Corp 2 Notes

Week 6 notes (Investment, strategy, and Economic Rents)

- It is easy to accidently include errors into estimates of cash flows
- Security analyst need to consider information known on the market and information known to them
- Start with market price and ask whether would prices be different in competitor's hands
- 2 ways to calculate present value
  - Estimate the expected cash flows and discount at a rate that reflects the risk of those flows.
  - Estimate what sure-fire cash flows would have the same values as the risky cash flows. Then discount these *certainty-equivalent* cash flows at the risk-free interest rate.
-

- **Economic rents –** profits that cover greater than the cost of capital

- **NPV is present value of economic rents**

-
- In LR competitive eqm, no competitor can earn more than the cost of capital

- This is due to other competitors coming in and eroding any economic rents

- Corporate strategy aims to exploit sources of competitive advantages

- **Corporate strategy**

  - Kay advises to pick out distinctive capabilities and identify markets where most value is added
  - These come from employee's skills, relationships with customers, reputation etc
- Portor suggests the five forces
  - New competition, threats, substitutes, and bargaining power of customer/supplier
- Firm's cannot rely on industry structure to provide high returns
- Economic rents allows firms to reconsider NPV calculations
- Allows them to identify sources of economic rents
- Positive NPV for projects is only believable if there are actual sources of economic rents

Using futures prices to estimate commodity cash flows are known as certainty equivalents
Understanding a firm's competitive advantage is more important than it's growth rate

EXAMPLE 11.2 • Opening a Gold Mine

Kingsley Solomon is considering a proposal to open a new gold mine. He estimates that the mine will cost $500 million to develop and that in each of the next 10 years it will produce .1 million ounces of gold at a cost, after mining and refining, of $1,150 an ounce. Although the extraction costs can be predicted with reasonable accuracy, Mr. Solomon is much less confident about future gold prices. His best guess is that the price will rise by 5% per year from its current level of $1,500 an ounce. At a discount rate of 10%, this gives the mine an NPV of −$35 million:

$$\text{NPV} = -500 + \frac{.1(1{,}575 - 1{,}150)}{1.10} + \frac{.1(1{,}654 - 1{,}150)}{(1.10)^2} + \cdots + \frac{.1(2{,}443 - 1{,}150)}{(1.10)^{10}}$$

$$= -\$35 \text{ million}$$

Therefore the gold mine project is rejected.

Unfortunately, Mr. Solomon did not look at what the market was telling him. What is the PV of an ounce of gold? Clearly, if the gold market is functioning properly, it is the current price, $1,500 an ounce. Gold does not produce any income, so $1,500 is the discounted value of the expected future gold price.[6] Since the mine is expected to produce a total of 1 million

ounces (.1 million ounces per year for 10 years), the present value of the revenue stream is $1 \times 1{,}500 = \$1{,}500$ million.[7] We assume that 10% is an appropriate discount rate for the relatively certain extraction costs. Thus

$$\text{NPV} = -\text{initial investment} + \text{PV revenues} - \text{PV costs}$$

$$= -500 + 1{,}500 - \sum_{t=1}^{10} \frac{.1 \times 1{,}150}{(1.10)^t} = \$293 \text{ million}$$

It looks as if Kingsley Solomon's mine is not such a bad bet after all.[8]

The price of an asset that pays no dividends (such as gold or a stock) assuming costs nothing to hold off and is traded in competitive markets

$$P_0 = \frac{P_t}{(1 + r)^t}$$

Consider that the more of a quantity you produce, prices fall according to demand curve

P = A – BQ

In equilibrium LR, NPV = 0

To find price level of which we have reached long term equilibrium, calculate NPV = 0 and solve for price

Using future prices to estimate cashflow of a project, the discount rate is the risk-free rate whilst the cash flows are considered as certainty equivalent.

Using CEQ method is good since no need to estimate cashflow or discount rate

Examples of competitive advantages than be sustained

- Patents/ Proprietary technology
- Brand names
- Economies of scale
- High barriers to entry
- Strategic assets that competitors cannot easily duplicate

$$\textbf{Annuity Factor} = \frac{1-(1+r)^{-n}}{r}$$

$$EAC = \frac{\textbf{NPV of project}}{\textbf{Annuity Factor}}$$

Whenever there is a calculation question, use the market prices to value what the value of the project is

Positive economic rents can be derived from the introduction of new technologies which leads to efficiencies
Firms can also derive economic rents if they are a monopoly since no competition

Capital budgeting: Bottom up process
Strategic planning: Top down process

Having a high salvage value means that:

- Firms have the option to abandon the project, making them more willing to take risks. However, entering the market makes it more competitive and reduces economic rents for everyone

Prices fall in response to more entrants in the market, thereby eliminating economic rents.

Week 7 notes (Agency Problems, Compensation, and Performance Measurement)

- This looks at the agency problems faced

- **Incentives:** Make sure that managers/employees are rewarded appropriately when they add value to the firm
- **Performance measurement** Can't reward value unless you measure it.

Can't let CFOs etc make investment decisions

- Top management have to manage and analyse numerous projects and can't possibly analyse all the projects
- Design of capital investment projects make managers unable to see some things and factors that were considered in design
- Many capital investments don't appear in budget such as worker training etc
- Small decisions add up
- CFO may also be tempted by agency problem

Agency problem in capital budgeting

Managers face following temptations when trying to find positive NPV projects

- **Reduced effort:** High pressure/effort activity and may simply slack off
- **Perks:** May try to get bonuses such as tickets etc
- **Empire building:** Managers prefer to run large business and therefore undertake projects to expand business but not be positive NPV
- **Entrenching investing:** they will undertake projects which requires their skills and expertise.

Last 2 are known as **overinvestment**

- **Free cash flow problem:** When too much cash but limited investment opportunities can lead to overinvestment

Agency problem and risk taking

Agents are not necessarily risk averse

- To reach high ranks, need to take risk
- Managers with stock options more tempted to take risk
- Managers have nothing to lose by taking risk
- Organisations are hesitant to curtail risky activities that lead to risky yet high profits

Monitoring:

- Reduce agency problems via monitoring people
- Can hire a board of directors to do this
    - However, this board can be friends of the CEO themselves
- Auditors can ensure GAAP is followed.
- Lenders can also monitor by tracing companies' financial situation

- Shareholders can also watch and ensure company is not underperforming

Rival companies

- Competitors can see if company is operating efficiently and take over if they believe the company is not being efficient

- There has been a trend with increases in management compensation over the years

- Compensation should be based such that it encourages managers to maximize shareholder wealth and depend on things such as input or output

    - However, this can also be due to factors outside agent's control and therefore not a good indicator
- Principal makes agent bears some risk but there is some risk sharing between 2 parties and this leads to an inefficient allocation of risk (since risk-neutral principal is not bearing all the risk)
- Incentive plans may tempt managers to withhold bad news or manipulate earnings

Advantages of account measures of performance

- Based on absolute performance rather than relative performance
- Makes it possible to measure performance of junior managers whose responsibility extends to only a single division/plant

However, accounting measures may also be bias

Return = C + (p1-p0) / P0

Economic income = cash flow + change in PV

$$\text{Rate of return} = \frac{C_1 + (\text{PV}_1 - \text{PV}_0)}{\text{PV}_0}$$

- Accounting looks at net book value rather than present value which is an issue
- Even in long run, it'll still be biased

- Need to be careful when using accounting profitability

- We can set earnings target for executives to try and reach

Net return on investment:

- ROI is ratio of after-tax operating income to net depreciated book value of assets. Compare ROI with cost of capital

Net ROI = ROI(%) – COC(%)

$$NET\ ROI = \frac{After\ tax\ earnings}{Amount\ invested} - Cost\ of\ Capital$$

$$EVA = Income\ Earned - [cost\ of\ capital * Investment]$$

Measure and reward performance: residual income/EVA

- Net dollar return to shareholders
- What are the earnings after deducing a charge for the cost of capital?
- Income = revenue – cost and taxes
    - Don't deduct the company cost of capital
    - Need to subtract cost of capital (* investment)

EVA is measure of company's financial performance based on residual wealth after deducting cost of capital from operating profit and adjusting for taxes.

Net earnings are earnings after tax but not taking interest payments into accounts

EVA ($) = residual income = income earned ($) – income required ($)
= income earned – (cost of capital* investment)

Example

A movie producer generates $30 million in net income during the 4 month run of the movie "Revenge of the Finance Professors." Movie rentals and post theater income is forecasted to be nominal. The cost to produce the movie was $100 million. Given a 10% cost of capital, what is the EVA of the project and was it a good investment?

$$\begin{aligned} EVA &= 30 - (.10 \times 100) \\ &= \$20\ million \end{aligned}$$

Answer - While the EVA is positive, the movie industry highlights a major shortfall of EVA. It ignores the fact that no long term benefit accrues from a movie. Thus, the positive EVA is misleading. The project is a loser, despite its high quality subject matter.

When ROI = cost of capital → net return and EVA = 0
Net return is a % and ignores scale of company whilst EVA recognises the amount of capital employed and number of $ of additional wealth created

Disadvantages of EVA

- Difficult to estimate a manager's contribution to EVA
- EVA does not measure present value

Advantages of EVA

- EVA is a substitute for explicit monitoring by top management
- EVA makes cost of capital visible to operating management and reduces capital employed
- EVA highlights parts of business that are not performing

We can use EVA to:

- Measure performance within firm
- Reward performance within firm
- Improve performance within firm

To improve EVA, managers can:

- Increase earnings
- Reduce capital employed

$$Economic\ Rate\ of\ Return = \frac{C_1 + PV_1 - PV_0}{PV_0}$$

Economic Profit = (ROI – r)$ * Capital invested($)

- EVA emphasise performance evaluation over accounting standards

EVA is in $ terms
Net ROI in % terms

$$\text{Rate of return} = \frac{\text{cash receipts} + \text{change in price}}{\text{beginning price}}$$

$$= \frac{C_1 + (P_1 - P_0)}{P_0}$$

Economic income = cash flow + change in present value

$$\text{Rate of return} = \frac{C_1 + (\text{PV}_1 - \text{PV}_0)}{\text{PV}_0}$$

	ECONOMIC	ACCOUNTING
INCOME	Cash flow + change in PV = Cash flow - economic depreciation	Cash flow + change in book value = Cash flow - accounting depreciation
	Economic Income	**Accounting Income**
RETURN	PV at start of year	BV at start of year

Economic income is the cash flow + change in PV of a firm.

$$\textbf{\textit{Economic income} = \textit{Cash Flow} - \textit{Economic Depreciation}}$$
$$\textbf{\textit{Economic } \pi = (\textit{ROI} - r) * \textit{ Cost of Capital}}$$

17. Consider the following project:

	Period			
	0	1	2	3
Net cash flow	−100	0	78.55	78.55

The internal rate of return is 20%. The NPV, assuming a 20% opportunity cost of capital, is exactly zero. Calculate the expected *economic* income and economic depreciation in each year.

	Period		
	1	2	3
Net cash flow	0.00	78.55	78.55
PV at start of year	100.00	120.00	65.45
PV at end of year	120.00	65.45	0.00
Change in value during year	+20.00	–54.55	–65.45
Expected economic income	+20.00	+24.00	+13.10

- Discount cashflow for all remaining cashflows left to t=0
  - Then after t=1, what is remaining cashflows

Economic income = CF + Change in PV

So period 1 = 0 + 20

Period 2 = 78.55 + (-54.55)

Managers may reject higher NPV projects in order to meet immediate book profits

Agency problems associated with capital budgeting:

- Reduced effort
- Private perks
- Empire building
- Entrenching investments
- Avoiding risks

These can lead to the over-investment problem
Monitoring is done by

1) Shareholders (they hold the ultimate responsibility)
2) Board of directors
3) Independent accountants
4) Lenders

Agency cost: Value lost when managers don't act to maximize value
Private benefits: Perks enjoyed by managers
Empire building: building for size and not npv
Free rider problem: when one shareholder monitors management, everyone else benefits
Entrenching investment: Selecting projects that increase manager's value to firm
Delegated monitoring: Monitoring on behalf of principals

Monitoring can never eliminated asymmetric information

Week 8.a notes

Chapter 14 – Overview of Corporate Financing

- Lenders have first claim on cash flows whilst stockholders have residual claims to income
- Stockholders have complete control of the firm, providing keep their promises to lenders

Retained Earnings = Net Income Earned – Dividends paid during year

$$Long\ term\ debt\ ratio = \frac{Long\ term\ debt}{Long\ term\ debt + equity}$$

$$Debt\ ratio = \frac{Long\ term\ debt}{Total\ Assets}$$

Internally Generated cash = Retained Earnings + Depreciation

- **Trends in financing**

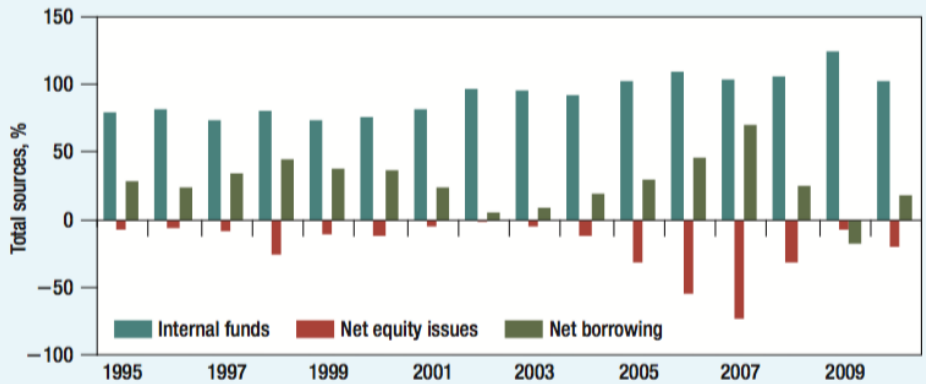


FIGURE 14.1
Sources of funds for U.S. nonfinancial corporations expressed as a fraction of the total.

Source: Board of Governors of the Federal Reserve System, Division of Research and Statistics, Flow of Funds Accounts Table F.102 at www.federalreserve.gov/releases/z1/current/data.htm.

