Advanced Finance - Cheatsheet

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Version: May 30, 2025

Terminology

Derivatives: Any financial instrument that is derived from another e.g. options, warrants, futures, swaps **Option**: gives the holder the right to buy or sell a security at a specified price during a specified time period **Call Option**: The right to buy a security at a specified price within a specified time **Option Premium**: The price paid for the option, above the price of the underlying security **Intrinsic Value**: Difference between the strike price and the stock price **Time Premium**: Value of option above the intrinsic value **Exercise Price**: (Strike Price) The price at which you uby or sell the security **American Option**: Can be exercised at any time prior to and including the expiration date **European Option**: Can be exercised only on the expiration date **Exercise price ↑**: **Call Price ↓**, **Put Price ↑ Put Option**: The right to sell a security at a specified price within a specified time **Butterfly Straddle Strategy of buying a call**: Bild einfügen **Value of company's assets ↑**, **Value of default put ↓ Std dev asset value ↑**, **Value of default put ↑ Amount of outstanding debt ↑**, **Value of default put ↑ Debt maturity ↑**, **Value of default put ↑ Default-free interest rate ↑**, **Value of default put ↓ Dividend payments ↑**, **Value of default put ↑ Indenture or trust deed**: The bond agreement between the borrower and a trust company **Registered bond**: A bond in which the company's records show ownership and interest and principal are paid directly to each owner. **Bearer bonds**: The bondholder must send in coupons to claim interest and mus send a certificate to claim the final payment of principal **Accrued interest**: The amount of accumulated interest since the last coupon payment **Coupon**: Interest paid on a bond **Debentures**: Long-term unsecured issues on debt **Mortgage bond**: Long-term secured debt, often containing a claim against a specific building or property **Collateral trust bonds**: Bonds secured by common stocks or other securities that are owned by te borrower **Equipmnet trust certificate**: Secured debt generally used to finance railroad equipment. The trustee retains equipment ownership until the debt is repaid. **Asset-backed securities**: The sale of cash flows derived directly from a specific set of bundled assets **Mortgage-backed securites**: Package of mortgage loans sold; owners of package receive portion of mortgage payments **Callable bond**: Allows the issuer to repay the debt, valuable to reduce leverage **Puttable (retractable) bond**: Allows the investor to be repaid for the debt, A protective covenant for the investor **Sinking fund**: A fund established to retire debt before maturity **Bond covenants**: Debt ratios, Security, Dividends, Event risk, (+) working capital, (+) net worth **Lease**: Rental agreement that involves fixed payments from lessee to lessor (*Reasons: convenient, provided maintenance, low cost through standardization, tax shields, financial distress, avoid capital expenditure controls, preserve capital off-balance sheet financing*) **Direct Lease**: The lessor buy the equipment from the manufacturer **Full Service Lease**: The lessor provides maintenance and insurance **Operating Lease**: The initial lease period is shorter than the economic life of the asset **Financial Lease**: The initial lease period is long enough for the lessor to recover the cost of the asset **Net Lease**: The lessee provides maintenance and insurance **Leveraged Lease**: The lessor finances the lease contract by issuing debt and equity claims against it **Sale and Leaseback**: The lessors buys the equipment from the prospective lessee **Spot price**: Price paid for immediate delivery **Forward vs futures contract**: Both contracts buy or sell at a specified future date at a specified price. However, compared to forwards, futures are traded on an exchange and they are marked to market. *Futures fixes a price which has to be payed if market value is higher or lower* **Long vs short position**: Investors who are long have agreed to buy the asset. Investors who are short have contracted to sell. **Basis risk**: The risk that arises because the price of the asset used to hedge is not perfectly correlated with that of the asset that is being hedged. **Mark to market**:Profits and losses on a position are settled on a regular basis **Net convenience yield**: The advantage from owning the commodity rather than the promise of future delivery less the cost of storing the commodity **Exchange Rate**: Amount of one currency needed to buy one unit on another **Spot Rate of Exchange**: Exchange rate for an immediate transaction **Forward Exchange rate**: Exchange rate for a forward transaction **Trade Credit:** Receivables from one company to another **Consumer Credit:** receivables from consumers **Terms of sale:** Credit, discount, and payment terms offered on a sale **Credit Analysis:** Procedure to determine the likelihood a customer will pay its bills **Credit Policy:** Standards set to determine the amount and nature of credit to extend to customers **Credit Scoring:** What your lender won't tell you **Collection Policy:** Procedures to collect and monitor receivables **Factoring:** Arrangement whereby a financial institution buys a company's accounts receivable and collects the debt **Spin-off:** New independent company created by detaching part of a parent company's assets and operations; shares given to existing shareholders **Carve-out:** Like a spin-off, except that shares in the new company are sold in a public offering **Asset sale or Divestiture:** The sale of a part of one firm to another **Privatization:** The sale of a government-owned company to private investors

