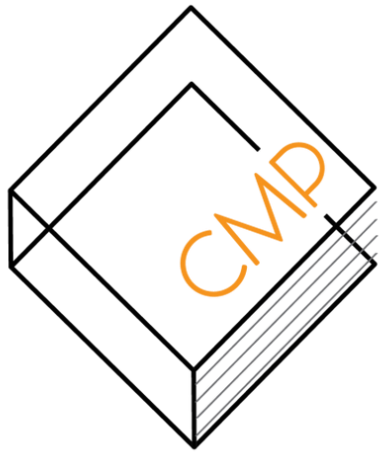


COMM 370 – Corporate Finance

FINAL REVIEW SESSION

Jason Van – December 13, 2020

UBC SAUDER SCHOOL OF BUSINESS

CUS commerce undergraduate society

Agenda

0	AC Introduction & Midterm Exam Info	5 mins
1	Topic 6 – Capital Structure Basics (MM1, MM2, Levering/Delevering Beta)	45 mins
2	Topic 7/8 – Bankruptcy, Capital Structure Theories (Recapitalizations)	30 mins
3	Break – 10 minute break	
4	Topic 9 – Advanced Valuation and Capital Budgeting (w/ Taxes)	30 mins
5	Topic 10/11 – Payout Policy and Mergers & Acquisitions	20 mins
6	Break – 10 minute break	
7	Practice Questions and Final Tips	Remainder of time

COMM 370 Final Exam Formula Sheet

COMM/COEC 370 Final Exam Formula Sheet

Present Value of an n-payment annuity of \$A = $A\left[\frac{1-(1+r)^{-n}}{r}\right]$

Present Value of a perpetuity of \$C = $\frac{C}{r}$

Present Value of a growing perpetuity = $PV_0 = \frac{C_1}{r-g}$

$FCF = EBIT \times (1-\tau_C) + Dep - CapEx - \Delta NWC$

CAPM (SML equation): $E(r) = r_f + \beta[E(r_M) - r_f]$

MM Propositions without taxes:

MM's Proposition I **without taxes**: $V_L = V_U$

MM's Proposition II **without taxes**: $r_E = r_U + \frac{D}{E_L}(r_U - r_D)$

$$\beta_U = \frac{D}{D+E_L}\beta_D + \frac{E_L}{D+E_L}\beta_E \quad \Rightarrow \quad \beta_E = \beta_U + \frac{D}{E_L}(\beta_U - \beta_D)$$

If $\beta_D = 0 \Rightarrow \beta_E = \beta_U\left(1 + \frac{D}{E_L}\right)$

MM Propositions with taxes:

MM's Proposition I **with taxes**: $V_L = V_U +$ PV(interest tax shield)

MM Proposition II **with taxes:** Constant debt level (Case 1)

$$r_U = \frac{D}{D(1-\tau_C)+E_L} r_D (1-\tau_C) + \frac{E_L}{D(1-\tau_C)+E_L} r_E$$

$$r_E = r_U + \frac{D}{E_L}(r_U - r_D)(1-\tau_C)$$

$$r_{WACC} = r_U\left(1 - \frac{D}{D+E_L}\tau\right)$$

MM Proposition II **with taxes:** Constant D/V (Case 2)

$$r_U = \frac{D}{D+E_L} r_D + \frac{E_L}{D+E_L} r_E$$

$$r_E = r_U + \frac{D}{E_L}(r_U - r_D)$$

$$r_{WACC} = r_U - \frac{D}{D+E_L} r_D \tau$$

MM's Proposition I with taxes, financial distress costs and agency costs & benefits:

$V_L = V_U +$ PV(interest tax shield) – PV(financial distress costs)
– PV(agency costs of debt) + PV(agency benefits of debt)

Mergers and acquisitions:

Benefit from an acquisition = $\Delta V = V_{AB} - (V_A + V_B)$

Total value of Firm B to Firm A = $V_B^* = \Delta V + V_B$

Information about the Midterm Exam 2020

Information about COMM/COEC 370 Final Exam

Exam Date: **Saturday, December 19, 2020**

Exam Time: **7:00 pm PDT* The exam will be 2.5 hours long.**
Start the exam as close to 7pm as possible. UBC exam policy requires all students to start their exam within 30 minutes of the official start time. After 30 minutes, students will be locked out of the exam.

Exam Location: Online Canvas exam written remotely and proctored online by Proctorio. Due to the online and offsite nature of the exam, students will be required to do an academic integrity pledge as part of the exam.

Exam format:

- **The final exam is a closed book and closed notes online exam on Canvas.**
- The exam is common across all sections of the course.
- Questions are a mixture of calculation-based and conceptual.
- Question styles will be multiple choice, multiple drop-down and fill in the blanks.
- Format instructions will be provided for numerical answers. Pay attention to them!
- Do not round intermediate values when performing calculations.

Exam content:

- **The final exam will focus on post-midterm material (Topics 6–11). Pre-midterm material will only be tested if it relates directly to post-midterm material (Topic 3 concepts).** Students are responsible for all material contained in lecture notes, recordings, problem sets, class discussions and assignments on these topics.

6

Topic 6 – Capital Structure Theories

MM1, MM2, Levering and Delevering Beta, Recapitalizations, and Cost of Capital

Learning objectives

1. Summarize basic empirical facts about capital structure and determine what drives capital structure choices in i) perfect capital markets & ii) imperfect capital markets
2. Describe how leverage affects equity risk, cost of capital, and firm value
3. Explain the mechanics of changes in capital structure (e.g., leveraged recapitalizations)
4. Develop & use levering/delivering formulas for returns and betas

Basic Empirical Observations

Observations

- On average, across all public & private firms, firms have book leverage ratios around 30% and this is quite stable over time.
- Market leverage ratios are affected by stock prices, and thus are more volatile than book ratios.
- There are large differences in the debt ratios across industries, possibly related to factors such as capital intensity or technology.
- Even within an industry, firms may have very different debt ratios.
- Firms' debt ratios tend to fall when they are above their "time series mean" and to increase when they are below.
- Most firms choose a target debt ratio and try to stay close to it. This target differs across firms and industries and varies over time.

Terms, Notations, and Perfect Capital Markets

Terms and Notation

Levered firm (L): a firm that has issued some debt

V_L : total market value of a levered firm ($V_L = D + E_L$)

D : market value of debt

r_D : required return on debt

E_L : market value of levered equity

r_E : required return on levered equity

Unlevered firm (U): a firm with no debt (or an all-equity firm)

V_U : total market value of an unlevered firm ($V_U = E_U$)

E_U : market value of unlevered equity

r_U : required return on unlevered equity (also called required return on the firm's assets, r_A)

Assumptions of Perfect Capital Markets

Perfect Capital Markets

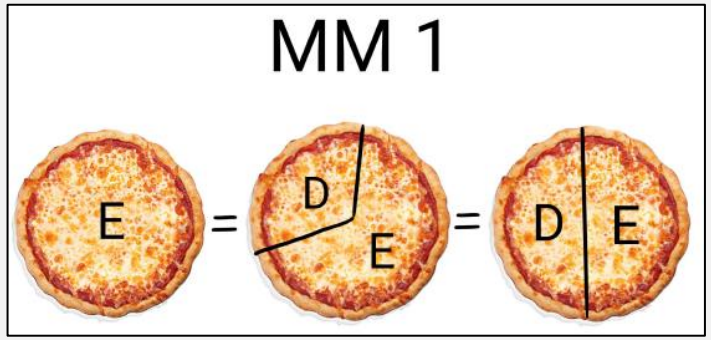
- Investors & firms can borrow and lend at same interest rate
- No transaction costs (e.g., brokerage fees)
- No issuance costs (e.g., underwriting fees)
- No agency costs (e.g., from separation of ownership and control)
- No information asymmetries (e.g., insiders vs. investors)
- Key: financing decisions do not change the firm's assets or cashflows
- ***No corporate taxes*** ($\tau = 0$) → no interest tax deductions

Modigliani-Miller Theorem (Assuming Perfect Capital Markets)

M&M Proposition I

MM 1: $V_L = V_U$

- Value of unlevered firm (all equity finance) is equal to the value of the levered firm (debt and equity financed)



M&M Proposition II

MM 2: $r_E = r_U + \frac{D}{E_L}(r_U - r_D)$

- Required return on levered equity increases when financial leverage (debt increases)

- **Key intuition:** Debt always increases the firms chance to default, amplifying the risk of equity (even when the debt has no risk of default)

- Cost of equity (r_E) will always be greater than the cost of capital to an unlevered firm (r_U)

➢ $r_E > r_U > r_D$

Modigliani-Miller Theorem Proof

M&M Proposition I

MM Proof Example

CMP Holdings generates $35 in perpetual cash flow. It has an unlevered cost of capital of 7%. This implies a firm value of $500.

CMP Holdings decides to issue $100 in debt at a 2% interest rate (cost of debt). What is the firm's value after it issues this new debt?

Step 1: Write down all the assumptions

V_U =
C =
D =
r_U =
r_D =

r_E = ?
V_L = ?

MM 1: $V_L = V_U$

Can we use (Using APV Method)? $V_L = V_U + PV(ITS)$

V_U =
C =

PV(ITS) = (Interest on debt) * (Tax Rate)

?

Step 2: Calculate Interest expense and levered free cash flow (cash flow after interest has been paid out)

Interest expense =
Levered FCF =

Step 3: Solve for cost of equity (r_E) using MM2

MM 2: $r_E = r_U + \frac{D}{E_L}(r_U - r_D)$

r_E =
r_E =
r_E =
r_E =

What we know:
r_E =
r_U =
C =
D =
E_L =
r_D =

*

Step 4: Divide Levered FCF by rE and Interest expense by cost of debt

V_L =
V_L =
V_L =
V_L =
$V_L = V_U$ ✓

Leveraged Recapitalization

Leveraged Recapitalization Timeline

ICC Corp. has 50M shares worth \$10 per share and no debt. Its cost of capital is r_U = 5%. It has a perpetual random CF with mean \$25M and it pays no taxes. ICC plans a leveraged recapitalization: issue \$200M in perpetual debt at r_D = 2% and repurchase shares.

Value before: V_U = 50M×\$10 = \$500M (= \$25M/.05)

Value after: V_L = \$500M = \$200M + E_L → E_L = \$300M

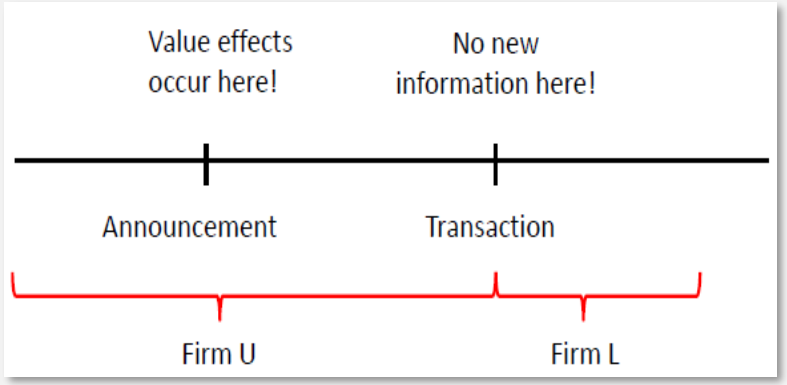
Cost of capital before: r_U = 5%

MM 2: $r_E = r_U + \frac{D}{E_L}(r_U - r_D)$

Cost of capital after: r_E = .05 + (200M/300M)×(.05 – .02) = 7%

Upon announcement, the share price does not change.

Repurchase \$200M / \$10 = 20M shares leaving 50M – 20M = 30M.



Key Observations of Leveraged Recapitalization

i. **Firm value** remains the same (\$500M)
ii. **Cost of capital** *increases* from 5% (r_U) to 7% (r_E)
iii. **Shares outstanding (S/O)** *reduces* from 50M to 30M
iv. **Share price** remains the *same* at \$10 per share
v. **EPS** *increases* due to leveraged recapitalization

Recall:
EPS = Net income / Share outstanding
EPS (Before recap) =

Recap happens and a few things change as a result
1. \$200M in debt at a 2% interest rate =
2. Repurchase xM in shares at \$10 using \$200M of debt

Cashflow (After recap) = (\$xM – \$xM) = \$xM
Shares outstanding (After recap) = xM – xM = xM S/O
EPS (After recap) = \$xM / xM shares outstanding = \$0.xx per share

What happens to share price?
1. Share price (before recap) = EPS / rU =
2. Share price (after recap) = EPS / rE =

vi. **Share price** remains the ***same*** in a leveraged recapitalization!

MM2 and WACC

MM2 and WACC

Before the recapitalization, $r_{WACC} = r_U = 5\%$.

After the recapitalization, $r_{WACC} = (3/5)\times 7\% + (2/5)\times 2\% = 5\%$

r_{WACC} did not change as a result of the recapitalization!

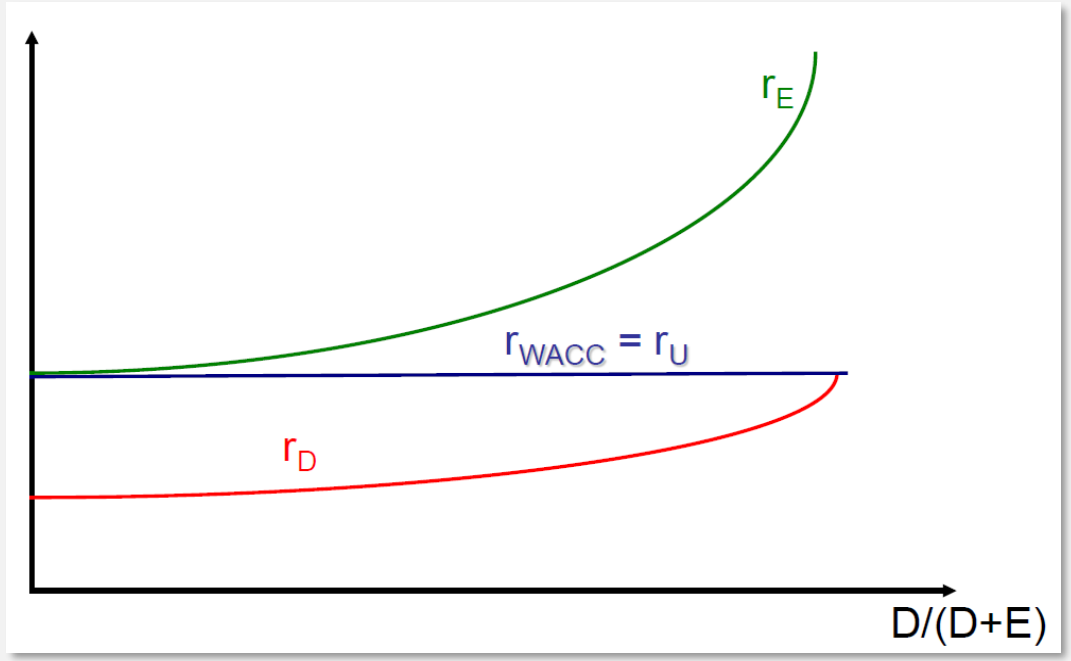
Since $A = E_U = D + E_L$ the return on the firm's assets is equal to the return on the unlevered equity, and both are equal to the return on a value-weighted portfolio of the firm's debt and equity. Thus:

$$r_{WACC} = r_A = r_U = \frac{D}{D+E_L} r_D + \frac{E_L}{D+E_L} r_E$$

Changes in capital structure do not affect a firm's r_{WACC} and since $V_L = C / r_{WACC}$, they do not affect a firm's value either.

