FOUNDATIONS SERIES

Baratelli Foundations: Corporate Finance Reference

A complete reference for students, finance professionals, and operators.

Corporate finance answers three fundamental questions: **Where should the firm invest its capital? How should it finance those investments? And how should it return value to its owners?** This guide covers the core concepts, formulas, and decision frameworks you need to answer all three — from the time value of money through capital budgeting, cost of capital, capital structure, and valuation.

For: students · early-career finance professionals · operators · small business owners building a finance vocabulary.

Section 1 — Time Value of Money

The foundation of all corporate finance: a dollar today is worth more than a dollar tomorrow

The time value of money (TVM) is the single most important concept in finance. It states that money available today is worth more than the same amount in the future, because money today can be invested to earn a return. Every valuation, every capital budgeting decision, every loan calculation is built on TVM.

#01 Future Value (FV) — Single Lump Sum

Future Value answers: 'If I invest $X today at a given rate, how much will I have in N years?' Compounding means you earn returns not just on your principal but also on previously earned returns — the engine behind long-term wealth creation.

Future Value Formula

$$FV = PV \times (1 + r)^n$$

FV = Future Value — what the investment grows to
PV = Present Value — the amount invested today
r = Interest rate per period
n = Number of periods

Key Insight: *$10,000 invested at 8% for 10 years grows to $21,589. At 20 years, it becomes $46,610. Compounding accelerates dramatically over time — this is why starting early matters so much.*

#02 Present Value (PV) — Discounting

Present Value answers the reverse question: 'What is a future cash flow worth in today's dollars?' This is the process of discounting — reducing future amounts by the opportunity cost of capital to find their equivalent value today. Every asset's value is the PV of its future cash flows.

Present Value Formula

$$PV = FV \div (1 + r)^n$$

PV = Present Value — today's equivalent of a future amount
FV = Future Value — the amount received in the future
r = Discount rate (opportunity cost of capital)
n = Number of periods until payment

Key Insight: *If someone promises you $50,000 in 5 years and your required return is 10%, that promise is worth only $31,046 today. Always convert future cash flows to PV before comparing them.*

#03 Ordinary Annuity — Present Value

An ordinary annuity is a series of equal cash flows paid at the END of each period — like a mortgage payment, lease payment, or bond coupon. The PV of an annuity formula collapses all those future payments into a single today's-dollar value.

PV of Ordinary Annuity

$$PV = PMT \times [1 - (1 + r)^{-n}] \div r$$

PMT = Payment amount each period
r = Discount rate per period
n = Total number of payments

Key Insight: *A $1,000/month payment for 5 years at 6% annual rate (0.5%/month) has a PV of $51,726. This is exactly how a bank calculates how much you can borrow given a monthly payment you can afford.*

#04 Perpetuity — Present Value

A perpetuity is an annuity that pays forever. While few instruments truly last forever, the formula is widely used in stock valuation (preferred stock, stable dividend payers) and in the terminal value calculation of a DCF model.

PV of Perpetuity

$$PV = PMT \div r$$

PMT = Fixed cash flow each period
r = Discount rate

Key Insight: *A bond paying $100/year forever, discounted at 5%, is worth exactly $2,000. Simple but powerful — this formula underlies the Gordon Growth Model for stock valuation.*

#05 Growing Perpetuity (Gordon Growth Model)

A growing perpetuity pays a cash flow that increases at a constant rate g forever. This is the foundation of the Dividend Discount Model (DDM) for stock valuation — used to find the intrinsic value of a stable, dividend-paying company.

PV of Growing Perpetuity

$$PV = PMT_1 \div (r - g)$$

PMT_1 = Cash flow at the end of period 1 (next year's payment)
r = Discount rate (must be greater than g)
g = Constant growth rate of cash flows

Key Insight: *If a stock pays a $3 dividend next year, dividends grow at 4% forever, and your required return is 9%, the stock is worth $3 ÷ (0.09 – 0.04) = $60. This is the Gordon Growth Model.*

#06 Compounding Periods & Effective Annual Rate (EAR)

When interest compounds more frequently than annually, you earn more than the stated (nominal) rate suggests. The Effective Annual Rate converts any compounding frequency into a true annual equivalent so you can compare rates fairly — credit cards, mortgages, and savings accounts all compound differently.

