Analysis for financial management (Robert C. Higgins)

Summary of the used chapters in the lecture (WM0609LR)

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Chapter 1 Interpreting financial statements

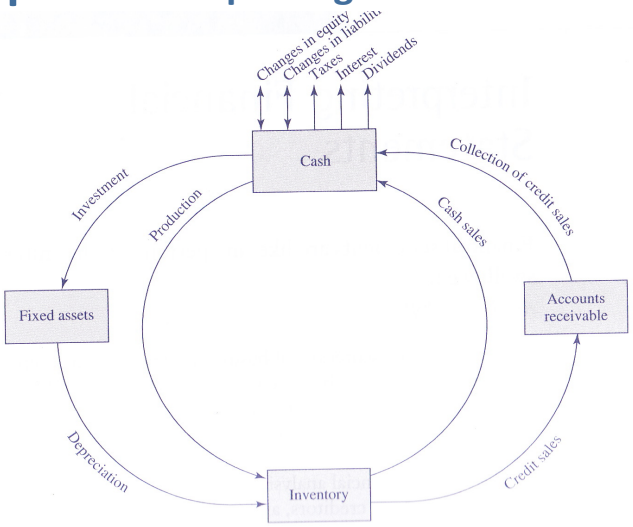

Figure 1 Cash flow-production cycle

(Operating) working capital: movement of cash into inventory
Investment: flow from cash into new fixed assets
Depreciation: the loss in value of fixed assets ⇒ increase in value of merchandise made + needed for growth
Solvency: ability to have cash to buy fixed assets and inventory (outflow cash)

The balance sheet

Equity= assets - liabilities

current assets			***current liabilities***		
	cash	€		accounts payable	€
	inventories	€			
	acc receivable	€			
fixed assets			***long-term liabilities***		
	equipment	€		long-term debt	€
	plant	€			
			total shareholders equity		
				stock	€
				retained earnings	€
	total assets	x	***total liabilities + equity***		x

Figure 2 example of a balance sheet

Financial snapshot: 1 moment in time
Assets against the claims

Liability: obligation to deliver something of value in the future
Equity: difference between assets and liabilities
Liquidity: speed at which an item can be turned into cash

Assets and liabilities are listed in order of decreasing liquidity

- **Current:** liquidity < 1 year
- **Long-term:** liquidity >1 year

Income statement

Difference between 2 important balance sheets
- Change in owner's equity in terms of **revenues** (sales) and **expenses** (costs) ⇒ **net income** (earnings, profits)
- Commonly divided in operating and non operating segment

Some different aspects of earnings

- **Accrual accounting:** revenue is recognised as soon as the effort required to generate the sale is complete + certain of sale ⇒ lag between generation of revenue and receipt of cash
- **Depreciation:** costs for (ex buildings) are spread over the years ⇒ period defined by useful life, salvage value, method of allocation to be employed
    - Straight line ⇒ $\frac{\cos t_{total} - salvationvalue}{lifetime}$
    - Accelerated ⇒ more depreciation in the early years an less later on
- **Taxes:** sometimes firms use different income statements for the tax and for the public shareholders
    - Taxes differ from the provisioned (higher/lower)
    - Can be used to shift tax payments to later years to use the finances in the business
- **Research and development (R&D)** ⇒ difficult to estimate the payoff
    - The cost have to be listed as an operating cost (united states)

Sources and Uses statements

Is not the same as income statement because ⇒ accruals, lists only cash flow associated with sale of goods with in the accounting period

- 2 balance sheets of a different date and note all the changes in account
- Segregate the changes into generated and consumed cash
    - Generate: reducing assets, increasing liabilities
    - Consume: increase assets, reduce liabilities

Cash can also come from loans (long term debt) or the retention of profits earned through the year

Cash flow statement

Difference between 2 important balance sheets

Provides a detailed look at changes in the cash balance

Cash provided or consumed by: rearranges sources and uses into these three categories

- Operating:
    - Non cash charges: amortisation, depreciation
    - Changes in current assets, liabilities
- Investing
- Financing