- **Key takeaway**
- WACC stays the same due to shifting proportions (ie. It's always 100%, adding debt just changes the mix, but the proportions that make up WACC will always add to 100% (in a perfect capital markets world with NO TAXES)

As you increase debt in the capital structure…



Key takeaways

- Cost of equity increases (higher risk of default)
- WACC stays the same
- Cost of debt increases up to the WACC or r_U

Bridging Questions – MM1 and MM2 (No Taxes)

Questions

Consider two firms in a MM world without taxes that are identical except for their capital structure.

1) How should the value of the levered firm compare with the value of the unlevered firm?
2) How should the cost of equity of the levered firm compare with the cost of equity of the unlevered firm?
3) How should the WACC of the levered firm compare with the WACC of the unlevered firm?

Answers

1) Value should of levered firm should be the same as value of unlevered firm $V_L = V_U$
2) Cost of equity of levered firm (r_E) should be GREATER than the cost of equity for the unlevered firm (r_U)
3) WACC of the levered firm should be the SAME as the WACC of the unlevered firm

Levering/Delevering Betas

Example

Example: Estimate rE for RainCo, a private firm with debt-to-equity (D/E) ratio of 0.75. Assume no taxes, and that RainCo's debt beta is 0, the risk-free rate is 2% and the expected return on the market portfolio is 12%

Step 1: Write down all the assumptions

$r_E = r_F + \beta_E(r_M - r_F)$
$r_E = \ + \beta_E(\ ) = ?$

Where:
r_E = cost of equity
r_F = risk-free rate
r_M = expected market return
β_E = RainCo's equity-beta

Conclusion: Can't solve for cost of equity without additional information for Beta (since RainCo is private)

Additional Information: There are two publicly traded comparable firms (in the same industry, same size, and same risk)

Company 1(C1)	**Company 2 (C2)**
D/E ratio = 1.5	D/E ratio = 0
$\beta_E = 3$	$\beta_E = 2.5$

From this information, can we assume that RainCo's beta is the average beta's of the two companies? (3+2)/2 = 2.5?

$$\beta_U = \beta_E / \left(1 + \frac{D}{E_L}\right)$$

Step 2: Unlever C1 beta using MM formula

$\beta_{U(C1)} =$

$\beta_{U(C1)} =$

$\beta_{U(C1)} =$

$\beta_{U(C2)} =$

Step 3: Take the average of the unlever betas, and lever it back up to RainCo's capital structure by re-arranging the formula to solve for β_E

$\beta_{U(RainCo)} = \beta_{E(RainCo)} = \beta_U \times (1 + (\frac{D}{E}))$

$\beta_{E(RainCo)} = =$

Step 4: Plug beta back into CAPM equation in Step 1 and solve for RainCo's cost of equity!

$r_E =$
$r_E =$
$r_E =$

MM w/ Taxes on Firm Value and Cost of Equity

M&M Proposition I (w/Taxes)

- **MM 1:** $V_L = V_U + PV(\text{Interest Tax Shields})$
- ***Meaning:*** firm value <u>increases</u> with financial leverage, because higher leverage increases PV(Interest Tax Shields).
  - ***Note:*** $V_U = (1 - \tau)C / r_U$ and with perpetual debt we get that PV(interest tax shields) = $(\tau\, r_D\, D) / r_D = \tau\, D$. So we will use:
  - **MM 1:** $V_L = V_U + \tau\, D$
- ***Key intuition:***
  - Increasing leverage generates interest tax shields which increase the firm's after-tax cash flows; pizza gets bigger!
  - Think about how WACC works: leverage reduces the after-tax cost of debt and thus the firm's cost of capital ($r_{WACC} < r_U$).

M&M Proposition II (w/Taxes)

- **MM 2:** $r_E = r_U + \frac{D}{E_L}(r_U - r_D)(1 - \tau)$
- **Meaning:** the required return on levered equity is increasing in financial leverage because leverage amplifies the firm's business risk and thus increases the risk of equity.
- **Note:** higher debt increases r_E less than without taxes; now shareholders get interest tax shields which are relatively safe.
- The appendix to these notes contains an **optional proof of MM1 with taxes**.
- The logic is similar to the prior proof; MM2 follows from MM1.

Key Takeaway

1) Taxes will increase firm value due to the benefits of the interest tax shield
2) Cost of equity increases (r_E) less than in scenario without taxes due to multiplier effect

MM w/ Taxes on WACC and Beta

M&M Propositions with Taxes & WACC

With taxes, the after-tax cost of debt is $r_D(1-\tau)$, thus WACC is:

$$r_{WACC} = \frac{D}{D+E_L} r_D (1-\tau) + \frac{E_L}{D+E_L} r_E$$

Now replace r_E in the WACC formula above by its expression from MM2 in the prior slide and rewrite as:

$$r_{WACC} = r_U \left(1 - \frac{D}{D+E_L}\tau\right)$$

Then: ***WACC decreases in leverage as long as $\tau > 0$.***

Or note that with taxes $V_L > V_U$ (the difference is the PV of ITS).
This implies that $V_L = C(1-\tau) / r_{WACC} > C(1-\tau) / r_U = V_U$.
Thus, it must be that $r_{WACC} < r_U$ for $D > 0$.

MM 2 and Beta

- The levering / delevering formula for CAPM betas changes to:

$$\beta_E = \beta_U + (\beta_U - \beta_D)\frac{D}{E_L}(1-\tau)$$

$$\text{If } \beta_D = 0 \quad \Rightarrow \beta_E = \beta_U \left(1 + \frac{D}{E_L}(1-\tau)\right)$$

- As before, financial leverage amplifies the market risk of a firm's unlevered assets, β_U, increasing the market risk of its equity.
- Note: these formulas hold assuming perpetual debt.

Key Takeaway

1) Taxes will decrease WACC due to multiplier effect (1-Tax)
2) Taxes will DECREASE beta by the amount of the multiplier

Modigliani-Miller Theorem Proof (w/Taxes)

Example

MM Proof Example (w/Taxes)

CMP Corp has 100M shares at $4.20 a share and no debt. Cost of capital of 5% (rU). It has perpetual cash flows before tax of $35M and a tax rate of 40%. CMP Corp decides to recapitalize and issue $200M in perpetual debt at a cost of debt of 2%. It plans to use those proceeds to repurchase shares.

Step 1: Write down and calculate what you know

Before the recapitalization)
V_U = 100M * $4.20 = $420M
Also check, V_U = $35M*(1-0.4) / 0.05 = $420M
EPS = $60M * (1-0.4) / $100M = $0.21
Share Price = $0.36 / 0.05 = $4.20
WACC = r_U = 5%, because no debt

After the recapitalization
D = 200
T = 40%
r_D = 0.02

Variables Given
Shares = 100M
Share price = $4.20
rU = 0.05
Cash flow = $35M
Tax Rate = 0.40
Cost of debt = 0.02
D = 200

1. Firm value will increase due to PV of Interest Tax shields
PV(ITS) = T*D = 0.40 * 200 = $80
Therefore, V_L = $420 + $80 = $500, Firm value increases by $80

What happens to r_E, WACC, and Share Price?

Step 2: Calculate new cost of equity and WACC
Firm is now worth $500M, $200 financed with debt, $300 with equity
r_E = 0.05 + (200/300)*(0.05-0.02)(1-0.4)
r_E = 0.05 + (200/300)*(0.03)(0.6)
r_E = 0.062 = 6.20%

MM 2: $r_E = r_U + \frac{D}{E_L}(r_U - r_D)(1-\tau)$

Check: take the after-tax cash flows, net of interest expense and divide by the cost of equity we calculated from above
E_L = (35 - 0.02*200)*(1-0.4) / 0.0620 = 300 ✓

WACC
V = $500 r_D = 2%
D = $200 Tax = 40%
E = $300 r_E= 7.68%

$r_{WACC} = r_E \times W_E + (1-\tau) \times r_D \times W_D$

WACC = (0.062)*(300/500) + (1-0.4)*(0.02)*(200/500)
WACC = 0.0372 + 0.0048 = 0.042 = 4.2%

Check: that after-tax cash flows divided by the WACC we just calculated
V_L = (35)*(1-0.4) / 0.042 = 500 ✓

Step 3: Determine new share price
- Shares repurchased = $200M / $4.20 = 47.619M shares
- Shares remaining = 100M – 47.619M = 52.381
- Divide V_L by shares remaining = $500 / 52.381 = $9.545 per share
- Check = $9.545 * 52.381 = $500 ✓

Summary

M&M Proposition I (w/Taxes)

- With perfect capital markets, changing capital structure does not affect total firm value or the firm's WACC (MM1 without taxes).
- With corporate taxes, firm value is increasing and WACC is decreasing in the amount of debt (MM1 with taxes). Shareholders capture the tax benefits of increases in debt.
- Both with and without corporate taxes, MM2 implies that:
  - Leverage increases expected EPS but also its volatility.
  - Leverage increases the required return on equity
- MM2 also provides useful levering / delevering formulas for the cases with and without corporate taxes.
- But we have no **"theory"** of capital structure so far: with only taxes very large amounts of debt appear to be optimal, provided that you have taxable income....But we don't see this in practice...

7

Topic 7 – Financial Distress and Bankruptcy

Chapter 7 (Liquidation), Chapter 11 (Reorganization) and Restructuring

Learning objectives

1. Distinguish between financial distress and economic distress; and flow and stock insolvency
2. Identify common symptoms of financial distress, and the operational and financial changes involved in managing financial distress
3. Identify the costs and benefits of formal bankruptcy
4. Determine when a private workout would be desirable

Financial and Economic Distress

Financial Distress	Economic Distress
Financial Distress Firm is unable to generate cash flow due to • Bad business model, production inefficiency, competition) • Overall Economic downturn	**Economic Distress** Firm's liquid assets / opearing cash flow are insufficient to cover conmtractual obligations (creditors, suppliers, labor) • Lawsuit or accident could make firm unable to meet interest payments (risk defaulting) • Can lead to default, debt renegotiation, restructuring

Key Takeaway

1) Economically distress firms can become financially distressed
2) Bad business models can lead to financial distress (poor sales, poor cost management, too much competition)
3) Temporary downturn can lead to financial distress (COVID impacted businesses), may need to restructure and reorganize debt

Flow vs. Stock Insolvency and Symptoms of Financial Distress

1) Flow vs. Stock Insolvency

Stock insolvency: Value of firm's assets < the value of firm's debt (negative net worth)
Flow insolvency: Operating cash flows are insufficient to cover obligations

1) Stock and flow insolvency often come together; some firms can be stock insolvent, but not flow insolvent.

   Example: Debt maturities are not due for many years

2) Financial distress is often driven by macroeconomic / industry factors

2) Symptoms of Financial Distress

- Reported losses; weakning of financial ratios
- Plant closings; layoffs; delays in investment
- Drop in stock prices; dividend cuts
- Management turnover

3) Managing Financial Distress

- Restructuring / rationalization of operations:
- Liquidate some (e.g., non-core) assets; focus on profitable businesses
- Plant closings & layoffs / wage cuts / introduction of cost saving technologies
- Use proceeds of asset sales to pay off creditors and keep firm alive
- Note: this is often a precondition for any agreement with creditors
- If not successful (economic distress unresolved), the firm should be liquidated

Flow vs. Stock Insolvency and Symptoms of Financial Distress

4) Managing Financial Distress

- **i) Restructure financial contracts:**
- Firm is now viable but debt is in default; lenders now own and control the firm
- To formalize this, swap defaulted debt for equity in the firm
- Remaining debt must have long maturity –allow firm to breathe
- Can do this in private workout, or in court under formal bankruptcy
- **ii) Infusion of new capital (firm still needs funds):**
- Raise new debt (collateral; seniority) and equity (e.g., preferred shares)
- Government support if firm is "of social interest"

5) Financial Restructuring - Example

A solvent firm has market value of $100M, debt with market value of $70M (equal to the face value of debt for simplicity) and equity with market value of $30M. Note:The firm is "balance-sheet solvent" in the sense that V > D.

Now the market value of the firm's assets falls to $50M (something went wrong), so the firm becomes bankruptor balance-sheet insolvent (V < D).

Also assume the firm becomes "flow-insolvent", i.e., it is unable to cover debt payments using cash flow, so it is now in violation of the debt contract.

6) Financial Restructuring – Example Continued

Creditors could liquidate the firm, but believe it is worth more to them if they are able to restructure its balance sheet and avoid the liquidation.

We will use "market value balance sheets" to explain the problem and show how a ***financial restructuring*** to avert liquidation would work.

Solvent Firm		→	Bankrupt Firm		or	Bankrupt Firm	
V = $100M	D = $70M		V = $50M	D = $70M		V = $50M	D = $50M
	E = $30M			E =-$20M			E = $0M
V = $100M	V = $100M		V = $50M	V = $50M		V = $50M	V = $50M

Negotiation: firm cannot repay the $70M; firm can only support interest payments on $10M in debt. Creditors get $49M and shareholders get $1M. Swap old debt claim for D_n = $10M in new debt (long maturity) and E_n = $39M in new *preferred* equity; original shareholders get E_o = $1M (ordinary shares).

Restructured Firm	
V = $50M	D_n = $10M
	E_n = $39M
	E_o = $1M
V = $50M	V = $50M

- D/V = 20%
- Its debt payments are now in good standing.
- The firm can "breathe".

Laws Governing Bankruptcy and Reorganization

Laws Governing Bankruptcy and Reorganization

USA: Bankruptcy Reform Act of 1978
- Chapter 7 – Liquidation
- Chapter 11 – Reorganization

Canada:
- Bankruptcy & Insolvency Act of Canada – liquidation
- Companies' Creditors Arrangement Act - reorganization

Formal Bankruptcy Proceedings

Firm can file for bankruptcy (often under strong pressure from creditors) and have a judge oversee the proceedings:

Liquidation:
- Used for firms that are not viable
- Firm ceases operations, sells assets and distributes proceeds to investors

Reorganization:
- Used for firms that are viable
- Firm kept as going concern
- Restructuring of operations and financial claims

Why is a Formal Bankruptcy Proceeding Needed?