Formulas

Put-Call-Parity

$$C + PV(EX) = P + S$$

where:

- C = Price of the European call option
- $PV(EX)$ = Present value of the strike price = $\frac{Ex.Price}{(1+r)}$
- P = Price of a European Put
- S = Share Price

Option Δ

$$Option\Delta = \frac{C_u - C_d}{S_u - S_d} = \frac{P_u - P_d}{S_u - S_d}$$

where:

- C_u = Call upside
- C_d = Call downside
- P = Put
- S = Stock

Risk neutral probability of rising value

$$p^* = \frac{(1+r) - d}{u - d}$$

where:

- r = Interest rate
- d = Relative downward change
- u = Relative upward change

Expected Value

$$ExpectedValue = (p^* * PayOff_u) + ([1 - p^*] * PayOff_d)$$

Present Value

$$PresValue = \frac{ExpectedValue}{(1+r)} = ValShares - ValLoan$$

$$ValueLoan = \frac{ValueShares_d}{(1+r)}$$

Up and Down Changes

$$1 + UpsideChange = u = e^{\sigma * \sqrt{h}}$$

$$1 + DownsideChange = d = \frac{1}{u}$$

where:

- σ = Standard Deviation
- h = Fraction of Year

Black-Scholes Formula(weg wenn zu viel)

$$C = (N[d_1] * S) - (N[d_2] * PV[EX])$$

$$d_1 = \frac{log(\frac{S}{PV[EX]})}{\sigma * \sqrt{t}} + \frac{\sigma\sqrt{2}}{2}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

where:

- C = Call Value
- $N[d]$ = Cummulative normal probability
- $PV(EX)$ = Ex. Price at risk-free interest rate
- S = Stock price
- t = number of periods tp exercise date
- σ = Standard Deviation
- $if d_1 is large, N(d_1) is closeto 1.0$
- $if d_1 is zero, N(d_1) is closeto 0.5$

Present Value Formlua BOND

$$PV = \sum_{t=1}^{T} \frac{cpn}{(1+r)^t} + \frac{par}{(1+r)^T}$$

$$PromisedYield = \frac{Payoff}{PV} - 1$$

where:

- cpn = Coupon rate
- r = Interest rate
- T = Number of periods
- par = Face value

Predicting Default: Altman's Z-score

$$Z = 1.2x_1 + 1.4x_2 + 3.3x_3 + 0.6x_4 + 1.0x_5$$

where:

- x_1 = working capital/total assets
- x_2 = retained earnings/total assets
- x_3 = earnings before interest and tax (EBIT)/total assets
- x_4 = market value of equity / total liabilities
- x_5 = sales/total assets

Convertible Securities

$$ConversionPrice = \frac{FaceValue(1000\$)}{ConversionRatio}$$

$$ConversionValue = Conversionratio * shareprice$$

Take or Die

Expansion Options: Uncertainty ↑ - Valoue of exp. option ↑ **Value of a call (takeaways)**:

- Never worth more than the stock price itself.
- When the share is worthless, the option is worthless.

Lease or Buy

- Buy if equivalent annual cost of ownership and operation is less than the best lease rate
- For using extended periods, buying tends to be cheaper
- Leasing, because lessor might be able to manage asset at less expense than lessee
- Leasing has useful options in leasing agreement

$$NPV_{lease} = InitialFinancing - \sum_{t=1}^{T} \frac{LeaseCashFlow}{[1 + r_D * (1 - T_c)]^t}$$

$$NPV = PV_{EquivalentLoan} + InitialFinancing$$

- r_D = discount rate
- t_c = marginal tax rate

Managing Risks

Risks to a business: Cash shortfalls, Financial distress, Agency costs, Currency fluctuations, Political instability, Weather changes

Pricing Futures Contracts

$$F_t = S_0 * (1 + r_f - y)^t$$

$$= S_0 * (1 + StorageCost - CY)^t$$

$$NCY = ConvenienceYield - StorageCost$$

- F_t = future price on contract of t length
- S_0 = today's spot price
- r_f = risk-free interest rate
- y = dividend yield
- NCY = NetConvenienceYield

