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CFA LEVEL I

Detailed Formula Sheet



Equity Investments

Topic 5 of 10 • Fully Explained

💡 Plain-English explanations 📊 Worked examples 🧠 Memory hooks ⚠️ Exam traps

Market Mechanics & Margin

Security Market Indexes

Market Efficiency

Dividend Discount Models

Growth & Required Return

Price & Enterprise Multiples

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👋 **Topic 5 — Equity Investments!** From how shares trade to how they're **valued**. The high-yield formulas live in indexes, the dividend discount model, and price multiples. Each card gives the formula, a **plain-English meaning**, a worked example, and **memory hooks**. 📈

💡 **In Plain English**

📊 **Worked Example**

🧠 **Memory Hook**

⚠️ **Watch Out**

📌 **Key Fact**

1 📈 Market Mechanics & Margin Trading

📄 Order Types & Positions (quick recap)

Market vs Limit orders • Long (buy, expect rise) vs Short (borrow & sell, expect fall)

💡 In Plain English

A **market order** executes immediately at the best available price; a **limit order** sets a price boundary. Going **long** profits when prices rise; **short selling** profits when prices fall.

⚖️ Buying on Margin

$$\text{Leverage Ratio} = \frac{1}{\text{Initial Margin \%}}$$

$$\text{Margin Call Price} = P_0 \times \frac{1 - \text{Initial Margin}}{1 - \text{Maintenance Margin}}$$

💡 In Plain English

Margin = borrowing from your broker to buy more shares. It **magnifies both gains and losses**. If the price falls far enough that your equity drops below the maintenance margin, you get a **margin call**.

📊 Worked Example

Initial margin 50% → leverage = $1/0.50 = 2.0\times$.

P_0 \$100, IM 50%, MM 25% → call price = $100 \times (1 - 0.50)/(1 - 0.25) = \66.67 .

🧠 Memory Hook

"Lower the margin → higher the leverage → bigger the swings." Returns are amplified by $1/\text{margin}$. 🎢

2 Security Market Indexes

The Three Weighting Methods

$$\text{Price-weighted: index} = \frac{\sum \text{Prices}}{\text{Divisor}} \quad | \quad \text{Equal-weighted: } w_i = \frac{1}{N}$$

$$\text{Market-cap (value) weighted: } w_i = \frac{P_i \times Q_i}{\sum (P_j \times Q_j)}$$

In Plain English

Price-weighted (e.g. the Dow): high-priced stocks dominate. **Equal-weighted**: every stock counts the same. **Market-cap-weighted** (e.g. S&P 500): biggest companies dominate — the most common method.

Worked Example

Price-weighted, 3 stocks \$10/\$20/\$30, divisor 3 → index = $60/3 = 20$.

A 2-for-1 split on the \$30 stock (→ \$15): new sum 45; to hold the index at 20, new divisor = $45/20 = 2.25$.

Watch Out

A **stock split forces a divisor adjustment in a price-weighted index** (not in market-cap or equal-weighted). Market-cap weighting tilts toward winners (momentum-like) and may overweight overvalued stocks.

Index Returns

$$\text{Price Return} = \frac{\text{Ending Index} - \text{Beginning Index}}{\text{Beginning Index}} \quad | \quad \text{Total Return adds reinvested income (dividends)}$$

In Plain English

Price return counts only capital gains; **total return** also includes dividends — so total return ≥ price return.

Worked Example

Index 1,000 → 1,050 = **5%** price return; add 1% from dividends → **6%** total return.

3 Market Efficiency

The Three Forms of Market Efficiency (EMH)

Weak (past prices) < Semi-strong (+ public info) < Strong (+ private info)

In Plain English

Each form says prices already reflect a set of information, so you **can't beat the market** using it. **Weak** → technical analysis won't work. **Semi-strong** → fundamental analysis on public info won't work. **Strong** → even insider info won't help (rarely holds in practice).

Memory Hook

"Weak kills charts; Semi-strong kills fundamentals; Strong kills insiders." Each level absorbs more info.

4 Dividend Discount Models (DDM)

One-Period & Multi-Period DDM

$$V_0 = \frac{D_1 + P_1}{1 + r} \quad | \quad V_0 = \frac{\sum D_t}{(1 + r)^t} + \frac{P_n}{(1 + r)^n}$$

In Plain English

A stock is worth the present value of all its future cash flows — the dividends you collect plus the price you eventually sell at, all discounted at the required return r .