Effective Annual Rate

$$EAR = (1 + r/m)^m - 1$$

r = Stated (nominal) annual interest rate
m = Number of compounding periods per year

Key Insight: *A 12% nominal rate compounded monthly yields an EAR of 12.68%. Always compare EAR — never nominal rates — when evaluating loans or investments.*

Section 2 — Capital Budgeting

Deciding which long-term investments create value for the firm

Capital budgeting is the process of evaluating and selecting long-term investments — new equipment, facilities, product lines, acquisitions. These decisions commit large sums of capital for years and are difficult to reverse. Using the right decision criteria is essential to ensure the firm only takes on projects that create value.

#07 Net Present Value (NPV)

NPV is the gold standard of capital budgeting. It measures the total value created (or destroyed) by an investment in today's dollars. You discount all future cash flows back at the required rate of return (cost of capital) and subtract the initial investment. A positive NPV means the project earns more than the required return and creates shareholder value.

Net Present Value

$$NPV = \Sigma [CF_t \div (1 + r)^t] - \text{Initial Investment}$$

CF_t = Cash flow in period t
r = Required rate of return (discount rate / WACC)
t = Time period (0, 1, 2, ... n)
n = Life of the project in periods

ACCEPT	REJECT
NPV > 0 Project earns more than required return. Accept — it creates value.	NPV < 0 Project earns less than required return. Reject — it destroys value.

Key Insight: *NPV is directly additive. The NPV of two projects together equals the sum of their individual NPVs. Always use NPV as the primary decision rule — it directly measures dollar value created.*

#08 Internal Rate of Return (IRR)

IRR is the discount rate that makes NPV exactly zero — the rate the project actually earns. You compare it to the hurdle rate (cost of capital). If IRR exceeds the hurdle rate, the project earns more than it costs to finance and should be accepted. IRR is popular because it's intuitive — a percentage return is easier to communicate than a dollar NPV.

IRR Definition (solve for r where NPV = 0)

$$0 = \Sigma\,[CF_t \div (1 + IRR)^t] - \text{Initial Investment}$$

IRR = Internal Rate of Return — the break-even discount rate
CF_t = Cash flow in period t

ACCEPT	REJECT
IRR > Hurdle Rate (WACC) Project earns more than cost of capital. Accept.	IRR < Hurdle Rate (WACC) Project earns less than cost of capital. Reject.

Key Insight: *IRR and NPV usually agree, but NPV wins when they conflict. IRR can give misleading results with non-conventional cash flows (multiple sign changes) or when comparing mutually exclusive projects of different sizes.*

#09 Payback Period

Payback measures how many years it takes to recover the initial investment from project cash flows. It is simple, intuitive, and widely used as a risk screen — shorter payback = less exposure. However, it ignores the time value of money and all cash flows after the payback date, making it a poor standalone decision rule.

Payback Period

Payback = Year before full recovery + (Unrecovered cost ÷ Cash flow in recovery year)

Year	Cash Flow	Cumulative Cash Flow
0 (Investment)	($500,000)	($500,000)
1	$150,000	($350,000)
2	$200,000	($150,000)
3	$250,000	$100,000 ← Payback between Year 2 & 3
Payback Period		**2 + ($150,000 ÷ $250,000) = 2.6 years**

Key Insight: *Use payback as a secondary filter for liquidity risk, not as your primary accept/reject rule. Always pair it with NPV.*

#10 Discounted Payback Period

Discounted payback fixes payback's biggest flaw by using discounted (present value) cash flows instead of raw cash flows. It still ignores post-payback cash flows, but at least accounts for the time value of money in determining when you recover your investment.

Discounted Payback

Same as payback, but use PV of each cash flow: $PV(CF_t) = CF_t \div (1 + r)^t$

Key Insight: *Discounted payback will always be longer than the regular payback period because discounted cash flows are smaller. A project that recovers its investment on a discounted basis has a positive NPV up to that point.*

#11 Modified Internal Rate of Return (MIRR)

MIRR addresses IRR's reinvestment rate assumption flaw. Standard IRR assumes cash flows are reinvested at the IRR itself — often unrealistically high. MIRR assumes reinvestment at the cost of capital, making it a more realistic measure of a project's true return.

