Business Analysis and Valuation

Stanford Cowell Fund

[Do Not Distribute Beyond Fund]

0 Accounting Review

Balance Sheet

- Assets:
  - Current Assets:
    - Cash and Cash Equivalents
    - Trade Receivables
    - Inventory
    - Prepaid Expenses
  - Non-Current Assets:
    - Property, Plant, and Equipment (PP&E)
    - Intangible Assets
    - Investments
    - Long-Term Receivables
- Liabilities:
  - Current Liabilities:
    - Accounts Payable
    - Accrued Expenses
    - Short-Term Loans
    - Current Portion of Long-Term Debt
  - Non-Current Liabilities:
    - Long-Term Loans
    - Bonds Payable
    - Lease Obligations
- Shareholders' Equity:
  - Common Stock
  - Additional Paid-in Capital
  - Retained Earnings
  - Treasury Stock
  - Accumulated Other Comprehensive Income

Income Statement

- Revenue:

  - Sales Revenue
  - Service Revenue
  - Other Operating Income
- Cost of Goods Sold (COGS) or Cost of Services
- Gross Profit/Margin: Revenue - COGS
- Operating Expenses:
  - Selling and Marketing Expenses
  - General and Administrative Expenses
  - Research and Development Expenses
  - Depreciation and Amortization
  - Other Operating Expenses
- Operating Income or Operating Profit: Gross Profit/Margin - Operating Expenses
- Non-Operating Income and Expenses
  - Interest Income
  - Interest Expense
  - Gains/Losses from Investments
  - Foreign Exchange Gains/Losses
- Net Income/Profit: Operating and Non-Operating Income Adjusted for Taxes
- Earnings Per Share (EPS): $\frac{\text{Earnings}}{\text{Number of shares outstanding}}$

1 Introduction

Accounting Value versus Market Value

- Why does the accounting value of a firm lag its market value?
  - Accounting information only reflects the past
  - Because of accounting recognition rules (human capital is not recognized because an asset is defined as a resource that can be controlled)
  - Investors know more about the firm than the manager

Fundamental Analysis

- The process of identifying the value generated by a firm or the firm's intrinsic value
- Estimates value-added that is missing from financial statements
- To generate returns to investors by comparing intrinsic value and market price

1. Strategy analysis
   - Industry analysis: why firms choose to operate in a specific industry or set of industries
     - Understand business model: what do they make, who are the main players, what are industry characteristics
     - Examine the link between the industry and macro-economy
     - Limitations: difficult to demarcate industry boundaries

    - Competitive strategy analysis: how do firms compete with other firms in the chosen industry?
    - Corporate strategy analysis: is the firm seeking to create value by exploiting synergies across the different industries in which it operates?
2. Accounting analysis: understand distortion
3. Financial analysis: evaluate current and past performance
4. Forecasting and valuation

Five-Forces Analysis (Porter)

- Threat of new entrants
    - Economies of scale (pharma)
    - First mover advantage (Microsoft)
    - Access to distribution channels/relationships
    - Legal barriers
- Bargaining power of buyers
- Threat of substitute products
- Bargaining power of suppliers
- Rivalry among existing firms
    - Monopoly, oligopoly, perfect competition P=MC
    - Competition determined by:
        * industry growth rate
        * concentration and balance of competitors
        * degree of differentiation and switching costs
        * scale/learning economies and ratio of fixed to variable costs
        * excess capacity

Criteria for Asset Recognition

- Control
- Probable future economic benefit
- Reliability of measurement

2 Accounting Analysis

Efficient Market Hypothesis

- Weak form $\rightarrow$ technical analysis
- Semi-strong form $\rightarrow$ fundamental analysis
- Strong form $\rightarrow$ passive investment

Corporate Disclosure

- Incentives: lower cost of capital; higher market liquidity
- Disincentive: information production is costly; proprietary costs may reduce competitive advantage

- This results in no "full disclosure"

Users of Firm's Financial Information

- Equity investors
- Debt investors
- Management
- Employees
- Litigants
- Customers
- Governments
- Competitors

Cash Accounting

- Records "actual" payments of receipts of cash (inflows and outflows)
- Matching problem: inflows and outflows may be distant in time

Accrual Accounting

- Records expected payments (costs) and expected receipts (revenues)
- Performance metric: net income (cash flow + accruals)
- Provides managers with discretion to convey private information or distort investors' perceptions
- The role of fundamental analysis is to "undo" these distortions

Investment Styles

- Intuitive investing
- Passive investing: accept market price
- Active (value) investing: based on fundamental analysis

Accounting Discretion

- Prudence: to make sure assets are never recorded above or below their fair values
- Accounting standards: limit management discretion, but rigid rules may harm financial reporting informativeness (R&D capitalization in US)
- External auditing
- Legal liability

Factors Influencing Accounting Quality

- Rigidity in accounting rules
- Random forecast errors
- Systematic reporting choices: management compensation, corporate contests, tax, regulatory, stakeholder, competitive, capital market considerations

- Contracting incentives: avoid taxation, maximize bonus, avoid covenant violation in loan agreements, avoid union intervention
- Market incentives: meet analyst targets, stock options, IPO, issue debt in near future, discourage competitor entry

How Managers "Cook" the Books

- Computer hardware
- Retail
- Subscription services
- Real estate
- Big bath: take large write-offs today to set up the books for the future
- Vendor financing: make loans to customers with questionable ability to repay them
- Booking revenues too early

