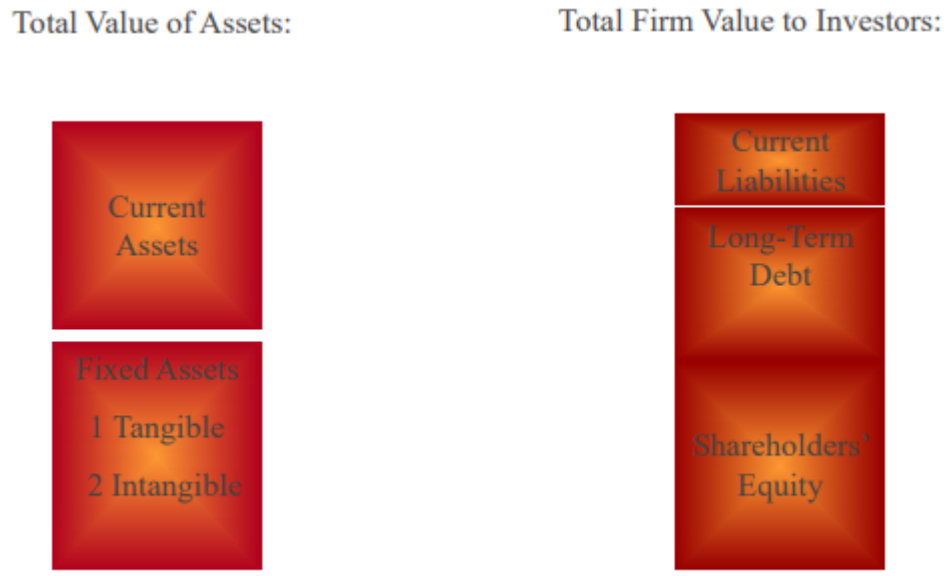
AFIN102 Notes

Introduction

Balance Sheet model of the firm



Forms of Business Organisation

Sole proprietorship

Partnership

- General partnership
- Limited partnership

Corporation

	Corporation	Partnership
Liquidity	Shares can be easily exchanged	Subject to substantial restrictions
Voting Rights	Usually each share gets one vote	General Partner is in charge; limited partners may have some voting rights
Taxation	Double	Partners pay taxes on distributions
Reinvestment and dividend payout	Broad latitude	All net cash flow is distributed to partners
Liability	Limited liability	General partners may have unlimited liability; limited partners enjoy limited liability
Continuity	Perpetual life	Limited life

The agency problem

There can be conflict of interest between shareholders and managers (agents) because their goals differ:

- Expenses - nice office, private jet
- Independence
- Survival
- Average return on acquisitions are negative. CEO's do this for self-interest as they can earn a larger bonus because the company is bigger
- Bigger business doesn't always = greater shareholder wealth

Managing managers

- Managerial compensation - Incentives can be used to align interests
- Corporate control - threat of a takeover may result in better management

Balance Sheet

- Creditors receive claim on firms cash flow
- Shareholder's equity is the residual between assets and liabilities

Loan amortization

Pure discount loan

- Borrow receives money today and repays a single lump sum at maturity

Interest only loans

- Requires interest only before maturity with full principal due at maturity

Amortised loans

- Repay principal and interest over time (typical mortgage)

What is a firm worth?

- A firm should be worth the PV of the firm's cash flows
- We have to determine the size, timing and risk of those cash flows

The profitability index (PI)

$$PI = \frac{\text{Total PV of Future Cash Flows}}{\text{Initial Investent}}$$

- Minimum Acceptance Criteria:
  - Accept if PI > 1
- Ranking Criteria:
  - Select alternative with highest PI

Making Investment Decisions

Incremental cash flows

- Incremental cash flows matter, not accounting earnings (ignore depreciation as it is not a cash outflow)
- Sunk costs do not matter. Don't throw good money after bad projects because "we've come this far"
- Opportunity costs and side effects matter
- Taxes matter as we want incremental after-tax cash flow
- Inflation matters

Side effects

- Negative - erosion of sales/demand
- Positive - synergies increasing demand?

Estimating cash flows

Incremental cash flow = cash flow of investment + cash flow from operations

Cash flow from operations (OCF)

- OCF = EBIT - Taxes + Depreciation

Cash flow from investment (ICF)

- ICF = -CAPEX - Change in NWC - Opportunity cost + Positive side effect - Negative side effect
- NWC = net working capital (current assets - current liabilities)

Net capital spending

- Salvage value (after tax) at the end of the project.
- Salvage value after tax = sale price - book value of the project * tax rate

Change in net working capital

- When the project starts, we usually require NWC
- When the project winds down, we enjoy a return of net working capital

Alternative definitions of OCF

Top-down approach

- OCF = sales - costs - taxes
- Do not subtract depreciation

Bottom up approach

- Works only when there is no interest expense
- OCF = Net income + depreciation

Tax shield approach

- OCF = (Sales - Costs) (1-T) + Depreciation *T

Interest expense

- At this stage, assume debt is independent of the project

Example - the Baldwin Company

➢The Baldwin Company investigated the marketing potential of brightly coloured bowling balls. The questionnaires costed $250,000. The results of the questionaries supported the conclusion that the brightly coloured bowling balls could achieve a 10-15% share of the market. The Baldwin Company is now considering investing in a building owned by the firm, which is vacant, and the land can be sold for $150,000 after taxes.