MIRR Formula

MIRR = (FV of positive CFs at cost of capital ÷ PV of costs at finance rate)^(1/n) – 1

FV of positive CFs = All inflows compounded forward to end of project at cost of capital
PV of costs = All outflows discounted back to time 0 at financing rate
n = Project life in periods

Key Insight: *MIRR is always more conservative than IRR when IRR > cost of capital. Use MIRR when the standard IRR seems unusually high or when comparing projects with different reinvestment opportunities.*

#12 Profitability Index (PI)

The Profitability Index measures value created per dollar invested. It is most useful when capital is rationed — meaning the firm cannot fund all positive-NPV projects and must prioritize. Rank projects by PI and work down the list until the budget is exhausted.

Profitability Index

PI = PV of Future Cash Flows ÷ Initial Investment (or 1 + NPV ÷ Investment)

ACCEPT	REJECT
PI > 1.0 PV of inflows exceeds investment. Accept (creates value).	PI < 1.0 PV of inflows less than investment. Reject (destroys value).

Key Insight: *Under capital rationing, rank by PI rather than NPV. A $10M NPV project requiring $100M of investment (PI = 1.10) may be less attractive than two $6M NPV projects each requiring $20M (PI = 1.30).*

Section 3 — Risk & Return

Quantifying uncertainty and pricing it into the required rate of return

Finance does not try to eliminate risk — it prices it. Investors demand higher returns for bearing higher risk. The key insight of modern portfolio theory is that not all risk is rewarded: only systematic (market) risk earns a premium, because unsystematic (company-specific) risk can be diversified away at no cost.

#13 Expected Return & Standard Deviation

Expected return is the probability-weighted average of all possible outcomes. Standard deviation measures how widely actual returns are likely to deviate from the expected return — it is the most common measure of total risk for a single asset.

Expected Return & Standard Deviation

$$E(R) = \Sigma [p_i \times R_i] \quad \sigma = \sqrt{\Sigma [p_i \times (R_i - E(R))^2]}$$

E(R) = Expected return
p_i = Probability of scenario i
R_i = Return in scenario i
σ = Standard deviation (total risk)

Key Insight: *Standard deviation is a measure of total risk, which includes both diversifiable and non-diversifiable risk. For a well-diversified portfolio, only the non-diversifiable portion matters.*

#14 Systematic vs. Unsystematic Risk

Total risk has two components. Unsystematic (diversifiable) risk is company-specific — a product recall, a CEO departure, a lawsuit. It can be eliminated by holding a diversified portfolio. Systematic (non-diversifiable) risk is market-wide — recessions, interest rate changes, inflation. No amount of diversification eliminates it, so the market rewards it with a risk premium.

Risk Type	Also Called	Examples	Rewarded?
Systematic	Market risk, Non-diversifiable	Recessions, rate changes, inflation, geopolitical events	YES — earns risk premium
Unsystematic	Idiosyncratic, Diversifiable	Earnings miss, lawsuit, key person loss, product failure	NO — diversify it away

Key Insight: *In a portfolio of 20–30 randomly selected stocks, nearly all unsystematic risk is eliminated. Beyond that, adding more stocks provides minimal diversification benefit.*

#15 Beta (β) — Measuring Systematic Risk

Beta measures a security's sensitivity to market-wide movements. A beta of 1.0 means the stock moves in lockstep with the market. Beta > 1 means more volatile than the market; beta < 1 means less volatile. Beta is the relevant risk measure for a diversified investor because it captures only systematic risk.