Conducting Accounting Analysis

- Identify key accounting policies
- Assess degree of accounting flexibility
- Evaluate accounting strategy
- Evaluate quality of disclosure
- Identify potential "red flags"
  - Profits grow faster than cash flows
  - Sales slow while inventories increase
  - Bad debt reserves are cut
  - Methods for calculating revenue and costs change
  - Sales are booked before payments received
  - Large change in gross margin
  - Turnover of auditors, key executives
- Undo accounting distortions

3 Lecture 3

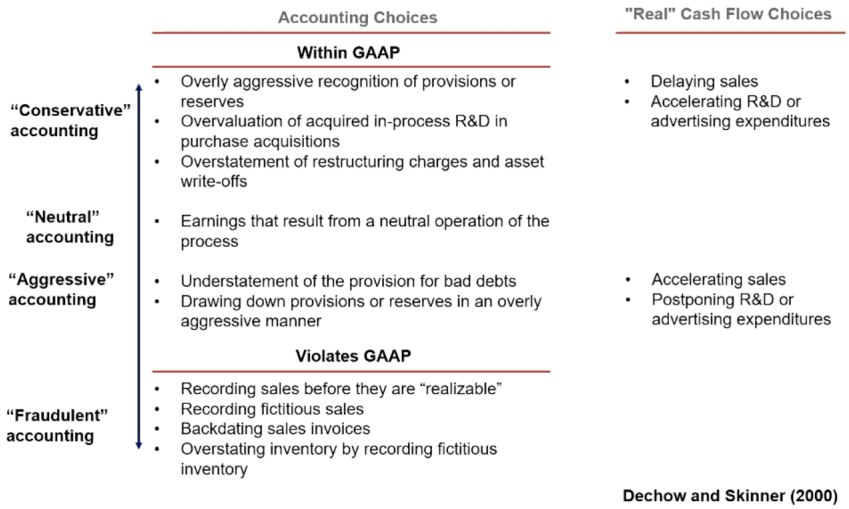
Cash Accounting versus Accrual Accounting

- Reported earnings = Cash flow + Accruals
- High- vs. low-quality accrual estimation: high-quality if earnings are persistent and stable
- Reported earnings are a function of constant "true" earnings, which are unknown
- $\beta \approx 0.72$

Earnings Management versus Fraud

- Earnings management: intervention in the reporting process for private gain within GAAP

- Detecting earnings management: motive, means, opportunity; reported earnings = "unmanaged" earnings + "managed earnings"
- Earnings discontinuity around zero → Sarbanes–Oxley Act (SOX)
- Forecast error (earnings surprise) = Actual EPS - Analyst EPS consensus forecast



Important Earnings Benchmarks

- Same quarter last year EPS
- Analyst consensus EPS forecast
- Reporting a profit (EPS > 0)
- Previous quarter EPS

Financial Forms

- 10-K: annual overview of firm, industry, financials, management, statements
- 10-Q: quarterly
- 8-K: disclosure of major events (M&A, bankruptcy, etc.)
- DEF 14A: proxy statement (info relevant to annual shareholder meetings)

Standardized Income Statement

- In order to compare financial statements across countries, one needs to standardize and create a template analysis
- Credit risk analysis: current and non-current assets and liabilities
- Profitability analysis: operating (OA) and financial assets (FA); operating liabilities (OL) and financial obligations (FO); FA + OA = FO + OL + CSE; NFA + NOA = CSE
- Operating expenses by nature (cause like cost of material) or by function (purpose like COGS)

Frequently Used Indicators

- EBITDA: earnings before interest, taxes, depreciation, and amortization
- EBIT
- EBT

- NOPAT: net operating profit after taxes
- Typically, we have OR, OE, OI before tax (EBITDA), OI after tax (NOPAT) and FR, FE, NFE before tax, tax shield, NFE after tax, EBT (EBIT - NFE before tax), tax expense (EBT * t)

Standardized Cash Flow Statement

- Cash flows from operating (C) - investing activities (I) + financing (equity/dividend + debt financing; d + F) + previous cash
- Cash conservation equation: C - I = d + F
- We have the following below, where ΔNOA is the change in net operating assets (i.e., depreciation)

$$\text{OR} - \text{OE} = \text{OI}$$

$$\text{OI} - \Delta\text{NOA} = \text{C} - \text{I}$$

$$\text{C} - \text{I} - \Delta\text{NFA} = \text{d}$$

Issues in Recasting Financial Statements

- Recognition of assets: owned or leased, unrecognized intangibles like R&D, impairment losses, asset over- and understatements, timing of revenue recognition, allowances like risk
- Recognition of liabilities: understated unearned revenues
- Equity distortions: contingent claims (stock options, convertible debt)

4 Financial Analysis

Ratio Analysis

- How line items relate to one another
- Value of a firm is determined by profitability and growth
- These are influenced by product market strategy (competitive strategy, operating policies, investment decisions) and financial market strategy (financing decisions, dividend policy)
- Compared with benchmarks
  - Relative: time-series (same firm over time), cross-sectional (multiple firms at the same time)
  - Absolute: Return on equity or assets (ROE, ROA)
- Note: the reversion principle states that financial ratios are more likely to revert to the mean over the long term

Ratios

- Profitability: ROE, ROCE, ROA, NPM, GPM
- Liquidity (ability to meet short-term debt obligations): CR, QR
- Solvency (ability to meet long-term debt obligations): D/E, D/C, IC
- Activity (Operating Efficiency): ATO, PPETO, CATO, WCTO, TRTO, TRD, TPTO, TPD, ITO, ID, CCC
- Valuation: P/E, P/B, P/S, P/CF