- Shareholders are happy to plow this cash back into firm provided that investments are positive NPV. Every positive NPV outlay increases shareholders values
- To cover any financing deficit, then firms first cut dividends in order to increase retained earnings or must raise new debt/equity from outside investor

- On average, internal funds cover most of cash needed for investment

- Internal financing is more convenient than external financing by stock/debt issues

- Debt ratio vary over time for particular firms

- Debt ratio lower computed with market value rather than book value

Common stock – Residual claim on firm's asset and cash flow

Managers prefer internally generated cashflows to finance capital expenditures because:

- They can avoid discipline of financial markets
- Cost of issuing new securities are high
- Announcement of new equity issues is bad for old investors

Total capitalization: Sum of long term debt and all other forms of equity
Shares outsiders hold are called **outstanding and issued**
Share company holds are called **issued but not outstanding**
These issued shares enter company's book at par value

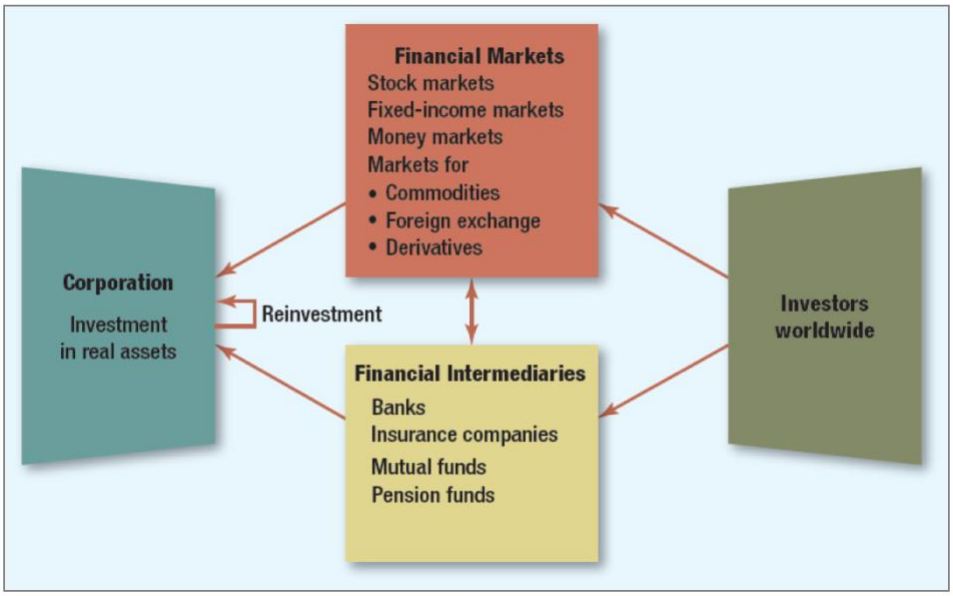
$$Par\ value = \frac{Common\ stock\ price}{Shares\ issued}$$

2 classes of stocks

- Same cash flows, different control rights
- Greater control rights grant private benefits

Types of debt

- Accounts payable
  - Short term.
  - Not paid for yet
- Unfunded obligations
  - Senior debt
- Special purpose entities
  - Raise cash through debt and equity
  - Doesn't show up on balance sheet
  - Obligations are secured even if parent company goes bankrupt

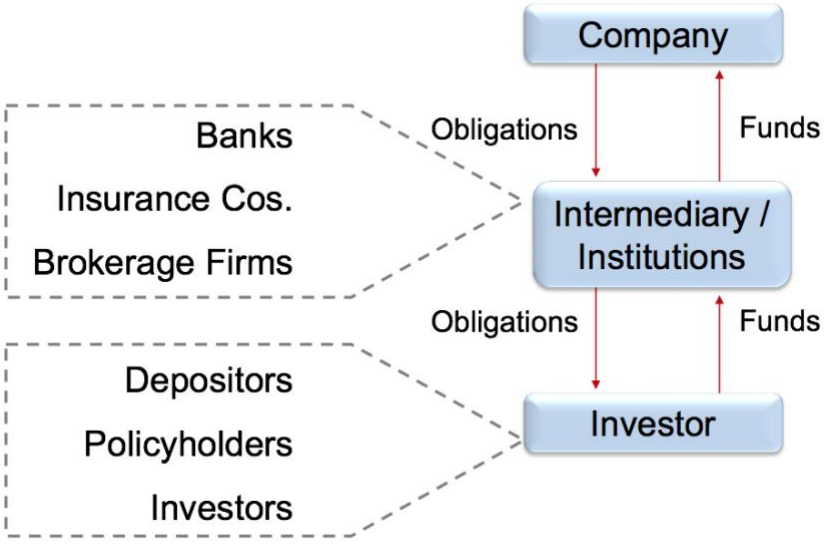


Financial markets

- Primary markets
    - Buy directly from company
- Secondary markets
    - Trade amount themselves
- OTC

Financial intermediaries

- Banks loan and take company's savings
- Investors can deposit money into banks and take loans



Role of financial intermediaries

- **Payment mechanism**
    - Allow individuals to make/receive payments over long distance
- **Borrowing/lending**
    - Channels savings to those who can best use them
- **Pooling risk**
    - Allows individuals to share risk
    - E.g. form of insurance
- **Information**
    - Allows estimation of expected returns

Week 8.b notes

Chapter 15 - How corporations issue securities

- Firms rely on venture capital markets initially
- Venture capital firms specialise in young high tech firms and provide capital and support to them

Lessons for VC

- Accept low probability of success
- Cut your losses

IPO

- New shares are sold to raise additional cash for the company
- Underwriters act as:
    - Provide company with procedural and financial advice
    - Buy the issue
    - Resell to the public

Issuing a new stock leads to fall in prices of old stock due to increases in supply

Rights issue: Give existing stockholders rights to buy the newly issued stocks

Underwriters help to:

- Provide advice
- Buy new issue
- Resell issue to public

Example:

- Offer to buy 3 new shares for every 20 shares currently held
- New shares priced at $13.93 whilst current price was $24.73

So if you had 20 shares before:
24.73*20 = $494.60
Bought 3 new shares 3*13.93 = 41.79
New value of shares = $536.39
Therefore, price per share is: $536.39/23 = **$23.32**

The right to buy each newly issued share at $13.93 is worth: 23.32-13.93 = $9.39

Implications for financial manager on deciding how to raise financing:

- *Larger is cheaper.* There are economies of scale in issuing securities. It is cheaper to go to the market once for $100 million than to make two trips for $50 million each. Consequently firms bunch security issues. That may often mean relying on short-term financing until a large issue is justified. Or it may mean issuing more than is needed at the moment in order to avoid another issue later.
- *Watch out for underpricing.* Underpricing is often a serious hidden cost to the existing shareholders.
- *The winner's curse may be a serious problem with IPOs.* Would-be investors in an initial public offering (IPO) do not know how other investors will value the stock and they worry that they are likely to receive a larger allocation of the overpriced issues. Careful design of issue procedure may reduce the winner's curse.
- *New stock issues may depress the price.* The extent of this price pressure varies, but for industrial issues in the United States the fall in the value of the existing stock may amount to a significant proportion of the money raised. This pressure is due to the information that the market reads into the company's decision to issue stock.
- *Shelf registration often makes sense for debt issues by blue-chip firms.* Shelf registration reduces the time taken to arrange a new issue, it increases flexibility, and it may cut underwriting costs. It seems best suited for debt issues by large firms that are happy to switch between investment banks. It seems less suited for issues of unusually risky or complex securities or for issues by small companies that are likely to benefit from a close relationship with an investment bank.

Shelf registration – method for publicly traded companies to register shares and not need to issue them immediately. They can issue them within a certain timeframe. Normally used for corporate bonds

Mezzanine financing – hybrid of debt and equity financing that allows lender to convert to equity in case of default

Top motive for firms to go public is to create shares for use in future acquisitions

Private placement – Sold to 35 knowledgeable investors

Winner's curse – Tendency for winning bid in auction to be highly way overvalued

Initial offering

- **Initial public offering**
  - First offering of stock to general public
- **Underwriter**
  - Firm buys an issue of securities from a company and resells to public
- **Spread**
  - Difference between public price and price paid by underwriter
  - The underwriter gets to buy the share at a lower price and then resell it to the public
- **Prospectus**
- **Underpricing**
  - Overpaying for it
- **Private placement –** Sale of securities to limited number of investors without public offering

- **Firm commitment**
  - Underwriters buy securities from firm and sell to public
- **Best efforts commitment**
  - Underwriters try to sell as much of the stock as possible
- **Floatation costs**
  - Cost incurred when firm issues new securities to public

Example

How much will a firm receive in net funding from a firm commitment underwriting of 250,000 shares priced to the public at $40 if a 10% underwriting spread has been added to the price paid by the underwriter? Additionally, the firm pays $600,000 in legal fees.

Cost to public	= $40	
Net to issuer	= $40/1.10 = $36.36	
Therefore, the spread was $3.64 per share		
Net to issuer	= 250,000 × $36.36 =	$9,090,000
Less: Legal fees		600,000
		$8,490,000

Eurobond – Bonds underwritten by group of global investors and offered simultaneously internationally
Global bond – Bonds sold internationally, and some part in domestic market

Week 9.a notes (Chapter 17 Does Debt policy matter)

Capital structure – Firm's mix of securities to finance assets

MM - Financing decision does not matter either in financial efficient markets

- Proposition 1: Firms value comes from its real assets. Capital structures are irrelevant as long as investment decisions are a given
- Overall cost of capital is same as cost of equity with all equity financing

Perfect Capital Markets

- Securities are fairly priced
- No tax or transaction costs
- Investment cash flows are independent of financing requirements

MM Proposition 1: Total value of a firm not affected by capital structure
MM Proposition 2: WACC is not affected by capital structure

- Debt is cheaper but return on equity rises
- Cost of equity is cost of capital + premium proportional to debt-equity ratio

MM theory:

- In world without debt, look at company just equity financed
- Value of firm unaffected by financing decisions
- Its value depends on its returns
- If we increase debt and reduce equity finance, returns is still the same and therefore valuation should still be the same
- Even though debt is cheaper and makes cost of capital cheaper, it makes the firm more risky and demand on equity return increases so that it offsets this. Therefore, the value of the firm remains the same and that financing structure has no effect on a firm's value

- 2 types of debt: common and preferred
    - Also other things such as hybrid

- MM shows that payout policy doesn't matter in perfect capital market and also that financing decisions don't matter either
    - This is due to the fact that value of a firm depends by its real asset, not securities issued
    - **Proposition 1**
        - Separation of investment and financing decisions
        - Firm could use capital budgeting process without wondering about financing
        - Debt + equity financing = all equity financing

- **Effect of financial leverage in competitive tax-free economy**

- Value of outstanding securities = Equity + Debt

    - This is known as **levered equity**

- What is the effect of borrowing new debt?
    - Does old debt + new debt = overall debt? Or does new debt make old debt more expensive
        - Since old investors should remand higher return or else their investment value has fallen
    - Does value increase if we borrow more or does it remain constant and cause equity to fall?

- ***Any policy that maximizes market value of firm accrues for firm's stockholders***

What is the combination of securities that maximizes value of firm?
- In perfect market, any combination of securities is as good as another
- Value of firm unaffected by choice of capital structure

If 2 firms and 1 is unlevered and 1 is levered:
Equity of levered = value of levered – debt of levered firm
- People more likely to invest in unlevered firm since less risky
- Or we can purchase both debt and equity of levered firm
- Law of once price says that since both strategy offers % of firm's payoff, they should sell for same value
- **VALUE OF LEVERED FIRM = VALUE OF UNLEVERED FIRM**

Proposition 1: The market value of any firm is independent of its capital structure
- When a firm issues debt, it splits cashflows into 2 streams
    - Doesn't affect firm's value as investor can replicate it by creating personal leverage himself. Only valueable if he can't do so himself
    - Furthermore, investors buying a stock can redo the leverage himself but it may be more costly for them to do so
- This holds if investors are able to borrow/loan at the same rate as companies

Example

2 firms: 1 unlevered and 1 levered (Vl = El + Dl)

1) If we buy 1% of unlevered firm, we get 1% of its profits
2) If we buy 1% of debt and equity of levered firm, we get 1% of profits-interest but also need to pay off 1% of interest. This cancels out so we get 1% of profits

Scenario 2 is when we:
1) Buy 1% of shares (equities) in levered firm so we get profits – interest
2) What we can do is borrow 1% of debt and buy 1% of equity in unlevered firm and this will give us profits-interest too

Law of conversation of value: Value of an asset is preserved regardless of claims against it

Firm value is determined by real assets and not by proportion of debt/equity issued to buy asset

- Capital structure can be irrelevant even when debt is risky (since corporate debt is not risk-free and companies can't borrow at risk free rate like govt bond)
- If a company borrows money, it does not guarantee repayment. Only repay if assets worth more than debt obligations. This means owners have limited liability and would be willing to pay a premium for levered shares

A firm may attempt to issue debt in order to buy up share and therefore increase EPS (after paying off interest). This will increase return on shares since less shares so higher proportion. However, investor can simply borrow themselves and buy more shares for same payoff.

Case study

	Current Structure: All Equity	Proposed Structure: Equal Debt and Equity
Expected earnings per share ($)	1.50	2.00
Price per share ($)	10	10
Expected return on share (%)	15	20

- Notice price per share is still the same despite return increasing for mixed structure
- This is because increase in EPS is offsetted by increasing in discount rate. Therefore, increasing EBIT, causes EPS to rise for a levered firm by a larger % whilst it increases by the same % for an unlevered firm. This works since debt payments stays fixed whilst leaving more operating income for a lesser number of shares.

Return required for unlevered firm

$$Return\ on\ asset = r_e = r_a = \frac{Expected\ operating\ income}{market\ value\ of\ all\ securities}$$

- In perfect capital markets, neither expected operating income or market value change.

$$\boldsymbol{r_e > r_a > r_d}$$

because:

$$\boldsymbol{\beta_e > \beta_a > \beta_d}$$

- Expected return on a portfolio (holding both debt and equity) is a weighted average of its returns

$$\boldsymbol{Expected\ return\ on\ asset = r_a = \left(\frac{D}{D+E}\ X\ r_d\right) + \left(\frac{E}{D+E}\ X\ r_e\right)}$$

$$r_e = r_a + (r_a - r_d)\frac{D}{E}$$

Proposition 2: **Expected rate of return on common stock of a levered firm increases in proportion to debt-equity ratio expressed in market value. This depends upon spread between return on asset, return on portfolio of all of firm's securities, and return on debt.**

$$r_E = r_A + (r_A - r_D)\frac{D}{E}$$

-

- **Expected return on equity positively related to leverage, required return on equity is linear function of debt-equity ratio, and risk to equity increases with leverage**
- **If firm has no debt, re = ra**

We can see that if a firm has debt, this causes re to rise. They require extra premium to compensate for risk

- **PROPOSITION 2 IS IN EFFECT SAYING THAT THE EXPECTED RETURN ON STOCKS INCREASES AS DEBT TO EQUITY RATIO INCREASES**
- **PROPOSITION 1 SAYS THAT FINANCIAL LEVERAGE HAS NO EFFECT ON SHAREHOLDER'S WEALTH**
- **Corporate borrowing increases EPS but reduces P/E ratio (if returns from company is greater than interest payment)**
- Any increase in expected return, comes with increased risk and therefore higher required rate of return is required
- Thus, if we had certain proportion of debt and equity, WACC is always constant
    - Increasing debt leaves everything unchanged **except** rate of return required on equity
    - This causes Re to increase if more debt since more risky for shareholders

Capital structure affects on beta

- Both stock/debt holders receive part of company's cashflow and bear risk from it
- Debtholders have less risk, so debt beta is lower than equity beta
- Financial leverage doesn't increase risk of firm's assets but pushes it up for the common stock. Shareholders demand higher return because of financial risk

$$\beta_{portfolio} = \beta_{asset} = \beta_{debt}\left(\frac{Debt}{Value}\right) + \beta_{equity}\left(\frac{Equity}{Value}\right)$$

$$B_{equity} = \beta_{asset} + (\beta_{asset} - \beta_{debt})\frac{D}{E}$$

- Asset beta always remain the same
- Higher leverage increases both expected equity return and equity risk
- **In this scenario, any changes in capital structure, affects the riskiness of both debt and equity holders. Therefore both debt and equity beta changes whilst asset beta is still the same**

- Previous scenario is that return on debt stays constant whilst return on equity needs to increase to compensate