Worked Example

D_1 \$2, expected price P_1 \$52, r 10% $\rightarrow V_0 = (2 + 52)/1.10 = \text{\$49.09}$.

Gordon Growth & Preferred Stock

$$\text{Gordon: } V_0 = \frac{D_1}{r - g} = \frac{D_0(1 + g)}{r - g} \quad | \quad \text{Preferred: } V_0 = \frac{D_p}{r}$$

In Plain English

The Gordon (constant-growth) model assumes dividends grow forever at a steady rate g . Preferred stock is just a **perpetuity** — a fixed dividend with no growth ($g = 0$).

Worked Example

D_1 \$2, r 10%, g 4% $\rightarrow V_0 = 2/(0.10 - 0.04) = \text{\$33.33}$.

Preferred paying \$5, r 8% $\rightarrow V_0 = 5/0.08 = \text{\$62.50}$.

Watch Out

Gordon only works when $r > g$ and uses D_1 (next year's dividend), not D_0 . The model is very sensitive to the $(r - g)$ gap.

Two-Stage DDM

$$V_0 = \sum \frac{D_t}{(1 + r)^t} + \frac{1}{(1 + r)^n} \times \frac{D_{n+1}}{r - g_L}$$

In Plain English

For young firms: discount each high-growth dividend individually, then apply Gordon to a stable long-run growth rate g_L to get the **terminal value**, and discount that back too.

5 Growth Rates & Required Return

Sustainable Growth Rate

$$g = b \times \text{ROE} \quad \text{where } b = \text{retention ratio} = 1 - \text{Payout ratio}$$

In Plain English

The rate a firm can grow **using only retained earnings** (no new equity). Reinvest more (higher b) or earn more on it (higher ROE) → faster sustainable growth.

Worked Example

ROE 15%, payout 40% → retention $b = 60\%$; $g = 0.60 \times 15\% = 9\%$.

Memory Hook

"Keep more, earn more → grow more." $g = (\text{what you keep}) \times (\text{how well you invest it})$.

Required Return on Equity

$$\text{CAPM: } r = R_f + \beta[E(R_m) - R_f] \quad | \quad \text{Build-up: } r = R_f + \text{Equity risk premium} + \text{other premiums}$$

In Plain English

The return investors demand to hold the stock, given its risk. CAPM uses beta (systematic risk); the build-up method stacks risk premiums on the risk-free rate (handy for private firms with no beta).

Worked Example

R_f 3%, β 1.1, equity risk premium 5% → $r = 3\% + 1.1(5\%) = 8.5\%$.

6 Price & Enterprise Multiples

Justified P/E (from the Gordon model)

$$\text{Leading } \frac{P_0}{E_1} = \frac{\text{Payout}}{r - g} \quad | \quad \text{Trailing } \frac{P_0}{E_0} = \frac{(1 - b)(1 + g)}{r - g}$$

In Plain English

The P/E a stock "deserves" given its fundamentals. **Leading** uses next year's earnings (E_1); **trailing** uses last year's (E_0). Higher payout, lower risk (r), and higher growth all justify a higher P/E.

Worked Example

Payout 40%, r 13%, g 9% (so $b = 60\%$): Leading P/E = $0.40 / (0.13 - 0.09) = 10.0$; Trailing P/E = $[0.40 \times 1.09] / 0.04 = 10.9$.



Other Multiples & Enterprise Value

Price multiples: $P/E \cdot P/B \cdot P/S \cdot P/CF$ (price $\div$ a fundamental per share)

Enterprise Value (EV) = Market Cap + Total Debt – Cash & Equivalents

In Plain English

EV is the cost to buy the *whole business* — you'd pay for the equity and assume the debt, but you get the cash. EV multiples (EV/EBITDA, EV/Sales) are **capital-structure-neutral**, so they compare firms with different debt better.

Worked Example

Market cap \$500, debt \$200, cash \$50 $\rightarrow$ EV = 500 + 200 – 50 = **\$650**.

Key Fact

P/B uses book value per share (good for banks & asset-heavy firms); **P/S** is useful when earnings are negative (sales are always positive). EV/EBITDA is a favorite for comparing across capital structures.