- To provide an opportunity for an orderly reorganization or liquidation; ensure viable firms are reorganized and the rest are liquidated
- Courts coordinate the process: multiple creditors have conflicting interests and want to be paid first
- interests of other stakeholders (e.g., employees or government) are important
- Direct costs of bankruptcy proceedings are large; incurred when involved parties cannot reach a private agreement on their own.
- Bankruptcy system is generally "pro-debtor"; allowing viable firms to restructure, develop their long-term strategy, and exit from bankruptcy

For your exam:
1. Know the difference between liquidation and reorganization

Liquidation and Reorganization

Liquidation

Bankruptcy Liquidation

- Firm or creditors file petition for liquidation; can happen after failed restructuring attempts or directly without such attempts.
- A trustee liquidates the assets, pays administration costs, and then pays remaining proceeds to investors based on the absolute priority rule (APR).
  - APR – seniority of claims in descending order:
  - Admin expenses of bankruptcy
  - Owed wages, rent, and taxes
  - Creditors (first secured creditors, then unsecured creditors)
  - Preferred shareholders
  - Common shareholders
- Judges have some discretion in their use of the APR.

Reorganization

Bankruptcy Reorganization

- Firm or creditors file petition for bankruptcy reorganization.
- If judge approves, management remains in charge (*debtor in possession*)
- Managers must file a reorganization plan within pre-set time frame.
- Plan includes changes to operations and financial restructuring.
- Reorganization plan requires creditor approval and ratification by judge.
- The firm can emerge from bankruptcy as a solvent firm.
- Firm can re-file for bankruptcy again later, but usually much less likely to succeed as this is part of the same distress event (move to liquidation).

1) Know APR (usually most senior secure debt tranches get paid out first, shareholders last!)

Private Bankruptcy Restructuring / Private Workouts

Key Legal Tools

Bankruptcy Restructuring – Key Legal Tools

- ***Trustee in Bankruptcy*** – judge appoints trustee to oversee the state; protect creditors from actions of the firm such as fraudulent transfer.
- ***Suspension of debt payments*** – relieve financial pressure paralyzing the firm (debt in default must be renegotiated).
- ***Automatic stay -*** lenders cannot seize the assets or collect from borrower – allows firm to continue operating its assets.
- ***Contract renegotiation*** - the defaulted borrower can renegotiate contracts, such as debt, leases, or even wages.
- ***Debtor in possession (DIP)*** - management remains in control, although the firm defaulted on debt and is thus owned by creditors.
- ***DIP financing -*** can issue debt senior to existing debt (only way to raise money to fund operations) – otherwise precluded by covenants.

Private Workouts

Private Workouts

- Process starts with default or impending default, leading to **private negotiations** between creditors and management.
- If successful, agreement to modify terms of debt:
  - reduce current amount in return for a (possibly higher) later payment
  - reduction of required interest or principal
  - extension of maturity
  - exchange of debt for equity
- Tends to work better when debt is private and concentrated in a few creditors.
- Restructuring public debt is more difficult - requires unanimous consent from every (even small) bondholder.
- **Holdouts:** dissenting bondholders can block the restructuring unless they get sweet deals … this makes the workout very costly.

Bankruptcy Private Workouts & Summary

Advantages of Bankruptcy / Disadvantages

Bankruptcy vs. Private Workouts

- Private workouts and bankruptcies are both commonly used; firm **choose** how they want to restructure, thinking of potential benefits and costs. Often file for bankruptcy after failed private workouts.
- ***Advantages of bankruptcy reorganization:***
  - Can use all the legal tools (very useful!) and judge oversight; good especially when reaching agreements is hard (e.g., too many creditors).
  - Some restructurings cannot be done unless in formal bankruptcy as they are complicated (e.g., United Airlines spent 3 years and 51 days in Ch 11)
- ***Disadvantages of bankruptcy reorganization:***
  - Much more costly than private workouts (latter cost 10% of former!)
  - Judge has a little too much power (e.g., may refuse to liquidate a firm)
  - Tendency for bad firms to survive

Summary

Summary

- Financial distress means a firm has a mismatch between its long term cash flow and its short term contractual obligations (≠ economic distress).
- The management of distress involves operational changes (e.g., asset sales) and financial restructuring (swapping old debt for equity); or liquidation.
- Formal bankruptcy is costly (legal fees), but offers various legal tools that help a firm reorganize successfully.
- Private workouts are feasible, and possibly less costly, when there are few lenders and consensus on how to proceed.
- Prepackaged bankruptcies involve filing for bankruptcy and a reorganization plan simultaneously – expedite the process.
- Legal details: Canada: Bankruptcy & Insolvency Act / Companies' Creditors Arrangement Act; USA: Chapters 7 & 11 of bankruptcy code.

1) Know everything in the Summary slide! Should be able to get a few easy marks from this

8

Topic 8 – Capital Structure Theories

Agency benefits of debt, theories, and MM assumptions on capital structure

Learning objectives

1. Identify other violations of the MM assumptions that can make capital structure decisions relevant
2. Determine how financial distress and bankruptcy costs may affect capital structure and limit use of debt
3. Explain how shareholder-bondholder conflicts affect firm value and identify agency benefits of debt
4. Describe main theories of capital structure (trade-off theory, pecking order theory, signalling with debt, stakeholder theory, and market timing/other factors
5. Describe the role of cash holdings in capital structure

Bankruptcy in a Perfect Market

1) Bankruptcy does not affect firm value!

Bankruptcy in a Perfect Market

A firm gives a cash flow of either \$600M w/ prob 70% or \$80M w/ prob 30% next year; then it will be liquidated. Compare all-equity financing (U) with \$150 in debt (at market value) and the rest in equity (L). The debt worth \$150M promises a payment \$P due right after cash flow accrues. Assume $\tau = 0$ & $r = 5\%$.

$V_U = (.7\times600 + .3\times80) / 1.05 =$ **\$422.86** [no bankruptcy if low CF]

$V_L = (.7\times600 + .3\times\mathbf{80}) / 1.05 =$ **\$422.86** [bankruptcy w/ Prob=0.3]

We get $\mathbf{V_U = V_L}$: Bankruptcy risk does not affect firm value! In bankruptcy, creditors get the \$80M and equity gets \$0.

For debt to be worth \$150M, it must promise a payment P:
$\$150 = (.7\times P + .3\times\mathbf{80}) / 1.05 \rightarrow$ **P = \$190.71M (YTM = 27.1%)**

$E_L = (.7\times(600 - 190.71) + .3\times\mathbf{0}) / 1.05 =$ **\$272.86M**

2) Costs of Bankruptcy

Costly Bankruptcy

Suppose now that bankruptcy costs are \$60M if the firm defaults.

$V_U = (.7\times600 + .3\times\mathbf{80}) / 1.05 =$ **\$422.86** [no bankruptcy if low CF]

$V_L = (.7\times600 + .3\times\mathbf{20}) / 1.05 =$ **\$405.71** [bankruptcy w/ Prob=0.3]

PV(bankruptcy costs) $= (.7\times0 + .3\times\mathbf{60}) / 1.05 =$ **\$17.15M**

We get $\mathbf{V_L = V_U - PV(bankruptcy\ costs)}$; leverage destroys value!

For debt to be worth \$150M, it must promise a payment P:
$\$150 = (.7\times P + .3\times\mathbf{20}) / 1.05 \rightarrow$ **P = \$216.43M (YTM = 44.3%)**

$E_L = (.7\times(600 - 216.43) + .3\times\mathbf{0}) / 1.05 =$ **\$255.71M**

Who bears the expected bankruptcy costs? Shareholders! With bankruptcy cost, E_L is \$17.15M lower (=PV(bankruptcy costs)).

<u>Key takeaways from the example above</u>

1. Higher leverage increases the risk of bankruptcy, but does not affect firm value
2. Shareholders bear the expected bankruptcy costs as shown in slide (2)

Bankruptcy and Financial Distress Cost / Trade-Off Theory

3) Bankruptcy & Financial Distress Costs

- The bankruptcy process imposes important direct and indirect costs on the firm that reduce cash flows and firm value.

- ***Direct costs*** of bankruptcy arise because outside professionals get involved (legal and accounting experts, consultants, appraisers, auctioneers). About **3%-4%** of firm value.

- ***Indirect costs*** of financial distress (**10%-20%** of firm value)
  - Loss of customers, suppliers, and employees
  - Fire sales of assets
  - Agency costs
  - Opportunistic behavior by rivals

- Indirect costs and some of the direct costs mentioned previously also apply to ***financial distress*** without formal bankruptcy.

- Costs of financial distress and bankruptcy vary with asset type. Firms with tangible assets lose less value in financial distress and bankruptcy than firms with intangible assets.

4) Trade-Off Theory of Capital Structure

- Issuing debt implies a tradeoff, as it carries:

– a benefit investors capture: interest tax shields (ITS)
– a cost investors bear: expected financial distress costs (EFDC)

- Managers choose D to maximize

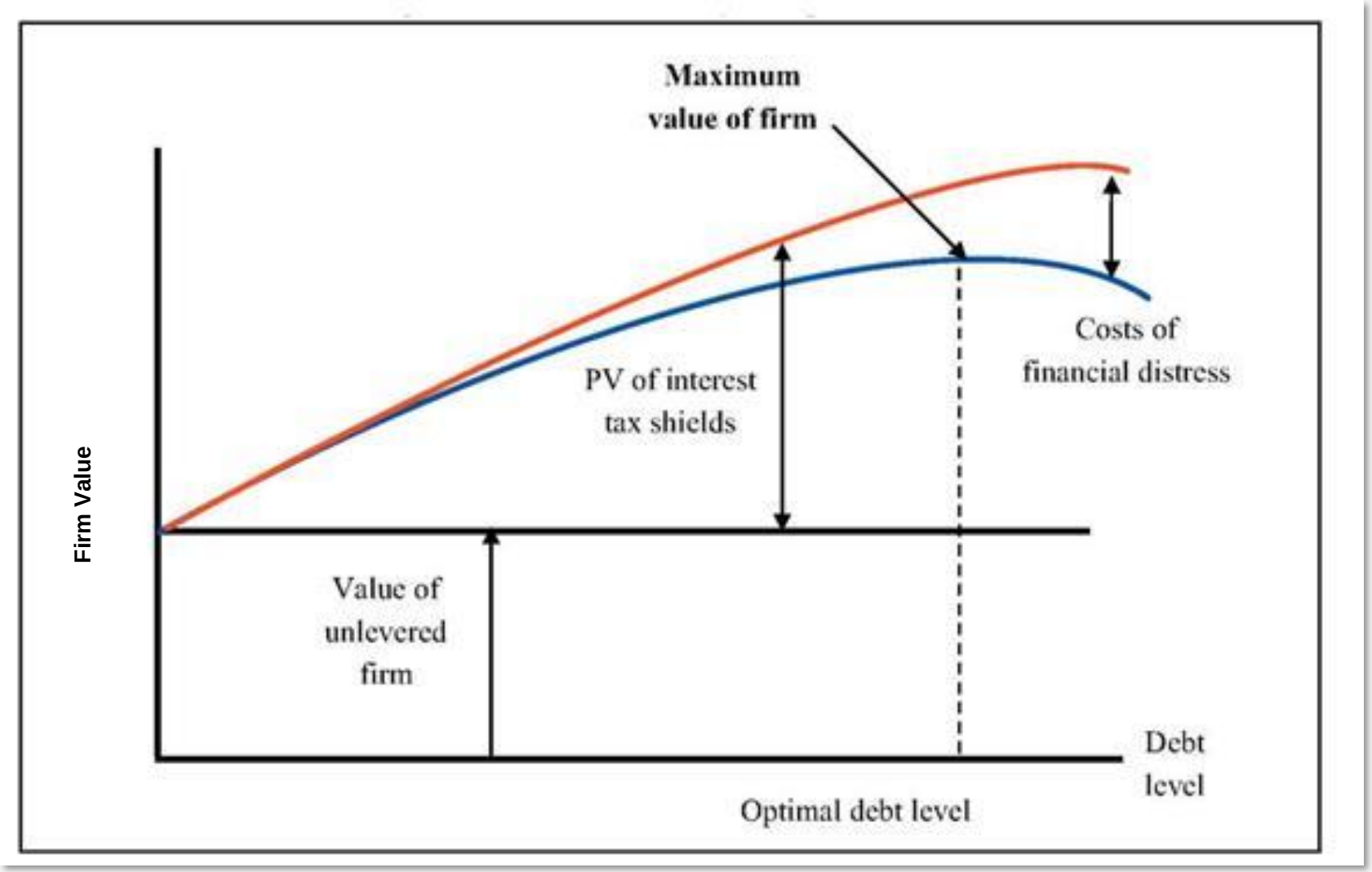
$$V_L = V_U + PV(ITS) - PV(EFDC)$$

- Note:this requires estimates of future ITS and of EFDC!
- Bottom line:Managers should choose the level of debt (D*) that maximizes firm value, trading off the costs and benefits of debt.

- High bankruptcy costs + Low tax benefits => D* will be low.
- Low bankruptcy costs + High tax benefits => D* will be high.
- The trade-off theory identifies a firm's "target debt" D*. A dynamic version of the theory suggests that if a firm has too much or too little debt they will rebalance to return to D*.
- Graham & Harvey (2002) surveyed 392 CFOs of the largest US public firms and asked about their capital structure choices.
- Their evidence was very supportive of the tradeoff theory: 80% of firms had a target capital structure (strict or flexible).

Trade-off Theory Diagram

5) Trade-Off Theory of Capital Structure Diagram



Most Distress Costs and Agency Costs of Debt Examples

6) More Distress Costs: Debt and Incentives

- When a firm is in trouble, shareholders may make decisions that reduce firm value but benefit equity at the expense of debt.
  - ***Cashing out:*** liquidate assets and pay the cash to shareholders when keeping the asset would have benefited lenders.
  - ***Over-investment or risk-shifting:*** undertaking high risk negative NPV projects that increase equity value but reduce debt value. Such projects should not be done and "shift risk" onto lenders!
  - ***Under-investment or debt overhang:*** shareholders refuse to provide the additional capital for a positive NPV project because lenders get most of the benefit through higher debt values. Such projects should be done, but pending debt prevents it!
- But rational lenders anticipate this when buying the debt, and thus shareholders ultimately bear these ***agency costs of debt***.