Cash flow

- **Net:** net income + Noncash items
- **From operating activities:** net cash flow +/- changes in assts and liabilities
- **Free:** total cash available for distribution to owners and creditors after funding investing activities
- **Discounted:** sum of money having the same value ⇒ receipt and disbursements

All this info can be found in the income statement and the balance sheet but ⇒

- Better understanding for the non-experienced and the ones against accrual accounting
- More accurate info about taxes and securizations
- Light on the firm's solvency (generating/consuming)

Financial statement and the value problem

Market value Vs book value

A company is never worth its book value

- An asset purchased in 1950 can be worth less or more on this moment (land (more), technology (less))
    - Problem: values of things in the present are subjective
        - "Accountants prefer to be precisely wrong rather than vaguely right"
        - Regulators: **fair value accounting:** some assets and liabilities must appear at their market price instead of the historical
- Equity investors buy shares for the future income they hope to receive and not for the value of the assets
    - Problem: accountant measure of shareholders equity h as little relation with future income
        - Accountants numbers look back and are cost based
        - Companies often have assets/liabilities that do not occur on the balance sheet but affect the future income nonetheless (patents, trademarks, loyal customers, lawsuits, bad/good management, technology) ⇒ book value inaccurate
        - More accurate ⇒ $value = \#\ shares \cdot value$
        - **Goodwill:** buy a company for more as the book value ⇒ book value in assets, the rest in the asset goodwill

Economic income Vs accounting income

The problem here lies in the distinction between realised and unrealized income
The accountant only recognises realized gains/losses⇒ assets that increase are **gains on paper** (it can fluctuate)

Imputed costs

Equity capital also has cost (investors expect a return) but these do not appear on the income statement⇒because there is no paper that says how much the company has to pay this cost must be estimated (imputed)

The economist would subtract these cost but an accountant does not, the difference is important because many decisions are based on the numbers in the income statement: wages, bonuses, etc

Chapter 2. Evaluating financial performance

Return on equity

Most popular tool to evaluate financial performance ⇒ it is a measurement of efficiency⇒ $\frac{earnings}{investedDOLLAR}$

$ROE = \frac{NETincome}{shareholdersEQUITY}$ Is the basic formula but can be redefined as

$$ROE = \frac{NETincome}{Sales} \cdot \frac{Sales}{Assets} \cdot \frac{Assets}{shareholdersEquity}$$

$$ROE = PROFITmargin \cdot ASSETturnover \cdot FINANCIALleverage$$

Profit margin: earnings out of every dollar of sale

- **Return on assets** $ROA = \frac{NETincome}{Assets}$
- **Gross margin:** $\frac{GROSSprofits}{Sales}$ ⇒ used to find out the fixed and the variable costs

Asset turnover: sales generated for every dollar of assets employed

Low: assets intensive industry

Inventory turnover: $\frac{costgoods_{sold}}{Inventory_{ending}}$

Collection period: shows the company's management of accounts receivable ⇒ average time lag between sale and cash

$$\frac{account_{recievable}}{creditsale/day}$$

Days' sales in cash: $\frac{cash + securities}{sales/day}$

The optimal ratio is different for every company and depends on the necessary liquidity

Payables Period: $\frac{accounts_{payable}}{purchases_{credit}/day}$

Control ratio for liability ⇒ period to accounts payable

Fixed-Asset turnover: $\frac{Sales}{netproperty}$ with net property = plant, equipment

Especially important for companies with capital intensive (= operating leverage) businesses (cars, etc) ⇒Sensitive to the state of the economy

Financial leverage: amount of equity used to finance the assets

- Not necessary max: find a balance between the benefits and costs of debt financing
- Ideal leverage depends on the nature of company's business and the assets
  ⇒ Stable/predictable cash flow⇒high financial leverage
- Inversely related with ROA⇒ safe, stable, liquid investment=low returns +big borrowing capacity

Measures of financial leverage:

- Debt to assets ratio: $\frac{liabilities_{total}}{assets_{total}}$ ⇒percentage of the assets' book value that comes from creditors
- Debt to equity ratio: $\frac{liabilities_{total}}{equity_{shareholders}}$ ⇒percentage by the creditors for every dollar of equity

Coverage ratios: used to calculate the burden of the debt on the cash flow
(EBIT=earnings before interest and taxes)

- Time interest: $\frac{EBIT}{\exp ense_{\text{int }erest}}$
  - ⇒Too liberal: assumes the company will roll over all its obligation as they mature
- Time burden covered: $\frac{EBIT}{\text{int }erest + (repayment_{principal} / 1 - taxrate)}$
  - ⇒ Too conservative: assumes the company to pay the loans down to zero
  - Best high for companies with high financial risks and low when ready access to cash

Market value leverage ratios: market value ratio are superior to book value ratio because book values are often irrelevant and market values are based on investors expectations about future cash flows.
⇒Helpful when assessing financial leverage of rapidly growing start-up businesses, because lenders will credit companies when they believe that they will be able to service the debts but don't have a bad coverage ratio.

- $\frac{debt_{marketvalue}}{equity_{marketvalue}}$ and $\frac{debt_{marketvalue}}{assets_{marketvalue}}$

Risks: ignore roll over risks (pay the debts not by promising future cash)

Liquidity ratios: determinant of company's debt capacity is liquidity of its assets (⇒maturing mismatching= liabilities come due before they generate enough cash), measures of liquidity are

- Current ratio: $\frac{assets_{current}}{liabilities_{current}}$
- Acid test: $\frac{assets_{current} - inventory}{liabilities_{current}}$

⇒Rather crude measures because:

- Rolling over obligation involves no insolvency risk
- Cash generated can't be used to reduce liabilities because it must be used to support continued operations

Problems of the ROE

Timing problem: ROE looks at the past and one periodic when for good business it is needed to look forward

⇒Ex high start up cost for a very good product will let the ROE fall

Risk problem: the ROE doesn't say anything about how much risk the company needed to take to generate the ROE

Return on invested capital (ROIC):

- Used to avoid the distortion of leverage on ROE an ROA
- $ROIC = \frac{EBIT \cdot (1 - taxrate)}{debt_{\text{int } erestbearing} + equity}$
- Is the rate of return earned on the total capital invested

Value problem

- The ROE is calculated on the book value of shareholders equity ⇒market value of the equity is much higher⇒needed: high ROE + unknown to other investors
- Earnings yield: $\frac{income_{net}}{shareholdersequity_{marketvalue}} = \frac{earning/share}{earning/share}$
  - ⇒Is no good solution because the stock price is dependent on investors expectation⇒high expectation=high stock price⇒low earning yield
- P/E ratio: $\frac{price/share}{earnings/share}$
  - Price of one dollar of earnings⇒used to normalise stock prices for different earnings levels
  - Rises with improved earnings and lowers with increasing risks
  - Gives a good image of what investors believe for the future

Market price problems: stock price as a performance measure

- Difficulty of specifying how operating decision affect stock price
- Managers now more about the company then external investors⇒why should managers consider the assessments of less informed investors
- Stock price is also dependent on factors out of the control of the company (ex. improving economy)

Ratio analysis

- If used properly can reveal a lot about the company
- No automatically insight in complex companies⇒they are more a clue
- There is no single correct value for a ratio⇒depends on the perspective of the analyst

Strategies

- Compare to rules of thumb
- Compare to industry averages (sometimes there are good reasons to differ)
- Look at changes in time (most useful)

Chapter 4 managing growth

Sustainable growth

Growth is not always a good thing because growth needs resources (financial)

Sustainable growth rate: the max rate of which a company can increase sales without depleting the financial resources

Typical life cycle of a successful company

- Losses: research, developing, foothold on the market
- Rapid growth: growth is so fast external investments are needed
- Maturity: decline in growth, no outside investment⇒generating more cash then can be invested
- Decline: declining sales, marginally profitable