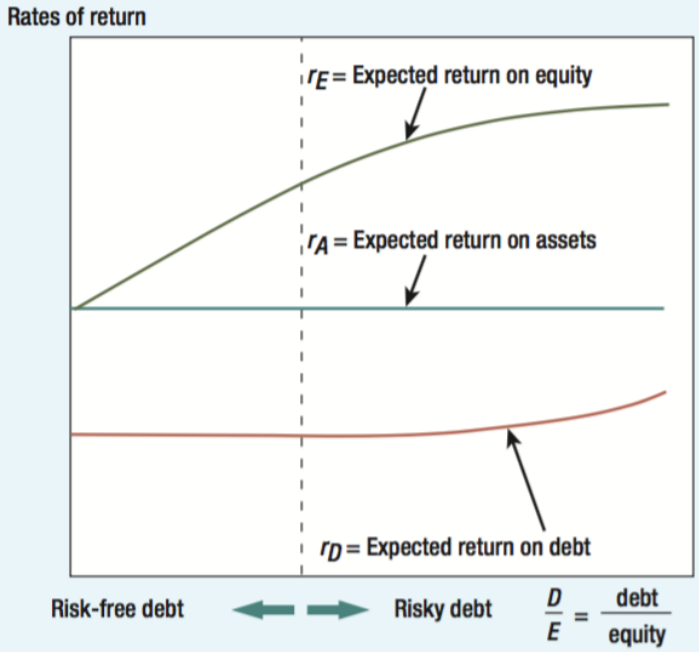
- **UNLEVERED BETA IS ALSO KNOWN AS ASSET BETA** (removes the impact of debt from beta)

- **MM proposition says that increased leverage increases both equity returns and equity risk (beta). Therefore, it does not increase shareholder's value**

- We can also MM proposition 2 allows for increase in return on debt as it gets more risky with more debt

FIGURE 17.2

MM's proposition 2. The expected return on equity r_E increases linearly with the debt–equity ratio so long as debt is risk-free. But if leverage increases the risk of the debt, debtholders demand a higher return on the debt. This causes the rate of increase in r_E to slow down.



$$Optimal\ Economic\ order\ quantity = \sqrt{\frac{2 * annual\ sales * cost\ per\ order}{carrying\ costs}}$$

- As firm borrows more, return on equity increases since more risk
- More debt firm has, less sensitive Re is to further borrowing
- Re tapers off since as the firm borrows more, more risk transferred from stockholders to bondholders, so rd increases
- However, if issuing more debt causes previous debt's value to fall, this causes transfer of wealth from debtholders to shareholders by the amount fallen

- If MM proposition 1 holds then: maximise overall market value = min WACC (provided operating income is independent of capital structure)

<u>Tradionalist view</u>

Things to note:

1) Shareholders care more about maximizing value of firm rather than minimizing WACC

2) Logical shortcircuit: Trying to minimize WACC, we can borrow more debt since cheaper and therefore minimize WACC. However, risk increases so return on equity demanded increases so WACC remains the same
    a. This depends on the assumption that rate of return on equity rises slowly or not at all

- If this assumption is true, then borrowing does lead to lower WACC, but eventually re rises and WACC raises again

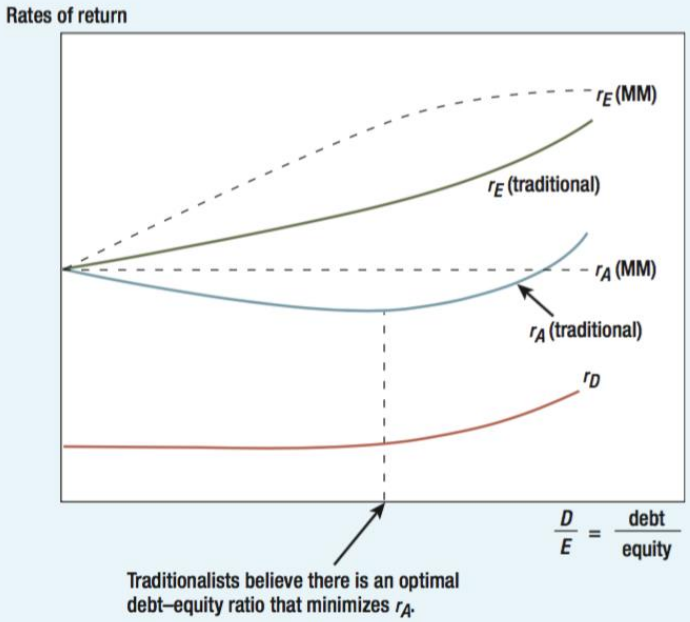


FIGURE 17.3

The dashed lines show MM's view of the effect of leverage on the expected return on equity r_E and the weighted-average cost of capital r_A. (See Figure 17.2.) The solid lines show the traditional view. Traditionalists say that borrowing at first increases r_E more slowly than MM predict but that r_E shoots up with excessive borrowing. If so, the weighted-average cost of capital can be minimized if you use just the right amount of debt.

2 arguments to support this notion

1) Investors do not notice low levels of debt but they do when debt is excessive
2) Actual markets are imperfect so proposition 2 doesn't hold. Firms that borrow therefore may provide valuable service for investors and therefore command a premium. If a firm can borrow more cheaply, then investors would require lower returns since holding levered firm stocks is a form of borrowing

There are economies of scale to borrowing
Therefore, a clientele is created whereby corporate borrowing is better than personal borrowing
Smart financial managers therefore look for these clientele

Violations of MM

- Government violates MM

If a firm changes mix of debt/equity securities, risk and return of securities change but overall cost of capital is constant

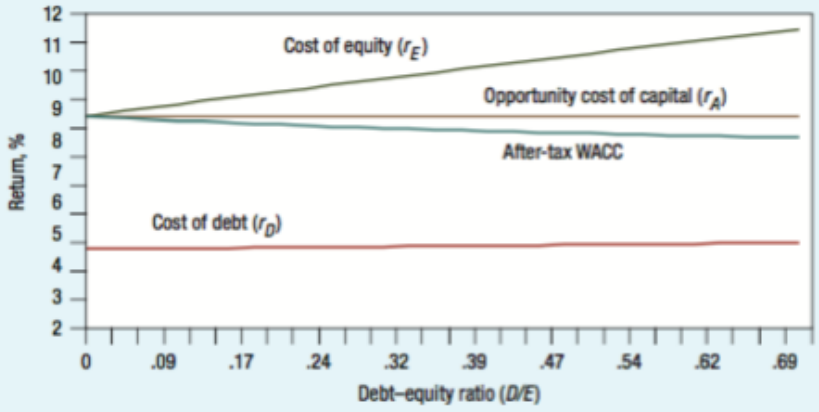
- However, need to account for tax shield which helps

$$\text{After-tax WACC} = r_D(1 - T_c)\frac{D}{V} + r_E\frac{E}{V}$$

- This violates MM2 which assumes no taxes. Therefore, the amount of leverage DOES affect the company's cost of capital

FIGURE 17.4

Estimated after-tax WACC for Union Pacific at different debt–equity ratios. The figure assumes $r_E = 9.7\%$ at a 14.3% debt ratio (equivalent to a 16.7% debt–equity ratio) and a borrowing rate of $r_D = 4.8\%$. Notice that the debt interest rate is assumed to increase with the debt–equity ratio.



- Therefore, in this case, we see WACC actually decreasing as debt increases

Maximizing value of firm contradicts with maximizing value for shareholders if If an issue of debt affects the market value of existing debt and firm can ignore dividend policy

Law of conservation of value: Value of an asset is preserved regardless of any claims against it

Value additivity works for:

- Combining and splitting up assets. Also for mix of debt securities issued by firm

Capital structure is irrelevant if:

- Capital markets are perfect
- Investors each holds a fully diversified portfolio
- Each investors holds same proportion of debt+equity

29. Wealth and Health Company is financed entirely by common stock that is priced to offer a 15% expected return. The common stock price is $40/share. The earnings per share (EPS) is expected to be $6. If the company repurchases 25% of the common stock and substitutes an equal value of debt yielding 6%, what is the expected value of earnings per share after refinancing? (Ignore taxes.)
A. $6.00
B. $7.52
C. $7.20
D. None of the above

I = (10)(0.06) = 0.60; new EPS = (6 - 0.60)/0.75 = $7.20/share

Bottom part is if we repurchase 25%, costs $10. We need to borrow $10 and pay interest at 6%. For EPS, we do $6 – interest to be paid / by less shares present so EPS rises

80. Under what circumstances would MM's proposition is violated? Briefly discuss.

MM's proposition I is violated when the firm, by imaginative design of its capital structure, is able to offer some financial service that meets the needs of a particular clientele. Either the service must be new and unique or the firm must find a way to provide some existing service more cheaply than other firms or financial intermediaries is able to provide. Therefore, smart financial managers look for an unsatisfied clientele, investors who need a particular type of financial instrument but because of market imperfections are unable to get it or get it cheaply.

82. State the generalized version of Modigliani-Miller proposition I.

Modigliani-Miller proposition I states that changes in capital structure does not affect the value of a firm. MM's proposition I is an extremely general result. Any change in the capital structure of the firm can be duplicated or "undone" by the investors at no cost. The investors need not pay extra for borrowing indirectly (by holding shares in a levered firm) when they can borrow just as easily and cheaply on their own account. It applies equally to trade-offs of any choice of financial instruments. For example, the choice between long-term debt and short-term debt would also not affect the value of the firm. Generally, the choice between issuing preferred stock, common stock, or some combination of the two should not have any effect on the overall value of the firm. It also applies to the mix of debt securities issued by the firm. The choices of long-term versus short-term, secured versus unsecured, senior versus subordinated, and convertible and nonconvertible debt all should not have any effect on the overall value of the firm.

Type: Medium

83. Explain why the cost of equity and the cost of debt are concave upward at high levels of debt.

As firm's take on higher levels of debt, the risk of default increases. Default risk requires a risk premium for investors. Since the risk of both debt and equity not getting paid increases, the premium also increases. Thus, both issues require an ever increasing risk premium.

Week 9.b notes **Chapter 18 – How much should a corporation borrow**

- If debt policy is irrelevant, then actual debt ratio should vary randomly between firms yet we don't see that
- High tech companies mainly equity whilst hotels etc are debt
- This is because we assume bankrupts is cheap and quick and that no taxes present
- There are legitimate financial distress cost
- Ignore conflicts between old and new creditors and debt vs equity holders
- What happens to old creditors when new debt is issued
- Information content when issuing debt vs equity

Adding corporate taxes back into the model

- Interest that company pays on debt is tax-deductible expense
- Tax shield present. **Depends on corporate tax rate and ability to earn enough to cover debt.**

$$PV(Tax\ shield) = \frac{Interest\ payment * Tax\ rate}{R_D}$$

$$Since\ interest\ payment = R_D * D = return\ on\ debt * amount\ borrowed$$

$$PV(Tax\ shield) = \frac{T_c R_D D}{R_d} = T_c D$$

- **Assumes**
  - **Amount of debt is fixed and stable over time**
  - **Tax rate is fixed**
  - **Personal tax rate on equity/debt income same**

- **If for n years:**

$$PV(Tax\ Shield) = \frac{T_c R_d D}{(1+r)^n}$$

- **Annuity**

$$PV(Tax\ shield) = \frac{T_c R_d D}{R_d}\left[1 - \frac{1}{(1+r_d)^n}\right]$$

- This does not hold if firm does not plan on borrowing a **permanent fixed amount (perpetuity)**
- **Make sure to discount by the cost of debt and marginal corporate tax rate**
- If not the case, use annuity formula

- A firm should borrow money to reduce tax bill and therefore increase cash flows to debt/equity investors

- After tax value of firm goes up by the PV(Tax shield)

MM + Taxes

Value of firm = value if all equity finance + PV(Tax shield) =

$$\boldsymbol{Value\ of\ firm = value\ if\ all\ equity\ finance + PV(tax\ shield)}$$

$$\boldsymbol{V_L = V_U + PV(T_C)D}$$

Value of firm = value if all equity finance + PV(Tax shield) =

MM proposition 1 states then:

1) **Capital structure can affect firm value due to tax shield**
2) **Raising debt-equity ratio allows firm to lower taxes and raise value**
3) **Firm value is maximized with 100% debt**

Why not then just go for 100% debt financing?

- **The reason we don't go out for 100% debt is because we can't assume perpetual debt. Ability to carry debt changes over time as profits change**
- **Some firms don't face marginal tax rates at 35%**
- **Can't use interest tax shields unless no future profits to shield**

So how do firms with low debt (and therefore tax shields) survive?
2 ways:

1) **Corporate and personal tax. What reduces tax more?**

- Firms need to also minimise tax paid on all sorts of taxes including personal
- Therefore, need to decide how to pay out
- We look at taxes paid by bondholders and equity holders
- There is personal tax on interest (Tp) and tax on equity income (Tpe)
- Capital gains tax can be deferred too (Tc)
- This depends then on mix of dividends + capital gains

$$\text{Relative tax advantage of debt} = \frac{1 - T_p}{(1 - T_{pE})(1 - T_c)}$$

- **1 – Tp is corporate borrowing so if this is better, this should be larger**

$$\boldsymbol{Effective\ personal\ equity\ tax = (1 - T_{dividend} * dividend) + (1 - T_{capital\ gain} * capital\ gain)}$$

- **The effective personal equity tax can be smaller than the personal interest tax**
- Firm should rearrange capital structure such that to maximise after-tax income
- Relative tax advantage of debt over equity
- **If value > 1; then debt is better. If <1; equity is better**
- **Top half is debt tax whilst bottom half is equity tax**

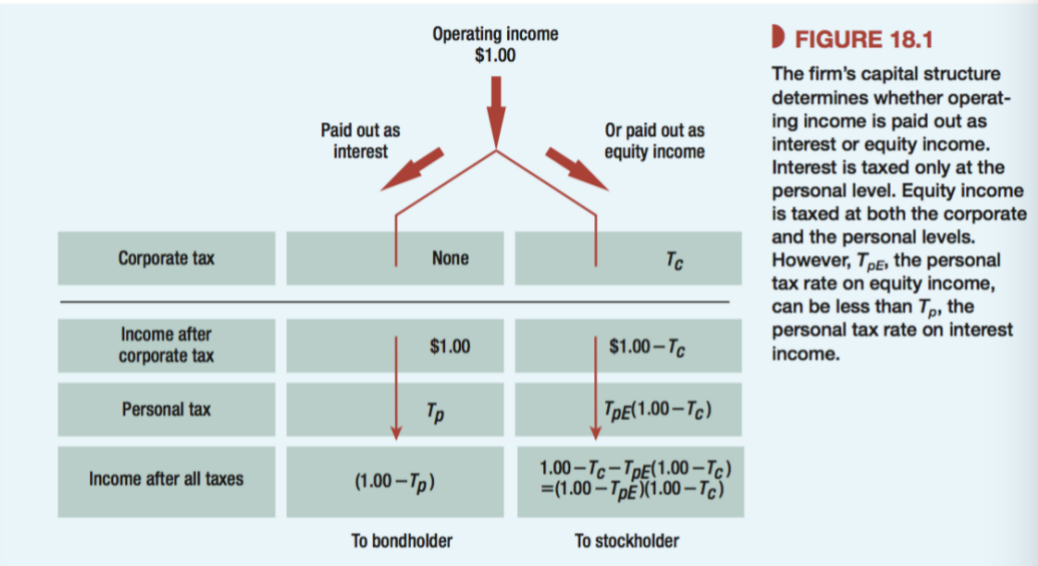


FIGURE 18.1

The firm's capital structure determines whether operating income is paid out as interest or equity income. Interest is taxed only at the personal level. Equity income is taxed at both the corporate and the personal levels. However, T_{pE}, the personal tax rate on equity income, can be less than T_p, the personal tax rate on interest income.