7) Agency Costs of Debt Simple Example (1 of 3)

- **Setup:** A firm has market value of assets of $200 and all of its debt outstanding is due tomorrow for an amount of $300.
- *What are the market values of the firm, its debt, and its equity?*

  V = $200 ; D = $200 ; E = $0 (ignore option *value)*
- **Do nothing**. *What do shareholders and lenders get?*

  Shareholders get $0 and lenders get $200
- **Cash out.** Sell the assets for $200 and pay a $200 dividend. *What do shareholders and lenders get?*

  Shareholders get $200 and lenders get $0

  But there are covenants on asset sales & dividends

Most Distress Costs and Agency Costs of Debt Examples

8) Agency Costs of Debt Simple Example (2 of 3)

- **Over invest.** Sell the assets for $200 and make an investment that pays $1,000 w/ prob. 10% and loses all with prob. 90%. The discount rate for this project is 50%.
- *What is the project's NPV?*
- NPV = -200 + [.9×0 + .1×1,000] / 1.5
  = -200 + 66.67 = -$133.3
- *What are (at market values) V, D, and E if the project is taken?*
- V = $66.7
- D = [.9×0 + .1×300] / 1.5 = $20.0
- E = [.9×0 + .1×(1,000 – 300)] / 1.5 = $46.7
- *What will shareholders do? They will do it!*

9) Agency Costs of Debt Simple Example (3 of 3)

- ***Under invest.*** Shareholders could invest an additional $100 in the firm, sell the assets for $200, and undertake a project that costs $300 but has an immediate payoff of $350 for sure.
- *What is the project's NPV?*
- NPV = -300 + 350 / 1 = -300 + 350 = $50
- *What are (at market values) V, D, and E if the project is taken?*
- V = $350
- D = $300
- E = $50
- *What will shareholders do?*
- They won't do it: they invest $100 but only get $50 back.

Agency Costs of Debt & Debt Covenants

10) Debt Covenants and Reducing Agency Costs of Debt

- Shareholders agree to debt covenants because, by restricting the firm's actions, they are able to get better prices on debt. Key covenants include:

– Restrictions on asset sales
– Restrictions on new issues or seniority over older issues.
– Dividend or payout to equity restrictions
– Financial Ratios: Minimum NWC, Maximum Debt/EBITDA.

- Covenants also come with costs:

– Constrain management and reduce flexibility
– Monitoring compliance is expensive

- Issuing **convertible debt**
- Issuing **senior debt**

– Any benefit of taking the project would go to senior creditors
– Covenants often restrict issuance of debt that is senior to existing debt; but in a bankruptcy proceeding the “debtor-in-possession financing” allows this for exactly this reason!

- Board participation (for large lenders)
- Reputation (for some frequent borrowers).

11) Bridging Questions

1) In a levered firm, which party bears the expected bankruptcy costs?

2) Firm A faces higher expected bankruptcy costs and lower tax benefits of debt than comparable Firm B. How will Firm A’s target debt compare to Firm B’s target debt?

3) Why would shareholders of a financial distressed firm vote to undertake highly-negative NPV projects?

A Broader Tradeoff Theory, Asymmetric Information & Signaling

12) A Broader Tradeoff Theory

$V_L = V_U$ + PV(interest tax shields) – PV(financial distress costs) – PV(agency costs of debt) + PV(agency benefits of debt)

Firms choose D* trading-off the benefits and costs of debt, which differ across industries, and across firms in an industry.

Low D*: High R&D firms; low current CF (no agency or tax benefit), intangible assets (high distress costs), high business risk (likely to default), flexibility in choosing investment (high agency costs of debt).

High D*: Oil refineries; high CF (high agency benefits & high tax benefits), fixed assets (low distress costs), low business risk (unlikely to default), and little room to manipulate investment (low agency costs of debt).

13) Bridging Questions

- ***Asymmetric information:*** Managers know more about the firm's fundamentals (future prospects) than outside investors.
- If the manager knows that future cash flows are high but outside investors do not then equity will be undervalued.
- In this case the manager can use high leverage to ***credibly signal*** to investors that the firm has high future cash flows.
- Why is this credible? Investors understand that a firm with high future cash flows can repay high debt, but one with low future cash flows cannot. A low cash flow firm would never maintain high debt and it would be driving itself into bankruptcy!
- If a firm has high leverage, it must be the case it is expecting high future cash flows. Thus, investors will pay higher prices.
- This gives rise to ***a signaling theory of debt***.

Asymmetric Information & Market Timing

14) Asymmetric Information & Equity Issuance

- ***Asymmetric information:*** Managers know more about the firm's fundamentals (future prospects) than outside investors.
- Investors know that managers can exploit their private information and issue equity only when it is overvalued.
- If a firm issues equity, investors will infer that it is overvalued, even if it is not, and would only pay very low prices.
- Debt issues suffer less from this problem; their value largely depends on interest rates. Thus, they are less underpriced.
- Empirically, asymmetric information is important:
  - Stock prices fall on the announcement of an equity issue
  - Stock prices tend to rise prior to an equity issue (timing)
  - Equity issues tend to occur when information asymmetries are minimized (e.g., after earnings announcements)

15) Market Timing

- The ***Market Timing view*** states that debt ratios largely result from managers' attempts to "time" equity markets:

– sell new equity if it is overpriced
– repurchase shares if equity is underpriced

- Implication: firms with low (high) D/V raised funds when past equity values were high (low) so issued more equity (debt).

16) The Pecking Order Theory

- The theory says firms prefer the following ordering of financing:
  - Retained earnings (avoid investor skepticism)
  - Debt (a little bit of information asymmetry)
  - Equity (large information asymmetry)
- This story is consistent with the data: retained earnings account for most financing, followed by debt, and firms issue little equity.
- However, the theory has no clear implication for the optimal level of debt a firm should carry. There is no target D/E!
- ***Prediction:*** more profitable firms will have lower debt ratios; build "financial slack" to avoid equity issues in the future (issue debt when CFs are low and retire when CFs are high). **True in data!**
- Other reasons for pecking order: a) higher issuance costs for equity than for debt, and b) managers don't like monitoring by lenders.

Stakeholder Theory & Competitive Strategy

17) Stakeholder Theory

- The ***stakeholder theory of capital structure*** suggests that the way a firm and its non-financial stakeholders interact is an important determinant of the firm's optimal capital structure.
- Since these other stakeholders may be reluctant to do business with a financially distressed firm, firms that worry about this may choose to be financed in a *conservative* way.
- Financial distress is especially costly for firms with:
  - Employees and suppliers who require specialized (firm-specific) capital or training
  - Products that require future servicing
  - Products with quality that is important yet unobservable
- These firms should hold less debt – evidence supports this view.

18) Capital Structure & Competitive Strategy

- A highly leveraged firm might be vulnerable to ***predation*** by low-leverage rivals (e.g. those with "deep pockets").
- A competitor might choose to lower its prices (or take other actions) to drive the highly leveraged firm out of business.
- Leverage may serve as a ***strategic tool*** that allows a firm to achieve a competitive advantage. Low debt allows the firm to:
  - defend from or even deter competitive attacks by rivals
  - to be opportunistic vs. weaker rivals (attack or prey on them!)
- Empirically, we see that:
  - highly leveraged firms lose market share during industry downturns, when high debt leads to financial distress.
  - firms with low leverage often increase their market share during industry downturns – it pays to maintain low debt.

What about Cash Holdings?

19) Cash Holdings

Firms often have both a lot of debt and large cash balances (more than what is needed for normal operations).

One practical view is that ***cash is negative debt***, e.g., when you compute enterprise value you use equity plus net debt (debt – cash).

Some firms, e.g., Lululemon, have no long-term debt (all-equity financed) and have large cash to assets (50% in Lulu's case).

If you estimate Lulu's equity beta from its stock returns (to obtain its cost of capital), does that reflect Lulu's ***asset*** (or unlevered) beta?

- No! It likely *understates* the firm's true asset (or unlevered) beta.
- Excess cash reduces Lulu's risk below the true risk of its business!

20) Cash Holdings (Continued)

So what to do? All levering / delevering formulas we derived still work – just replace debt D by net debt D – C, when C is excess cash.

For example, $\beta_E = \beta_U + (\beta_U - \beta_D)\frac{(D-C)}{E_L}(1-\tau)$

For Lulu, D = 0, so net debt = - C ; cash is roughly riskless, so $\beta_D = 0$.

$$\Rightarrow \beta_E = \beta_U\left(1 - \frac{C}{E_L}(1-\tau)\right)$$

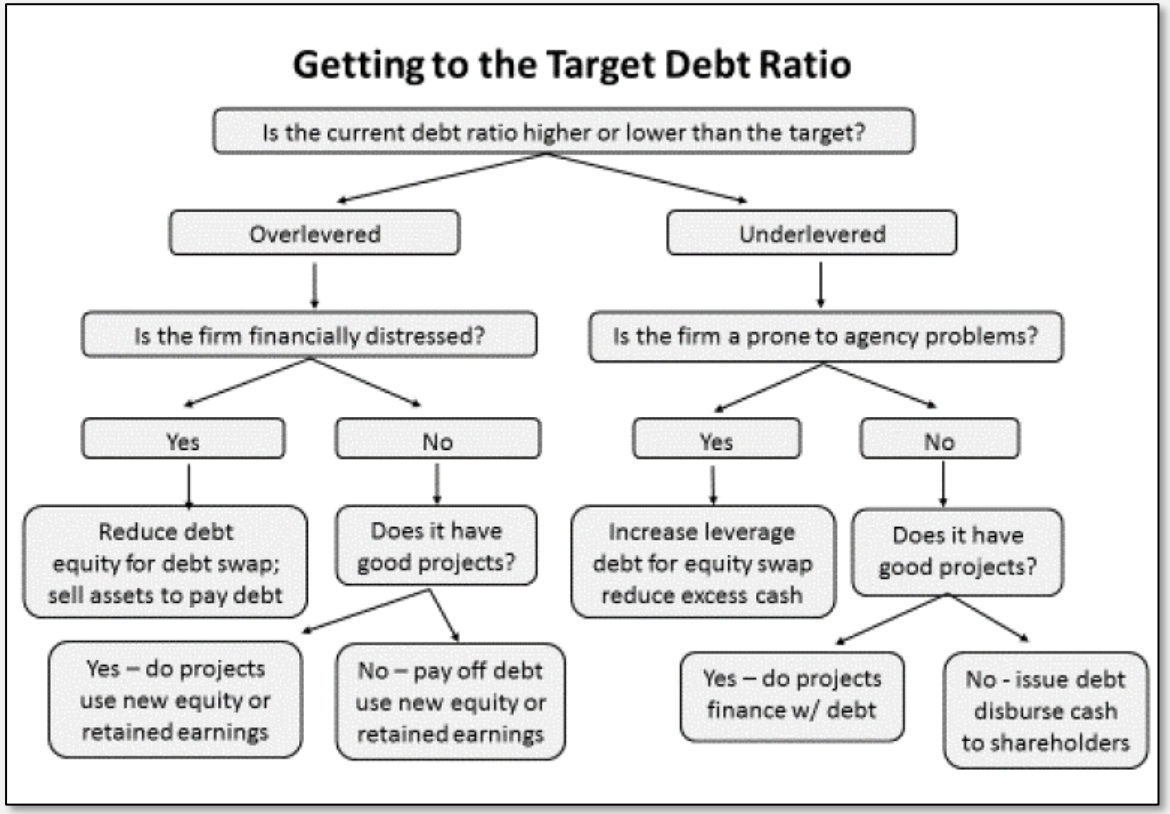
This means that $\beta_E < \beta_U$; you can use this formula to unlever it.

Note: read the brief assigned RWJR section on cash on your own

- discusses benefits / costs of holding cash, and cash management
- the optimal amount of cash depends on this tradeoff
- more on this in the payout policy section of the course

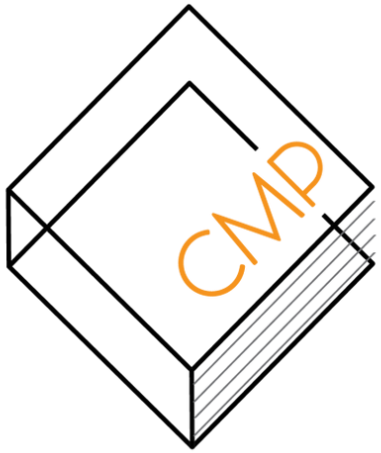
Summary & Conclusions

21) Cash Holdings



22) Summary

- Direct and indirect financial distress costs affect firm value.
- *Agency costs of debt* are due to shareholder-bondholder conflicts; *agency benefits of debt* are due to shareholder-manager conflicts.
- The **tradeoff theory** says that D* is chosen to maximize firm value trading off the marginal benefits and marginal costs of debt.
- The **pecking order theory** says that firms prefer to finance with retained earnings, then debt, and finally equity.
- The **market timing view** says that firms' capital structures are the outcome of past attempts to time the equity market.
- The **stakeholder view** says that firms should think how their financial decisions will affect the behavior of other stakeholders.
- Other factors, e.g., competitive environment, can be important.



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9

Topic 9 – Advanced Valuation & Capital Budgeting

WACC, CFTE, APV, D/E, Taxes, LBO's and more

Learning objectives

1
- Distinguish between firm cost of capital and project cost of capital
- Use comparable firms to obtain cost of capital for project with different operations

2
- Discuss FCF forecasting horizon vs. using terminal values
- Distinguish between a capital structure with constant debt level and one with constant debt ratio

3
- Identify key assumptions behind APV, CFTE, WACC, and how they deal with the value created by interest tax shields

4
- Determine when and why one valuation method might be easier to implement than another

5
- Briefly discuss leverage buyouts (LBOs) as a setting where APV is very useful

Leveraged Recapitalization

Leveraged Recapitalization Timeline

ICC Corp. has 50M shares worth $10 per share and no debt. Its cost of capital is r_U = 5%. It has a perpetual random CF with mean $25M and it pays no taxes. ICC plans a leveraged recapitalization: issue $200M in perpetual debt at r_D = 2% and repurchase shares.

Value before: V_U = 50M×$10 = $500M (= $25M/.05)

Value after: V_L = $500M = $200M + E_L → E_L = $300M

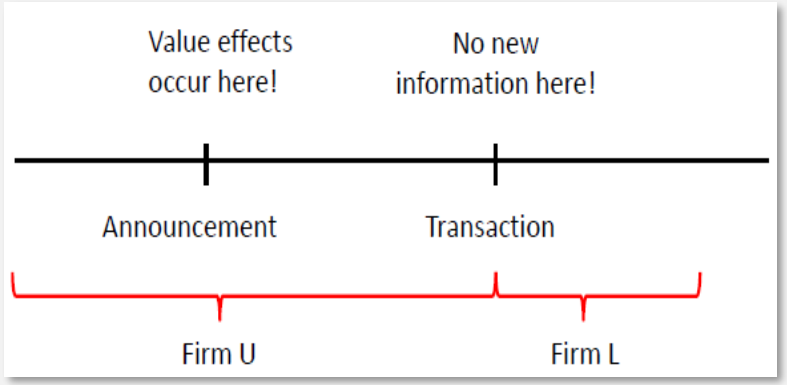
Cost of capital before: r_U = 5%

MM 2: $r_E = r_U + \frac{D}{E_L}(r_U - r_D)$

Cost of capital after: r_E = .05 + (200M/300M)×(.05 – .02) = 7%

Upon announcement, the share price does not change.