Cost of Capital

- Cost of equity capital: $r_E = r_f + \beta(r_m - r_f)$
- Cost of debt capital: $r_D = \frac{\text{NFE}}{\text{NFO}}$
- Weighted average cost of capital: $\text{WACC} = r_E \frac{\text{CSE}}{\text{NFO+CSE}} + r_D(1-t)\frac{\text{NFO}}{\text{NFO+CSE}}$

Profitability ratios

- Return on equity (shareholders): $\text{ROE} = \frac{\text{Net income}}{\text{Equity}}$; $\text{ROE} > r_E \rightarrow V_E > \text{CSE}$); can do this only for controlling shares
- Return on common equity: $\text{ROCE} = \frac{\text{Net income–Preferred dividends}}{\text{Equity–Preferred shares}}$
- Return on assets (entire company): $\text{ROA} = \frac{\text{Net income}}{\text{Total assets}}$; $\text{ROA} > \text{WACC} \rightarrow V_A > \text{NOA}$
- Return on net assets
- NOA = NCA + NNCA
- NCA = Current Assets − Current Liabilities
- NNCA = Non-Current Assets − Non-Interest Bearing Non-Current Liabilities

DuPont ROE Decomposition

$$\text{ROE} = \frac{\text{Net income}}{\text{sales}} \frac{\text{Sales}}{\text{Total assets}} \frac{\text{Total assets}}{\text{Equity}}$$

$$\text{ROE} = \text{Net profit margin} * \text{Asset turnover} * \text{Total financial leverage}$$

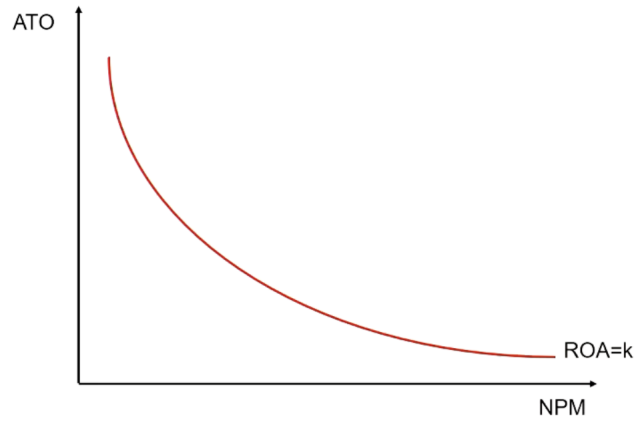
$$\text{ROE} = \text{NPM} * \text{ATO} * \text{TFL}$$

$$\text{ROE} = \text{ROA} * \text{TFL}$$

DuPont ROE Shows that Higher Profitability (ROE) Can Be Generated By the Following

- Increasing net profit margin
- Increasing asset turnover
- Leveraging on debt capital; note: this increases risk (Modigliani-Miller Capital Structure Irrelevance Theorem)

Relationship Between ATO and NPM



Limitations to DuPont

- The balance sheet under GAAP mixes up operating and financing activities
- Finance theory (i.e., Modigliani-Miller) posits that financing activities do not generate value, only operating activities do
- ROA does not consider income for debt holders, although it considers total assets
- This leads us to return on net operating assets: RNOA $= \frac{\text{NOPAT}}{\text{NOA}}$ and the alternative DuPont ROE decomposition

Alternative DuPont ROE Decomposition

$$\text{ROE} = \text{RNOA} + \text{NFL}(\text{RNOA} - r_D(1-t))$$

$$\text{ROE} = \text{RNOA} + \text{NFL} * \text{SPREAD}$$

- An increase in borrowing is beneficial if spread is positive (RNOA $> r_D(1-t)$)

Alternative DuPont ROE Decomposition for Non-Controlling Interest (NCI)

$$\text{ROE} = [\text{RNOA} + \text{NFL}(\text{RNOA} - r_D(1-t))] * \text{NCI Ratio}$$

$$\text{NCI Ratio} = \frac{\text{Net income attributable to parent company's shareholders/Net income}}{\text{Equity attributable to parent company's shareholders/Equity}}$$

5 Ratio Analysis and Cash Flow Analysis

Trade-Offs Between NPM and ATO

- Microeconomic theory: capacity constraint; firms much increase ROA by pushing on NPM and introducing barriers to entry
- Microeconomic theory: competitive constraint; upper limit on NPM; increase ROA via ATO and introducing product differentiation, cost leadership
- NPM $= \frac{\text{Net income}}{\text{Sales}}$
- Gross profit margin = GPM $= \frac{\text{Sales}-\text{COGS}}{\text{Sales}}$
- EBITDA margin $= \frac{\text{EBITDA}}{\text{Sales}}$

Vertical Analysis

- Assess whether company margins are consistent with stated competitive strategy
- Common size income statement: each income statement line item is divided by sales
- Common size balance sheet: each balance sheet line item is divided by total assets

Trend Analysis

- Growth income statement: percentage growth for each income statement line item
- Growth balance sheet: percentage growth for each balance sheet line item

Activity Ratios

- Asset turnover (ATO): ATO $= \frac{\text{Sales}}{\text{Total assets}}$
- Working capital turnover (WCTO)

- Trade receivables turnover (TRTO)
- Trade payables turnover (TPTO)
- Inventory turnover (ITO)
- PPE turnover (PPETO)
- Current assets turnover (CATO)