Growth phase
The growth rate is limited by the growth of owners' equity (sustainable)

$$g^* = \frac{equity_{change}}{equity_{bop}} [bop = beginning - of - period]$$

$$g^* = \frac{R \cdot earnings}{equity_{bop}} [R = retention - rate]$$

$$g^* = R \cdot ROE_{bop}$$

$$g^* = R \cdot profit_{m\,arg\,in} \cdot asset_{turnover} \cdot assets - to - equity_{ratio}$$

If a company increases sales at a other rate then g^* some of the ratios must change

Balanced growth
$g^* = R \cdot (assets - to - equity_{ratio}) \cdot ROA \Rightarrow$ **Growth** depends on return on assets

What to do when actual growth exceeds sustainable growth

Check how long this will continue

- Short: additional loaning for the transition to mature (absorbing⇒generating financing)
- Long-term:
  - Sell new equity: solves everything but equities don't sell easily (illiquid, minor owner)
  - Increase financial leverage:
  - Reduce dividend:
  - Profitable pruning: no spreading of resources over more markets
  - Outsource: releases assets, increases asset turnover
  - Increase prices: reduces growth
  - Merge:

Product diversification:

- Less risks but not good for the shareholders who can diversificate by buying different stock
- Spreading of resources: followers in many markets less as leading in one market

To little growth

Have the problem not knowing what to do with the money⇒inefficient
Check how long this will continue

- Short term: accumulate cash for future growth
- Long term
    - Ignore the problem: this attracts raiders (hostile buyers)⇒will redeploy the resources
    - Return money to the shareholders: repurchasing shares or raising the dividend
    - Buy growth

Growth comes from increasing volume and rising prices
The inflation⇒rise in assets and accounts receivable ⇒ worsens the growth problems

- Increases amount of external financing
- Increase debt to equity ratio

New equity financing

Corporations don't use equity as a source but just cash

Why don't US corporations issue more equity?

- No need ⇒borrowing and retained profits were enough
- Expensive to issue (5-10% of the raised amount⇒2 times the cost for debt)
- Managers are fixated on earnings per share (EPS) ⇒new equity lowers EPS
- Companies almost always think there undervalued
- Stock market is a unreliable funding source

Chapter 5 financial Instruments and markets

Financial security:

- A piece of paper of paper that investors get from the companies with the nature of their claim on future cash flow
- This paper can be traded on financial markets.
- Must be designed to be attractive to investors + meets the demands of the company

Financial instruments

Companies are relatively free to design their own securities like they want ⇒ only real regulation is that the consumer needs to get all the info relevant to value the security.

Bonds

- Is a fixed income security ⇒ holder receives a specified interest and maturity
- Usually in small amounts ($1000)
- Largest source of external financing (34%)
- Variables
    - Par value: amount of money the holder will receive on the bond's maturity date
    - Coupon rate: % of the par value the issuer promises to pay as annual interest income
    - Maturity date: company will pay the par value and stop paying interest
- Companies try to make the initial market price of the bonds equal to its par value
- After issue the bond's market price can differ (different interest and credit risk)
    - Interest rises ⇒ bond prices fall
- Sinkin fund: repayments to creditors to reduce principal
    - Retire bonds or repurchase market securities
- Floating rate: interest is tied to a short term interest rate
- **Call provisions**
    - Company has the option to retire the bond earlier (mostly with a premium)
    - Delayed call: issuer can't call before a specified period (5-10 years)
    - If interest rate falls ⇒ retire and resell a lower interest rate
    - Changing market conditions ⇒ rearrange the capital structure
- **Covenants:** specified in the indenture agreement ⇒typically sets lower limit for current ratio and upper limit for debt-to-equity ratio (sometimes forbids to sell/buy major assets without approval)⇒company fails (default): bankruptcy or liquidation: sale of assets to meet the claims
- **Rights of liquidation:** distribution of the money (rights of absolute priority)⇒ government (due taxes), senior creditors, general creditors, subordinated creditors, stock and shareholders
- **Secured creditor (mortage, hypotheek in Dutch):** loan collateralized with a specific asset ⇒on liquidation money of sale of this assets go to this creditor
- Bonds are vulnerable to inflation ⇒ interest is the same but value decreases
- **Bond rating:** bonds are rated by companies with a letter grade, these grades are important because with good grades the companies need to offer a smaller interest rate.⇒Bad ratings have a high interest but also higher risk