Repurchase $200M / $10 = 20M shares leaving 50M – 20M = 30M.



Key Observations of Leveraged Recapitalization

i. **Firm value** remains the *SAME* ($500M)
ii. **Cost of capital** *increases* from 5% (r_U) to 7% (r_E)
iii. **Shares outstanding (S/O)** *reduces* from 50M to 30M
iv. **Share price** remains the *same* at $10 per share
v. **EPS** *increases* due to leveraged recapitalization

Recall:
EPS = Net income / Share outstanding
EPS (Before recap) = $25M / 50M shares outstanding = $0.50 per share

Recap happens and a few things change as a result
1. $200M in debt at a 2% interest rate = $4M in interest expense
2. Repurchase 20M in shares at $10 using $200M of debt

Cashflow (After recap) = ($25M – $4M) = $21M
Shares outstanding (After recap) = 50M – 20M = 30M S/O
EPS (After recap) = $21M / 30M shares outstanding = $0.70 per share

What happens to share price?
1. Share price (before recap) = EPS / rU = $0.50 / 0.05 = $10
2. Share price (after recap) = EPS / rE = $0.70 / 0.07 = $10

vi. **Share price** remains the ***same*** in a leveraged recapitalization!

Firm vs. Project Cost of Capital

1) Firm vs. Project Cost of Capital

Firm vs. Project Cost of Capital

- We want to value a specific project that a firm wants to pursue – assume both are all equity financed.
- Can we use the firm's cost of capital (r_U) to discount the project's free cash flow? Careful! It depends:
  - Correct only if the firm and project have the same business risk:
    - the project is an expansion of its main line of business.
    - Lululemon wants to open a new clothing store in Toronto.
  - Incorrect if the firm and project have different risk:
    - Firm has two segments, chemicals and liquor; its cost of capital reflects the average risk; project is in chemicals only.
    - Firm is a pure play in chemicals, but the project is in the liquor business as the firm wants do diversify its operations.

2) Firm vs. Project Cost of Capital

Firm vs. Project Cost of Capital

- Now assume the project is in a *different* line of business than the firm (but both remain all equity financed).
- Estimate the project's cost of capital using comparables:
- Find comparable publicly traded companies that focus solely on the same business as the project (**pure plays**).
- Estimate the project's cost of capital using the betas of the comparable firms (same business risk as project).
- If the pure play firms are levered but the project is all equity, use the MM2 levering/delevering formulas:
  - Delever the equity betas of all comparable firms and get their β_U
  - Project's β_U = avg of β_U across all comparables
  - Plug project's β_U into CAPM to get the project's r_U

Firm vs. Project Cost of Capital (continued)

3) Firm vs. Project Cost of Capital

Firm vs. Project Cost of Capital

- Now assume the project is in the same line of business as the firm (same business risk) but the firm is levered.
- Can we use the firm's cost of capital (r_{WACC}) to discount the project's free cash flow? Careful! It depends:
  - Correct only if the firm will impose its capital structure on the project and thus have the same financial risk:
    - If the firm's D/V = 50%, the project's financing is 50% debt and 50% equity – this firm maintains a target D/V = 50%.
    - So firm and project have the same financial risk as well.
  - Incorrect if the firm's D/V and project financing mix differ:
    - e.g., firm's D/V = 50%, but the project's financing is all equity.
    - With different financial risk, the firm's cost of capital might understate or overstate the project's cost of capital.
    - Think of errors resulting from using the firm's WACC.

4) Firm vs. Project Cost of Capital

Firm vs. Project Cost of Capital

- Firms that maintain a given D/V will typically impose that financing mix in all projects, but what if they don't?
- Example: What to do if the firm's D/V = 50% and project is all equity (but same business risk)?
  - Firm is still a good comparable for the project – same business
  - Need to use the firm's r_U - MM2 formulas help obtain that from r_E!
  - Side note: firm leverage will be lower with the project
- More generally, what is the cost of capital for a **startup** that will be financed with D/V = 50%?
  - Estimate r_{WACC} of a 50% debt firm in the startup's line of business!
  - Find comparable publicly traded firms – same business risk
  - But their WACCs cannot be used if their D/Vs are not 50%
  - Further adjustments to get the right r_{WACC} are needed!

Selecting Comparable Firms and Appropriate use of WACC

5) Selecting Comparable Firms

Selecting Comparable Firms

Ideally, comparable firms should be publicly traded companies that are:

- Exclusively in the same line of business as project (same industry classification or peer group).
- Generally, affected by the same economic forces as the project, i.e., their business risk should be similar.
- Serving the same target market as the project.
- Similar in size (assets, revenue, employees) to project.
- Located in the same geographic region as the project.
- Similar in capital structure to project; not a huge issue: we can correct for differences using our formulas.

6) Appropriate Use of WACC

Appropriate Use of WACC

This is important, so let's say it again:

The WACC is the correct cost of capital to use in evaluating new projects, provided that the following three underlying assumptions are true for those new projects:

1. The projects are in the firm's main line of business, and so have the same business risk as the firm.
2. The new projects are financed with the same capital structure weights as the firm.
3. The firm must maintain the capital structure weights you use to compute WACC over time (more later!)

Otherwise think carefully about how to proceed!

IRR vs. Hurdle Rates

7) IRR vs. Hurdle Rates

IRR vs. Hurdle Rates

The textbook / conceptual approach:

IRR: the discount rate **r** that makes a project's NPV = 0.

$\mathbf{r_p}$: true cost of capital of the project (reflecting its true risk).

Assume: FCF is well behaved (initially negative then positive, no reversals, so there is a unique IRR).

Rule: if **IRR > $\mathbf{r_p}$** then we know that NPV>0; **take project!**

IRR and NPV

Assume initial cost = 100, Perpetual FCF = 10

r_p	NPV
1%	
2%	400
3%	233.33
4%	150
5%	100
10%	0
15%	-33.33

8) Practical Use of IRR & Hurdle Rates

Practical Use of IRR & Hurdle Rates

Firm has **many projects** so would need to estimate r_p for each one (painful). Instead set a hurdle rate $\mathbf{r_h}$ and use it for **all** projects.

Rule: take any project if **IRR ≥ $\mathbf{r_h}$** (or if NPV > 0 discounting at r_h).

To set the hurdle rate $\mathbf{r_h}$, management must have in mind a true cost of capital $\mathbf{r_p}$ to use as benchmark (e.g., the firm's WACC).

Key advantage: no need to calculate r_p for every different project!

Works well if: all projects have the same risk and thus same $\mathbf{r_p}$ and firm sets $\mathbf{r_h} = \mathbf{r_p}$. If this is true, then the rule leads to decisions consistent with the standard DCF / NPV analyses.

Note: some firms set $\mathbf{r_h} > \mathbf{r_p}$, so may discard positive NPV projects with low IRR; also some may not revise $\mathbf{r_h}$ frequently enough.

IRR & Hurdle Rates w/ Unequal Risk

9) IRR & Hurdle Rates – Projects with Unequal Risk

IRR & Hurdle Rates – Projects w/ ≠ Risk

Using a single hurdle rate is bad if projects have different risk ($\mathbf{r_p}$).

Example: firm uses $r_h = 20\%$ for both projects A and B:

- Project A costs \$10M; gives perpetual FCF of \$5M per year; cost of capital is $r_A = 20\%$.
- Project B costs \$355M; gives perpetual FCF of \$5M per year; cost of capital is $r_B = 10\%$.

$NPV_A = -10M + 5M/.20 = 15M$; $-10 + 5 / r = 0$ gives $IRR_A = 50\%$

$NPV_B = -35M + 5M/.10 = 15M$; $-35 + 5 / r = 0$ gives $IRR_B = 14.3\%$

Projects A and B have same NPV, but with its hurdle rate of 20%, the firm would (systematically) do A and not B…

10) IRR & Hurdle Rates – Dollar NPVs

IRR & Hurdle Rates – Dollar NPVs

Two projects can have similar IRR but very different dollar NPVs.

Example: firm uses $r_h = 45\%$ for both projects A and B:

- Project A costs \$10M; gives perpetual FCF of \$5M per year; cost of capital is $r_A = 20\%$.
- Project B costs \$100M; gives perpetual FCF of \$40M per year; cost of capital is $r_B = 20\%$.

$NPV_A = -10M + 5M/.20 = 15M$; $10 + 5 / r = 0 \rightarrow IRR_A = 50\%$

$NPV_B = -100M + 40M/.20 = 100M$; $-100 + 40 / r = 0 \rightarrow IRR_B = 40\%$

Naïve IRR vs. hurdle rate: $IRR_A > r_h$ so do project A ; $IRR_B < r_h$ so don't do project B.

But both projects have positive NPV, and in fact $NPV_B > NPV_A$!

FCF Forecasting & Terminal Values; Capital Budgeting

11) FCF Forecasting & Terminal Values

FCF Forecasting & Terminal Values

- Projects often have ***infinite lives*** and go over an initial phase of change until their operations and free cash flows stabilize.
- Initial phase is 0 to T and steady state is T+1 to infinity. Then:
  - Carefully forecast FCF's over years 0 to T
  - Compute a ***terminal value (TV)***, i.e., an estimate of the PV as of time T of all future FCFs over T+1 to infinity.
  - Add the TV to the FCF in year T (later discounted to year 0).
- To estimate TV you typically assume that starting in T+1 the FCF grows at some ***constant rate g.*** To compute it use:
  - $TV_T = \frac{FCF_{T+1}}{(r-g)}$; the growing perpetuity formula
  - g based on expected inflation or long-term growth in demand.

12) Capital Budgeting

Capital Budgeting with Leverage

- We know that debt financing reduces the cost of capital and thus increases firm/project value (interest tax shields).
- Up to now we focused on perpetual debt, which implies a fixed schedule of interest payments - **constant debt level.**
- Alternatively, we saw firms can keep a **constant debt ratio,** e.g., always rebalance to keep it at a "target level".
- The actual present value of interest tax shields depends on the firm's ***capital structure policy***, since it affects:
  - The risk of the associated interest payments.
  - Dollar interest payments over time.
- Depending on what capital structure policy a firm uses, one valuation methods may be easier than another.

Capital Budgeting with Leverage

13) Capital Budgeting with Leverage

Capital Budgeting with Leverage

- We already illustrated the equivalence of CFTE, APV, and WACC with constant debt **levels** (ZZ Hop example).
  - Recall APV was easiest to use: only required FCF, r_U, r_D; interest was just $r_D \times D$ with D known.
  - CFTE and WACC required things we didn't have or were hard to compute (to get D/V you need to know V).
- CFTE, APV, and WACC are also equivalent with constant debt **ratios**, although we will not show this directly.
- We now extend the ZZ Hop example to show:
  - What methods are easier to use with constant D/V.
  - How the rebalancing to keep D/V must take place.
  - How the value of ITS depends on capital structure policy.

Value of all-equity firm example

14) All Equity, forecasting example

ZZ Hop Pro-Forma Income Statement
3% growth, all-equity (no debt)

($Million)	2019	2020	2021	2022	2023
Revenues	0	1000	1030	1060.9	1092.7
- Cost of goods sold	0	-800	-824	-848.7	-874.2
- Depreciation	0	-100	-103	-106.1	-109.3
EBIT	0	100	103	106.1	109.3
- Interest	0	0	0	0	0
Taxable Income	0	100	103	106.1	109.3
- Taxes @ 30%	0	-30	-30.9	-31.8	-32.8
Net Income	0	70	72.1	74.3	76.5
+ Depreciation	0	100	103	106.1	109.3
CF from Operations	0	170	175.1	180.4	185.8
- Capital Expenditures	0	-100	-103	-106.1	-109.3
+ Debt Issuance	0	0	0	0	0
Dividends	***0***	***70***	***72.1***	***74.3***	***76.5***

15) Value of All Equity Firm

Value of the all-equity firm

Using the Gordon Growth Model with 3% growth (g=0.03) – recall "PV = C / [r – g]" – the firm's value in 2019 is:

$V_{2019} = E_{2019} = DIV_{2020} / (r_A - g) = 70 / (0.1-0.03) =$ **$1000M**

To be precise, this is the value of the firm with no debt (V_U).

Note: CFTE, WACC, and APV are all the same calculation:

- Weight on equity is 100%, so $r_{WACC} = r_E = r_A = r_U$
- FCFE = FCF & PV(ITS) = 0

Next, ZZ Hop recapitalizes under one of two scenarios:

- Issues $400M debt and maintains this debt level
- Issues debt to maintain a constant D/V = 36.85%

In both cases the interest rate is r_D=5%.

Value of firm with Constant Debt Levels Forecasting Example

16) Constant Debt Forecasting Example

ZZ Hop Pro-Forma Income Statement
3% growth, all-equity (no debt)

($Million)	2019	2020	2021	2022	2023
Revenues	0	1000	1030	1060.9	1092.7
- Cost of goods sold	0	-800	-824	-848.7	-874.2
- Depreciation	0	-100	-103	-106.1	-109.3
EBIT	0	100	103	106.1	109.3
- Interest	0	0	0	0	0
Taxable Income	0	100	103	106.1	109.3
- Taxes @ 30%	0	-30	-30.9	-31.8	-32.8
Net Income	0	70	72.1	74.3	76.5
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CF from Operations	0	170	175.1	180.4	185.8
- Capital Expenditures	0	-100	-103	-106.1	-109.3
+ Debt Issuance	0	0	0	0	0
Dividends	***0***	***70***	***72.1***	***74.3***	***76.5***

17) Valuation with Constant Debt

Valuation with $400M Constant Debt

The debt level is constant → **Use APV (easiest)**

Unlevered firm value in 2019 is $1000M (computed earlier)

Recall that with constant debt interest payments have same risk as debt, so discount them at r_D=5%.

PV(ITS) = (Interest×τ) / r_D = D×τ = 400×0.3 = $120M

$V_L = V_U$ + PV(ITS) = 1000 + 120 = **$1120M**

Can we use WACC as well? Yes, but would be very difficult:

- firm grows but not debt; need a different WACC each year!
- weight of debt declines over time, r_E declines over time, r_{WACC} would start off low, but approach r_U over time.

Value of firm Constant Debt-to-value levels

18) Valuation w/ Constant D/V

Valuation w/ Constant D/V

ZZ Hop can choose any D/V, but assume it maintains **a constant D/V = 36.84%**. Why pick this particular number?