Decomposing Asset Turnover

- The following have the same equation as asset turnover ($\frac{\text{Sales}}{\text{Total assets}}$) except total assets is replaced with working capital, trade receivables, etc.
- Working capital turnover
- Trade receivables turnover
- PPE turnover
- Current assets turnover
- The following two are different
- Inventory turnover: ITO = $\frac{\text{COGS}}{\text{Inventory}}$
- Trade payables turnover: TPTO = $\frac{\text{COGS}}{\text{Trade payables}}$

Evaluating Investment Management

- Trade receivables days: TRD = $\frac{\text{Trade receivables}}{\text{Sales}/365}$; we want this number to be low
- Trade payables days: TPD = $\frac{\text{Trade payables}}{\text{COGS}/365}$; we want this number to be high
- Inventory days: ID = $\frac{\text{Inventory}}{\text{COGS}/365}$; we want this number to be low
- Cash conversion cycle: CCC = TRD + ID - TPD; we want this number to be low; CCC is high for healthcare but low for utilities

Evaluating Financial Management (Liquidity)

- Current ratio: CR = $\frac{\text{Current assets}}{\text{Current liabilities}}$
- Quick ratio: QR = $\frac{\text{Cash+Short-term investments+Trade receivables}}{\text{Current liabilities}}$ (no inventory or prepaid expenses, which take too long to liquidate)
- Cash ratio: CR = $\frac{\text{Cash+Short-term investments}}{\text{Current liabilities}}$ (no trade receivables)

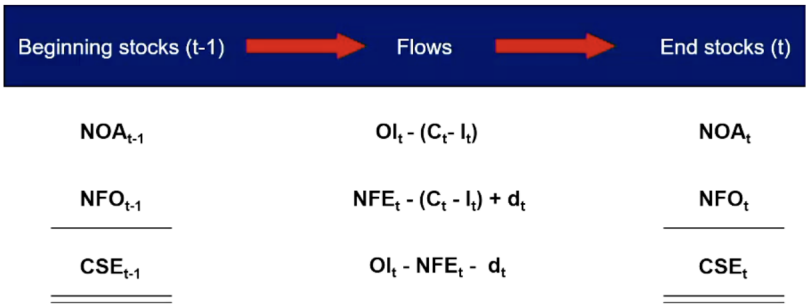
Evaluating Financial Management (Solvency Analysis)

- Debt to equity ratio: D/E = $\frac{\text{Current debt+Non-current debt}}{\text{Equity}}$
- Debt to capital ratio: D/C = $\frac{\text{Current debt+Non-current debt}}{\text{Current debt+Non-current debt+Equity}}$
- Interest coverage ratio: IC = $\frac{\text{Net income+Interest expense+Tax expense}}{\text{Interest expense}}$

Sustainable Growth

- Sustainable growth rate: ROE$*$(1$-$Dividend payout ratio) where Dividend payout ratio) $= \frac{\text{Cash dividend}}{\text{Net profit}}$

Cash Flows



Reformulated Income Statement

(In $ millions)	August 30, 2020	September 1, 2019
Operating revenue (OR)	166,761	152,703
Operating expense (OE)	161,326	147,966
Operating income (OI) before tax (i.e., EBIT)	**5,435**	**4,737**
Tax on operating income	1,325	1,055
Operating income (OI) after tax (i.e., NOPAT)	**4,110**	**3,682**
Financial revenue (FR)	92	178
Financial expense (FE)	160	150
Net financial expense (NFE) before tax	**68**	**-28**
Tax shield	17	-6
Net financial expense (NFE) after tax	**51**	**-22**
Earnings before tax (EBT)	**5,367**	**4,765**
Tax expense	1,308	1,061
Earnings	**4,059**	**3,704**

Reformulated Cash Flow Statement

(In $ millions)	August 30, 2020
Free cash flow from operating activities ((C - I) = OI - ΔNOA)	**1,638**
Equity financing flows (d = NI - ΔCSE)	938
Debt financing flows (F = NFE - ΔNFO)	700
Total financing flows (d + F)	**1,638**

6 Credit Analysis

Overview

- Credit analysis is the evaluation of a firm from the perspective of a (potential) holder of its debt
- Useful for commercial banks' decisions to extend loans, creditors' decisions to invest in corporate bonds, suppliers' decisions to service firms
- Third parties interested in credit analysis are auditors, potential customers, and competitors

Debt Financing

- Why: signal theory, drives value creation by management, tax shield
- Costs: legal, debt restructuring, financial distress, forgone investment, credit-shareholder conflict

Credit Markets

- Commercial banks (lending, universal banking with IB)

- Non-bank financial institutions (finance companies and asset-based lending like receivables and factoring)
- Public debt markets (corporate bonds)
- Sellers

Process of Credit Analysis in Private Credit Markets

1. Consider the nature and purpose of the loan
2. Consider the loan type (open line of credit, revolving line, working capital, term, mortgage, lease) and available security (receivables, inventory, PP&E, real estate)
3. Perform financial analysis (ratio analysis, forecasting)
4. Assemble loan structure/package, including loan covenants (min net worth, max coverage, max ratio of liabilities to net worth, min current ratio), sometimes accompanied by performance pricing (higher cost of borrowing when default risk increases)

Credit Analysis in Public Credit Markets

- Larger distance between borrowers and lenders → greater information asymmetry → credit analysts reduce this distance with credit ratings (Moody's, Fitch, Standard and Poor's)
- Credit rating: proxy for probability of default
- Issuer rating: measures probability of default without taking into account recovery rates
- Issue rating: considers likelihood of default and recovery rate

Business and Financial Risk

- Qualitative analysis for business risk
- Quantitative analysis for financial risk
- See below for business risk and financial risk matrix