- Interest taxed at only personal level
- Equity income is taxed on both corporate and personal leve

- **If debt and equity income were taxed at same rate, Tp = Te then:**

$$\text{Relative advantage} = \frac{1 - T_p}{(1 - T_{pE})(1 - T_c)} = \frac{1}{1 - T_c}$$

- Relative advantage only depends on corporate tax rate
- This is consistent with MM theory. We don't need to assume away personal tax, we just assume they are identical
- Personal tax rate does not matter

- **If corporate and personal tax rates cancel out to make debt policy irrelevant then:**

$$1 - T_p = (1 - T_{pE})(1 - T_c)$$

- This only happens if:
    - Corporate tax rate Tc < personal tax rate Tp
    - Personal tax rate on equity income is small
    - Tax shield on debt offsetted by higher personal tax paid on interest income

- Hard to calculate Tpe since investors have different tax rates
- Tp is also the same issue
- Also, different lenders will need different compensation returns. Those that have higher taxes vs those who don't, will require higher debt returns to make it worthwhile to lend
- **Therefore, to determine net tax advantage of debt, we need to know tax rate faced by *marginal investor***
    - This is an investor who is equally happy to hold either debt OR equity

- **To calculate Tpe (tax on equity income, we need to consider both the tax paid on deferred capital gain and tax paid on dividends)**

To determine the net tax advantage of debt, companies would need to know the tax rates faced by the *marginal* investor—that is, an investor who is equally happy to hold debt or equity. This makes it hard to put a precise figure on the tax benefit, but we can nevertheless provide a back-of-the-envelope calculation. On average, over the past 10 years, large U.S. companies have paid out about half of their earnings. Suppose the marginal investor is in the top tax bracket, paying 35% on interest and 15% on dividends and capital gains. Let's assume that deferred realization of capital gains cuts the effective capital gains rate in half, to 15/2 = 7.5%. Therefore, if the investor invests in the stock of a company with a 50% payout, the tax on each \$1.00 of equity income is $T_{pE} = (.5 \times 15) + (.5 \times 7.5) = 11.25\%$.

Now we can calculate the effect of shunting a dollar of income down each of the two branches in Figure 18.1:

	Interest	Equity Income
Income before tax	\$1.00	\$1.00
Less corporate tax at $T_c = .35$	0	.35
Income after corporate tax	1.00	.65
Personal tax at $T_p = .35$ and $T_{pE} = .1125$	.35	.073
Income after all taxes	\$ .65	\$.577
	Advantage to debt = \$.073	

The advantage to debt financing appears to be about seven cents on the dollar.

$$\frac{1 - T_p}{(1 - T_c)(1 - T_{pe})}$$

$$\frac{1 - .35}{(1 - .1125)(1 - .35)} = 1.27$$

Therefore better for debt financing

Modified form of MM proposition 1 to include person tax so PV of tax shield changes:

$$V_L = V_U + T_c D$$

But we see that:

$$V_L = V_U + [1 - \frac{(1 - T_{pE})(1 - T_c)}{(1 - T_p)}]D$$

Where top half is from equity and bottom half from debt and the whole term is value of tax shield

If ratio is 0.8, then adding \$1 of debt leads to value of firm increasing by \$0.20

If ratio is 1, using debt or equity does not affect value of firm

If ratio is 0, adding \$1 of debt leads to value of firm increasing \$1 (since all of equity taxed away)

2) Costs of financial distress

- Financial distress occurs when difficulty in paying creditors

- Therefore, if firms becomes involved in financial distress, that needs to be incorporated into the valuation of the firm:

$$\boldsymbol{Firm\,Value = Value\ equity\ financed + PV(Tax\ Shield) - PV(Cost\ of\ financial\ distress)}$$

- PV(Cost of financial distress) depends upon probability of distress and magnitude of costs encountered if distress occurs
- Tradeoff between tax benefits and cost of distress determines optimal capital structure

Tradeoff Theory

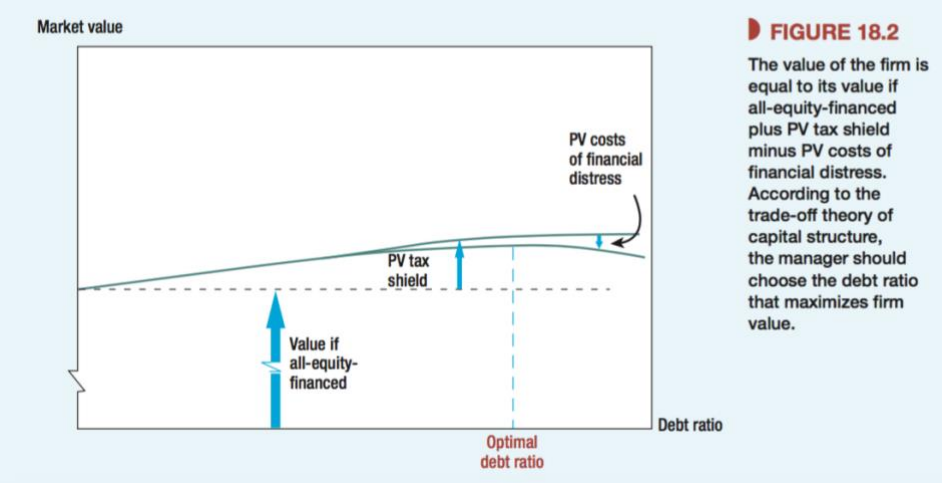


FIGURE 18.2
The value of the firm is equal to its value if all-equity-financed plus PV tax shield minus PV costs of financial distress. According to the trade-off theory of capital structure, the manager should choose the debt ratio that maximizes firm value.

- Initially, PV of tax shield outweights distress likelihood
- Eventually, distress becomes quite likely, and tax advantage of additional debt disappears
- Cost of financial distress eventually starts reducing value
- **Additionally, tax shield is only valuable if firm has profits to get tax shields from**
- Tax adv of additional debt also dwindles to 0
- **This is known as tradeoff theory**

What are the sources of costs of financial distress?

- **Bankruptcy cost**
    - Shareholders has right to default so they can walk away and leave troubles to creditors. This lead to corporate bankruptcy
    - This right is valuable as it allows equity holders to walk away and leave troubles to creditors
    - **Bankruptcy is the result of a decline in value**

    - Bankruptcy is a legal mechanism allowing creditors to take over when a firm defaults and the costs of using this mechanism is known as **bankruptcy costs**

- Combined payoff of limited liability equity holders + bondholders = combined payoff of unlimited liability equity holders + bondholders

Analogy:
'When a person dies, it is not the implementation of their will which is the cause of death'

Bankruptcy costs are the costs of using this bankruptcy mechanism

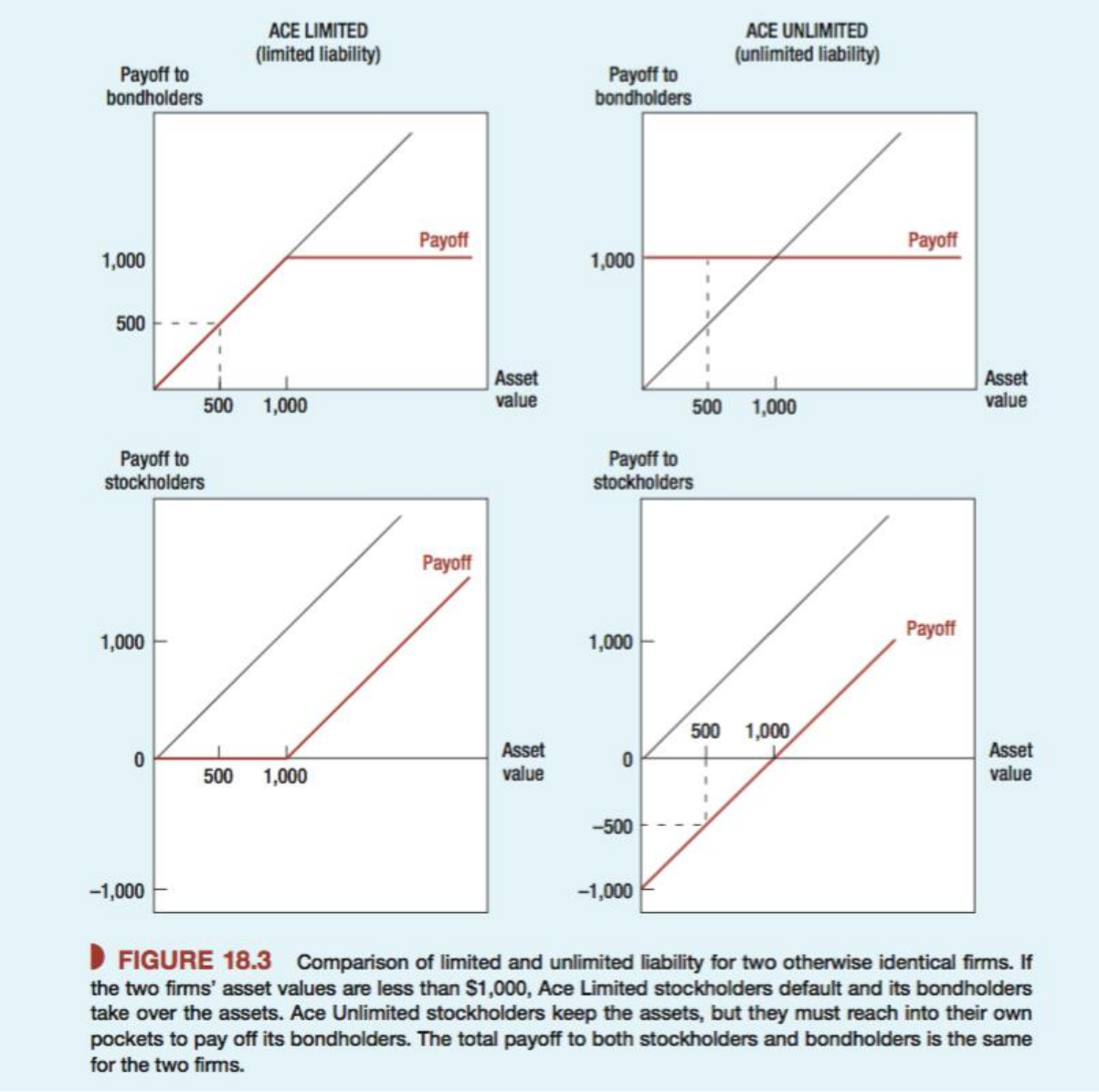


FIGURE 18.3 Comparison of limited and unlimited liability for two otherwise identical firms. If the two firms' asset values are less than $1,000, Ace Limited stockholders default and its bondholders take over the assets. Ace Unlimited stockholders keep the assets, but they must reach into their own pockets to pay off its bondholders. The total payoff to both stockholders and bondholders is the same for the two firms.

- **We can see payoffs to bond/equity holders are identical if firm has both limited and unlimited liabilities**
- However, debt in 1st scenario is worth less since you only get $500 in case of firm default whilst 2nd scenario, you see that debtholder gets full $1000 back
- **Therefore, since combined payoffs are equal, value of firms should be equal**
  - The equity side of ace limited is worth more

    - The debt side of ace unlimited is worth more
    - **These cancel out so the firms are of equal value**

However, there are also bankruptcy fees like lawyers which reduces the payoff for debt holders in Ace limited

- Therefore, by issuing risky debt, the company has also allowed lawyers etc a claim on the firm in the case if it defaults
- Market value of firm is reduced by this claim
- So if a firm borrows more, increases probability of default, and increases the value of lawyers' claim. This reduces the value of the firm from:

$$Firm\ Value = Value\ equity\ financed + PV(Tax\ Shield) - PV(Cost\ of\ financial\ distress)$$

- **Therefore, creditors demand higher returns in the case firm does not payoff and this then reduces the payoff for stockholders and reduces market value of their shares**

<u>Financial Distress Cost</u>

Bankruptcy cost

- **Direct cost of bankruptcy**
    - Legal and administrative costs of bankruptcy

- **Indirect cost of bankruptcy should be considered too**
    - Difficult of managing a company undergoing liquidation or reorganisation

Costs of financial distress short of bankruptcy

- Creditors may be reluctant to seize assets as they rather help company get back to its feet
- Additionally, if bankruptcy, this may means course set aside some money for stockholders too. So they rather have the firm back to health and pay them back in full first
- The mere threat of financial distress can be costly as suppliers and customers are cautious in dealing with the firm. Employees may also leave
- Managers may play games and take risks
- Issuing fine print to deal with these problems cost money and reduce opportunities

Companies with safe and tangible assets should have higher debt ratios

Firms can't always be at optimal level due to costs of adjusting cap structure

Debt and incentives

- **Conflicts of interest between stockholders and debt holders**
- Equity holders take more bets in order to hope firm recovers. Gambles with creditors money on projects that hopefully will work
- Stockholders gain if this pays off

Equity holders can play a few games as a result in case of financial distress:

- **Risk shifting**
    - Managers trying to act in shareholder interests' will take very risky bets. Financial creditors will see loss in value for them. Temptation to play is high when odds of default is high. Managers may take on negative NPV projects (with the option of being profitable) as risk

- **Refusing to contribute equity capital**
    - If firm in distress, issuing more equity and injecting capital into firm will cause bondholder's stake to increase since probability of default is smaller.
    - So a manager may put in $10 of capital but only gain $7 from increase in market value
    - Any increase in value of firm is shared among bond and stock holders. Therefore, not in stockholder's self interest to contribute fresh equity capital

- **Cash in and run**
    - stockholders reluctant to put money in but happy to take money out of a financially distressed firm (like in the form of cash dividend)

- **Playing for time:** Stockholders delay creditors salvaging things. They can conceal things via accounting, etc

- B**ait and switch:** start with a conservative amount of debt and then take on a lot more. Makes debt risky and impose capital loss on old bondholders. This is a gain for stockholders. Eventually puts the firm into debt

These are all agency costs. The more a firm borrows, the more temptation there is to play games and more poor decisions

Cost of distress varies with the type of asset. Sometimes easy to restructure and reorganise everything e.g. easier to recapitalise a hotel company vs electronics company

- Additionally, costs money to issue complex debt contracts and also for lender to monitor firm's performance
- Lenders demand higher interest rates as a result (**monitoring costs**)
- They also place constraints on firms to prevent risk-shifting game, which may make them from pursuing good investment opportunities
    - Lenders may veto high risk projects even if NPV is positive

From all this:
- Firms vary in debt ratios with stable firms having higher debt ratios
- However, due to costs in adjusting debt ratios, firms will not necessarily be at optimum level of ratio

Review of tradeoff theory

- **Optimal capital structure reached when MB from tax shield = MC of distress**
- Helps to explain why some industries use lots of debt and some don't

- Still doesn't explain why some firms still thrive with little debt. The most profitable companies borrow the least
- **Profitable companies, will have profits in which they can utilise tax shields to beneft from**
    - High profits means firms can service higher debt ratio and should therefore have higher ratios
    - Debt ratios are still the same rate during times when tax rates were 0, which eliminates the value of tax shields

Pecking order theory:

- Starts with asymmetric information between manager and potential investors
- Information is signalled from choice of financing
    - Selling shares can mean 2 things:
        - Current equity is overvalued
        - Firm not optimistic about future
- Order of this:
    - **Internal**
    - **Cut dividends –** adapt dividends ratio to ensure they can meet investment projects, whilst trying to avoid sudden changes
    - **Debt financing –** this is considered the safest form. However, this can lead to financial distress costs to rise
    - **Hybrid securities**
    - **Equity financing**

- In pecking theory, tax shields benefits aren't as important

- However, not always asymmetric information. Sometimes equity or else it shows financial distress

    - This still depresses stock prices regarding financial distress
- Keep a safe debt/equity ratio
- Asymmetric info can explain more debt vs equity being issued
- Here, ratio of structure changes depending on imbalance of cash flow net of dividends

4 factors affecting firms to have higher debt ratios:

1) Bigger size – able to finance more
2) More Tangible assets. More collateral. Less financial distress
3) Low profitability. Less financing and need to borrow more
4) Low Market to book or else better to issue expensive equity. Value firms face lower cost of capital to borrow. This can also be interpreted as profitability. Growth firms have overvalued stocks and therefore more likely to issue equity and therefore have less debt ratio

Case can be argued for both pecking order and tradeoff theory

- Pecking order theory works better for large stable firms with access to capital
    - Rarely issue equity
    - Uses mainly internal funds
    - Resort to capital markets if needed
- Smaller younger growth firms resort to equity issuing

- Companies can also use market timing techniques in order to issue more equity and make more money (taking advantage of investors' overconfidence and optimism). Popular companies are able to issue more equity and therefore have lower debt ratios

- **Financial slack** is valuable as you have access to financing. Ensure company has financing for available investments

- Too much financial slack may encourage firms to empire build, expand perks, or be complacent. Not returning it back to stockholders and worsen agency theory

How much leverage adds in value to unlevered firm per $ debt

$$1 - \frac{(1 - T_c)(1 - T_{pe})}{1 - T_p} \; D$$

- Remember, everything is done of market value
- Tradeoff theory seeks to explain leverage which takes place at market values
    - When we seek to retire debt, we do so at the market value
- Pecking order theory is based also on market values
    - Internal financing from reinvested earnings is based on current market values
    - Debt capacity is viewed from market value as it tells us how much we need to service the debt at current levels

Week 10 – Financing and valuation (Chapter 19)

Previously, we assessed value of projects by:

1) Forecast after tax cash flow
2) Asset project's risk
3) Estimate opportunity cost of capital
4) Calculate NPV using OCC as discount rate

- Now we want to include value contributed by financing decisions similar to what we did earlier
- 2 ways to do so:

1) **Adjust discount rate. Downward to account for tax shield benefits**
2) **Adjust present value: APV = base case value + value of financing side effects. First calculate as if all equity financed, then adjust base case for financing effects**

- Before we separated financing and investment decision and this used the MM assumption where financing decisions are irrelevant
- Decision to spend money separated from decision to raise money
- However, this can't be separated due to taxes and tax shields
- **When calculating WACC, use market values for D,E,V**

$$\text{WACC} = r_D(1 - T_c)\frac{D}{V} + r_E\frac{E}{V}$$

- WACC uses after tax cost of debt. This capture the value of interest tax shields
- **Formula is for the average project**
- **Based on firm's current risks to discount *future* cashflows**
  - This is fine as long as firm has same risks in the future
- Use market value when calculating WACC

For perpetual earnings

$$\boldsymbol{After\ tax\ interest = r_d(1 - T_c)D}$$
$$\boldsymbol{Expected\ equity\ income = C_f - After\ tax\ interest}$$
$$\boldsymbol{= C_f - After\ tax\ interest}$$

$$\text{Expected equity return} = r_E = \frac{\text{expected equity income}}{\text{equity value}}$$

- Equity value is just the amount of equity in the firm

- **When discounting by perpetual WACC, we assume**
  - Project risk same as other projects and remain so
  - Project uses same fraction of debt to value in capital structure

If either of these 2 not constant, then shareholders should ask for different level of equity expected return

Valuation of companies

2 steps to value a business:

1) **Free cash flows forecasted out to a valuation horizon and discounted (via WACC)**
2) **Horizon/terminal value is calculated and discounted back**

3 important things to remember:

1) **If discount at WACC, cash flows must be projected as you would for capital investment project. Don't deduct interest. Calculate taxes as if company was entirely equity financed.**
2) Companies are potentially immortal so we need a terminal value (perpetuity).
3) **Discount at WACC values assets and operations of the company.**
    a. **If we are valuing common stock (equity), then subtract value of outstanding debt from overall valuation of the company**

- Free cash flow is calculated before interest. It is amount of cash firm can pay out after making all investments necessary for growth
- Discount free cash flow at after tax WACC gives us debt+equity valuation
- Income calculated after various noncash expenses including depreciation. Add back depreciation to calculate free cash flow
- CAPEX and NWC affects free cash flows

Income	Free Cash Flow
Calculated after interest expense	Calculated before interest expense
Calculated after noncash expense including depreciation	Doesn't include things like depreciation (therefore need to add back in)
CAPEX and NWC doesn't appear on income statement	CAPEX and NWC reduces FCF, so we need to consider this too

Free cash flow = Profits after Tax + Depreciation – Investment in fixed assets - NWC

(No need to consider financing aspect, we do that later)

		Latest Year	Forecast						
		0	1	2	3	4	5	6	7
1	Sales	83.6	89.5	95.8	102.5	106.6	110.8	115.2	118.7
2	Cost of goods sold	63.1	66.2	71.3	76.3	79.9	83.1	87.0	90.2
3	EBITDA (1–2)	20.5	23.3	24.4	26.1	26.6	27.7	28.2	28.5
4	Depreciation	3.3	9.9	10.6	11.3	11.8	12.3	12.7	13.1
5	Profit before tax (EBIT) (3–4)	17.2	13.4	13.8	14.8	14.9	15.4	15.5	15.4
6	Tax	6.0	4.7	4.8	5.2	5.2	5.4	5.4	5.4
7	Profit after tax (5–6)	11.2	8.7	9.0	9.6	9.7	10.0	10.1	10.0
8	Investment in fixed assets	11.0	14.6	15.5	16.6	15.0	15.6	16.2	15.9
9	Investment in working capital	1.0	0.5	0.8	0.9	0.5	0.6	0.6	0.4
10	Free cash flow (7 + 4 – 8 – 9)	2.5	3.5	3.2	3.4	5.9	6.1	6.0	6.8
	PV free cash flow, years 1–6	**20.3**							
	PV horizon value	**67.6**			(Horizon value in year 6)			113.4	
	PV of company	**87.9**							
	Assumptions:								
	Sales growth, %	6.7	7.0	7.0	7.0	4.0	4.0	4.0	3.0
	Costs (percent of sales)	75.5	74.0	74.5	74.5	75.0	75.0	75.5	76.0
	Working capital (percent of sales)	13.3	13.0	13.0	13.0	13.0	13.0	13.0	13.0
	Net fixed assets (percent of sales)	79.2	79.0	79.0	79.0	79.0	79.0	79.0	79.0
	Depreciation (percent of net fixed assets)	5.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
	Tax rate, %	35.0							
	WACC, %	9.0							
	Long-term growth forecast, %	3.0							
	Fixed assets and working capital								
	Gross fixed assets	95.0	109.6	125.1	141.8	156.8	172.4	188.6	204.5
	Less accumulated depreciation	29.0	38.9	49.5	60.8	72.6	84.9	97.6	110.7
	Net fixed assets	66.0	70.7	75.6	80.9	84.2	87.5	91.0	93.8
	Net working capital	11.1	11.6	12.4	13.3	13.9	14.4	15.0	15.4

TABLE 19.1 Free-cash-flow projections and company value for Rio Corporation ($ millions).

After finding the PV of the free cash flows, we have found the value of the company

When we found the value of the company, if we want the equity, we need to subtract value of debt
Value of company = total value of equity + total value of debt

We can then divide the equity by number of shares to get value per share

- After calculating a value, compare PE multiples and ratios of market to book value of comparables
- Are the revenues realistic etc
- Sometimes business is worth more if it's liquidated

- WACC allows us to pick up interest tax shield effects and thus find company value. We then subtracted debt to find equity value

- If we want to find equity value, we can **discount cash flows to equity after interest and tax (cost of equity capital)**
- **This is the flow-to-equity** method
    - if **debt ratio** is constant over time, flow to equity method gives same value as WACC method and subtracting by debt

- In the case multiple sources of debt

$$\text{WACC} = r_D(1 - T_c)\frac{D}{V} + r_P\frac{P}{V} + r_E\frac{E}{V}$$

- Only consider long term debt, not short term debt (if this debt is temporary). However, if short term debt is permanent, then consider it
- Also include short term debt in WACC calculations if:
    - Short term debt is at least 10% of total liabilities
    - Net working capital is negative

Capitalization = Long term financing = Long term debt + long term equity + preferred stock

Make sure that if you use WACC, that the debt/equity proportions is same to what firm has

Unlevering WACC to calculate opportunity cost of capital since a project's financing can differ to a firm's financing

If project is completely equity financed, WACC = Re = OCC
Now if we increase debt, cost of equity increases but WACC declines

FIGURE 19.1

This plot shows WACC for the Sangria Corporation at debt-to-equity ratios of 25% and 67%. The corresponding debt-to-value ratios are 20% and 40%.

eXcel

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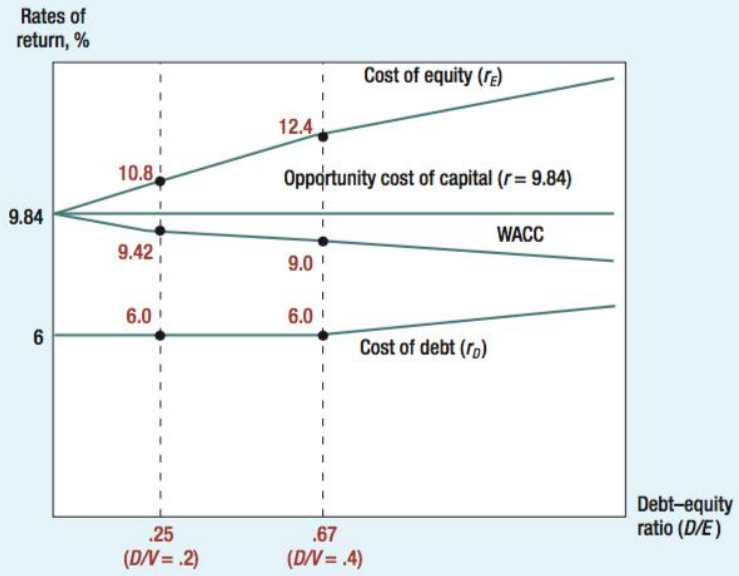

- It falls because of tax shields benefits
- **If no tax shields, then WACC would be constant**

3 steps to unlevering:

FIGURE 19.1

This plot shows WACC for the Sangria Corporation at debt-to-equity ratios of 25% and 67%. The corresponding debt-to-value ratios are 20% and 40%.

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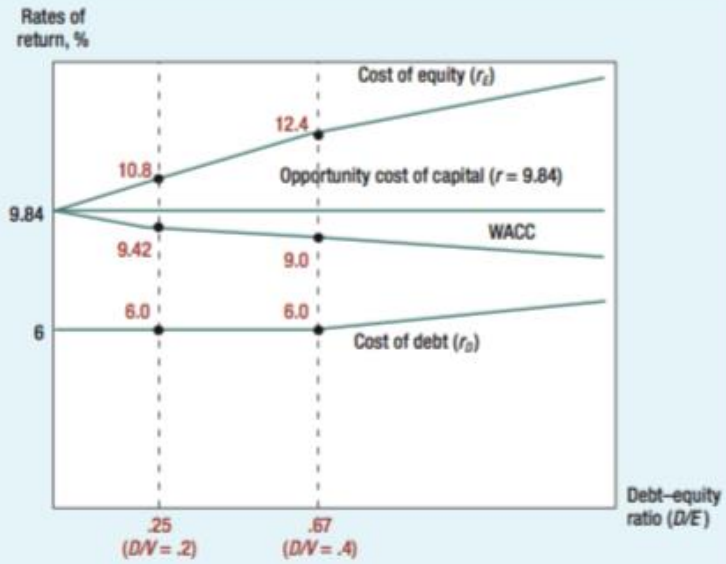


Notice that opportunity cost of capital is always constant since it is the rate of return of a company that is completely equity financed (unlevered). We use this a base point for step 1 to then help us calculate WACC at different levels. OCC is same as WACC but without tax shield benefits, which is why WACC is below OCC in this graph.

Method 1: WACC Method

(First case if haven't done so, find out what original WACC was which includes taxes)

1) Calculate OCC by calculating WACC and cost of equity at 0 debt. If **no tax**, WACC = OCC and independent of leverage. **We unlever the tax because we want to calculate OCC without tax effects**

$$OCC = r = r_d \frac{D}{V} + r_e \frac{E}{V}$$

- If no tax, WACC = opportunity cost of capital and independent of leverage
- **Here, the equity is unlevered (since there is 0 debt which then gives us 0 cost of capital)**

2) Estimate cost of debt at **new debt ratio** and **calculate new cost of equity at this level. On the graph, we are on the Opportunity cost of capital line, and to go up to cost of equity line, we need to add in a risk premium for different levels of debt. First we need to find cost of debt at this new level, and with that, we can estimate cost of equity**

$$r_e = r + (r - r_d)\frac{D}{E}$$

(MM proposition 2)

The equity here is levered equity since needs to be compensated for adjustments in debt-equity structure. r here can be seen as value of unlevered equity

Assumes continuous rebalancing

If there is taxes though:

3) Recalculate using new Re, Rd, and weights using WACC formula for new WACC at our new point in the graph

$$r_{new} = WACC_{new} = (1 - T_c) r_d \frac{D}{V} + r_e \frac{E}{V}$$

Method 2: Beta

1) We need to get an estimate for asset beta (asset beta is weighted average of beta)

$$\beta_A = \beta_D(D/V) + \beta_E(E/V)$$

2) We can then recalculate what is equity beta at new debt/equity ratio whilst debt beta and asset beta is constant

$$\beta_E = \beta_A + (\beta_A - \beta_D)D/E$$

Beta of debt is generally 0

3) Recalculate what return on equity is with the new equity beta

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

Note that both methods should give us same result

Note that:

$$\boldsymbol{Opportunity\ cost\ of\ capital = r = r_f + \beta_a(r_m - r_f)}$$

- These allow for adjustment in debt/equity ratios but if we have differences in business risk, we need to adjust the opportunity cost of capital itself

Rebalancing

- Need to remember to rebalance
- If company does well and market value increases, that means company needs to increase and have more debt to keep equity-debt raito constant
- Calculating WACC assumes capital structure does not change in the near future
- If they do this, WACC does not work
- **If firm decides to pay off debt or dramatically change capital structure, NEED TO RELY ON THE APV METHOD IN THIS SCENARIO**

We can also use this method if debt ratio not constant

- **MM considered a company with perpetual stream of cashflows financed with fixed perpetual debt**

$$r_{MM} = r(1 - T_c \frac{D}{V})$$

- **To unlever, set D/V = 0**
- NOTE: We can only use this if debt ratio changes but the level of debt itself is constant

- If we want to remove assumption of continuous rebalancing, and have it so that the firm rebalances only once a year, then use **Miles Ezzell formula**

$$r_{miles\ ezzell} = r_a - \left(\frac{D}{V}\right) r_d T_t \left(\frac{1 + r_e}{1 + r_d}\right)$$