Common stock

- Residual income security:
- Stockholder has a claim on any income remaining after payment of al the obligations (incl. debt interest)
- Highest benefits when the company prospers but also highest loss when things go bad
- Amount of money they receive depends on the dividends (choice of the company)
- **Shareholders control:** the shareholders own the company (in theory) ⇒ when there is no dominant shareholder, management controls the board (particularly in US and UK)
    - Management can't ignore the shareholders because this would be bad performance ⇒low stock price⇒maybe hostile take-overs
    - Security markets ⇒needs to be attractive to raise debt or equity capital
- $anual_{income} = d_1 + p_1 - p_0$ With d_1 = dividend, p_0, p_1 are beginning/end of year value of the stock
- $annual_{return} = \frac{d_1}{p_0} + \frac{d_1 - d_0}{p_0}$
- The difference between bonds is an additional percentage (premium) for the risk bared

Preferred stock

- Is a hybrid security: debt/equity
    - Debt: fixed income: annual dividend ⇒coupon rate
    - Equity: may choose not to pay these dividend, not a deductable expense, no maturity
- Have priority over common stock for dividends
    - Common don't get dividends before the preferred are fully paid
    - Cumulative: if the dividend is passed ⇒ no dividend until fully paid the preferred stock
- Sometimes more control in big decisions
- Can be seen as cheap equity or debt with a tax disadvantage

Financial markets

Financial markets: are the channels through which investors provide money to companies

Private equity financing

Strategic investors: make significant equity investments in start-ups

- Gain access to promising new products and technology
- Outsourcing research and development

Venture capitalists: wealthy individuals or professional venture capital companies (private equity firms)

- Buy a significant fraction of a company and take an active role in the management
- Liquidate the investment in 5-6 years
- Very high risks but also very high profits
- Unusual organisation: private equity partnership
    - General partner raises a pool of money from investors, pension funds, insurance, etc
    - Invest and manages ⇒ liquidates and returns to the investors
    - Firm charges percentage of the original capital and around 20% of the earnings
- Addresses several problem of conventional investment
    - Minimise differences between management and owners ⇒create value for the owners
    - Aggressive buy-fix-sell attitude ⇒management has to take decisive action

Initial public offerings

Initial public offering (IPO): creating a public market for common stock

- Creates liquidity for growth and for existing owners
- **Investment banking:**
  - Proposals of investment banks (how to sell)⇒winner= managing underwriter
  - Road show: top executives go and market the issue in financial centres
  - Selling syndicate and underwriting syndicate: short joining of investment banks
    - Selling: each member sells predefined amount of securities
    - Underwriting: buy all the securities at a fixed price and try to sell them at a higher price

Seasoned issues

Shelf registration: allow frequent security issuers to avoid cumbersome traditional registration by filing a general-purpose registration

- Ready for use when needed (no time lag between decision and issue)
- High likelihood of bidding between investment banks ⇒ issue cost 10-50% lower as traditional

International markets: whenever the currency employed is outside of the control of the issuing monetary authority ⇒ ex. Dollar loan to an American company in London

- Minimal reporting and regulatory requirements, very competitive prices
  - Absence of reserve requirements on international bank deposits
  - Possibility to issue bonds in bearer form= unregistered owners, lower coupon rate but same after tax return (illegal in US⇒tax avoidance)

Issue costs: costs the issuer and its shareholder incur on initial sale

- Privately negotiated transaction ⇒fee charged by the investment banker
- Public: legal, accounting, printing fees, managing underwriter
  - Underwriter: spread fee per share he sold ⇒split between syndicate and underwriter
    - Offer under the market price ⇒ easier to sell to less informed outsiders
- Equity is more costly then debt
  - 11% for IPO, 7.1% for public sold, 3.8% bonds
  - Cost rise when issue size decreases