	FINANCIAL RISK Profile				
BUSINESS RISK Profile	**Minimal**	**Modest**	**Intermediate**	**Aggressive**	**Highly Leveraged**
Excellent	AAA	AA	A	BBB	BB
Strong	AA	A	A-	BBB-	BB-
Satisfactory	A	BBB+	BBB	BB+	B+
Weak	BBB	BBB-	BB+	BB-	B
Vulnerable	BB	B+	B+	B	B-

Default Prediction

- Credit analysis that predicts financial distress
- Altman Z-Score
- Reduced form models: accounting, market, combined (Beaver 2005, Bharat 2008)
- Structural models: Merton, KMV's expected default frequency (EDF)
- Z-Score assesses bankruptcy risk; reduced and structural estimate probability of default; reduced focus on accounting and market data; structural focus on capital structure and asset value
- How to improve: ownership and group structure (limited liability, veil piercing)

Value Investing in Credit Markets

- Physical default probability PD (bankruptcy prediction models) → theoretical credit spread CS^* (structural model) → future changes in CS (credit returns)
- Hedge return: go long when $CS > CS^*$, short when $CS < CS^*$
- Can we use probability of default estimates to identify mispriced securities: Correia 2012 says credit spreads reflect information about forecasted default rates with significant lag
- Stock-bond return co-movement: positive in "good" times; hedge ratio: sensitivity of corporate bond returns to changes in value of equity; firms that report more conservatively exhibit higher stock-bond co-movement

7 Forecasting: Theory and Applications

Why Forecast?

- Informed decision-making
- Strategic planning
- Increased efficiency
- Ball and Brown (1968): stock returns respond to unexpected earnings announcements
- Sloan (1996): companies with high accruals have lower future cash flows; must look at quality of accounting

Forecasting

- Strategy, accounting, and financial analysis
- Condensed financial statements
  - Income statement: revenue, NOPAT, NFE, Profit/loss
  - Balance sheet: NWC, NLTOA, NOA, NFO, CSE
  - Cash flow statement: cash flow from equity (d), cash flow from debt (F), free cash flow (FCF = d - F)
  - We make assumptions about revenue growth, NOPAT margin, NWC/Revenue, and NLTOA/Revenue
  - We assume that NIPAT = NFE * $\frac{\text{Debt}}{\text{Capital}}$
- Predict changes in environmental and firm-specific factors
- Assess relationship between these and financial performances: why did ratios change? how sensitive are they? permanent of transitory? patterns/trends visible?
- Forecast financial statements
- ROE = RNOA + FLEV * SPREAD
- ROE = $\frac{\text{NOPAT}}{\text{NOA}}$ + FLEV * SPREAD
- ROE = NPM * AT + FLEV * SPREAD
- Components of ROE: earnings (random walk), AT (stable), FLEV (stable), NOPAT (mean reverting), spread (mean reverting)

Overview of Forecasting

- Macroeconomic analysis (segments, ESG, etc.), Business analysis (growth in segments, expansion, etc.), Accounting analysis

- Condensed balance sheet: NWC, NLTOA, NOA (NWC + NLTOA), FO, FA, NFO (FO - FA), CSE, Net capital (CSE - NFO)
- Condensed income statement: OR, OE, OI, Tax, NOPAT, NFE, Tax shield, NFE after tax, EBT, Tax expense and effective tax rate, Net income (a.k.a. CI)
- Condensed cash flow statement: equity financing flow (d), debt financing flow (F), Free cash flow (FCF = d - F); compare with reported FCF
- Ratio analysis: ROE, RNOA, FLEV, SPREAD, compare with reported ROE, RNOA, NPM, AT, compare with reported RNOA
- Look at revenue growth based on market (global, US, and non-US), by source (physical stores, online), by segment (region, men versus women, etc.)
- NOPAT Margin (NOPAT / Total Revenue)
- Operating performance: net working capital, days' receivable/inventories/payable, etc.
- Long-term assets, financial obligations

8 Valuation: Discounted Cash Flow Models

Valuation Models

- Discounted Dividend Models (DDM); note that not all firms pay dividends
- Discounted Cash flows Models (DCF)
- Residual Income Models (RI)
- Residual Income Growth Models (RIG)
- Price multiples

Theory

- The equity value of a firm is the present value of all future cash flows (dividends)
- Perpetuity: $PV = \frac{PMT}{r}$; $PV_{growth} = \frac{PMT}{r-g}$

Cost of Capital

- Minimum required return for holding an asset with specified risk; should be lower than return
- Derived from CAPM, DPM
- $r_E = \frac{D_1}{P_0} + g = \frac{\text{Dividend}}{\text{Market value}} + \text{dividend growth rate}$
- CAPM: $r = r_f + \beta(r_m - r_f)$
- WACC: $R_{WACC} = \frac{\text{Equity}}{\text{Equity+Debt}} r_E + \frac{\text{Debt}}{\text{Equity+Debt}} r_D(1-t)$
- Sustainable growth rate (what is reinvested in the business): $g = \text{ROE} * (1 - \text{payout ratio})$

Free Cash Flow (FCF)

- FCF = Operating CF - CAPEX
- FCF to Equity = FCF_e = Profit or loss + ΔBVD - ΔBVA
- FCF to Equity Holders = Profit or loss - ΔBVE = Dividends

- FCF from Operations (unlevered) = NOPAT - ΔNOA
- Free Cash flow to Equity (levered) = CI - ΔNOA - ΔNFO + ΔDebt