- Here, next year's tax shield which depends on this year's debt is known

Adjusted Present Value

- Divide and conquer method
- **WACC only captures one financing effect: tax shields. If there are numerous financing effects, use APV**

1) First establish a base case value for project/firm as if all equity financed venture
    a. Discount rate for this is opportunity cost of capital
2) Then look at financing side effects

$$\textbf{APV} = \textbf{Base case NPV} + \textbf{Sum of PVs of financing side effects}$$

- **Most important financing side effect is interest tax shield on debt supported by project**
- **Need to consider the issue cost of securities**
- **Financing packages subsidised by government**

With this new strategy, is base NPV is positive, but financing side effect is negative, we can look around and see if there is any other way to finance this profitable project

USE OPPORTUNITY COST OF CAPITAL, NOT WACC SINCE NO TAX SHIELDS EFFECT

Example (pg 496 with 492 and 493 for background):

Sangria:

- WACC is 9%
- Debt is 40% of future value of firm (similar assumption as WACC version of this)
- Risk of tax shield is same as risk of project so

$$\beta_{tax\ shield} = \beta_{asset}$$

- **This means we can discount tax shields by OCC**
- Unlevered WACC = 9.84%

- Looking at base case NPV = $-1.067 million

- If we had debt of $5 million with 6% borrowing rate and 35% tax rate, annual tax shields are: $5 million * 6% * 0.35 = $105,000 perpetuity (**assuming firm is constantly rebalancing debt to keep same debt *ratio*)**

- Then PV of this tax shield, **discount by OCC**

105,000/9.84% = $1.067 million is PV(tax shield)

APV IS THEREFORE:

APV = Base Case NPV + PV(Tax shield) = -1.067 + 1.067 = 0

- However, we can then decide to use different discount rate for tax shield if we decide to keep same **level** and not ratio of debt
- **We can then use the return on debt discount rate**

105,000/0.06 = $1.75 million
This means through APV method:
-1.067 + 1.75 = $.683 million

- **With fixed debt, interest tax shields are safe and worth more**
  - Intuition is that, debt is constant and less risky. Can discount at lower rate which is Rd which is less than risk of project (WACC)
  - However, fixed debt is not necessarily safer as if project fails, it affects the firm's other assets
  - **Additionally, fixed levels of debt ratio makes us more certain on what future tax shields will be and therefore allow us to discount it**

- **We can also allow for other financing side effects**

1) Suppose project finances project by debt + equity
2) Issue $7.5 million equity at 7% cost and $5 million of debt at 2% cost
3) Tax shield = (5 million * 2% * 35%) = $0.035 million then
   a. PV(tax shield) = 0.035/0.02% = $1.75 million perpetuity
   b. Cost of debt is: $5*0.02% = $.1 million
4) Cost of equity
   a. $7.5*0.07 = $.525 million

New APT value = Base Case + PV(tax shield) – cost of equity – cost of debt
-1.067 + 1.75 -.525 - .1 = $0.058 million

APV very useful when financing side effect are numerous and important
APV should be used when project's level of debt is known throughout its lifetime
APV for valuing businesses allows us to explore implications for different financing strategies without having to reconstruct a new WACC

$$\beta_E = \beta_A + (\beta_A - \beta_D)D/E$$

where β_E is the equity beta, β_A is the asset beta, and β_D is the beta of the company's debt. The asset beta is a weighted average of the debt and equity betas:

$$\beta_A = \beta_D(D/V) + \beta_E(E/V)$$

- Investment projects are not separately financed. Should focus on project's contribution to firm's overall debt capacity. Even if you can borrow a loan for that project, you are still borrowing against your existing assets and other projects

    - However, if a project's financing structure is significantly, different to rest of company, then you can relever as seen earlier.
- If differences in business risk, change the opportunity cost of capital
- Always use marginal corporate tax rate when calculating WACC
- Discount rate is adjusted for only corporate taxes

Debt capacity – How much business chooses to borrow against project/ongoing business

Summary
- WACC method assumes for projects that are identical to the firm
- Assume firm keeps market debt ratio constant
- Only assumes financing matters because of interest tax shields
    - If can't assume, use APV method
    - Calculate NPV of base case as if financing does not matter and discount via opportunity cost of capital
    - Calculate PV of relevant financing side effect and add that to base case

- **APV allows us to see where the money and value is**

Total market value = Debt market value + equity market value

$$\boldsymbol{Internal\ rate\ of\ return = -cost + \frac{Cash\ flows}{IRR} = 0}$$

Internal rate of return is a discount rate that makes the NPV of a project = 0

Lowering debt-equity ratio changes: financing proportion, return on equity/debt, and effective tax rate

Example questions:

34. A firm has zero debt in its capital structure. Its overall cost of capital is 8%. The firm is considering a new capital structure with 50% debt. The interest rate on the debt would be 5%. Assuming that the corporate tax rate is 40%, its cost of equity capital with the new capital structure would be?

$$\textbf{Overall cost of capital} = \textbf{equity return unlevered}$$
$$= \textbf{cost of equity}\left(0\frac{\textbf{debt}}{\textbf{equity}}\textbf{ratio}\right)$$
$$r = 8\%$$

At the ratio of 1(D/E), the return on equity at this point is:

$$r_e = 8 + (8 - 5)(1) = 11\%$$

35. The Marble Paving Co. has an equity cost of capital of 17%. The debt to equity ratio is 1.5 and a cost of debt is 11%. What is the cost of equity if the firm was unlevered? (Assume a tax rate of 33%)

2 methods

$$r_e = 17\% \; is \; at \; the \; point \; where \frac{d}{e} = 1.5 \; but \; we \; want \; to \; get \; either \; r$$
$$(since \; that \; is \; cost \; of \; equity \; for \; unlevered \; firm)$$
$$\boldsymbol{or}$$
$$at \; the \; graph \; where \; r_e \; passes \; through \; the \; y$$
$$- axis \left(\frac{d}{e} = 0\right) which \; is \; again \; unlevered \; return \; on \; equity \; since \; 0 \; debt$$

1)

$$\boldsymbol{r_e = r_a + (r_a - r_d)\frac{D}{E}}$$
$$\boldsymbol{17 = r_a + (r_a - 11) * 1.5}$$
$$\boldsymbol{2.5 r_a = 33.5}$$
$$\boldsymbol{r_a = 13.4\%}$$
$$\boldsymbol{r_e = r_a + (r_a - r_d)\frac{D}{E}}$$
$$\boldsymbol{r_e = r_a \; since \frac{D}{E} = 0}$$
$$\boldsymbol{r_e = 13.4\%}$$

2)

$$\boldsymbol{r = r_e\left(\frac{E}{V}\right) + r_d\left(\frac{D}{V}\right)}$$
$$\boldsymbol{r = 17\left(\frac{2}{5}\right) + 11\left(\frac{3}{5}\right)}$$
$$\boldsymbol{r_a = 13.4\%}$$

Valuation steps:

1) **Calculate EBITDA (Revenue – COGS)**
2) **Calculate EBIT (EBITDA – Depreciation)**
3) **Calculate (1-T)EBIT**
4) **Calculate Free cash flow = (1-T)EBIT + Depreciation – CAPEX – change in NWC**
5) **Discount free cash flows to get market capitalisation**
6) **Find enterprise value by: EV = market cap – Debt outstanding**
7) **Find share price by: EV/Shares outstanding**

Week 11 –
Chapter 16 Payout Policy

Resolves 2 questions
1) How much cash to pay out to shareholders
2) Should it be in form of dividends or repurchasing shares

Dividends decided by board of directors
In ideal world, doesn't matter which way

Why should firms pay out dividends
Shouldn't pay out dividends unless confident it can be maintained
Repurchases are more flexible and do not convey much information to investors
Repurchases are tax-advantaged since capital gains have better rates

How much dividends to pay out
- Is business generating positive cashflows after investing in positive NPV projects
- Is this cashflow likely to continue
- How is the firm's debt ratio? Pay it down if its too high
- Do we have sufficient funds in the case of a bad times

$$Payout\ Ratio = \frac{Dividend\ per\ share}{EPS}$$

$$Dividend\ yield = \frac{Dividend}{Stock\ price}$$

Facts about payout

Dividend payments
- Stocks are bought or sold with dividends
- Sometimes can be supplemented by one off dividend
- **Stock dividends:** Send people x shares for every number of shares they own
    - **Similar to a stock split**
    - **Reduces value per share**

FIGURE 16.2 Exxon Mobil's first dividend in 2012.

Share buybacks
- **Companies buy shares back in 4 ways**
    - Announce they will buy it in open market
    - Tender offer where they offer to buy shares back at a premium

    - Dutch auction whereby firm states series of prices at which it wants to repurchase stock and buyers submit how many shares they wish to sell at each price
    - Direction negotiation with major shareholder

Information content of dividends and repurchases

- Managers reluctant to adjust dividends or having to resort to taking out loans or issuing more shares to pay it back
- Managers smooth dividends
- Managers focus on dividend changes rather than absolute dividend levels

This is due to information released from this

- Increase dividends means optimistic outlook for future
- Higher dividends causes rise in stock price
- They worry about change in dividend rather than level of dividends
- However, case study can be seen when JP Morgan cut its dividends yet we see share rise. JP acted from position of strength at GFC when still being profitable whilst other banks were making losses. Did it to prepare for worst case . Signal of confidence and not distress
- This means the company is not having extra cash whereby managers can be overinvesting or empire building

Information content of share repurchases

- Firms may still buyback to change capital structure or they have too much cash. Buyback shares at lower price
    - So buying them now signals shares are currently underpriced
        - However, also signals optimism about confidence in the future
        - Share prices jump

Left view of payout

- Repurchases are better since higher stock prices and capital gains taxed less

Right view of payout

- Investors pay more for firms with generous stable dividends

Central view

Assumptions from MM:

- **Indifference policy:** Investors are indifferent with the timing of payout of dividends
- Investment policy set before payout policy. So payout policy doesn't affect it
- Shares are sold at fair price

- No difference between the two
- MM proposition
- Dividend policy is value irrelevant in a world without taxes, transaction costs and other market imperfections
- Value of company only depends on earnings

- First need to hold dividend policy after holding firm's assets, investment and borrowing policy fixed
    - If reduce investing to pay out dividends, dividends and future profitability are cancelled out
- If you increase dividend without changing investment policy or capital structure, extra cash must comes from somewhere.
    - If holds borrowing fixed, then this is from selling or repurchasing shares

Repurchase share indicates to people that company believes these shares are undervalued and will go up in future. Lots of projects coming up possibly. Therefore, prices go up

- Firm can also pay lower dividends
    - With policy fixed, cash saved can be used to buy back shares (money from not paying out dividends)
    - Therefore, any changes in dividend payout is offset by sale/repurchase of shares

Rational Demiconductor Balance Sheet (Market Values, $ millions)

Surplus cash	$ 1.0	$ 0	Debt
Fixed assets and net working capital	10.0	11.0	Equity market capitalization (1 million shares at $11 per share)
	$11.0	$11.0	

- Market cap currently $11 million and if we pay out surplus cash $1 million

Rational Demiconductor Balance Sheet (Market Values after Payout, $ millions)

Surplus cash	$ 0	$ 0	Debt
Fixed assets and net working capital	10.0	10.0	Equity market capitalization
	$10.0	$10.0	

- We see market cap falls.
- **However, price per share depends on whether we paid it out as dividends or buybacks**
- If share buy back, uses $1million to buy 90909 shares at $11 each leaving it still at $11 ($10 million / 909,091 shares)
- If dividends, stock is worth $10 ($10 million divided by $1 million shares) + $1 dividend so total value is $11

Summary of this process

- Company pays out surplus cash

- Equity market capitalisation needs to fall to as a result
    - If share buyback occurred, calculate how many shares are left outstanding and divide market cap by that to get new price per share
    - If dividend payout was used, calculate price per share as before, and add the amount of dividend pay out

These 2 methods should give us the same result

- Repurchase does not increase stock price but avoids fall in stock price than would've occur if amount spend on repurchases were paid out as dividends (since stock is worth less after dividends)
- Repurchase also reduce number of shares outstanding, so future EPS rises
- Therefore, company repurchase if wants flexibility to cut back payout if investment opportunity arises
- Company pay dividends to assure stockholders its running a tight ship to prevent free cash flow problem

Dividends issued doesn't change the price of a stock whilst share buybacks pushes it up since market cap is constant whilst number of outstanding shares have fallen

If we have repurchases, how can we use DCF model since that requires dividends per shares (but number of dividends are changing)

2 valuation approaches for stocks when repurchases are important

1) Calculate market cap by forecasting and discounting free cash flow paid to investors
    a. First calculate future cash flows and discount it back
    b. This gives us our equity value or our equity market capitalization
    c. Calculate price per share by dividing by number of shares outstanding

2) Calculate PV of dividends per share taking account of growth rate of dividends per share by number of shares declining as they are repurchased

$$P = \frac{\text{DIV}_1}{r - g} = \frac{.50}{.10 - .05} = \$10$$

    - Cash flow used to repurchase shares offset via decrease in dividends is offsetted by free cash flow per share (since less shares)

Summary of this:

1) Absent tax effects and other market frictions means that it does not matter whether we pay out with dividends or buybacks
2) Using repurchases over dividend payouts reduces current dividends but increases future earnings and dividends per share
3) Make sure you don't double by including both forecasted dividend per share and buyback cash since if you sold your share, you don't get dividends

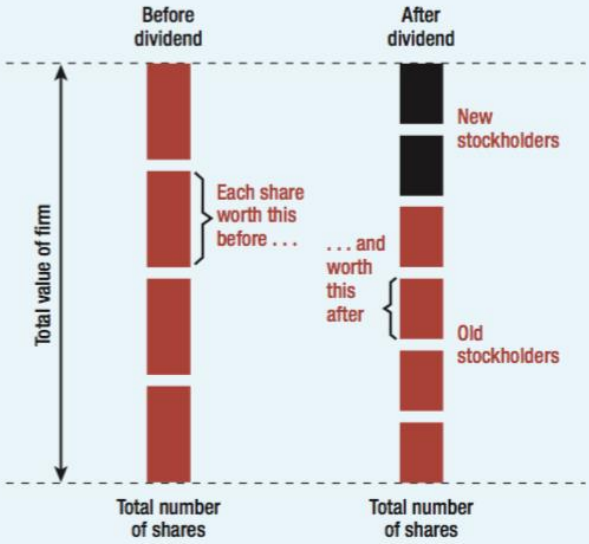
Transfer value

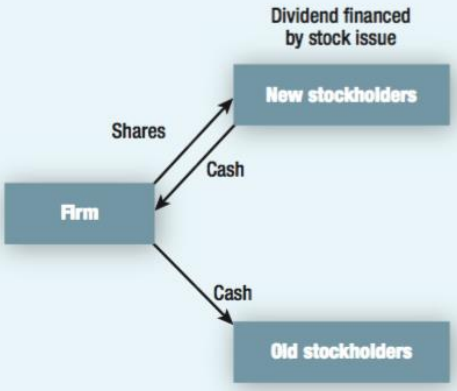
- If firms want to pay out higher dividends all else fixed, then they need to issue new shares. However, assets and firm's profitability has not changed. There is transfer of value from old to new stockholders. New holders get new shares each one worth less than before extra dividend was announced and old shareholders suffer capital

loss on shares. **Capital loss borne by old shareholders offsets extra cash dividends they receive**

FIGURE 16.4

Company Z pays out a third of its worth as a dividend and raises the money by selling new shares. The transfer of value to the new stockholders is equal to the dividend payment. The total value of the firm is unaffected.