Beta Formula

$$\beta = \mathrm{Cov}(R_i, R_m) \div \mathrm{Var}(R_m) = \rho_{im} \times (\sigma_i \div \sigma_m)$$

$\mathrm{Cov}(R_i, R_m)$ = Covariance of asset i's return with market return
$\mathrm{Var}(R_m)$ = Variance of market returns
ρ_{im} = Correlation between asset i and the market
σ_i **/** σ_m = Standard deviation of asset i / market

Beta Value	Interpretation	Example
β = 0	No market sensitivity	Treasury bills, money market funds
β = 0.5	Half as volatile as market	Utility companies, consumer staples
β = 1.0	Moves with the market	An index fund (by definition)
β = 1.5	50% more volatile than market	Tech growth stocks, cyclical firms
β > 2.0	Highly amplified market movements	Biotech startups, leveraged ETFs

Key Insight: *Beta is estimated from historical data and changes over time as business risk and leverage change. Unlevered beta (asset beta) strips out the effect of financial leverage for comparisons across firms.*

#16 Capital Asset Pricing Model (CAPM)

CAPM is the most widely used model for determining the required return on an investment. It says: investors deserve the risk-free rate plus a premium for bearing systematic risk. The premium equals beta times the market risk premium. CAPM is the cornerstone of the cost of equity calculation used in WACC.

CAPM — Required Return on Equity

$$R_e = Rf + \beta \times (R_m - Rf)$$

R_e = Required return on equity (cost of equity)
Rf = Risk-free rate (typically 10-year Treasury yield)
β = Beta of the security
R_m − Rf = Market risk premium (historical avg ~5–6%)

Key Insight: *If the risk-free rate is 4.5%, the market risk premium is 5.5%, and a stock has a beta of 1.2, then the required return = 4.5% + 1.2 × 5.5% = 11.1%. This becomes the cost of equity in WACC.*

Section 4 — Cost of Capital

The hurdle rate — what the firm must earn to create value

The cost of capital is the minimum return a firm must earn on its investments to satisfy all of its capital providers — debtholders and equity holders alike. It is the appropriate discount rate for capital budgeting and the benchmark against which project returns are measured. Get it wrong and you'll accept value-destroying projects or reject value-creating ones.

#17 Cost of Debt (Kd)

The cost of debt is the effective interest rate the firm pays on its borrowed funds, adjusted for the tax deductibility of interest. Because interest expense reduces taxable income, the government effectively subsidizes debt — making the after-tax cost of debt lower than the stated rate.

After-Tax Cost of Debt

$$Kd = \text{Pre-tax cost of debt} \times (1 - \text{Tax Rate})$$

Kd = After-tax cost of debt
Pre-tax cost = Yield to maturity (YTM) on existing debt, or rate on new borrowing
Tax Rate = The firm's marginal corporate tax rate

Key Insight: *If a company's bonds yield 7% and the tax rate is 25%, the after-tax cost of debt is 7% × (1 – 0.25) = 5.25%. The tax shield is worth 1.75% per year in savings.*

#18 Cost of Equity (Ke) — CAPM Approach

The cost of equity is the return shareholders require to invest in the firm. Unlike debt, equity has no contractual payment — but it still has a cost, because equity investors have an opportunity cost (they could invest elsewhere at the market return). CAPM is the most common method for estimating cost of equity.

Cost of Equity (CAPM)

$$Ke = Rf + \beta \times (R_m - Rf)$$

Ke = Cost of equity — the required return for equity investors
Rf = Risk-free rate
β = Equity beta of the firm
$R_m - Rf$ = Market risk premium

Key Insight: *Cost of equity is almost always higher than cost of debt — equity investors bear more risk and get paid last in bankruptcy. This is why firms use a mix of both.*

#19 Weighted Average Cost of Capital (WACC)

WACC is the blended cost of all capital sources, weighted by their proportions in the firm's capital structure. It represents the overall required return for the firm and is the standard discount rate used in DCF valuation and capital budgeting. Every dollar of new investment must earn at least WACC to avoid destroying value.

WACC Formula

$$WACC = (E/V) \times Ke + (D/V) \times Kd \times (1 - T)$$

E/V = Equity as a proportion of total firm value (market weights)
D/V = Debt as a proportion of total firm value
Ke = Cost of equity
Kd = Pre-tax cost of debt
T = Corporate tax rate
V = Total firm value = E + D

Component	Amount	Weight	Cost	Weighted Cost
Equity (E)	$600M	60%	10.0%	6.00%
Debt (D)	$400M	40%	6.0%	2.40% (after-tax: 6% × 75%)
Total / WACC	**$1,000M**	**100%**	**—**	**8.40%**

Key Insight: *Always use MARKET VALUE weights, not book value weights. And always use the marginal cost of new capital — not the historical cost of capital already raised.*

Section 5 — Capital Structure

How the firm finances itself — and whether the mix of debt and equity matters

Capital structure refers to how a firm finances its assets through a combination of debt and equity. The central question: is there an optimal debt-to-equity ratio that maximizes firm value? Modigliani and Miller's work (with and without taxes) forms the theoretical foundation; trade-off theory and pecking order theory describe real-world behavior.

