floating payments on a notional.

Forwards: private OTC, customized, **counterparty risk**. **Futures**: exchange-traded, standardized, **daily marking-to-market** via clearinghouse margin - virtually no default risk. **Convergence**: futures -> spot at expiry. Uses: hedgers transfer risk, speculators take it, arbitrageurs link prices.

Pricing: **cost of carry** F = S(1+r)^T - PV(income). **Contango** (F > S) vs **backwardation**. Index futures, currency forwards (covered interest parity), commodity futures with storage costs. **Basis** = spot - futures; **basis risk** remains when hedging imperfectly.

Swaps: **interest-rate** (fixed <-> floating to manage duration), **currency** (cross-border funding), **credit default swaps** (default insurance - central in 2008). **Hedge ratio** = beta x (portfolio/futures values). Perfect hedges are rare - monitor basis and roll costs.

- **Futures = standardized + margined + cleared**; forwards = customized + risky.
- **Cost-of-carry** prices every forward.
- **Hedge ratio** sizes the futures position to the exposure.
- **Margin calls** can sink a "right" position - size for survival.

VERY IMPORTANT — Exam Pointer

Exam pointer: a fund manager fears a market fall - design the index-futures hedge including the ratio.

Section Summary

Forwards/futures lock prices; swaps restructure exposures - all priced by no-arbitrage.

Lecture 12: Performance Evaluation and Ethics

Learning Objectives

- Attribute performance
- Evaluate managers
- Apply investment ethics

Key Terms & Definitions

Performance attribution

Decomposing returns into allocation, selection, interaction.

GIPS

Global Investment Performance Standards for fair presentation.

Fiduciary duty

Loyalty, prudence and care owed to clients.

Measurement: **time-weighted** returns (manager skill, neutral to flows) vs **money-weighted/IRR** (investor experience). **Benchmarks** must be investable, specified in advance, matching style - **custom benchmarks** for odd mandates. Compare over full cycles, net of fees.

Attribution (Brinson): **allocation** (over/underweight sectors), **selection** (stock picks within), **interaction**. Tells whether the manager adds value and how. **Style analysis** (returns-based) detects drift. **Persistence** of outperformance is weak - fees predict future returns better than past returns do.

Ethics (CFA): **fiduciary duties** - loyalty, prudence, care; **suitability**; full disclosure of conflicts/fees; no front-running, no misrepresentation (**GIPS** compliance signals honesty); insider trading prohibitions; **soft dollars** disclosed. Trust is the industry's product - scandals (Madoff) show its fragility.

- **Time-weighted** for managers; **money-weighted** for investors.
- **Brinson attribution**: allocation + selection + interaction.
- **Fees predict future performance** better than past returns.
- **Fiduciary first**: loyalty, disclosure, no misrepresentation.

Example

A fund beats its benchmark by 2%: attribution shows +3% selection, -1% allocation - the manager picks well but times sectors poorly.

VERY IMPORTANT — Exam Pointer

Very important: decompose excess return with Brinson attribution and state the CFA's core duties.

Section Summary

Evaluate skill net of fees against proper benchmarks, attribute the sources, and hold fiduciary standards.

Glossary of Key Terms

Sharpe ratio — Excess return per unit of total risk.

Beta — Systematic risk: Cov(Ri,Rm)/Var(Rm).

CAPM — E(Ri) = Rf + beta[E(Rm)-Rf].

Duration — Bond price sensitivity to yield changes.

DDM — Dividend Discount Model: P0 = D1/(k-g).

Put-call parity — C + PV(X) = P + S.

IPS — Investment Policy Statement: objectives + constraints.

GIPS — Global Investment Performance Standards.