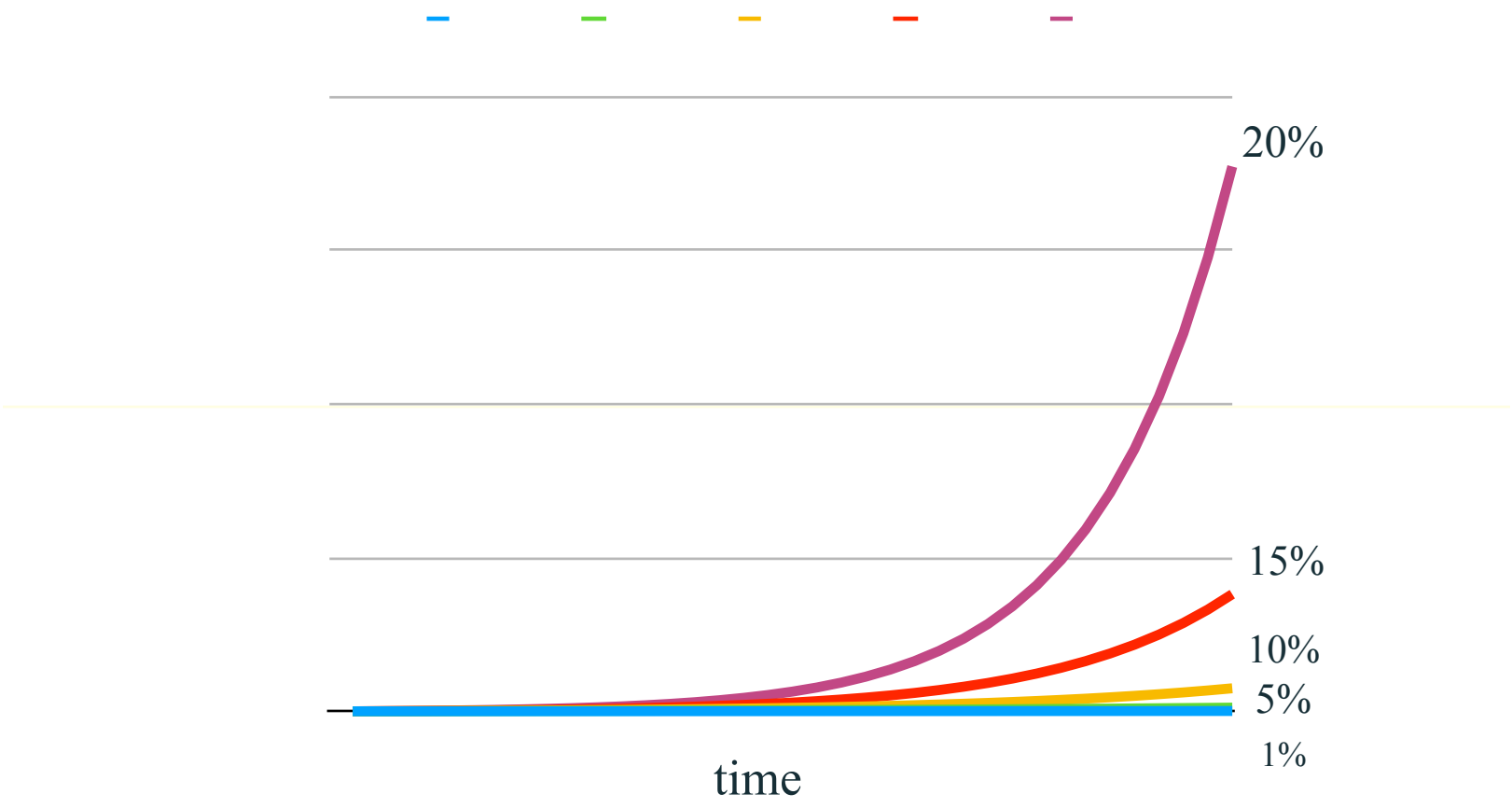
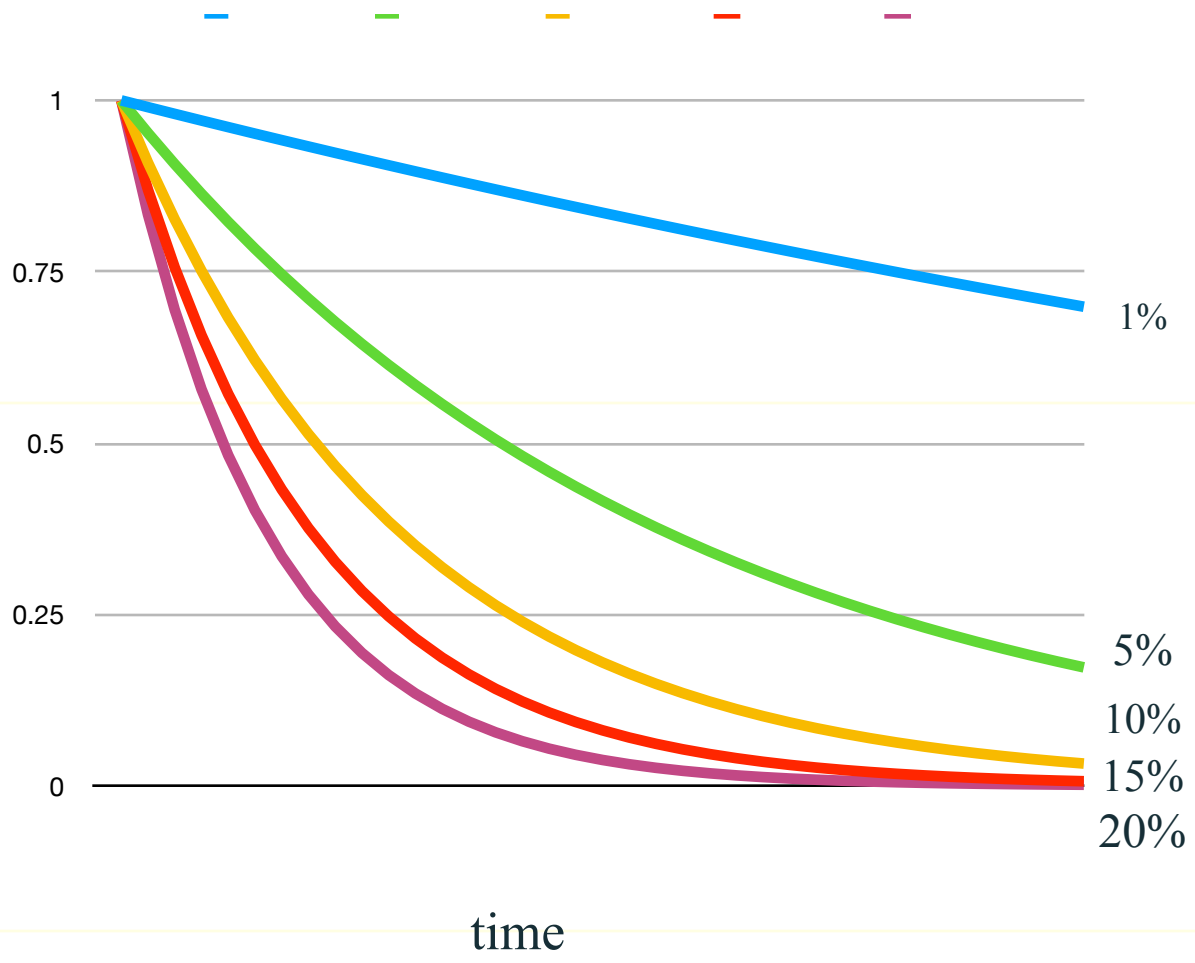
Week 6 Lecture Notes