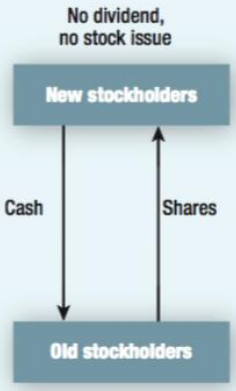


FIGURE 16.5

Two ways of raising cash for the firm's original shareholders. In each case the cash received is offset by a decline in the value of the old stockholders' claim on the firm. If the firm pays a dividend, each share is worth less because more shares have to be issued against the firm's assets. If the old stockholders sell some of their shares, each share is worth the same but the old stockholders have fewer shares.

- So if $2 dividend policy announced, share price falls ex dividend announcement to $9 (previously at $11)
- After paying out $1, they need to issue more shares to pay for this
- So stock price is at $9, so to raise $1 million to pay out extra $1 to previous $1 million shares, we need to issue 111,111 shares
- Our market cap is now: 1.111111 million * $9 = $10

Therefore, paying out extra dividends does not see increase in value for old shareholders since their capital gains from stock has fallen as a result.
No benefits from this since in efficient markets, if they wanted cash, they should be able to sell the stocks
Transfer of value from old to new shareholders
Therefore, investors should not worry whether they are getting dividends or share buybacks

Right view

- MM is unrealistic due to many assumptions regarding rational investors etc
- There is a tendency for people to prefer high payout stocks
    - For example some institutions requires to purchase stocks that have had a history of dividend payouts
- People prefer stocks that pay out dividends rather than selling small amount of the stocks ourselves
    - Easier to let us receive dividend income rather than have to decide for ourselves how much shares to sell etc
- People willing to pay more for stocks that have dividends
    - Investors who prefer cash dividends have a wide choice of dividend paying stocks
    - If supply of stocks sufficient to satisfy investors, then additional firms have no incentive to switch from repurchases to cash dividends
- People prefer cash to capital gains since these are certain unlike capital gains
- These is also information content released from dividend payouts
- **Biggest argument**
    - Paying out funds to shareholders prevent managers from misusing funds and free cash flow problem
    - This creates careful value-oriented investment policy

Left view

- They argue that dividends are taxed more heavily than capital gains so firms should pay lowest cash dividend they can get away with and instead repurchase shares
- If this is true though, 2 issues
    - **Why should companies ever pay dividends? Differences in tax rates between the 2 payout policies aren't that big now too, so why does that matter?**
    - Difference in taxation level may not matter
        - However, capital gain taxes can be deferred unlike dividend taxes. This lowers PV of tax liability.
        - Pension funds do not get taxed
        - Only corporations have a tax reason to prefer dividends since they pay corporate tax on the dividends since they pay income tax on only 30% of dividends received (which is 30% of 35%) whilst they have to pay full rate on capital gains tax
- **Empirical evidence on dividends and taxes**
    - Taxes affect investor's choice of stock
    - Companies in countries with low tax, are more willing to increase payout
- Stock prices fall by less than dividend amount ex dividend date if investors do not like dividend tax

34. If investors have a marginal tax rate of 20% and a firm has announced a dividend of $5;
A. The price of stock should decrease by $4 on the ex-dividend date

- Taxes are important but not the whole story

- Depends on the company too
- Small growth companies reinvest all earnings and pay noting out

- MM say that payout is a residual after other financial policies
  - When abundance of opportunities, firm shouldn't pay off and instead reinvest into projects
  - When mature company, less NPV projects and then they should start with payout
  - As firm ages, more payout is called for as company's future is stable

$$Expected\ yield = \frac{Dividend\ paid\ out}{Stock\ price}$$

- If tax considerations do matter, we expect high dividend paying stocks to have lower prices **and higher returns**
- However, what does it mean for a stock to be high yield?

Cash is surplus when these three criteria are met:

1. Free cash flow is reliably positive. Recall that free cash flow is the operating cash flow left over after the firm has made all positive-NPV investments.
2. The firm's debt level is prudent and manageable. Otherwise free cash flow is better used to pay down debt.
3. The firm has a sufficient war chest of cash or unused debt capacity to cover unexpected opportunities or setbacks.

- However, even if company pays out, if there are no good investment opportunities such as low interest rates, then no point
- Dividends taxed when distributed whilst capital gains can be deferred

- **MM states that dividends are residual payouts as a result of other of other financial byproducts**

Life cycle of firm

- Young: Don't pay out much. Use to invest in projects
- Maturing firm: Positive NPV projects become scarcer and therefore start paying out. Prefer dividends since it signals strong and reassuring sign of financial discipline (commitment of financial discipline can outweigh the tax cost)
- As firm gets really old, then needs to pay out more

Imputation System

- Shareholders receive franking credits with dividends, this is equal to corporate tax rate paid on income on which dividends are paid
- **Under this system**
  - Companies pay tax on net income at corporate tax rate
  - Distribute profits net tax, together with franking credit which is equivalent to amount corporation has paid

- Shareholder taxed on cash and franking credit received

Example

A company's income of $1 is paid out as an after-tax dividend. What is the shareholder's after-tax income if his tax rate is 45%?

		Classical	Imputation
Corporate level	Net income	$1.00	$1.00
	Company tax	0.30	0.30
	Cash dividend	0.70	0.70
Shareholder level	Taxable income	0.70	1.00
	Personal tax liability	0.32	0.45
	Franking credit	n.a.	0.30
	Tax paid	0.32	0.15
	After-tax income	0.38	0.55

- Here, under imputation, the investor gets franking credit equivalent to the company tax paid
- So they get $.70 in dividends + $.30 in franking credits = $1
- They then get taxed at 45% so they owe $0.45 however, franking credits is $0.3, so subtract that to get a **tax liability of $0.15**
- With the $0.7 dividend, they need to pay a tax of $0.15 on it and therefore: **final payout is $0.55**

The return on a share that pays a fully-franked dividend, before personal tax, can be stated as:

$$r_t' = (p_t - p_{t-1} + d_t + \gamma \cdot f_t)/p_{t-1}$$

where:

r_t' = after-company tax but before personal tax rate of return
p_t = price of the share in period t
d_t = cash dividend paid per share
f_t = dollar amount of tax (or 'franking') credits per share distributed at time t
γ = portion of the franking credit used to reduce personal tax

Deriving Miles-Ezzel formula which assumes rebalancing of once a year

For a one-period project to have zero APV:

$$APV = C_0 + \frac{C_1}{1+r_A} + \frac{(T_C \times r_D \times D)}{1+r_D} = 0$$

Rearranging gives:

$$\frac{C_1}{-C_0} - 1 = r - (T_C \times r_D)\left(\frac{D}{-C_0}\right)\left(\frac{1+r_A}{1+r_D}\right)$$

For a one-period project, the left-hand side of this equation is the project IRR. Also, (D/ $-C_0$) is the project's debt capacity. Therefore, the minimum acceptable return is:

$$r^* = r_A - (T_C \times r_D \times L)\left(\frac{1+r_A}{1+r_D}\right)$$

Week 12 -
Financial Planning – Chapter 29

Overview
- Short term planning (cash budgeting): Ensure firm does not run out of cash
- How to develop long-term coherent strategy

Short term assets (12 months or less)
- Inventory
- Accounts receivable
- Cash
- Marketable securities

Link between short term and long term financing decision
Financial planning is about which risks to take
Short term financial decisions differ from long-term in 2 ways
1) Involves short term assets and liabilities
2) Easily reversed on short notice

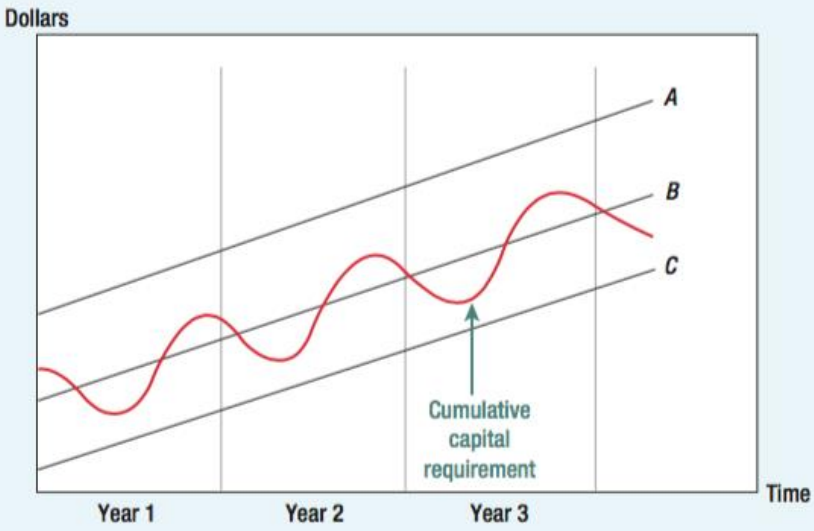


FIGURE 29.1
The firm's cumulative capital requirement (red line) is the cumulative investment in all the assets needed for the business. This figure shows that the requirement grows year by year, but there is some seasonal fluctuation within each year. The requirement for short-term financing is the difference between long-term financing (lines *A*, *B*, and *C*) and the cumulative capital requirement. If long-term financing follows line *C*, the firm always needs short-term financing. At line *B*, the need is seasonal. At line *A*, the firm never needs short-term financing. There is always extra cash to invest.

- Cumulative investment is asset needed for business
    - Short term financing is difference between long-term financing and cumulative capital requirements
    - **Long term financing is the straight line**

- Assets can be financed by long term or short term capital
- **Cumulative Capital Requirement: Total investment required**

- We use short term capital to make up difference between cumulative capital requirement and long-term financing

1) Most financial managers attempt to match maturities between assets and liabilities

2) Most firm make permanent investments in net working capital (financed from long term sources)

- Current assets easier to convert into cash compared to long-term assets
    - So firms with lots of current assets hold great liquidity
- Inventories are converted into cash when they are sold
- Accounts receivable are also liquid
- Issuing short securities are another form of liquid financing

- Companies that are rapidly growing may have more cash than they need for their projects, thus making them more liquid

    - Eventually, they can readjust by altering their payout policy

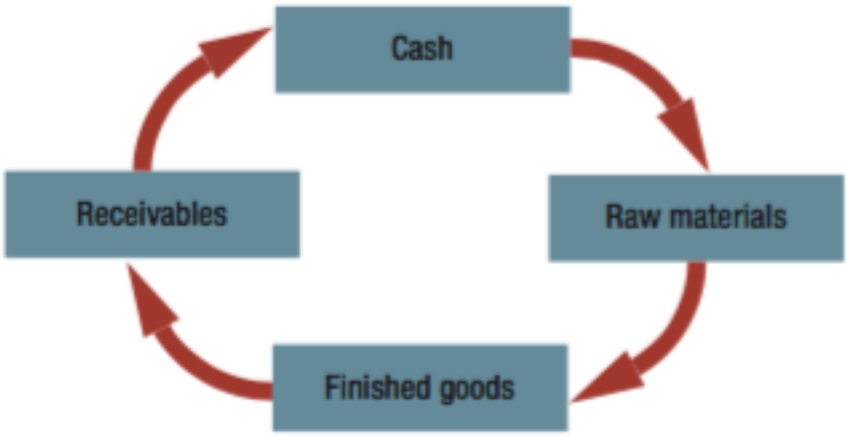
- Advantages for holding cash for small firms such as not needing to go to capital markets which can be expensive
- Drawbacks to surplus cash is that free cash flow problem

Cash flow statements classify cash flows from

1) **Operating activities**
    - **a.** Income earned
    - **b.** Depreciation (add cash back in since non-cash flow activity)
    - **c.** Releasing inventory by selling it (therefore generating a cashflow)
    - **d.** Increasing accounts payable (we borrow money so we have more cash)
    - **e.** Allowing cash receivable to grow (means they are lending cash to customers)
2) **Investing activities**
    - **a.** Issuing debt
    - **b.** Investing in gross fixed assets
    - **c.** Repaying debts
    - **d.** Purchasing securities
3) **Financing activities**
    - **a.** Paying dividends

To calculate cash flows from operating activities

- Start with net income
    - Add back in depreciation
    - Income statement shows sales and expenditure when they are made and not actually when cash changes hand (subtract). So we subtract cash from accounts receivable since we are ‘giving a loan’ to customers



- There is only 1 constant throughout these 4 steps: **working capital**
    - **This measures assets and liabilities. Unaffected by seasonal or temporary movements between different assets/liabilities**
    - However, it also hides a lot of information as different assets have different levels of liquidity

Cash cycle

- Calculate average time materials remain in inventory

$$\text{Average days in inventory} = \frac{\text{inventory at start of year}}{\text{daily cost of goods sold}} = \frac{130}{1{,}644/365} = 29 \text{ days}$$

$$\text{Average collection period} = \frac{\text{receivables at start of year}}{\text{average daily sales}} = \frac{125}{2{,}200/365} = 21 \text{ days}$$

We can also calculate the average time that it takes *Dynamic* to pay its bills:[8]

$$\text{Average payment period} = \frac{\text{payables at start of year}}{\text{daily cost of goods sold}} = \frac{110}{1{,}644/365} = 24 \text{ days}$$

To calculate COGS: Beginning inventory + purchases – Ending inventory (how much you have sold in that period)
Average collection period: How long it takes business to collect on its accounts receivables
Average days in inventory: How long a good spends in inventory
Average payment period: How long it takes your own company to pay off accounts payable

Therefore, to calculate cash cycle:

1) Day 0: we have purchased raw materials to produce our inventory
2) Day 24: We paid for our raw material (by paying down accounts payable) **Money has left the firm at this point**
3) Day 29: We have finished producing our good which is then sold
4) Day 50: 21 days later, we receive payment from our customer. **Money has entered the firm again at this point**

The difference in days between money flowing out and money coming back in is 26 days

Cash cycle (days)	=	average days in inventory	+	average collection period	−	average payment period
26	=	29	+	21	−	24

- This is also known as the operating cycle
- Cash cycle affects the amount of working capital firm needs
    - If a firm has a long cash cycle, it needs a substantial net working capital to remain in business and operate daily. **NWC measures the liquidity of a business (current assets + current liabilities)**

Cash budgeting

- Need to forecast future sources and uses of cash
    - Provide standard/budget for which subsequent performance can be judged
    - Alert manager to future cash flow needs

Cash budgeting inflows

Remember cash flows comes from collections on accounts receivables

Ending accounts receivable = beginning accounts receivable + sales − collections

		First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1	Receivables at start of period	150	199	181.6	253.6
2	Sales	560	502	742	836
	Collections:				
	Sales in current period (70%)	392	351.4	519.4	585.2
	Sales in last period (30%)	119[a]	168	150.6	222.6
3	Total collections	511	519.4	670	807.8
4	Receivables at end of period 1+2−3	199	181.6	253.6	281.8

TABLE 29.4 To forecast Dynamic Mattress's collections on accounts receivable, you have to forecast sales and collection rates in 2013 (figures in $ millions).

[a]We assume that sales in the last quarter of the previous year were $397 million.