#20 Modigliani-Miller Proposition I (No Taxes)

M&M; Proposition I states that in a perfect market (no taxes, no bankruptcy costs, no information asymmetry), capital structure is irrelevant — the total value of the firm is unaffected by how it is financed. The insight: you can't create value simply by rearranging the right side of the balance sheet.

M&M; Proposition I (No Taxes)

$$V_{levered} = V_{unlevered}$$

Vlevered = Value of a levered firm (uses debt)
Vunlevered = Value of an identical all-equity firm

Key Insight: *The real world has taxes, bankruptcy costs, and information problems — so capital structure DOES matter. M&M;'s value is in identifying exactly what frictions cause it to matter.*

#21 M&M; Proposition I (With Corporate Taxes) — Tax Shield

Once corporate taxes are introduced, debt creates value through the interest tax shield. Because interest is tax-deductible and dividends are not, a firm that uses debt reduces its tax burden and keeps more cash flow for its investors. In the pure M&M; with taxes model, firms should use as much debt as possible.

Firm Value with Tax Shield

$$V_{levered} = V_{unlevered} + (\text{Tax Rate} \times \text{Debt})$$

Tax Rate × Debt = Present value of the interest tax shield (assuming permanent debt)

Key Insight: *If a firm has $400M of permanent debt and a 25% tax rate, the tax shield adds $100M to firm value. This is why profitable firms use debt — the government effectively subsidizes it.*

#22 Trade-Off Theory

Trade-off theory says firms balance the tax benefits of debt against the costs of financial distress. As debt increases, the tax shield grows — but so does the probability of bankruptcy and the associated direct (legal, administrative) and indirect (lost customers, suppliers, talent) costs. The optimal capital structure maximizes firm value at the point where the marginal benefit of the tax shield equals the marginal cost of financial distress.

Factor	Favors More Debt	Favors Less Debt
Tax shield	High tax rate, consistent profitability	Low or no taxable income
Financial distress	Stable, predictable cash flows	Volatile or cyclical revenues
Asset type	Tangible assets (collateral)	Intangible assets (hard to liquidate)
Growth options	Few growth options (mature firms)	Many growth options (high-growth firms)
Industry norm	Capital-intensive industries	Tech, biotech, early-stage firms

Key Insight: *Most investment-grade companies target a debt ratio in line with their industry peers. Rating agencies publish leverage guidelines by industry — these serve as informal optimal structure benchmarks.*

#23 Pecking Order Theory

Pecking order theory (Myers & Majluf) says firms prefer financing in this order: (1) internal cash flow, (2) debt, (3) new equity — last resort. The reason: information asymmetry. Managers know more than investors. Issuing new equity signals that management thinks the stock is overvalued — so stock prices typically fall on equity issuance announcements.

Financing Preference Hierarchy

Internal Funds → Debt → Convertibles → Equity

Key Insight: *Firms with lots of internal cash flow (Apple, Microsoft) often have low debt not because they're avoiding the tax shield, but because they don't need external financing. Pecking order explains this better than trade-off theory.*

Section 6 — Valuation

What is the firm worth? DCF, multiples, and terminal value

Valuation is the process of determining what a business (or asset) is worth today. The two dominant approaches are (1) Discounted Cash Flow (DCF) — intrinsic value based on projected future cash flows, and (2) Relative Valuation (Multiples) — market value based on how comparable companies are priced. Professional analysts use both and triangulate.

#24 Free Cash Flow to Firm (FCFF)

FCFF is the cash flow available to ALL capital providers (both debt and equity holders) after funding operations and capital expenditures. It is the cash flow used in an enterprise value DCF. It is calculated from operating income (EBIT) and is independent of how the firm is financed.