- To make it comparable to the case with $400M constant debt.
- Check later that $400M debt is 36.84% of ZZ Hop's value.
- Then we can compare the value of ITS under both policies.

With constant debt ratio → **easiest to use WACC**

We know D/V, r_D, and τ, so we are only missing r_E.

- normally compute r_E using CAPM, so very easy
- but here use r_E=12.92%: the r_E that results from levering up ZZ Hop to a D/V = 36.84% when its keeps D/V constant.
- It comes from $r_E = r_U + (D/E)(r_U - r_D)$. See appendix for why.

19) Valuation with Constant D/V

Valuation w/ Constant D/V

r_{WACC}=0.1292×(1-0.3684)+0.05×(1-0.3)×0.3684=9.45%

V_L (in 2019) = FCF_{2020} / (r_{WACC}-g) = 70/(0.0945-0.03)=**$1085.7M**

Note: firm issues 0.3684×1085.7=$400M in debt in 2019, same as in constant debt example, but now debt grows over time.

Can we use APV as well? Yes, but it would be very difficult:

- Need to forecast debt and interest payments into the future to compute PV(ITS); these are changing over time.
- How to forecast future interest when debt is a constant fraction of changing future firm value that you don't know?
- Again, can be done, but not practical in general.

Bridging Questions

Bridging Questions

Bridge Questions

Q1. Suppose a levered firm starts a new project in its line of business and finances the new project with equity. Can we use the levered firm's cost of capital to discount the free cash flows of the project?

Q2. What is the easiest method to value a firm when the firm maintains a constant level of debt?

Q3. What is the easiest method to value a firm when the firm maintains a constant debt to value ratio?

Answers

Q1. A

Q2.

Q3.

Value of firm Constant Debt-to-value levels

20) Debt Capacity & Rebalancing

Debt Capacity & Rebalancing

Debt capacity: the amount of debt required at time t to maintain the firm's target D/V at time t.

Debt capacity = target D/V $\times$ V_t ,

where V_t is the firm's levered continuation value on date t (PV of FCF in t+1 onwards, discounted at r_{WACC})

Capital Structure Rebalancing to keep a D/V=36.84% constant

($Million)	2019	2020	2021	2022	2023
FCF	0.0	70.0	72.1	74.3	76.5
PV(FCF,9.45%)	1085.7	1118.3	1151.8	1186.4	1222.0
Debt Capacity	400.0	412.0	424.3	437.1	450.2
Debt Issuance	400.0	12.0	12.4	12.7	13.1
Debt Ratio	36.84%	36.84%	36.84%	36.84%	36.84%

21) ZZ Hop All Equity

ZZ Hop Pro-Forma Income Statement
3% growth, all-equity (no debt)

($Million)	**2019**	**2020**	**2021**	**2022**	**2023**
Revenues	0	1000	1030	1060.9	1092.7
- Cost of goods sold	0	-800	-824	-848.7	-874.2
- Depreciation	0	-100	-103	-106.1	-109.3
EBIT	0	100	103	106.1	109.3
- Interest	0	0	0	0	0
Taxable Income	0	100	103	106.1	109.3
- Taxes @ 30%	0	-30	-30.9	-31.8	-32.8
Net Income	0	70	72.1	74.3	76.5
+ Depreciation	0	100	103	106.1	109.3
CF from Operations	0	170	175.1	180.4	185.8
- Capital Expenditures	0	-100	-103	-106.1	-109.3
+ Debt Issuance	0	0	0	0	0
Dividends	***0***	***70***	***72.1***	***74.3***	***76.5***

Debt Capacity and Rebalancing; Debt Ratio Constant

22) Debt Capacity & Rebalancing (400M debt issuance)

Debt Capacity & Rebalancing

Capital Structure Rebalancing to keep a D/V=36.84% constant

($Million)	2019	2020	2021	2022	2023
FCF	0.0	70.0	72.1	74.3	76.5
PV(FCF,9.45%)	1085.7	1118.3	1151.8	1186.4	1222.0
Debt Capacity					
Debt Issuance	400.0				
Debt Ratio	36.84%	36.84%	36.84%	36.84%	36.84%

23) CFTE w/ Constant D/V

What about CFTE w/ Constant D/V?

No problem! Just use FCFE & r_E. D/E does not change over time, so our r_E = 12.92% still works (like r_{WACC}).

Note FCF grows 3% per year and so does debt (debt has to keep up with FCF to keep D/V constant)

($Million)	2019	2020	2021	2022	2023
FCF	0.0	70.0	72.1	74.3	76.5
PV(FCF,9.45%)	1085.7	1118.3	1151.8	1186.4	1222.0
Debt Capacity	400.0	412.0	424.3	437.1	450.2
Debt Issuance	400.0	12.0	12.4	12.7	13.1
Debt Ratio	36.84%	36.84%	36.84%	36.84%	36.84%

So FCFE will also grow at 3%

CFTE w/ Constant DV; Financial Policy & Value of ITS

24) Debt Capacity & Rebalancing (400M debt issuance)

What about CFTE w/ Constant D/V?

We just need $FCFE_{2020}$

$FCFE_{2020} = FCF_{2020} + \text{Chg Debt}_{2020} - \text{Interest}_{2020} \times (1-\tau)$
$= 70 + 12 - .05 \times 400 \times (1-.3) = \$68M$

So $E_{2019} = FCFE_{2020}/(r_E - g) = 68 / (.1292-.03) = \$685.7M$

$V_L = E + D = 685.7 + 400 =$ **1085.7M**

25) Financial Policy & Value of ITS

Financial Policy & Value of ITS

ZZ Hop issues $400M in debt in 2019 in both cases, but:

- with constant debt level ZZ's value is $V_L = \$1120M$
- with constant debt ratio ZZ's value is $V_L = \$1086M$

Why is ZZ Hop's value with constant debt ratio (growing debt) lower than with constant debt level? Two opposite forces:

- Debt growing → more tax shields → more value
- Debt co-moves with ZZ's value → ITS more risky → less value

Either force can win, depending on parameters:

- In this example, risk dominates → constant debt is better.
- If ZZ Hop was less risky (lower r_U), higher tax shields dominate → constant debt/value ratio is better.

Takeaway: even if it does not affect its operations, the choice of financial policy affects the value of ITS and thus value!

Last Example: Acme's AAA Project

26) Last Example: Acme's AAA Project

Last Example: Acme's AAA Project

- The market risk of Acme's proposed AAA project is similar to that of Acme's other lines of business.
- The project has a 4 year life and then it will be liquidated; cash flow estimates are provided on the next slide.
- Acme's initial situation without the AAA project:
  - The market value of debt is D=$300M and the market value of equity is E=$300M.
  - Acme will maintain this D/E=1 in the future and will impose this financing mix on the AAA project.
  - The cost of debt is r_D=6% ; the cost of equity r_E=10%.
- In this setting, WACC is the easiest method to use.

27) ACME CF Projection

Acme's AAA Project

$ Million	Year 0	Year 1	Year 2	Year 3	Year 4
Incremental earnings forecast					
Sales		60.00	60.00	60.00	60.00
COGS		-25.00	-25.00	-25.00	-25.00
Gross profit		35.00	35.00	35.00	35.00
Operating expenses	-6.67	-9.00	-9.00	-9.00	-9.00
Depreciation		-6.00	-6.00	-6.00	-6.00
EBIT	-6.67	20.00	20.00	20.00	20.00
Income taxes at 40%	2.67	-8.00	-8.00	-8.00	-8.00
Unlevered NI	-4.00	12.00	12.00	12.00	12.00
Free cash flow					
+ Depreciation		6.00	6.00	6.00	6.00
- CapEx	-24.00				
- Increase in NWC					
FCF	***-28.00***	***18.00***	***18.00***	***18.00***	***18.00***

Last Example: Acme's AAA Project (Continued)

28) Value AAA using WACC

Value AAA Using WACC

- $r_{WACC} = .5 \times 10\% + .5 \times 6\% \times (1 - .4) = 6.8\%$
- $V_L = \$18M \times [1 - 1.068^{-4}]/.068 = \$61.25M$
- NPV = -$28M + $61.25M = $33.25M

Rebalancing and Debt Capacity

	Year 0	Year 1	Year 2	Year 3	Year 4
FCF	-28.00	18.00	18.00	18.00	18.00
V_L @ WACC = 6.8%	61.25	47.41	32.63	16.85	
Debt capacity w/ D/V = 50%	30.62	23.71	16.32	8.43	
Net debt issuance	30.62	-6.92	-7.39	-7.89	-8.43
Equity w/ D/V = 50%	30.62	23.71	16.32	8.43	
Increase in E due to NPV	33.25				
Net equity issuance	-2.62	-6.92	-7.39	-7.89	-8.43

29) Rebalancing and Debt Capacity

Value AAA Using WACC

Rebalancing and Debt Capacity

	Year 0	Year 1	Year 2	Year 3	Year 4
FCF	-28.00	18.00	18.00	18.00	18.00
V_L @ WACC = 6.8%	61.25	47.41	32.63	16.85	
Debt capacity w/ D/V = 50%	30.62	23.71	16.32	8.43	
Net debt issuance	30.62	-6.92	-7.39	-7.89	-8.43
Equity w/ D/V = 50%	30.62	23.71	16.32	8.43	
Increase in E due to NPV	33.25				
Net equity issuance	-2.62	-6.92	-7.39	-7.89	-8.43

Acme Example with Fixed Debt Schedule

30) Fixed Debt Schedule

New Setting: Fixed Debt Schedule

- Before Acme was keeping D/V constant. In that setting:
  - WACC is very useful and easy to implement
  - APV is not easy to implement (need to solve for D also)
- Now Acme uses a ***fixed debt schedule***:
  - issue $30M initially
  - repay debt so that it is: $20M in the first year, $10M in the second, and $0M in the third
  - interest payments are predetermined / known in advance
- APV is easy to use; WACC difficult (r_{WACC} changes).
- We will discount interest tax shields at r_D=6%.
- We will use r_U = 8.5% ; this is the r_U obtained from r_E & r_D when debt is constant (MM2 formula) – see appendix.

31) Fixed Debt Schedule

Value AAA Using APV (Fixed Debt Schedule)

	Year 0	Year 1	Year 2	Year 3	Year 4
Unlevered value					
FCF	-28.00	18.00	18.00	18.00	18.00
V_U (at 8.5%)	58.96	45.97	31.88	16.59	0.00
Interest tax shields					
Debt schedule	30.00	20.00	10.00	0.00	0.00
Interest paid	0.00	1.80	1.20	0.60	0.00
Interest tax shields	0.00	0.72	0.48	0.24	0.00
PV(ITS) **at 6%**	1.31	0.67	0.23	0.00	0.00
APV (excl init outlay)	60.27	46.64	32.11	16.59	0.00
Initial outlay	28.00				
NPV	32.27				
Debt ratio (D/V)	49.78%	42.88%	31.15%	0.00%	

What is a Leveraged Buyout (LBO)?

30) LBO

What is a Leveraged Buyout (LBO)?

- A group of investors buys a company and finances the buyout partly with their own money and partly with debt.
- Shareholders service the interest and principal payments with cash flow (ideally buy out a "cash cow") and with asset sales.
- Shareholders hope to reverse the LBO within 3 to 7 years by way of a public offering or sale of the company to another firm.
- In a LBO shareholders are expected to pay off outstanding principal according to a specific timetable.
- The owners know that the debt-to-equity will fall and can forecast the dollar amount of debt needed to finance future operations.
- In this situation APV is the most practical valuation approach because the capital structure is changing.

31) Mechanics of LBO

Mechanics of LBO's

- First, the buyout group creates a *"shell company"*, with no real operations, that holds the investors' equity.
- Second, the shell company issues debt equal to the target's purchase price minus the shell company's equity.
- Third, the shell company acquires the "target", and the two firms are legally unified in a merger.
- The new firm's assets are those of the target, but the new firm now carries the debt inherited from the shell company.
- The new entity quickly repays its debt from cash flows, until within a few years it reaches its "target capital structure".

Summary

32) Summary

1. Be careful with firm vs. project cost of capital.
- The firm's WACC applies only if: (1) the project is in the same line of business AND (2) it will be financed with the same D/V as the firm.

Otherwise find comparable publicly traded firms and use levering/delevering formulas to adjust

- Debt financing generates interest tax shields and this increases firm and project value.
- However, the exact value of the interest tax shields depends on the firm's capital structure policy.

- A key assumption behind using WACC is that the firm's target capital structure weights will remain constant.
- The firm must adjust its capital structure continuously (by issuing or repurchasing stocks or bonds) to keep its market value capital structure weights constant.
- Furthermore, the use of a firm's WACC in capital budgeting assumes that all projects will be financed with the same capital structure weights as the firm.
- Therefore, the target capital structure weights will, therefore, dictate how projects will be financed.

33) Summary Continued

- WACC, CFTE and APV are equivalent, but in practice one of these methods will be easier to implement.

- WACC and FTE implicitly assume that the market value debt/equity ratio is constant over time. If it changes, then the discount rate would have to be adjusted over time, but this may become very complicated in practice.

- When the D/E ratio is constant over time – firm keeps a target D/V - then WACC and FTE are easier to use.

- When debt ratios change over time, but the dollar

- amounts of debt over time are known, then APV is easier to use (discount interest tax shields at the cost of debt).

- APV is the easiest method for transactions such as LBOs, which result in pre-determined debt schedules.

10

Topic 10 – Payout Policy

Cash dividends, stock repurchases, and dividend policy

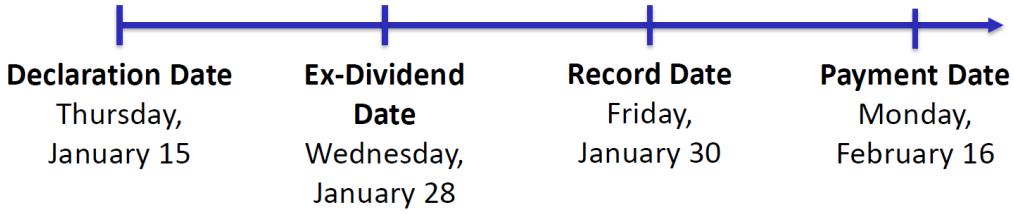
Learning objectives

1. Distinguish between cash dividends and stock repurchases for the company and the stockholders
2. Explain payout policy irrelevance in an M&M world
3. Identify real-world factors that may affect a company’s payout
4. Discuss how companies establish a payout policy

How Cash Dividends are Paid & Share Repurchases

1) How Cash Dividends are Paid

How Cash Dividends Are Paid



- **Declaration date:** board of Directors authorizes the dividend.
- **Record date:** shareholders of record are designated to receive the declared dividend (2-3 weeks prior to the payment date).
- **Shareholder of record:** bought the stock before ex-dividend date.
- **Ex-dividend date:** two business days before the record date.
- **Payment date:** the dividend is paid to all shareholders of record.