Terminal Value

- From perpetual growth: TV = $\frac{FCF_f(1+g)}{(r-g)}$; we need $r > g$
- From exit multiple: TV = Financial Metric * Trading Multiple; metrics include EV/EBITDA, FCF
- Assumptions: persistent abnormal growth; abnormal return on constant revenue; competitive equilibrium; multiple-based

Other Metrics

- Sensitivity analysis: shows equity value per share for different growth rates
- Margin of safety = $1 - \frac{\text{Share price}}{\text{Intrinsic value per share}}$

Summary

- Calculate FCF via FCFO or FCFE (this requires making assumptions)
- Determine the discount rate via WACC (CAPM for r_e and $r_d = \frac{\text{NFE}}{\text{Debt}}$))
- Determine TV via Gordon Growth (perpetuity) or multiples (Current P/E or EV/EBIDTA multiplied by final-year forecast of E or EBITDA)
- Sum the present values of FCF and TV (after discounting both with WACC)

DCF Pitfalls

- Very dependent on inputs and forecasts
- Focused on cash, not earnings and book values
- Free cash flows are not value adding
- Positive cash flows are needed

9 Valuation: Residual Income Models

Introduction

- We value a firm based on actual profits compared with expected profits
- Clean Surplus Accounting: $BVE_t = BVE_{t-1} + Equity - Dividends$
- After rearranging: Equity value = Book value of equity + PV of future abnormal earnings
- Capital charge ("abnormal income") = Income - Expected income = $\text{Income}_1 - r_e * BVE_0$
- Equity value = $BVE_0 + \frac{\text{Capital charge}}{(1+r_e)}$
- Francis (2000): in theory, DCF, residual income, FCF should all yield the same result; however, they don't because adjustments are different and growth rates and discount rates are unknown; residual income model is much better because it relies less on terminal values and forecasts

What Models are Used

- DCF: because of tradition and ease of use

- Adjusted EBITDA (basically, adjusted FCF): EBIT - D&A - other adjustments like SBC, one-off charges, maintenance fees
- Residual income (RI): most reliable according to Francis

How Accounting Affects Residual Income

- Revenue recognition
- Expense capitalization (WorldCom example during DotCom era)
- One-off charges
- Provisions and reserves

Residual Income Growth Model

- A firm's value lies in its ability to generate abnormal profit growth
- Abnormal profit growth = $\Delta\text{Earnings}_{t+1} = r_e(\text{Earnings}_t - \text{Dividends}_t)$

Equations

- Residual income: Equity value = $BVE_t + \Sigma_{t+1}^{T} \frac{\text{Earnings}_t}{-} r_e * BVEt + 1(1 + r_e)(t + 1) + PV_{TV}$
- TV = $\frac{RI*(1+g)}{r-g}$
- Residual income growth: Equity value = $\frac{\text{Earnings}_t}{r_e} + \frac{1}{r_e}\Sigma_{t+1}^{T} \frac{\Delta\text{Earnings}_t - r_e(\text{Earnings}_t - \text{Dividends}_t)}{(1+r_e)^t)} + PV_{TV}$
- TV = $\frac{1}{r_e} * \frac{RI*g}{r-g}$

Equity versus Asset Valuation

- Equity valuation when interested in share values using net income and r_e
- Asset valuation when determining value of business asset using NOPAT and WACC; use enterprise value for the whole business
- MM says enterprise value is independent of capital structure
- EV (to) Equity Bridge: Equity = EV - Net Debt - Minority Interest - Preferred Stock

RI Structure

- Forecast residual net income over a finite horizon; Residual net income = Net income - r_e * Beginning CSE
  - Note: for asset valuation, we use residual NOPAT instead of residual net income; Residual NOPAT = NOPAT - r_{WACC} * Beginning NOA
- Forecast residual net income beyond the finite horizon; calculate via perpetual growth (TV = $\frac{RI*(1+g)}{r-g}$) or exit multiple (TV = financial metric * Trading multiple)
- Discount residual net income at the cost of equity
- Equity value is the sum of all discounted residual net income; divide by shares outstanding for by-share value

Pitfalls of RI(G) Models

- Dependent on inputs and forecasts

- Reliant on accounting figures
- Complex (when adjusting)
- Only applicable to firms with stable and predictable earnings
- Focus on short-term and past performance
- Srivastava (2014): Newly listed firms are different and have more volatile cash flows and less predictable earnings

10 Relative Valuation: Price Multiples

Introduction

- Relying on comparable asset to value another asset / reliance on the market
- Must select comparable firms, poor performance, assumptions
- Market multiples are difficult to compare; however, it works well on average (Liu 2002)
- PE ratio = $\frac{\text{Price}}{\text{EPS}}$; EPS adjusted quarterly but Price adjusted instantaneously → information asymmetry; Morgan Stanley example
- PEG ratio = $\frac{\text{PE ratio}}{g_{earnings}}$; focused on forward EPS; PEG < 1 → undervalued; PEG is still a lagging indicator because it is based on historic numbers
- Easton 2004: PEG is better than PE but still not great (significant abnormal growth in earnings forecast horizon); bias is present in both

Comparable Firms

- Comparable firms have similar operating and financial characteristics
- Finding peers is difficult, but relative valuations reveal peers relatively well (Bhojraj 2002)
- Simple methods (industry) work as well as more complicated methods (earnings growth and risk); adjusting for other financial aspects does not improve accuracy (Alford 1992)
- Issues: same industry does not mean same firm; different countries; lack of available data for private and unique firms

