15.402 Study Guide

Intro

3 Key jobs of CFO & CEO

- Don't Run out of cash
- Finance operations of the firm
- Decide which investments to undertake

Balance sheet of the firm

cash Management: (A)

Assets (A)	Debt (D)
	Equity (E)

(C) (B)

(A) Given (A, D, E), will the firm run out of cash

(B) Financing: what is optimal capital structure

(C) Investing: in which assets or projects do we invest?

Cartwright lumber: simple Financing

Themes:

- sustainable growth
- sole proprietor challenges

Ratio Analysis

A. Days of Inventory = $365 * \left(\frac{\text{Inventory}}{\text{COGS}}\right)$

B. Collection Period = $365 * \left(\frac{AR}{\text{Sales}}\right)$

C. Payables Period = $365 * \left(\frac{AP}{\text{Purchases}}\right)$

D. $\frac{\text{Liabilities}}{\text{Net worth}}$ = Book leverage Ratio

E. $\frac{EBIT}{\text{Interest Exp.}}$ = coverage ratio

F Sales Growth & Margins

G. ROA, ROE

Sources & Uses

Uses

- Asset has increased
- Liability has decreased

sources

- Asset has decreased
- Liability has increased

Useful generic assumption for IS

- Make Sales growth assumption
- % Rev (COGS, A/P)

Sales Growth & poor management lead to increased funding needs

Cash cycle = Time between Payment to supplier & payment from customer

$= \left(\text{Days inventory} - \text{Days Payable} + \text{collection Period}\right)$

Key Growth and Point: low Profitability = Financing need

Forecasting Needs

IS: • Sales → Make Assumptions

→ Margins dictated

→ Interest Expense

circularity

BS: debt are plug

Sustainable Growth

$$\begin{cases} g^* = (1-d)\,ROE \\ g \le g^* \end{cases}$$

→ conditions for sustainable growth (d = dividend rate)

How to grow fast fter than sustainable?

- Cut Dividend
- Increase Margins
- Increase Leverage
-

Playtime Toys: Funding Seasonality

→ again Bank loan is plug

- level production b rings constant inventory increase

Cash: set at operational min

A/R: last [X] days of sales

PP&E: same

Inventory → Figure it out

End Inventory = Beginning + Production − COGS

Part 2: Financing

Present Value

Present value of cash flow received in 1 year

$$PV = \frac{C}{1+r}$$

[r] → return rate on investment of similar risk characteristic (Discount Rate)

PV of Project

$$PV = C_0 + \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \cdots \frac{C_T}{(1+r)^T}$$

PV of Perpetuity (w/ Growth)

$$PV = \frac{C}{r}$$ no growth

$$PV = \frac{C(1+g)}{(r-g)}$$ w/ growth

Capital Structure

- shows how assets are financed

Modigliani Miller => Firm Value depends on assets (Funding Irrelevant)

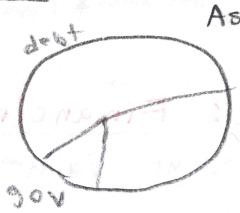
Implications: Re capitalization

- companies can oscillate between Debt & Equity & not effect company valuation
  - → share issues do not effect existing shareholders if issued at fair market value

Why MM Fails

Tax Shields

Motivation: CashFlows from Assets



$$\begin{pmatrix}\text{value}\\ \text{levered}\\ \text{firm}\end{pmatrix} = \begin{pmatrix}\text{value}\\ \text{unlevered}\\ \text{firm}\end{pmatrix} + \begin{pmatrix}PV\\ \text{tax}\\ \text{shield}\end{pmatrix}$$

$$\begin{pmatrix}PV\\ \text{tax}\\ \text{shield}\end{pmatrix} = \boxed{\tau * D}$$

τ = tax Rate

D = Market Debt Value

Cost of Financial Distress

- Direct costs of Financial Distress
  - Administrative & legal fees
- Indirect
  - Fire-Sale
  - Loss of customers
  - Loss of employees
  - Hard to raise funds
  - "Gambling w/ debtholder money"

Debt overhang Problem

- Shareholders in financial Distress are reluctant to fund NPV positive Projects b/c a substantial portion of benefits go to firm's debtholders

Optimal capital structure

Value of levered firm = + Value (unlevered) + PV(Tax-shields) − PV(expected Distress costs)

Dynamics

optimal capital structure: A checklist

- Taxes
  - → Does company benefit from debt tax shield
- Expected cost of distress
  - → volatility of cash flows

costs of Financial Distress

- Scare customers?
- Scare suppliers?
- Would firms pass up projects?