2) How Repurchases are Done

How Repurchases are Done

- The company purchases its own shares from investors in an ***open market*** repurchase and pays current market prices.
- Unlike dividends, repurchases reduce the # of shares outstanding, and thus reduce the book value of the company's common stock.
- Note 1: 95% of repurchases are open market, but there are also "tender offers" where the company offers to buy a fixed price (usually above market) – this often happens in the context of takeovers.
- Note 2: the open market repurchases might allow companies to "manipulate" the price of their shares. Hence, there are "antimanipulative" provisions in the securities regulation:
  - publicly announce the repurchase program
  - only use one broker or dealer on any single day
  - avoid trading just before market closing
  - limit the daily volume of purchases to a specified amount

Mogdigliani-Miller Payout Irrelevance

3) Modigliani-Miller Payout Irrelevance

Modigliani-Miller Payout Irrelevance

- Assume ***perfect capital markets:***
  - no taxes, trading fees, information asymmetries, or agency.
  - ***payout decision does not affect investment / free cash flow.***
- *Then, firm value is independent of payout policy, i.e., it is unaffected by the amount or the form of the cash distribution:*
- Two almost identical all-equity firms differ only in payout policy:
  - Firm 1 pays cash to investors
  - Firm 2 retains the cash
  - $V_1 = V_2$: pay out vs. retain has no effect on firm value!
- Two almost identical all-equity firms differ only in payout policy:
  - Firm 1 returns cash using dividends
  - Firm 2 returns the cash using repurchases
  - $V_1 = V_2$: form of distribution has no effect on firm value!

4) Modigliani-Miller Payout Irrelevance

Modigliani-Miller Payout Irrelevance

- Assume ***perfect capital markets:***
  - no taxes, trading fees, information asymmetries, or agency.
  - ***payout decision does not affect investment / free cash flow.***
- *Then, firm value is independent of payout policy, i.e., it is unaffected by the amount or the form of the cash distribution:*
- Two almost identical all-equity firms differ only in payout policy:
  - Firm 1 pays cash to investors
  - Firm 2 retains the cash
  - $V_1 = V_2$: pay out vs. retain has no effect on firm value!
- Two almost identical all-equity firms differ only in payout policy:
  - Firm 1 returns cash using dividends
  - Firm 2 returns the cash using repurchases
  - $V_1 = V_2$: form of distribution has no effect on firm value!

Example of Payout Policy Irrelevance (1 of 3)

5) Example of Payout Irrelevance

Example of Payout Policy Irrelevance

Alpha Corp is an all-equity firm in a Modigliani-Miller world with perfect capital markets (no taxes). Its perpetual annual FCF is $2M and its cost of capital is 20%. It pays all its FCF to investors in annual dividends. It has 100,000 shares.

What is Alpha's current market value and share price?

V = 2M / .2 = $10M ; p = $10M / 100,000 = $100

What is the effect on Alpha's value and share price if it announces a $10 special dividend per share funded with equity issuance?

MM: The special dividend does not affect investment or FCF; so firm's value remains at $10M and p(cum dividend) = $100.

6) Example of Payout Policy Irrelevance

Example of Payout Policy Irrelevance

The firm needs to raise = $10x100,000 = $1M in cash, which is automatically paid out to existing shareholders ($10 a share).

But how many new shares must be issued to raise the $1M?

New shareholders will only be willing to pay $90/share (ex-dividend), since they will not receive the $10 dividend. Thus:

$$\text{\# new shares issued: } \frac{\$1M}{\$90/\text{share}} = 11{,}111 \text{ shares}$$

Alpha's value after: 111,111 shares × $90/share = $10M

No change in firm value! Price drops to $90 (ex-div).

Why?

Firm's FCF or cost of capital did not change!

Example of Payout Policy Irrelevance (2 of 3)

7) Example of Payout Irrelevance

Example of Payout Policy Irrelevance

- Consider a shareholder with 100 shares prior to Alpha's announcement. *Is she happier with the special dividend?*
- Wealth before dividend:
  - Stock: 100 shares × $100/share = $10,000
  - Cash: $0
- Wealth after dividend:
  - Cash: $10 × 100 = $1,000
  - Stock = 100 × $90 = $9,000
  - Total = $1,000 + $9,000 = $10,000
- Conclusion: the shareholder has paid for her own dividend as the drop in share price exactly offsets the dividend.

8) Example of Payout Policy Irrelevance

Example of Payout Policy Irrelevance

- Wait a second! Before she had **all** $10,000 in the firm's stock, but now she has only $9,000 and $1,000 in cash…
- *What if she would rather have all in the firm's stock?*
  - She can ***reinvest*** the $1,000 dividend, purchase $1,000/$90 = 11.111 shares from other investors.
  - Now she has 111.111 shares of Alpha and $10,000 invested in the firm's stock – just as before.
- *What if Alpha does not pay the special dividend, but the investor prefers to receive the $1,000 in cash?*
  - She can make the dividend "at home"
  - i.e., she can **sell** $1000/$100 = 10 shares to get it!

Example of Payout Policy Irrelevance (3 of 3)

9) Example of Payout Irrelevance

Example of Payout Policy Irrelevance

Let's revisit the Alpha Corp example; recall it always pays its FCF in annual dividends. Assume now the firm also has $5M in excess cash.

What is Alpha's current market value and share price?

V = PV(regular dividends) + Excess cash = 2M / .2 + $5M = $15M
p = $15M / 100,000 = $150

Now Alpha decides to pay out the $5M excess cash right away with a special dividend or a repurchase; and maintain regular dividends.

Does the choice "dividend vs. repurchase" affect share price or value?

- No! At announcement: value and price remain the same (cum);
- After payout: value drops to V=$10M (cash is gone) and price drops to $100 (ex-dividend) with the dividend but not with the repurchase.

10) Example of Payout Policy Irrelevance

Example of Payout Policy Irrelevance

Consider a shareholder with 100 shares prior to the announcement, and thus $15,000 in Alpha's equity. *What does she prefer?*

With the dividend of $5M/100,000=$50 per share:

- gets 100×$50 = $5,000 in cash
- price drops to $100 (ex-div), keeps 100×$100 = $10,000 in equity.

Selling 33.333 shares in the repurchase:

- she gets 33.333×$150 = $5,000 in cash
- price remains at $150, keeps 66.666×$150 = $10,000 in equity.

Note:
Choice does not affect (cum) firm value. Investors are indifferent. But price drops with dividend; # of shares drops with repurchase.

M&M Dividend Policy Irrelevancy and Capital Market Imperfections

11) M&M Dividend Policy Irrelevancy

M&M Dividend Policy Irrelevancy

In the M&M world payout policy is irrelevant:

- pay out vs. retain does not matter to investors!
- pay out w/ dividends vs. repurchases does not matter to investors!

For example, this implies that, as long as the firm can invest the cash the same way as (or better than) the shareholders can do, the there is no reason for a firm to pay dividends.

But, **we know payout policy does matter in the real world**. We now think about what capital imperfections makes it relevant: taxes, issuance costs, agency costs, information asymmetries, institutional / legal constraints, and transaction costs!

12) Capital Markets Imperfections: Taxes

Capital Market Imperfections: Taxes

One key capital market imperfection that makes payout policy relevant and, therefore, affects share prices. As usual, the first to examine is **taxes**.

Two main points:

1. Corporate taxes make retaining excess cash more costly, but whether the cash should be retained or paid out depends on whether the firm's tax rate exceeds the tax rate investors pay on personal income (including interest).
2. Personal taxes create a tax disadvantage for dividends over share repurchases, because the effective tax rate on dividends is higher than on capital gains (paid in the repurchase). Capital gains are taxed only when they are realized, and they are taxed at 50% of the marginal tax rate.

Effect of Taxes on Distribute or Retain / Repurchase

13) Effect of Taxes on Distribute vs. Retain

Effect of Taxes on Distribute vs. Retain

Alpha Corp. can invest its \$5M excess cash in T-Bills at 5% per year forever and disburse the resulting annual interest stream in dividends.

Or, Alpha can distribute the \$5M excess cash to investors right away and they will invest it in T-Bills at 5% per year forever on their own.

Investors pay τ_D for distributions received (dividends or repurchases) and τ_I on personal income (including interest), and the firm pays τ_C.

If Alpha distributes the excess cash and investors buy T-Bills:

Investors get $(1-\tau_D)\times\$5M$ today, invest it at 5%, and get an after-tax annual interest of $(1-\tau_I)\times(1-\tau_D)\times\$5M\times0.05 = \mathbf{(1-\tau_I)\times(1-\tau_D)\times\$250{,}000}$.

If Alpha retains the excess cash and invests it in T-Bills:

Each year Alpha collects $(1-\tau_C)\times\$5M\times0.05 = (1-\tau_C)\times\$250{,}000$ and disburses it to investors who get $\mathbf{(1-\tau_D)\times(1-\tau_C)\times\$250{,}000}$ per year.

Investors prefer that Alpha distributes the cash if:

$(1-\tau_I)\times(1-\tau_D)\times\$250{,}000 > (1-\tau_D)\times(1-\tau_C)\times\$250{,}000$ or if $\tau_C > \tau_I$

14) Effect of Taxes on Dividends vs. Repurchase

Effect of Taxes on Dividend vs. Repurchase

Alpha's share price is \$150, it has 100,000 shares, and it will pay out its \$5M in excess cash either with a dividend or a repurchase.

An investor owns 100 shares of Alpha and pays taxes on both types of distributions (dividends & repurchases) at the same rate of 15%.

The investor bought the shares at \$60 and will sell all of them next year. Assume no future price changes other than due to dividends.

With a \$50 dividend per share she gets \$50×100 = \$5,000

Tax on dividend received today: 0.15×\$50×100 = \$750

Tax on capital gains next year: 0.15×(\$100-\$60)×100 = \$600

Total taxes paid (today + next year) = \$1,350

Selling 33.333 shares in repurchase she gets \$150×33.333 = \$5,000

Tax on capital gains today: .15×(\$150-\$60)×33.333 = \$450

Tax on capital gains next year: .15×(\$150-\$60)×66.667 = \$900

Total taxes paid (today + next year) = \$1,350

Conclusion from Examples + Tax Clienteles & Other Imperfections

15) Conclusion from examples + Tax Clienteles

Conclusion from examples + Tax Clienteles

1st example: investors with a low tax rate ($\tau_C > \tau_I$) prefer cash distributions to retention; those with $\tau_C < \tau_I$ prefer retention.

2nd example: even if the tax rates on dividends and capital gains were the same (but the rate on dividends is usually higher), ***dividends have a tax disadvantage*** because they trigger taxes sooner. This disadvantage of dividends could differ across investors:

- A long-term investor can defer capital gains taxes for a long time, so dislikes a dividend today more than a short-term investor does.
- Corporations don't pay taxes on dividends received from stock held in other firms – dividends have an ***advantage*** for them!
- There are also tax-exempt investors (pension funds, endowment funds, and trust funds).

Idea of clienteles: firms could choose payout policies catering to the tax preferences of particular clienteles.

16) Other Imperfections

Other Imperfections

Reducing issuance and distress costs – a key benefit.

- Retain cash to cover future cash shortfalls, e.g., fund future projects or avert distress.
- Avoids asymmetric information problems related to raising capital (e.g., low share prices if investors worry about timing).
- Avoids costly issuance fees: 5-15% for IPOs, 3-13% for SEOs, 1-8% for debt (smaller for larger issues).

Agency costs of retaining cash – a key cost.

- "Cash can burn a hole in your pocket!"
- Excess cash retained in the firm can lead managers to fund money-losing projects or acquisitions, shirk, or consume perks.
- RJR Nabisco CEO kept 2 maids on payroll, 12 country club memberships, and 10 corporate planes (RJR air force).

Other Imperfections (continued)

17) Other Imperfections

Other Imperfections

Asymmetric Information (between managers and investors)

Dividend changes ***signal*** managers' views of future earnings:

- Increases signal ability to pay higher dividends in the future.
- Cuts signal inability to pay the current dividend in the future.

Empirically: stock prices increase when firms announce dividend increases and decrease when they announce decreases.

Managers will ***time*** repurchases based on observed stock prices, and will repurchase shares when they think they are *undervalued*.

Rational investors should react favorably to the announcement of share repurchases, as they learn the stock is undervalued.

Empirically: in surveys managers say they repurchase when prices are low and there are positive returns upon the announcement.

18) Other Imperfections

Other Imperfections

Institutional constraints:

If various institutions avoid investment in non- or low dividend payout stocks because of **legal restrictions**, management may find it optimal to pay dividends despite the tax burden it imposes on investors. For example, some mutual funds are precluded from holding non- dividend paying stocks.

Also note that most bond indentures and some federal and provincial laws constrain the dividends that a firm can pay.

Transaction costs:

If dividend payments minimize transaction costs to equity holders that prefer current income, e.g., brokerage fees are involved in making dividends at home and this requires planning, then paying dividends might be optimal.

Establishing a Dividend Policy in Practice

19) Dividend Policy in Practice

Establishing a Dividend Policy in Practice

- In practice, once dividend payments are initiated investors expect them to continue *unless fundamentals change*:
  - Dividend cuts (eliminations) thought to convey bad news
  - Dividend increases (initiations) thought to convey good news
- Changes in dividends may confuse investors due to information asymmetry, e.g., firm cuts dividends to fund positive NPV project but investors interpret bad news about fundamentals.
- A ***stable dividend policy*** (e.g., same dividend per share every period) reflects "business as usual" and reduces uncertainty.
- Share repurchases are more flexible, i.e., not expected to remain the same, so firms can use them more discretionarily.
- Together with their tax advantage, this often makes *repurchases well suited to make larger and infrequent payouts to investors*.

20) Dividend Policy in Practice

Establishing a Dividend Policy in Practice

- The firm could follow a **residual dividend approach:** pay dividends only after meeting investment needs, while keeping a desired debt-to-equity ratio (recall dividends decrease equity value). Makes sense, but dividends can then be very unstable!
- In practice, many firms appear to follow **a compromise dividend policy** (that balances stability with investment needs):
  - Avoid cutting back on positive NPV projects to pay a dividend.
  - Avoid cutting dividends.
  - Avoid issuing new equity.
  - Maintain a target debt-to-equity ratio.
  - Maintain a target dividend payout ratio (a long-run Div/NI), while smoothing dividends relative to earnings.

Summary

21) Summary

Summary

- With perfect capital markets payout policy is irrelevant. Payout policy matters due to capital market imperfections!
  - Retaining cash is costly due to corporate taxes & agency problems, but it reduces issuance and distress costs.
  - Personal taxes create a tax disadvantage of dividends compared with repurchases, but there are tax clienteles.
  - Firm insiders are better informed than outside investors, so dividend choices could signal information.
  - Repurchases could signal the stock is undervalued.
  - Trading costs make some investors prefer dividend payers.
  - Mutual funds with “income” goals must hold dividend payers.
- There are good reasons to keep dividends roughly constant!
- Use special dividends for special occasions; but share buybacks are usually better to pay out larger amounts due to tax reasons.