Selecting the Measure

- Enterprise value multiples: EV = Shareholders' Equity + Net Debt + Preferred Stock + Minority Interest
- EV takes into account debt and cash (takeover target identification), has higher comparability and is more comprehensive, ignores tax differences (cross-country comparison), less impacted by accounting distortions
- Examples: EV/EBITDA, EV/EBIT, EV/NOPAT, EV/E
- Equity multiples: uses market capitalization and share price
- Equity multiples are easy and intuitive, gauge market sentiment, more forward-looking, impacted by change in capital structure, more impacted by accounting distortions
- Examples: PE, PEG, PS, PB, P/BVE, P/FCFE
- Issues: leading versus lagging multiples, negative multiples, transitory shocks, accounting distortions

Market Multiples

- EV/BVE $(1 + \Sigma_{t=1}^{\infty} \frac{(ROE_t - r_e) * (1+g_t)}{(r+r_e)^t})$ depends on abnormal ROE: negative abnormal ROE results in EV/BVE < 1
- EV/BVE depends on growth in BVE: equity growth reduces the EV/BVE if abnormal ROE < 1
- EV/EPS depends on abnormal ROE and growth in BVE: similar to EV/BVE

Equity Security Analysis

- Investment funds: money market, fixed income, equity (mutual funds are difficult to understand, DeHaan 2021), balanced, real estate, hedge
- Sustainable investments (tech heavy because they are ESG), AI, robo-analytics
- Market efficiency (EMH)

Summary

- Price multiples: performance-driven (PE, PEG) and investment-driven (PB / price-to-book ratio); easy, real-time; distorted by accounting rules, heavily influenced by market sentiment
- Enterprise value multiples: EV/EBITDA, EV/EBIT; consider entire capital structure, cross-capital-structure comparison; EV calculation is complex, influenced by non-operating factors
- Profitability multiples: ROE, ROA, ROI; provide insight into efficiency and profitability; affected by accounting, unstable
- Non-financial multiples: price-to-subscriber ratio, price-per-click/user; industry-specific, isolated from accounting practices; require specialist knowledge

11 Private Equity Valuation: IPOs and M&As

IPOs

- Pros: funding, realizing returns, publicity
- Cons: complying with regulations, disclosure costs, more and diverse shareholders
- IPO volume fluctuates over time and is currently decreasing
- ICOs (initial coin offerings): release of crypto tokens instead of shares; unregulated and cheap; major recent increase; regulation is costly for investors, but not for good firms
- Dot-com bubble
- Steps: organizational meeting (bake-off meeting), quiet period (prospectus, no communication), due diligence (review documents, interview, visit offices) registration and SEC review, road show and book-building (surveying investors), pricing (negotiation of price and underwriter discount; determined by demand, market conditions, valuation), IPO (D-Day: underwriter gives money to company and sells security certificates), post IPO (long-term IB services; analyst coverage, M&A)
- Underpricing increasing due to issuer-objective function (IBs want to make more), higher valuations, and uncertainty

M&As

- Rockefeller and oil: exploiting efficiency with excess capital, cash flow
- Corporate raiders

- Now: transactions viewed as essential for growth; cyclicity and uncertainty, plummeting market
- Microsoft and Activision
- Benefits: economies of scale, target management, complimentary resources, tax benefits, low-cost financing, restructuring, increasing rents
- Costs: diversification, anticompetitive pressure, empire building (RJR Nabisco)
- Market reaction, social media, hedge fund trading strategies (long targets, short acquirer), bond returns, role of IBs
- Must analyze acquirer, acquiree, and combined firms
- Key questions: motivations, industries and relations, operational strengths, friendly or hostile, performance before M&A
- Overpaying; assessed via target value analysis: analyze acquisition premium (compare premium with premium of similar transactions; friendly vs. hostile premiums: 30% difference), value of target to acquirer (market multiples, valuation models)
- M&A valuation models (less common than market multiples): forecast valuation measure as independent and combined; compute discount rate with post-acquisition cost of equity; analyze sensitivity to changes in assumptions

M&As Acquisition Financing

- Effect of form of payment on acquirer: capital structure, agency problems, ownership changes
- Effect of form of payment on target: tax effects, transaction costs
- Leveraged buyout (LBO): buy company with significant debt and little equity, restructure company, use cash flow from target to pay off debt, significant tax shield and risk, take public companies private
- Acquisition outcome: competing bids, management entrenchment $\rightarrow$ takeover regulation (protecting minority shareholders, restricting boards and management); antitrust and security issues
- Steps to record purchase: estimate rate of return implicit in transaction (r from value = FV of NOI + PV of FCF); identify and value contributory assets (cost, market, or income approach); calculate goodwill (purchase price - value of CAs)

12 Valuation Recapitulation

Overview

- Forecasts: key drivers (revenue) determine value
- DCFs: free cash flows capture value created by firm for investors; levered vs unlevered cash flows
- RIs and RIGs: abnormal earnings and abnormal earning growth capture value created by firm; asset vs. equity valuation
- Multiples: relative comparison; reaction to assumptions and absolute value estimates of previous models; EV and equity multiples; EMH and reliance on price
- PE valuation: IPOs and M&As; underpricing and overpaying; focus on multiples

Questions

- How to calculate r_d: $r_d = \frac{\text{NFE}}{\text{Debt}}$; more sophisticated method: YTM for traded bonds, credit spreads for non-traded bonds, weighted average cost of debt

- FCFE = Net income - ΔNOA - ΔFA + ΔDebt
- Perpetual scenarios used in DCF model: persistent abnormal performance, abnormal returns on constant revenue, competitive equilibrium, multiple-based approach
- Discount rate for RI valuation: cost of capital when equity, WACC when asset
- Why invest in PE if market is so illiquid: liquidity is incorporated in valuation