Total collections depends on how much sales are paid by customer that current time period and whether are we collecting any more payments from customers in previous periods too

Ending accounts receivable = beginning accounts receivable + sales - collections

Cash budgeting outflows

1) Payments on accounts payable
    a. Form of short term financing but also expensive
2) Increase in inventories
    a. requires additional investment into this
3) Labor and other expenses
4) CAPEX
5) Taxes, interest, and dividend payments

They need to establish a minimum operating cash balance to absorb unexpected cash inflows/outflows. We don't want inflows = outflows just in case

Short-term financing plan

Options for short term financing

1) Bank loan
2) Stretching payables (putting off paying bills)

Evaluating plan

1) Does plan satisfy ratios
2) Are there intangible costs of stretching payables
3) Are we in good financial shape for next year
4) Should use long-term financing for major CAPEX?
    a. However, we may just be using short term financing because we ultimately want the firms to finance via retained earnings
5) Can we adjust operating/investment plans to make short-term financing problem easier?
6) Should firm release cash by reducing level of other current assets?

Long term Financial Planning

- Capital budgeting on a grand scale

We need plans because:

- Contingency planning
    - For unlikely events
- Considering options
    - Opportunities for firm to exploit strengths by moving into new areas
- Forcing consistent
    - Ensure there is connection between plans for growth and financing requirement

$$\text{External capital required} = \text{investment in net working capital} + \text{investment in fixed assets} + \text{dividends} - \text{cash flow from operations}$$

3 steps to finding out how much extra capital a firm will need and implications for debt ratio:

1) Project next year's income + depreciation
2) Project what additional investments in NWC and fixed assets will be required to support this new activity. The summation of these 2 gives us **total uses of capital.** If total uses of capital exceeds cash flow, we need to raise additional long-term financing
3) Construct a forecasted balance sheet that incorporates new assets level + new debt/equity levels

Growth and external financing

$$\text{Internal growth rate} = \frac{\text{retained earnings}}{\text{net assets}}$$

- **Internal growth rate:** Maximum growth rate firm can achieve without external funds

We can then multiply this term out

$$\text{Internal growth rate} = \frac{\text{retained earnings}}{\text{net income}} \times \frac{\text{net income}}{\text{equity}} \times \frac{\text{equity}}{\text{net assets}}$$

If a firm wants to grow faster without raising any additional equity capital, it needs:

1) Plowback higher % of earnings
2) Earn higher ROE
3) Have lower debt-equity ratios

Sustainable growth rate

- Highest growth rate firm can maintain without increasing financial leverage. This means is uses an optimal level of capital structure and keeping debt-equity structure optimal

$$\text{Sustainable growth rate} = \text{plowback ratio} \times \text{return on equity}$$

Firm's only issue enough debt to keep debt-equity ratio constant (since firms should've settled on optimal capital structure and want to now stick to it)

Week 13

Working capital management – Chapter 30

Current assets – current liabilities = **working capital**

4 principles of current assets

- **Inventory**
  - Expensive to store. So tradeoff between holding large inventories and cost
- **Accounts receivable**
  - Set terms for payments
- **Firm cash balances**
  - Two principal problems
    - How much cash firm needs to retain
    - How much to invest in interest bearing securities
- **Short term Securities**

Operating and cash conversion cycles

Delay between initial investments in inventory and final sale date is **inventory period.** Time from goods are sold and customer settles their accounts receivable, it is known as **accounts receivable period.** The time from purchase of raw inventory and final payment by customer is **operating cycle.**

Operating cycle = Inventory Period + Accounts receivable Period

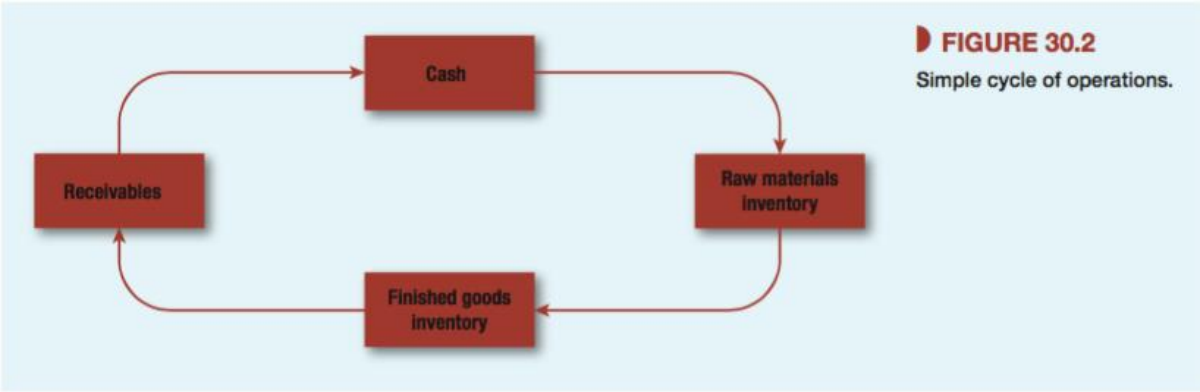


FIGURE 30.2
Simple cycle of operations.

- Firm is not out of cash for the whole cycle
    - Even though they pay for raw materials initially, they don't need to pay up with cash right away
    - Accounts receivable period reduces amount of time firm is out of cash

Interval between firm's payment for inventory and collection of payment is known as firm's cash conversion cycle

Cash conversion cycle = operating cycle – accounts payable

- The longer time production takes, the longer firm has cash tied up in inventories

Average inventory period = average inventory / daily COGS
Average receivables period = average accounts receivable/sales

These 2 combined gives us operating cycle

Cash conversion cycle is then:
Cash conversion cycle = (inventory period +receivables) – accounts payable

Inventories

- Most firms keep inventories of raw materials etc waiting sale and shipment

Inventory trade-off

- There are costs to holding inventory
- Costs are:
    - **Handling and delivering costs**: Large order sizes, reduces this cost
    - **Carrying costs such as storage and OCC invested into inventory**

FIGURE 30.5

As the inventory order size is increased, order costs fall and inventory carrying costs rise. Total costs are minimized when the saving in order costs is equal to the increase in carrying costs.

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Try It! Figure 30.5: Akron's inventory costs

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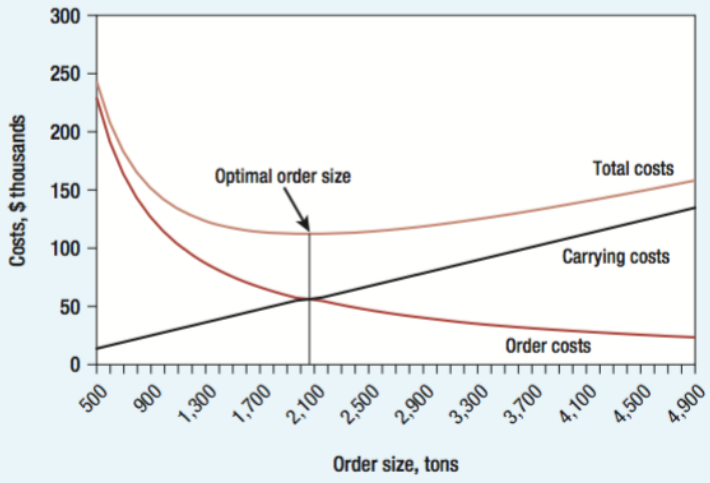


- Optimal inventory level trade-off between carrying and order costs
- Firms can replenish amount of inventory they have

- Carrying costs includes costs of storing goods as well as capital tied up

- As sales increased, optimal inventory sales level rises but not in the same proportion

Credit management

- This looks firms' account receivable

3 steps:

1) Fixed terms of sale
2) Decided on contract customer must sign
3) Estimate probability of payment

Terms of sale

- Not all sales involve credit

Promise to pay

- A commercial draft means there is a clear commitment from buyer before delivering goods
- Bankers acceptance: banks guarantee customer's debt

Credit analysis

- Good way to find out whether customer likely to pay debt

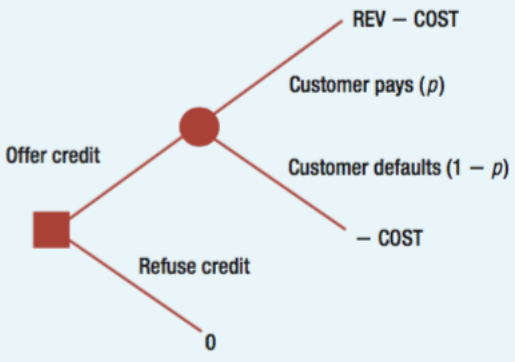
Credit decision

$$p\,\mathrm{PV}(\mathrm{REV}-\mathrm{COST})-(1-p)\mathrm{PV}(\mathrm{COST})=p\times 200-(1-p)\times 1{,}000$$

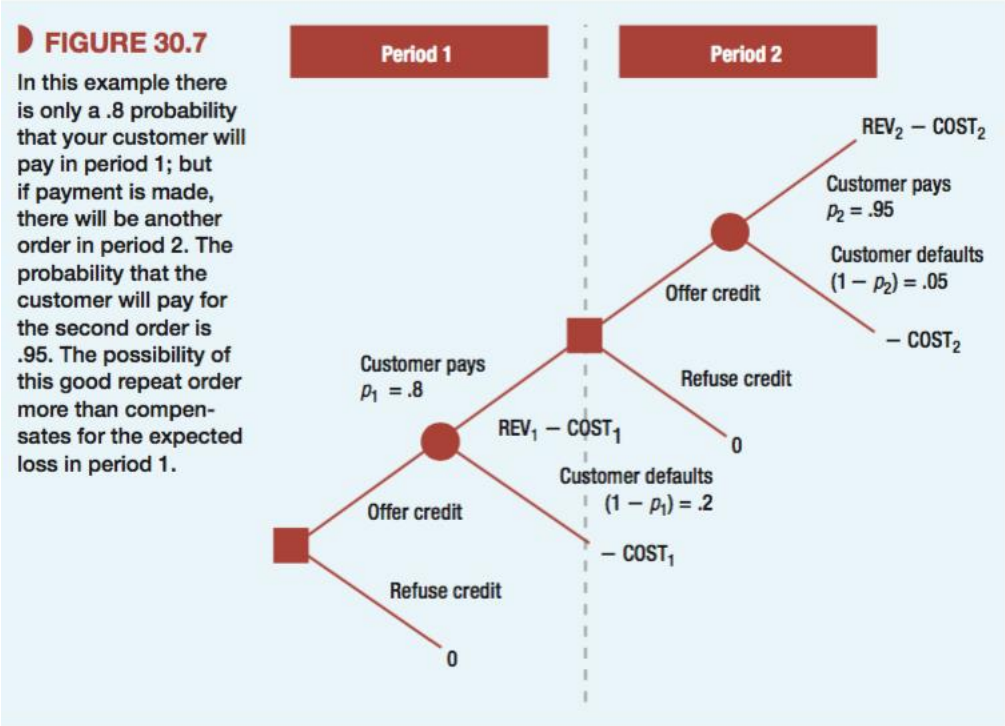
$$Expected\ profit = p * PV(REV - COST) - (1 - p) * PV(COST)$$

FIGURE 30.6

If you refuse credit, you make neither profit nor loss. If you offer credit, there is a probability p that the customer will pay and you will make REV − COST; there is a probability (1 − *p*) that the customer will default and you will lose COST.



$$Probability\ of\ breakeven = P = \frac{PV(COST)}{PV(REV)}$$



- When doing credit decision, aim to
  - Maximize profits
  - Concentrate on dangerous accounts
  - Look beyond immediate order

Collection policy

- **Collection policy:**
  - Procedures to monitor and collect receivables
- **Aging schedule**
  - Classification of accounts receivables by time outstanding
- **Factoring**
  - Financial institution buys company's accounts receivable and collect debt

Cash

- Why hold cash?
  - Liquidity
- Marginal value of liquidity declines as you hold more cash
  - You want marginal value of liquidity to equal interest foregone
- **Sweep program**
  - Sweep surplus funds into interest bearing investment

Marketable securities are securities to be sold or redeemed within a year

Ways to pay for purchases

TABLE 30.4
Small, face-to-face purchases are commonly paid for with cash, but here are some of the other ways to pay your bills.

Check When you write a check, you are instructing your bank to pay a specified sum on demand to the particular firm or person named on the check.
Credit card A credit card, such as a Visa card or MasterCard, gives you a line of credit that allows you to make purchases up to a specified limit. At the end of each month, either you pay the credit card company in full for these purchases or you make a specified minimum payment and are charged interest on the outstanding balance.
Charge card A charge card may look like a credit card and you can spend money with it as with a credit card. But with a charge card the day of reckoning comes at the end of each month, when you must pay for all purchases that you have made. In other words, you must pay off the entire balance each month.
Debit card A debit card allows you to have your purchases from a store charged directly to your bank account. The deduction is usually made electronically and is immediate. Often, debit cards may be used to make withdrawals from a cash machine (ATM).
Credit transfer With a credit transfer you ask your bank to set up a standing order to make a regular set payment to a supplier. For example, standing orders are often used to make regular fixed mortgage payments.
Direct payment A direct payment (or debit) is an instruction to your bank to allow a company to collect varying amounts from your account, as long as you have been given advance notice of the amount and date. For example, an electric utility company may ask you to arrange an automatic payment of your electricity bills from your bank account.

Money market securities

- Companies place cash not needed for short term investments in money markets

Investment	Borrower	Maturities When Issued	Marketability	Basis for Calculating Interest	Comments
Treasury bills	U.S. government	4 weeks, 3 months, 6 months, or 1 year	Excellent secondary market	Discount	Auctioned weekly
Federal agency benchmark bills and discount notes	FHLB, "Fannie Mae," "Sallie Mae," "Freddie Mac," etc.	Overnight to 360 days	Very good secondary market	Discount	Benchmark bills by regular auction; discount notes sold through dealers
Tax-exempt municipal notes	Municipalities, states, school districts, etc.	3 months to 1 year	Good secondary market	Usually interest-bearing with interest at maturity	Tax-anticipation notes (TANs), revenue anticipation notes (RANs), bond anticipation notes (BANs), etc.
Tax-exempt variable-rate demand notes (VRDNs)	Municipalities, states, state universities, etc.	10 to 40 years	Good secondary market	Variable interest rate	Long-term bonds with put options to demand repayment
Nonnegotiable time deposits and negotiable certificates of deposit (CDs)	Commercial banks, savings and loans	Usually 1 to 3 months; also longer-maturity variable-rate CDs	Fair secondary market for negotiable CDs	Interest-bearing with interest at maturity	Receipt for time deposit
Commercial paper (CP)	Industrial firms, finance companies, and bank holding companies; also municipalities	Maximum 270 days; usually 60 days or less	Dealers or issuer will repurchase paper	Usually discount	Unsecured promissory note; may be placed through dealer or directly with investor
Medium-term notes (MTNs)	Largely finance companies and banks; also industrial firms	Minimum 270 days; usually less than 10 years	Dealers will repurchase notes	Interest-bearing; usually fixed rate	Unsecured promissory note placed through dealer
Bankers' acceptances (BAs)	Major commercial banks	1 to 6 months	Fair secondary market	Discount	Demand to pay that has been accepted by a bank
Repurchase agreements (repos)	Dealers in U.S. government securities	Overnight to about 3 months; also open repos (continuing contracts)	No secondary market	Repurchase price set higher than selling price; difference quoted as repo interest rate	Sales of government securities by dealer with simultaneous agreement to repurchase