11

Topic 11 – Mergers & Acquisitions

Acquisitions, synergies, offer prices, and financing considerations

Learning objectives

1. Distinguish between different types of acquisitions: by legal form, means of payment, by relatedness of operations, and source of value gains.
2. Explain why it may make sense for companies to merge; estimate the gains (synergies) and costs of mergers.
3. Identify the value to the acquirer, NPV of an acquisition, and discuss reasonable ranges for merger offers.
4. Briefly describe the empirical evidence on acquisitions. Distinguish between cash and share financing in a merger; understand the basic logic of merger deals.

Legal Forms of Acquisitions and Acquisition Classification

1) Legal Forms of Acquisitions

Legal Forms of Acquisitions

- **Merger:** complete absorption of one company by another, where the acquiring firm retains its identity and the acquired firm ceases to exist as a separate entity. Must be approved by the stockholders of both firms.
- **Consolidation:** acquisition in which a new firm is created and both the acquired and acquiring firms cease to exist.
- **Acquisition of stock:** purchase of a firm's voting stock. No stockholder vote is required; acquirer can deal directly with stockholders, even if management opposes.
- **Acquisition of Assets:** a firm can effectively acquire another firm by buying most or all of its assets; the target firm does not necessarily cease to exist.

2) Acquisition Classifications

Acquisition Classifications

- **Horizontal Acquisition:** acquisition of a firm in the same industry as the buyer - an acquisition of a rival firm. Example: Great-West Lifeco acquired Canada Life Financial.
- **Vertical Acquisition:** acquisition of a firm at a different stage of the production process – acquisition of a supplier or customer firm. Example: Imperial Oil acquires gas stations.
- **Conglomerate / Diversifying Acquisition:** acquisition of a firm in an unrelated line of business. Example: Campeau Corporation's acquisition of Federated Department Stores.
- **Note:** horizontal acquisitions can raise antitrust concerns; vertical ones too, but much less frequently.
- The word **takeovers** refers broadly to a firm gaining control of another firm (various legal forms), in a friendly or hostile deal.

Gains from Acquisition & Sources of Synergies

3) Gains from Acquisition

Gains from Acquisition

Synergy: the incremental gain arising from the combination of two firms, A and B, through a merger or acquisition.

The merger should be undertaken only if: $V_{AB} > V_A + V_B$

The synergies (value gain) is: $\Delta V = V_{AB} - (V_A + V_B)$

When $\Delta V > 0$, the merger should be undertaken.

If Firm A buys Firm B, it gets a company worth V_B plus the incremental gain ΔV.

Thus, the value of Firm B to Firm A is: $V_B^* = V_B + \Delta V$

4) Sources of Synergies

Sources of Synergies

- **Revenue enhancement:** The combined firm may generate greater revenues than two separate firms due to:
  - Marketing gains (advertising, distribution network, product mix)
  - Strategic benefits (more flexibility regarding future operations)
  - Market power (reduce product market competition)
- **Cost reductions:** The combined firm may operate more efficiently than two separate firms due to:
  - Economies of scale (ability to produce larger quantities at lower cost; common in industries with high fixed costs)
  - Economies of vertical integration (control whole production process, reduce search cost for suppliers or customers)
  - Complementary resources (using skills/resources that complement each other)

Sources of Synergies (continued)

5) Sources of Synergies

Sources of Synergies

- **Reducing Capital Needs:**
  - Reductions in required investment in working capital and fixed assets relative to the two firms operating separately.
  - More efficient management of assets under one umbrella.
  - Some assets can be sold if they are redundant in combined firm.
- **Tax Gains**:
  - The use of tax losses. A firm that loses money on a pre-tax basis is attractive to a partner with high tax liabilities.
  - The use of unused debt capacity. Acquirer can use acquired firm to increase debt and gain tax shields.
  - The use of surplus funds. If, instead, free cash flow were paid to investors as dividends it would be taxed.
  - The ability to write up the value of depreciable assets (so tax deductions from depreciation are higher).
  - Changing tax jurisdictions.

6) Sources of Synergies

Sources of Synergies

- Horizontal mergers can lead to cost savings (economies of scale) and market power in setting prices (higher profits).
- Vertical mergers can eliminate bottlenecks in production, increase supply chain reliability, and increase product quality.
- What about *conglomerate mergers*?
  - Diversification of a firm's activities and the associated reduction of business risk is often mentioned as a benefit to such mergers.
  - But investors can diversify their portfolios (hold many firms) more cheaply; they don't need the firm to do it, so won't pay more for such firms.
  - Maybe managers want to reduce their own exposure to risk? This would happen to the personal benefit of mangers, not investors.
  - Note there is some evidence of a *diversification discount*, i.e., a conglomerate firm is worth less than a replica based on independent firms.

Inefficient Management & Takeovers and Cost/NPV of an Acquisition

6) Inefficient Management and Takeovers

Inefficient Management & Takeovers

- There are firms whose value could be increased with a change in management – these firms are poorly run.
- Corporate raiders can identify poorly run firms, take them over, replace inefficient management, and create value for the target firm shareholders and society in general.
- But takeovers frequently result in layoffs, which may reduce trust between managers and labor, and thus reduce efficiency and increase costs.
- There might also be social costs. If takeovers result in plant closures or layoffs, then workers' wellbeing is affected. Taxpayers may be burdened by costs of retraining and relocation programs.
- A strong board of directors could maximize managerial efficiency at lower cost, but takeovers are a disciplinary mechanism that works when internal governance fails.

7) Cost & NPV of an Acquisition

The Cost & NPV of an Acquisition

For an acquirer A the NPV of acquiring firm B is:

$$NPV = V_B^* - Cost\ to\ Firm\ A$$

$$where\ V_B^* = V_B + \Delta V \ \text{and}\ \Delta V = V_{AB} - (V_A + V_B)$$

In a **cash offer** A makes a cash payment to B's shareholders:

- the cost to firm A = the cash it pays.
- the cost is unaffected by the realization of merger gains.

In a **share offer** A pays B's shareholders with its own shares:

- the cost to firm A = # *shares of A* × *post merger share price*
- the cost depends on the realization of merger gains, because the gains show up in the post-merger share price.

Financing considerations, valuation, and payment range

8) Cash versus Share Offer

Cash Versus Share Offer

- Synergies are estimated but uncertain. Note that:
  - if cash is used, the target firm's shareholders do not participate in the potential gains (or losses) of the merger.
  - if shares are used, then the target firm's shareholders share in the potential gains (or losses) of the merger.
  - If an acquirer is confident that the synergies will materialize, what form of payment would the acquirer prefer?
- Tax issues:
  - payment by cash usually results in a taxable transaction
  - acquisition by exchanging shares is generally tax free.
- Control rights of acquirer:
  - payment by cash does not affect the acquirer's control.
  - payment with voting shares does affect control (target shareholders are now owners of the acquirer!).

9) Cost & NPV of an Acquisition

Evaluating an Acquisition & Payment Range

Valuation of an acquisition:

- use (don't estimate) the market values of traded companies.
- estimate only the value of the synergies
- use the correct discount rate - the required rate of return on the incremental cash flow. Often the target's cost of capital.
- be aware of significant transaction costs (fees to investment bankers, legal fees, and disclosure requirements).

The merger negotiations around payment amount:

- *what is maximum payment the acquirer will accept?*
  - the payment such that NPV=0 , that is, $V_B^* = V_B + \Delta V$
- *what is the minimum payment the target will accept?*
  - *the value of the target as a stand alone, that is, V_B.*
- conceptually, the negotiation is largely about the division of ΔV!

NPV and Beneficiaries of the Acquisition

10) Will the NPV be > 0?

Will the NPV be > 0?

- Will an acquisition be anything more than a zero NPV project in an efficient capital market?
- If it is, this excess value likely results from:
  - the acquirer's access to superior managerial and labour talents at costs not fully reflective of their marginal value
  - access to raw material inputs at lower costs
  - ability to price the product more profitably
  - synergies in production and/or distribution
  - access to capital at lower cost
  - greater efficiency due to lower agency costs
- Each of these reasons suggests an inefficiency in a factor market, product market, or capital market.

11) Who Benefits from Acquisitions?

Who Benefits From Acquisitions?

- Acquirers must often pay a premium over the target's current market price to for the target to accept the deal.
- Target firms earn excess stock returns in a merger (e.g., about 23%) – *target shareholders clearly benefit.*
- For acquirers, excess stock returns at announcement are much lower (3%-11% in Canadian mergers and closer to zero for American mergers) – *not so clear*:
  - Expected merger gains may not be realized.
  - Bidding firms are larger, so it takes a larger dollar gain to get the same percentage gain.
  - Management may not be acting in the best interests of shareholders (e.g., managerial empire building).
  - Takeover market may be competitive.
  - Announcement may not contain new information about the bidding firm (e.g., information already contained in prices).

Cash Offer Example

12) Cash Offer Example

A Cash Offer Example

Suppose V_A = \$20M, with p_A = \$10 and n_A = 2M; V_B = \$6M, with p_B= \$6 and n_B = 1M; V_{AB} = \$30M. Firm A offers \$7M **in cash** to the shareholders of Firm B.

What is the cost of the acquisition?

cost = \$7M; it is independent of the realization of the synergies

What is the value of the expected synergies?

$\Delta V = V_{AB} - (V_A + V_B) = \$30M - (\$20M + \$6M) = \$4M$

Given the offer, what is the NPV of the acquisition for firm A?

NPV = \$6M + \$4M − \$7M = \$3M

What is A's post-merger value?

Post-merger value of A = V_{AB} – cash paid = 30 – 7 = \$23M

13) Cash Offer Example (Continued)

A Cash Offer Example (cont.)

What is the maximum cash offer X that Firm A would be willing to make to Firm B? Why?

- NPV = \$6M + \$4M − X = 0; so max cash offer is X= \$10M.
- This is a \$10M / 6M – 1 = 66.67% premium over B's value.

What is the minimum cash offer S that Firm B would be willing to accept? Why?

The target will never accept less than its value, so S = \$6M

How are the expected synergies divided between target and acquirer shareholders if the offer price is \$10M vs. \$6M?

- If price is \$10M, target shareholders capture all synergies
- If price is \$6M, acquirer shareholders capture all synergies

Share Offer Example

14) A Share Offer Example

A Share Offer Example

Now say A will pay \$7M **in shares**, giving B's shareholders 700,000 of A's shares in exchange for the 1M shares of B.

It this the same as the \$7M cash offer we examined before?

The shares offered are worth 700,000×\$10 = \$7M; so this seems to make sense.

But this is <u>less</u> than the true cost of the acquisition because B's shareholders will obtain part of the merger gain!

After the merger there will be 2.7M shares of A outstanding, of which the shareholders of B own 0.7/2.7 = 25.9%!

Post-merger value to A's original shareholders:

$= V_{AB} - 0.259 \times V_{AB} = 30M - 0.259 \times 30M = \$22.22M$

15) Share Offer Example (continued)

A Share Offer Example (cont.)

How many shares of A should firm A offer to firm B so that the post-merger value to A – and thus the NPV of the acquisition to A - is that same as that with the cash offer?

Let α = new shares issued / total shares post merger. Then set the post merger value to A = to that with the cash offer:

$V_{AB} - \alpha \times V_{AB} = 23M \quad ; \quad 30 - \alpha \times 30 = 23M \rightarrow \alpha = 23.33\%$

Recall that A has 2M shares pre-merger, and let s be the # of new shares A should issue to give to B's shareholders:

$$\alpha = 23.33\% = \frac{s}{2+s}; \quad \text{solving gives } s = 0.609M$$

Analyzing Merger Offers - Example

16) Analyzing Merger Offers - Example

Analyzing Merger Offers - Example

Dean Witless Inc and Longfellow Associates are involved in a bidding war over Sherman Brothers.

Dean Witless has offered $24 cash per share, while Longfellow has offered $5.00 cash per share plus 0.20 shares in Longfellow per share of Sherman Brothers.

Which offer, if any, should Sherman Brothers' shareholders accept?

Firm	Share Price	Shares Outstanding	Estimated Synergies
Sherman Bros	$20	10M	
Dean Witless	$190	6M	$50M
Longfellow	$100	4M	$75M

17) Analyzing Merger Offers - Solutions

Analyzing Merger Offers - Solution

The Dean Witless offer of $24 cash per share is good: it exceeds Sherman Brothers' current stock price of $20!

How does the Longfellow cash / stock offer compare?

Post-merger value of Longfellow

= 4M×$100 + 10M×$20 + $75M – 10M×$5 = $625M

Sherman Brothers shareholders will receive per share:

$$.20\times\left[\frac{\$625M}{4M+.20\times10M}\right]=\$20.83$$

$20.83 in stock + $5 in cash = $25.83 per share, more than the Dean Witless offer of $24. But what about risk?

Bridging Questions and Summary

18) Bridging Questions

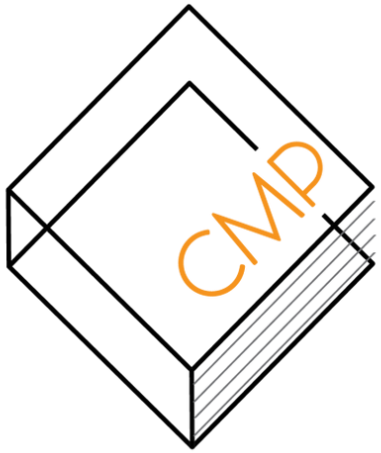
Bridging Questions

- When does it make sense for companies to merge?
- What are reasonable ranges for merger offers?
- What form of payment:
  - would cause **target** firm's shareholders to not participate in the potential gains (or losses) of the merger?
  - would the **acquirer** prefer, *if an acquirer is confident that the synergies will materialize*?
  - usually results in a taxable transaction?
  - does not affect the **acquirer's** control?

19) Summary & Conclusions

Summary & Conclusions

- A merger is a combination of two firms under the same management, and there are various legal ways to do this.
- The key logic is that the value of two firms is larger when run jointly than when run independently – there are *synergies*.
- Merger negotiations are typically over the division of the expected synergies between acquirer and target.
- The offer can be cash, stock or a mix. However, in comparing cash vs stock offers, note there is risk that expected synergies will not materialize and the choice of consideration matters.
- In cash offer, all risk is on the acquirer shareholders; with a stock offer, risk is shared with the target shareholders.
- More broadly, the acquisition of a company is an investment decision and, from the perspective of the acquirer, it is important to correctly value the target using tools we learned.



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