Free Cash Flow to Firm (FCFF)

$$\text{FCFF} = \text{EBIT} \times (1 - \text{Tax Rate}) + \text{D\&A;} - \Delta\text{Working Capital} - \text{CapEx}$$

EBIT = Earnings Before Interest and Taxes
D&A; = Depreciation & Amortization (non-cash, add back)
ΔWorking Capital = Change in net working capital (increase = cash use)
CapEx = Capital expenditures (investments in fixed assets)

Key Insight: *FCFF is also called Unlevered Free Cash Flow. It strips out financing effects so you can value the business operations independently from how they are funded.*

#25 DCF Valuation — Enterprise Value

Enterprise Value (EV) is the total value of the firm's operations — what you'd pay to buy the entire business (debt and equity together). In a DCF, you project FCFF for a forecast period (typically 5–10 years), add a terminal value for all cash flows beyond the forecast, and discount everything back at WACC.

DCF Enterprise Value

$$\text{EV} = \Sigma\,[\text{FCFF}_t \div (1 + \text{WACC})^t] + \text{Terminal Value} \div (1 + \text{WACC})^n$$

FCFF_t = Free cash flow to firm in period t
WACC = Weighted average cost of capital (discount rate)
Terminal Value = Value of all cash flows beyond the explicit forecast period
n = Length of the explicit forecast period

Key Insight: *In most DCF models, 60–80% of value comes from the terminal value. This makes the terminal growth rate assumption the most critical — and most sensitive — input in the model.*

#26 Terminal Value

Terminal value (TV) captures the value of the firm beyond the explicit forecast period. The two most common methods are the Gordon Growth Model (assumes cash flows grow at a constant rate forever) and the Exit Multiple Method (applies a market multiple to the final year's EBITDA or EBIT).

Terminal Value — Two Methods

$$\text{Gordon Growth: } TV = FCFF_{n+1} \div (WACC - g) \;|\; \text{Exit Multiple: } TV = EBITDA_n \times \text{Multiple}$$

$FCFF_{n+1}$ = Normalized FCFF in the first year beyond the forecast
g = Perpetuity growth rate (typically GDP growth, 2–3%)
Multiple = Typically EV/EBITDA of comparable public companies

Key Insight: *The Gordon Growth rate must be less than WACC, and should not exceed long-run nominal GDP growth. Using both methods and checking that they produce similar results is a best practice.*

#27 Enterprise Value to Equity Value Bridge

DCF produces Enterprise Value — the value of the whole firm. To get to equity value (what shareholders own), subtract net debt (total debt minus cash) and any other non-equity claims. Then divide by diluted shares outstanding to get intrinsic value per share.

Equity Value Bridge

$$\text{Equity Value} = \text{Enterprise Value} - \text{Net Debt} - \text{Preferred Stock} - \text{Minority Interest}$$

Net Debt = Total financial debt minus cash and cash equivalents
Preferred Stock = Liquidation value of preferred shares
Minority Interest = Non-controlling interest in consolidated subsidiaries

Key Insight: *Cash is subtracted from debt (not from EV) because cash is already an asset — a buyer of the whole firm gets the cash too, reducing the effective purchase price.*

#28 Relative Valuation — Key Multiples

Multiples-based valuation compares a firm to similar public companies or recent M&A; transactions. The key is selecting truly comparable companies (similar industry, size, growth, margins) and understanding what drives differences in multiples across firms.

Multiple	Formula	What It Measures	Best Used For
EV/EBITDA	Enterprise Value ÷ EBITDA	Operating cash earnings relative to total firm value	Cross-industry, capital structure neutral
EV/EBIT	Enterprise Value ÷ EBIT	Operating profit relative to firm value	Firms with similar D&A; profiles
EV/Revenue	Enterprise Value ÷ Revenue	Revenue relative to firm value	High-growth or unprofitable companies
P/E Ratio	Stock Price ÷ EPS	Equity value relative to earnings per share	Mature, profitable companies; equity comparisons
P/B Ratio	Stock Price ÷ Book Value per Share	Market vs. accounting value of equity	Financial institutions; asset-heavy firms
EV/FCF	Enterprise Value ÷ Free Cash Flow	Cash generation relative to firm value	Capital-efficient businesses

Key Insight: *No single multiple is universally correct. Use 3–4 multiples and triangulate. Understand WHY a comp trades at a premium or discount before applying its multiple to your subject company.*

Section 7 — Working Capital Management

Managing the short-term assets and liabilities that keep the business running

Working capital management ensures the firm has enough liquidity to meet its short-term obligations while minimizing the cash tied up in operations. Poor working capital management is one of the most common reasons profitable businesses fail — they run out of cash even while earning accounting profits.