Hedging Rations and Basis Risk

$$ExpectedChangeInValueA = \alpha + \delta * (ChangInValueB)$$

- δ = sensitivity of A to change in the value of B (hedge ration)
- α = offset

Premium- Discount Relationship

$$ForwardDiscount = \frac{1}{t_{years}} * (\frac{SpotPrice}{ForwardRate} - 1)$$

Basic Relationships in the FX Market

$$CurrSpotRate * Exp.Diff.InflationRates = Exp.SpotRat$$

$$r_{Real} = \frac{1 + r_{nom}}{1 + r_{exp}} - 1$$

$$\frac{(1 + r_{CHF})^t}{(1 + r_{USD})^t} * S_{CHF/USD} = ForwardExchangeRates$$

$$Req.Return = r_{Swiss} + \beta * MarketRiskPrem_{Swiss}$$

Balance sheet

- Assets are listed in declining order of liquidity
- Current assets are inventories of raw materials, work in process, and finished goods
- Current liabilities include debts that are due to be repaid and payables
- Net working capital is the difference between current assets and liabilities
- Net working capital = $10,890 – 14,243 = – $3,353

$$EBIT = TotalRevelue - Costs - Depriciation$$

ExampleTable

$$MarketCapitalization(MC) = \#SharesOutstd * SharePrice$$

$$MarketValueAdded(MVA) = MC - Equity_{BookValue}$$

$$MarketToBookRatio = \frac{Value_{Market}}{Value_{Book}}$$

$$EconomicValueAdded(EVA) = AfterTaxInterest + NetIncome - CostOfCapital * capital$$

Return Rates

Return on Capital

$$ROC = \frac{AfterTaxInterest + NetIncome}{TotalCapital}$$

Return on Asset

$$ROA = \frac{AfterTaxInterest + NetIncome}{TotalAssets}$$

$$= AssetTrunoverRatio * OpProfitMarg$$

Return on Equity

$$ROE = \frac{NetIncome}{Equity}$$

$$ProfitMarg. = \frac{NetIncome}{TotalSales}$$

$$OpProfitMarg. = \frac{AfterTaxInterest + NetIncome}{TotalSales}$$

$$AssetTrunoverRatio = \frac{Salse}{Assets@StartOfYear}$$

$$LeverageRatio = \frac{Assets}{Equity}$$

$$DebtBurden = \frac{NetIncome}{AfterTaxInterest + NetIncome}$$

Measuring Efficiency

$$Inv.TurnoverRatio = \frac{CostOfGoods}{Inventory@StartOfYear}$$

$$Rec.Turnover = \frac{Sales}{Receivables@StartOfYear}$$

$$LongTermDebtEquityRatio = \frac{LongTermDebt}{Equity}$$

$$LongTermDebtRatio = \frac{LongTermDebt}{LongTermDebt + Equity}$$

$$TotalDebtRatio = \frac{TotLiabilities}{TotalAssets}$$

$$TimeInterestEarned = \frac{EBIT}{InterestPayments}$$

$$CashCoverageRatio = \frac{EBIT + Depriciation}{InterestPayments}$$

Measuring Liquidity

$$NWCToTotalAssets = \frac{NetWorkingCapital}{TotalAssets}$$

$$CurrentRatio = \frac{CurrentAssets}{CurrentLiabilities}$$

$$QuickRatio = \frac{Cash + MarketableSecurities + Receivables}{CurrentLiabilities}$$

$$CashRatio = \frac{Cash + MarketableSecurities}{CurrentLiabilities}$$

Growth and External financing

SustainableGrowthRate: Highest growth rate a firm can maintain without increasing its financial leverage

$$InternalGrowthRate = \frac{ReinvestedEarnings}{NetAssets}$$

$$= \frac{ReinvestedEarnings}{NetIncome} * \frac{NetIncome}{Equity} * \frac{Equity}{NetAssets}$$

$$= PlowBack * ReturnOnEquity * \frac{Equity}{NetAssests}$$

$$SustainableGrowthRate = PlowbackRatio * ReturnOnEquity$$

The Operating and Cash Cycles

$$Op.Cycle(Days) = InventoryPeriod + AcountsReceivablePeriod$$

$$CashCycle(days) = Op.Cycle - AcountsPayablePeriod$$

$$Avg.InventoryPeriod = \frac{Inv.@StartOfYear}{DailyCostofGoodsSold}$$

$$Avg.ReceivablesPeriod = \frac{Receivables@StartOfYear}{DailySales}$$

$$Avg.PaymenPeriod = \frac{Payables@StartOfYear}{DailyCostofGoodsSold}$$

Inventory

Components:

- Raw materials
- Works in progress
- Finished Goods

The Goals is to minimize amount of cash tied up in Inventory **Tools to minimize:**

- Just-in-time
- As the firm increases its order size, the number of orders falls and therefore the order costs decline
- However, an increase in order size also increases the average amount in inventory, so that the carrying cost of inventory rises
- The trick is to strike a balance between these two costs

Economic Order Qty: Order size that minimizes total inventory costs (generally applicable formula with some limitations)

$$EOQ = \sqrt{2 * Sales * \frac{CostPerOrder}{CarryingCost}}$$

Trade Credit:receivables from one company to another
Consumer Credit:receivables from consumers

$$CreditDecision = prob. * PV(COST - REV) - (1 - prob.) * PV(COST)$$

Mergers

Horizontaml Merger: One that takes place between two firms in the same line of business **Vertical Merger:** Involves companies at different stages of production **Congomlerate Merger:** Involves companies in unrelated lines of business **Economies of Scale:** Reduce per-unit cost through spreading fixed cost across more units **Economies of Vertical Integration:** Control over suppliers may reduce cost - overintegration can have opposite effect **Complementary Resources:** Merging may result in each firm filling in the "missing pieces" of its firm with pieces from the other firm **Industry Consolidation:** These conditions typically lead to mergers and acquisitions, prompting cuts in capacity and jobs, and freeing up capital for reinvestment elsewhere in the economy **Diversification:** Diversification is easier and cheaper for the stockholder than for the corporation. There is little evidence that investors pay a premium for diversified firms **Increasing Earnings per Share (BootsTrap Game):** Acquiring firm has high P/E ratio, Selling firm has low P/E ratio, After merger, acquiring firm has short-term EPS rise, Long term, acquirer will have slower than normal EPS growth due to share dilution **Lower Borrowing Cost:** There might be economies of scale, e.g., if firms can make fewer, larger security issues by merging, there can be savings **Management Motives:** Manager hubris, Personal objectives (salary, reputation...), Unusual self-esteem leads to more frequent and larger acquisitions, higher premiums paid, value destroying mergers

$$PV(AB) > PV(A) + PV(B)$$

Stock Financing:

$$Cost = xPV_{AB} - PV_B$$

Merger Preoffer Defenses:White knight: Friendly potential acquirer sought by a target company threatened by an unwelcome suitor/**Shark repellent:** Amendments to a company charter made to forestall takeover attempts/**Poison pill:** Measure taken by a target firm to avoid acquisition; for example, the right for existing shareholders to buy additional shares at an attractive price if a bidder acquires a large holding Master
Merger Postoffer Defenses:Litigation: Target files suit against bidder for violating antitrust or securities laws.**Asset restructuring:** Target buys assets that bidder does not want or that will create an antitrust problem **Liability restructuring:**Target issues shares to a friendly third party, increases the number of shareholders, or repurchases shares from existing shareholders at a premium.

Leveraged restructuring

LBO: Purchase of a business using mostly debt financing. The company goes private so that its stock no longer trades in the open market. **MBO:** An LBO that is undertaken by existing management. **Spin-off:** A parent company creates a new company with part of its assets and operations. Shares in the new business are distributed to the parent's stockholders. **Carve-out:** Like a spin-off, but shares in the new business are sold in a public offering. **Asset-sale:** A sale of specific assets rather than the entire firm. **Privatization:** The purchase of a government-owned business by private investors. **Leveraged Restructuring:** A company increases its debt, pays the debt proceeds to stockholders, and thereby increases its debt–equity ratio.
Private–Equity Fund: Widely diversified, investment in unrelated industries/Limited-life partnership forces sale of portfolio companies/No financial links or transfers between portfolio companies/ General partners "do the deal," then monitor; lenders also monitor/Managers' compensation depends on exit value of company
Public Conglomerate: Widely diversified, investment in unrelated industries/Public corporations designed to operate divisions for the long run/Internal capital market/ Hierarchy of corporate staff evaluates divisions' plans and performance/Divisional managers' compensation depends mostly on earnings—"smaller upside, softer downside"

Binomial Method