Efficient markets

Important in raising new capital is timing⇒sell when prices are high⇒predictions future price trends in financial markets
Market efficiency is controversial because many companies overstate the evidence supporting efficiency and misrepresent its implications.⇒ Not black and white but shades of grey

Efficient market: is a market in which the prices adjust rapidly to new info and prices reflect fully the available info about the assets traded

- Weak-form: current prices reflect all the info about past prices
- Semistrong-form: current price fully reflect all the publicly available info
- Strong-form: current price reflect all info (public and private)

Implications of efficiency

- Publicly available info is not helpful
- Absence of private⇒best forecast is the current price (trend)
- Without private info a company can not improve terms to sell by timing
- Without private info/accept high risks ⇒no earning above market average return

Solution is making an information gathering system or get inside info (illegal?), buy a forecast of a firm

Forward contracts, options and the management of corporate risks

Forwards and options are a class of securities: derivatives: value depends on underlying assets

- Used to control risks of volatile exchange rates, interests rates and commodity prices
- Must be very careful ⇒can loose a lot of money to

Forward markets

Forward market: the price is set today but exchange happens on a future date (ex reserving a room)
Speculating: ex. Selling euros when the euro has a high value then wait a while and buy them again when price is lower

This can results on transactions with euro's to a US company so they can sell the same amount in euro's for dollars so the effect of a fall is hedged for a future drop of the euro (forward market hedge) ⇒ is convenient to put in the right number in accounts receivable

Options: a security entitling the holder to either buy or sell the asset at a predefined price/time

- Put option: right to sell at a predefined price
- Call option: right to buy at a predefined price
- Premium: amount you pay for the option
- Maturity date: date option expires
- Can be used to hedge the effects of the exchange rate by buying put options

Limitations of hedging

- Asset creating the risk must trade in financial markets
- Amount and timing of the foreign cash needs to be known with reasonable certainty
    - This is a problem when it is an operating cash flow
        - Hedge an unknown amount

Chapter 6 the financing decision

Financing decision

- Decide how much capital is required: estimate sales growth, assets needed, available money
- Instrument to be sold ⇒ risk, inability to sell, excessive costs if wrong choice was made
- Focus should be on supporting the business strategy (acquiring/deploying assets)
- Take into account the effect on the future ability to raise money

Financial leverage

Financial leverage: device increases owners expected return at the cost of greater risk

- Increase the debt financing ⇒interest expenses
- Way to vary the way they finance ⇒debt-equity ratio
- Debt reduces variable costs + increases fixed costs⇒after breakeven income will rise more
- $ROE = ROIC + (ROIC - i') \cdot Debt_{\text{int eres}} / Equity_{bookvalue}$ With i' after tax interest rate
  - ROIC is the return a company earns before the financial leverage
  - Improves financial performance when business is going well and vice versa
- Example p203-210

Bond financing: lower tax bill⇒interest tax shield
Common stock: higher earnings after tax
To make a decision a range of earnings need to be made (plot EBIT-EPS)

How much to borrow

Purpose should be to increase the shareholders value

- Increase value the shareholders attach to the operating cash flow (absolute by M&M)
- Increase the level of cash flow

Irrelevance by Franco Modigliani and Merton Miller (M&M)

- When cash flow is constant the amount of debt has no effect on the value⇒no concern in value-maximizing
- Increased risk precisely offsets the increased return
- Physical assets produce value⇒ no increase in cash flow produced no increased value
- Concl: financial choice should be the one that maximizes the cash flow