- Costs of test marketing (already spent): $250,000
- Current market value of proposed factory site (which we own): $150,000
- Cost of bowling ball machine: $100,000 (depreciated according to MACRS 5-year)
  - The MACRS 5-year plan is: (0.2, 0.32, 0.192, 0.1152, 0.1152)
- Increase in net working capital: $10,000
- Production (in units) by year during 5-year life of the machine: 5,000, 8,000, 12,000, 10,000, 6,000

- Price during first year is $20; price increases 2% per year thereafter.
- Production costs during first year are $10 per unit and increase 10% per year thereafter.
- Annual inflation rate: 5%
- Working Capital: initial $10,000
  - changes with sales: 10% sales of the year
- Tax rate if flat at 34%
- Assume the discount rate is 10%

($ thousands) (All cash flows occur at the *end* of the year.)

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Investments:						
(1) Bowling ball machine	100.00					-21.76*
(2) Opportunity cost (warehouse)	150.00					-150.00
(3) Net working capital (end of year)	10.00	10.00	16.32	24.97	21.22	0
(4) Change in net working capital	10.00		6.32	8.65	-3.75	-21.22
(5) Total cash flow of investment [- (1) - (2) - (4)]	–260.00		–6.32	–8.65	3.75	192.98

* We assume that the ending market value of the capital investment at year 5 is $30,000.
After-tax salvage value = $30,000-[0.34 * ($30,000 – $5,760)]=$21,758

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Income:						
(6) Sales Revenues		100.00	163.20	249.70	212.24	129.89

Recall that production (in units) by year during the 5-year life of the machine is given by:

(5,000, 8,000, 12,000, 10,000, 6,000).

Price during the first year is $20 and increases 2% per year thereafter.

Sales revenue in year 2 = 8,000 × [$20 × $(1.02)^1$] = 8,000 × $20.40 = $163,200.

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Income:						
(6) Sales Revenues		100.00	163.20	249.70	212.24	129.89
(7) Operating costs		50.00	88.00	145.20	133.10	87.85

Again, production (in units) by year during 5-year life of the machine is given by: (5,000, 8,000, 12,000, 10,000, 6,000).

Production costs during the first year (per unit) are $10, and they increase 10% per year thereafter.

Production costs in year 2 = 8,000 × [$10 × $(1.10)^1$] = $88,000

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Income:						
(6) Sales Revenues		100.00	163.20	249.70	212.24	129.89
(7) Operating costs		50.00	88.00	145.20	133.10	87.85
(8) Depreciation		20.00	32.00	19.20	11.52	11.52

Depreciation is calculated using the Modified Accelerated Cost Recovery System (shown at right).

Our cost basis is $100,000.

Depreciation charge in year 4
= $100,000 × (.1152) = $11,520.

Year	ACRS %
1	20.00%
2	32.00%
3	19.20%
4	11.52%
5	11.52%
6	5.76%
Total	100.00%

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Income:						
(6) Sales Revenues		100.00	163.20	249.70	212.24	129.89
(7) Operating costs		50.00	88.00	145.20	133.10	87.85
(8) Depreciation		20.00	32.00	19.20	11.52	11.52
(9) Income before taxes [(6) - (7) - (8)]		30.00	43.20	85.30	67.62	30.53
(10) Tax at 34 percent		10.20	14.69	29.00	22.99	10.38
(11) Net Income [(9)-(10)]		19.80	28.51	56.30	44.63	20.15

	Year 0	***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***
(1) Sales Revenues		$100.00	$163.20	$249.70	$212.24	$129.89
(2) Operating costs		50.00	88.00	145.20	133.10	87.85
(3) Taxes		10.20	14.69	29.00	22.99	10.38
(4) OCF=(1) - (2) - (3)		39.80	60.51	75.50	56.15	31.67
(5) Total CF of Investment	–260	0	–6.32	–8.65	3.75	192.98
(6) Total CF of the project [(4) + (5)]	–260	39.80	54.19	66.85	59.90	224.65

$$NPV = -\$260 + \frac{\$39.80}{(1.10)} + \frac{\$54.19}{(1.10)^2} + \frac{\$66.85}{(1.10)^3} + \frac{\$59.90}{(1.10)^4} + \frac{\$224.65}{(1.10)^5}$$

$$NPV = \$51.59$$

Investments of unequal lives

When comparing the NPV of investments with unequal lives, we calculate the Equivalent Annual Cost (EAC)

- EAC is the value of the level payment annuity that has the same PV as our original set of cash flows
- Use PVA formula by using the NPV as the PV, over the rest of the formula

- The "Cadillac cleaner" costs $4,000 today, has annual operating costs of $100, and lasts 10 years.
- The "Cheapskate cleaner" costs $1,000 today, has annual operating costs of $500, and lasts 5 years.

➢ Assuming a 10% discount rate, which one should we choose?

Cadillac Air Cleaner		Cheapskate Air Cleaner	
CF0	–4,000	CF0	–1,000
CF1	–100	CF1	–500
F1	10	F1	5
I	10	I	10
NPV	–4,614.46	NPV	–2,895.39

At first glance, the Cheapskate cleaner has a higher NPV.

Cadillac EAC = $4{,}614.46 \div \frac{1-(1.1)^{-10}}{0.1}$

= $750.98

- For example, the EAC for the Cadillac air cleaner is $750.98.
- The EAC for the Cheapskate air cleaner is $763.80, thus we should reject it.

Inflation and capital budgeting

Fisher equation

$$(1 + \text{Nominal Rate}) = (1 + \text{Real Rate}) \times (1 + \text{Inflation Rate})$$

- When inflation is high, we use this exact formula
- We must use real cash flows discounted by real rates and nominal cash flows discounted by nominal rates

Sensitivity, scenario and break-even

- Test how sensitive NPV is to changing rates and cash flows