Companion reference — *The receivables, payables, inventory, and cash figures that drive this section all originate in the Chart of Accounts and the 8-step Accounting Cycle. See* ***Baratelli Foundations: Accounting Reference*** *(Guides 1 and 3) for the bookkeeping that produces these numbers.*

#29 Net Working Capital (NWC)

Net Working Capital is the difference between current assets and current liabilities. Positive NWC means the firm can cover its short-term obligations — a sign of liquidity. But too much NWC means cash is tied up inefficiently in receivables and inventory instead of being invested productively.

Net Working Capital

$$\text{NWC} = \text{Current Assets} - \text{Current Liabilities}$$

Current Assets = Cash, accounts receivable, inventory, prepaids
Current Liabilities = Accounts payable, accrued expenses, short-term debt

Key Insight: *In capital budgeting, INCREASES in NWC are treated as a cash outflow (you're funding more receivables or inventory). DECREASES are cash inflows. Always include NWC changes in project cash flows.*

#30 Cash Conversion Cycle (CCC)

The Cash Conversion Cycle measures how many days it takes to convert investments in inventory and receivables into cash collections, net of the time suppliers give you to pay. A shorter CCC means cash cycles through the business faster — less financing needed. A negative CCC (like Amazon's) means suppliers finance your operations.

Cash Conversion Cycle

CCC = DIO + DSO – DPO

DIO = Days Inventory Outstanding = (Inventory ÷ COGS) × 365 — how long inventory sits
DSO = Days Sales Outstanding = (Accounts Receivable ÷ Revenue) × 365 — how long to collect
DPO = Days Payable Outstanding = (Accounts Payable ÷ COGS) × 365 — how long before you pay

Metric	Formula	Reduce By...	Danger of Over-Reducing
DIO	(Inventory ÷ COGS) × 365	Just-in-time inventory, demand forecasting	Stockouts, lost sales
DSO	(AR ÷ Revenue) × 365	Tighter credit terms, faster collections	Losing customers to competitors with better terms
DPO	(AP ÷ COGS) × 365	Negotiate longer supplier payment terms	Damaging supplier relationships

Key Insight: *Reducing CCC by even 5 days can free up millions in cash for a large company. Benchmark your CCC against industry peers — significant deviations indicate operational inefficiency.*

#31 Liquidity Ratios

Liquidity ratios measure the firm's ability to meet its short-term obligations. Lenders and creditors watch these closely. A deteriorating liquidity ratio is often an early warning signal of financial stress.

Key Liquidity Ratios

Current Ratio = Current Assets ÷ Current Liabilities Quick Ratio = (CA – Inventory) ÷ CL

Current Ratio = Broad liquidity — includes inventory (less liquid)
Quick Ratio = Stricter liquidity — excludes inventory; also called Acid-Test
Cash Ratio = Most conservative: Cash + Equivalents ÷ Current Liabilities

Ratio	Formula	Healthy Range	Below This — Warning
Current Ratio	Current Assets ÷ Current Liabilities	> 1.5x	< 1.0x — can't cover short-term debt
Quick Ratio	(CA – Inventory) ÷ Current Liabilities	> 1.0x	< 0.5x — serious liquidity concern
Cash Ratio	Cash & Equivalents ÷ Current Liabilities	> 0.3x	< 0.1x — nearly no cash buffer

Key Insight: *Industry context matters enormously. Grocery stores run current ratios below 1.0 because they collect cash before paying suppliers. Manufacturing firms typically need higher ratios.*