Improving Models

- Forecasts: forecast for each segment separately, identify cost and value drivers for each segment, sum of the parts approach
- Disaggregation of items: persistent versus transitory items; accruals and cash flow-based items; different and more asset ratios
- Deal with cash, investments, joint ventures, options, warrants, convertibles, etc.
- Impact of accounting distortions: leases, financial assets, OCI, impairments and one-off charges, aggressive depreciation and revenue recognition, changes in accounting standards, tax adjustments (DTLs and DTAs)
- Cost of capital: more sophisticated estimates of r_e and r_d; unlevered, levered, and size-adjusted betas
- Growth rates
- Financial institutions: focus on net interest income and regulatory capital instead of NOPAT $\rightarrow$ capital ratio and risk-weighted assets
- Cyclical and commodities: value dependent more on macro variables
- Private firms: data availability; private firm discounts (20-30%); purpose of valuation: M%A, transfer of ownership, security/investment analysis
- Data: EDGAR, Investor relations, Yahoo! Finance, Brokers

Cheat Sheet – AC215

Balance Sheet and Income Statement Classification
(Typical Items)

<u>Current Assets</u>	
Cash and Equivalents	Operating
Short-term Investments	Financial
Accounts Receivable	Operating
Inventories	Operating
Prepaid Expenses	Operating
Deferred Income Tax Assets (current)	Operating
<u>Long-term Assets</u>	
Long-term Investments in Securities	Financial
Property, Plant & Equipment, Net	Operating
Natural Resources	Operating
Equity Method Investments	Operating
Intangible Assets	Operating
Deferred Income Tax Assets (long-term)	Operating
Capitalized Lease Assets	Operating
Other Long-term Assets	Operating
<u>Current Liabilities</u>	
Short-term Notes and Interest Payable	Financial
Accounts Payable	Operating
Accrued Liabilities	Operating
Deferred Income Tax Liabilities (current)	Operating
Current Portion of Long-term Debt	Financial
<u>Long-term Liabilities</u>	
Long-term Debt	Financial
Capitalized Lease Obligations	Financial *(treated as 'Operating' in this course if Operating Lease)*
Pension Liabilities	Operating
Deferred Income Tax Liabilities (long-term)	Operating
<u>Equity</u>	
Minority Interest	Financial
Common Shareholders' Equity	Financial

Abbreviations and Calculations

Balance Sheet

Debt	Total borrowings, net. *Current portion of Long-term Debt + Long-term Debt*
NWC	Net Working Capital *Current Operating Assets – Current Operating Liabilities*
NLTOA	Net Long Term Operating Assets *Long-term Operating Assets – Long-term Operating Liabilities*
NOA	Net Operating Assets *NWC + NLTOA*
FO	Financial Obligations *Current Financial Liabilities + Long-term Financial Liabilities*
FA	Financial Assets *Current Financial Assets + Long-term Financial Assets*
NFO	Net Financial Obligations *FO – FA*
CSE	Common Shareholders' Equity *Common Shareholders' Equity – Treasury Stock – Other Comprehensive Income + Minority Interest*

Income Statement

CAPEX	Capital Expenditures Δ*Property, Plant, & Equipment + Depreciation*
Operating Revenue	Revenue, net, generated by operations. *Revenue (usually)*
Operating Expenses	Expenses, net, incurred to generate operations. *Cost of Goods Sold + Selling, Administrative & General Expenses (SG&A) + Other Operating Expenses + Other Expense (Income)*
EBIT (*OI)*	Earnings Before Interest and Tax *(Operating Income)* *Operating Revenue – Operating Expenses*
Effective Tax Rate	Tax rate used for calculating tax expenses. *Statutory Tax Rate OR Tax Expense / Earnings Before Tax*
Tax on …	Tax Expense, net, incurred over …. *Effective Tax Rate * ...*

NOPAT	Net Operating Profit after Tax *EBIT – Tax on EBIT*
Tax Shield	Tax expense reduction due to interest expense incurred. *Effective Tax Rate * Interest Expense (Income)*
NFE	Net Financial Expense *Interest Expense * (1 – Tax Shield)*
CI	Net Income *NOPAT – NFE*

Condensed Cash Flow Statement

FCF	Free Cash Flow *Operating Cash Flow – CAPEX*
FCFO	Free Cash Flow from Operations *NOPAT – ΔNOA*
FCFE	Free Cash Flow to Equity *Net Income – ΔNOA – ΔFA + ΔDebt*
UFCF	Unlevered Free Cash Flow *Free Cash Flow from Operations*
LFCF	Levered Free Cash Flow *Free Cash Flow to Equity*

Additional Derivations and Explanations

Free Cash Flow to Equity (Levered Free Cash Flow)

FCFE = $Net\ Income - \Delta NOA - \Delta FA + \Delta Debt$
$NOPAT - NFE - \Delta NOA - \Delta FA + \Delta Debt$
$FCFO - NFE - \Delta FA + \Delta Debt$

FCFE is the total cash from operations available to equity holders. Thus, from *FCFO* we adjust for the cash that is used to pay interest (*NFE*) because this is a transaction using cash with debt holders. This cash can no longer be used for equity holders. Then, we adjust for the cash that is (re)invested or divested in the short-term (*FA*), because this represents a use of cash that cannot be used for equity holders this year (in case of investment), or represents an extra source of cash that can be used for equity holders (in case of divestment). Lastly, we adjust for the increase (decrease) in debt as a result of issuance (repayment), because this represents an increase (decrease) of cash that can be used for equity holders.