5-factor model to change the cash flow

- Tax benefits: debt financing increases the tax benefit⇒increases cash flow
- Distress costs: various costs a company incurs when it has to much debt capital
    - Bankruptcy: $P(banktruptcy) \cdot \cos ts$, bankruptcy doesn't necessarily mean liquidation but the risk is very high and depends on the resale value of some assets
    - Indirect costs: increase as the chance of bankruptcy rises and can reinforce the chance of bankruptcy
        - Internal: conserve cash by cutting R&D, marketing (lost profit opportunities)
        - External: costumers are concerned + higher financing cost by worried investors + concurrent would try to kill you by making a price war
    - Conflicts of interest: various parties in the company worry about themselves⇒ owners have nothing to loose but creditors do
- Flexibility: if the debt capacity is reached further financing needs to be done by equity which is not always reliable or even possible⇒ remaining under the debt capacity is better to be able to handle future extra costs
- Market signalling: studies have shown that total stock prices decline with 30% of the new issued equity and vice versa (permanent) ⇒ market signalling: sail of extra equity signals investors that management is concerned for the future⇒firms try first to internally finance to avoid unnecessary signalling
- Management incentives: (aansporing): debt can be a very strong incentive, management doesn't does it's best they could lose there business (jobs)

The financing decision and growth

Rapid growth

- Maintain conservative leverage ratio with unused borrowing capacity
- Modest dividend payouts⇒internal financing of growth
- Cash, marketable security as buffer liquidity ⇒ investment exceeds internal sources
- External financing ⇒ debt only until leverage ratio threatens flexibility
- Sell equity rather then restrict access to financial markets⇒reduce growth only when no alternative

Low growth

Easy financial decisions because only problem is how to get rid of the excess cash⇒create value for the owners by aggressive debt financing use proceeds to repurchase shares

- Increased tax shield (reduce taxes)
- Positive market signal (
- High financial leverage increases the management incentive

Selecting a maturity structure

Minimum-risk maturity structure occurs when the maturity of liabilities equals that of the assets⇒cash generated by operations over the years should be sufficient to repay existing liability

- Maturity is less then the assets ⇒ risk of refinancing: maturing liabilities have to be paid with newly raised capital.
- Maturity longer then the assets: extra margin of safety + excess cash

Can't always use the perfect maturity

- Unacceptable terms
- Reduce borrowing costs

Debt has an advantage with inflation⇒only when inflation is unexpected else it is compensated for in the interest

Chapter 7 discounted cash flow techniques

Company future depends on the investments of today
⇒Key aspect is capital budgeting: process of financial evaluation of investment proposals

Discounted cash flow techniques: relevant whenever a company contemplates an action entailing costs or benefits that extend beyond the current year

- Valuing stocks and bonds, divisions, companies
- Choosing competing product technologies
- Etc

Figures of merit

Financial evaluation

- Estimate of relevant cash flows
- **Figure of merit** of the investment: number summarizing an investment economic worth
- Compare figure of merit to an acceptance criterion: standard of comparison

Figures of merit

- Payback period: time to recoup the initial investment
  - Problem: insensitive to the period after that
- Accounting rate of return
  - $\frac{average-cash\,\text{inf}\,low_{annual}}{cashoutflow_{total}}$
  - Problem: insensitive to timing of cash flow

Time value of money

A dollar today is worth more then a dollar in a year

- Inflation: reduces the purchase power of one dollar in the future
- Uncertainty of receipt rises when receipt date is further in the future
- Opportunity cost: return one could earn on the next best alternative ⇒ cash received in the future could already be used in investments if received today

Because of this no cash flows occurring at different dates can be just added up before adjusted by

- Compounding: process of determining the future value of a present sum
- Discounting: process of finding the present value of a future sum⇒ $\frac{1\$}{\left(1\$+1\$\cdot discount_{rate}\right)^{period}}$
- Present cash is equivalent to future cash

Net present value (NPV)

$NPV = cash\,\text{inf}\,low_{present,value} - cashoutflow_{present,value}$

Important to calculate if an investment will add value to your company in the future

Benefit-cost ratio (BCR): profitability index

$BCR = \frac{cash\,\text{inf}\,low_{present,value}}{cashoutflow_{present,value}}$ ⇒Higher then 1 is good

Internal rate of return (IRR)

Most popular form of merit and closely related to NPV⇒is the discount rate at which he NPV is 0

Determining the relevant cash flows

Relevant cash flow

- Cash flow principle: record investment cash flows when the money actually moves not when the accountant say they occur
- With-without principle: image 2 worlds, the one with the investment made and one without all cash flows that are different in these worlds are relevant