Section 8 — Key Formulas Quick Reference

Every formula from this guide in one place — the page to bookmark

Time Value of Money

Future Value	$FV = PV \times (1 + r)^{n}$
Present Value	$PV = FV \div (1 + r)^{n}$
PV of Ordinary Annuity	$PV = PMT \times [1 - (1 + r)^{-n}] \div r$
FV of Ordinary Annuity	$FV = PMT \times [(1 + r)^{n} - 1] \div r$
PV of Perpetuity	$PV = PMT \div r$
PV of Growing Perpetuity (DDM)	$PV = PMT_{1} \div (r - g)$
Effective Annual Rate (EAR)	$EAR = (1 + r/m)^{m} - 1$

Capital Budgeting

Net Present Value (NPV)	$NPV = \Sigma [CF_{t} \div (1 + r)^{t}] -$ Initial Investment
IRR (solve for r)	$0 = \Sigma [CF_{t} \div (1 + IRR)^{t}] -$ Initial Investment
Profitability Index (PI)	PI = PV of Future CFs ÷ Initial Investment
MIRR	MIRR = (FV of inflows at WACC ÷ PV of outflows)^(1/n) – 1

Risk & Return

Expected Return	$E(R) = \Sigma [p_{i} \times R_{i}]$
Standard Deviation	$\sigma = \sqrt{\Sigma [p_{i} \times (R_{i} - E(R))^2]}$
Beta	$\beta = Cov(R_{i}, R_{m}) \div Var(R_{m})$
CAPM / Cost of Equity	$Ke = Rf + \beta \times (R_{m} - Rf)$
Portfolio Expected Return	$E(R_{p}) = \Sigma [w_{i} \times E(R_{i})]$

Cost of Capital

After-Tax Cost of Debt	Kd = Pre-tax yield × (1 – Tax Rate)
WACC	WACC = (E/V) × Ke + (D/V) × Kd × (1 – T)

Capital Structure

M&M; Value with Tax Shield	Vlevered = Vunlevered + (T × D)

Levered vs. Unlevered Beta	**βL = βU × [1 + (1 – T) × (D/E)]**

Valuation	
FCFF	**FCFF = EBIT(1 – T) + D&A; – ΔWorking Capital – CapEx**
DCF Enterprise Value	$EV = \Sigma [FCFF_t \div (1 + WACC)^t] + TV \div (1 + WACC)^n$
Terminal Value (Gordon Growth)	$TV = FCFF_{n+1} \div (WACC - g)$
Equity Value	**Equity Value = Enterprise Value – Net Debt – Preferred – MI**
P/E Ratio	**P/E = Stock Price ÷ Earnings Per Share (EPS)**
EV/EBITDA	**EV/EBITDA = Enterprise Value ÷ EBITDA**

Working Capital	
Net Working Capital	**NWC = Current Assets – Current Liabilities**
Cash Conversion Cycle	**CCC = DIO + DSO – DPO**
Days Inventory Outstanding	**DIO = (Inventory ÷ COGS) × 365**
Days Sales Outstanding	**DSO = (Accounts Receivable ÷ Revenue) × 365**
Days Payable Outstanding	**DPO = (Accounts Payable ÷ COGS) × 365**
Current Ratio	**Current Assets ÷ Current Liabilities**
Quick Ratio	**(Current Assets – Inventory) ÷ Current Liabilities**

NEXT STEP — Going Deeper

If this reference clarified the vocabulary, the next step is putting it to work on real businesses. **First Principles of Master Investing** walks the same concepts through applied valuation cases — Apple, Snap, Cisco, BYD, BNSF, Coca-Cola — under the Buffett-Munger framework.

First Principles of Master Investing — 244pp paid flagship, $99

- Applied valuation walks: Apple, Snap, Cisco, BYD, BNSF, Coca-Cola
- The Buffett-Munger framework end to end
- Show-the-Math discipline on every case — no hand-waving
- Intrinsic value versus enterprise value in practice
- Concentration discipline and position sizing under uncertainty

Read at: baratelliinstitute.com/first-principles-master-investing

*Also: for the working-capital, cost-of-capital, and statement-preparation reference depth, see the **CFO & Controller's Guide** (489pp) at baratelliinstitute.com/cfo-controllers-guide.*

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