Cheap Debt Fallacy

- Higher Leverage Ratio makes equity riskier

Massey Ferguson: Debt Trap

- → sometimes can be "too late" to unlever

Asymmetric Info & agency cost

Asysmmetric info

- means managers know more about firm than investors do

CashFlow in => negative signal

cash Flow out => Positive signal

- when Equity is undervalued, managers prefer internal financing to Equity (giving away greater Portions of ownership than internally valued)

Valuation of Free Cash Flows

IRR → Discount rate at which NPV exactly zero

* Always use NPV criterion *

Steel: (Determine Project Horizon)

- Project is over when there are no more cash flows
  - → includes sale of useful assets
- calculate terminal value if infinite Horizon

step 2: Estimate Cash Flows

step 3: Discount cash flows @ cost of capital

Forming Free Cash Flows

1. (−) Investment (capex)
2. (+) After-Tax EBIT
   - → $(1-T)*(Rev - Cogs - SG\&A + D_{dep})$
3. (+) Depreciation Expense
4. (+) salvage Value
5. (+/−) tax on gain or tax credit on loss
   - → if sold below Market Value (tax credit)
   - → if sold above (tax)

6. (-) Opportunity Costs

- cannibalization of other products
- firm could use land for something else

7. (-) ΔNWC

→ Difference between short-term assets and short-term liabs

WACC & APV

weighted average cost of capital (WACC)

$$r_{WACC} = \frac{D}{D+E} r_d(1-T) + \frac{E}{D+E} r_E$$

→ Note: Discount Rates should be Project specific

components:

1. Target Project leverage Ratio $(D/(D+E))$
2. Return on Debt (r_d)
3. Marginal Tax Rate (T)
4. Required Return on Equity (r_E)

Figuring out Target Leverage Ratio

- Take guidance from company
- if no guidance, use leverage Ratio of combined company "firm & project"
- If nothing, use leverage ratio of comparables

Cost of Debt & Tax Rate

r_d → rate at which company can borrow

T → marginal Tax Rate

Finding cost of Equity: r_E

To CAPM

$$r_e = r_f + \beta_E (r_m - r_f)$$

→ $$\beta_e = \frac{cov(r_m, r_E)}{var(r_m)}$$

procedure:

1. Identify Pure-Plays
2. Get β_e from Pure Plays
3. Compute β_A of pure plays using unlevering formula
4. compute average β_A across pure plays
5. Compute "levered" Beta β_e using our project's target leverage ratio

Levering/Unlevering Procedure

unlevering: $$\beta_A = \left(\frac{E}{D+E}\right)\beta_e$$

Levering: $$\beta_e = \beta_A\left(1 + \frac{D}{E}\right)$$

Full form:

$$\beta_A = \frac{D}{D+E}\beta_D + \frac{E}{D+E}\beta_e$$

⇒ assume $\beta_D = 0$ (for investment grade debt)

- Last use r_f of similar

Valuing a Company

Perpetuity

$$PV = \frac{C}{r-g}$$ w/ growth

$$PV = \frac{C}{r}$$ w/o growth

Alternative Representation of FCF

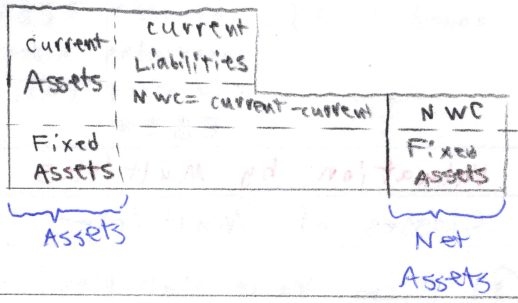
$$FCF = EBIT(1-T) - \underbrace{\text{Current Dep} - \Delta NA}_{\Delta NA}$$

where ΔNA = change in net assets

Net assets = Assets − Current Liabilities

= NWC + Fixed Assets

Pictorially,



Valuing Equity vs. Assets

- DCF Analysis gives you the Enterprise Value
- subtract the net debt (debt − cash) to achive equity value

Terminal Value

3 Basic Types:

1. Perpetuity
2. Perpetuity w/ Growth
3. Terminal Value Multiple

① Perpetuity

$$TV = \frac{EBIT_T (1-T)}{r}$$

② Perpetuity w/ Growth

$$TV = \frac{EBIT_T * (1+g)(1-T) - (g * NA_T)}{r - g}$$

Growth only valuable when

$$\frac{EBIT_T * (1-T)}{NA_T} > r$$

Economic value added

- growth only valuable if EBIT supercedes increase in after-tax EBIT

Valuation by Multiples

Classes of Multiples

① Firm Value Multiples

→ EV/EBIT

→ EV/EBITDA

→ EV/FCF

② Price Multiples

→ Price/Earnings per share

→ Price/EBIT per share

→ Price/EBITDA per share

→

Practical Tips

- Don't use price Multiples when firm has different capital structure than comps
- Don't use firms w/ very small earnings
  → leads to insignificant large Multiples
- Do sensitivity over a range of multiples