Net Present Value and Other Project Evaluation Methods Making Capital Investment Decisions

Future Value of $1



Present Value of $1



5.1 Why Use Net Present Value?

- Accepting positive NPV projects benefits shareholders.
  - ✓ NPV uses cash flows
  - ✓ NPV uses all the cash flows of the project
  - ✓ NPV discounts the cash flows properly

The Net Present Value (NPV) Rule

- Net Present Value (NPV) =

Total PV of future CF's + Initial Investment

- Estimating NPV:
  1. Estimate future cash flows: how much? and when?
  2. Estimate discount rate
  3. Estimate initial costs
- Minimum Acceptance Criteria: Accept if NPV > 0
- Ranking Criteria: Choose the highest NPV

5.2 The Payback Period Method

- How long does it take the project to "pay back" its initial investment?
- Payback Period = number of years to recover initial costs
- Minimum Acceptance Criteria:
  - Set by management
- Ranking Criteria:
  - Set by management

Example

Years	Project A	Project B
0	-1,000	-1,000
1	800	200
2	200	200
3	200	800
4	200	800
5	200	800

Payback period of A is 2 years

Payback period of B is 2 and 600/800 = 3/4 years, that is 2 years and 9 months

The Payback Period Method

- Disadvantages:
  - Ignores the time value of money
  - Ignores cash flows after the payback period
  - Biased against long-term projects
  - Requires an arbitrary acceptance criteria
  - A project accepted based on the payback criteria may not have a positive NPV
- Advantages:
  - Easy to understand
  - Biased toward liquidity
  - Helpful in assessing lower management

5.3 The Discounted Payback Period

- How long does it take the project to “pay back” its initial investment, taking the time value of money into account?
- Decision rule: Accept the project if it pays back on a discounted basis within the specified time.
- By the time you have discounted the cash flows, you might as well calculate the NPV.

Example: assume that market rate is 10%

Years	Project A	Project B	Discounted Cash Flow of A	Discounted Cash Flow of B
0	-1,000	-1,000	-1,000	-1,000
1	800	200	800/1.1= 727	182
2	200	200	165	165
3	200	800	150	601
4	200	800	137	546
5	200	800	124	497

Payback period of A is 727+165=892 2 years and 108/150 =0.72 about 9 months

Please note that discounted payback period is longer than payback period

Online poll : 111S20Q18, payback

a project accepted with payback period method can have a negative NPV

Online poll : 111S20Q19, discount

a project accepted with discounted payback period method can have a negative NPV

5.6 The Profitability Index (PI)

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

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

Using PI on Mutually Exclusive Projects

Project	A	B	A-B
Investment	-100	-70	-30
Year 1	120	20	100
Year 2	80	140	-60
NPV (@10%)	75.21	63.88	11.32
PI(@10%)	1.75	1.91	1.38

Mutually exclusive: pick either A or B but not both

The Profitability Index

- Disadvantages:
  - Problems with mutually exclusive investments
- Advantages:
  - May be useful when available investment funds are limited
  - Easy to understand and communicate
  - Correct decision when evaluating independent projects

5.7 The Practice of Capital Budgeting

- Varies by industry
- NPV, Payback Period, Discounted Payback Period, Profitability Index.
- The most frequently used technique for large corporations is NPV or IRR.
- IRR is covered extensively in ENG 110.

Company is considering taking on a project, how would the financial statements be affected by this project?

BLOSSOM COMPANY Income Statements For the Year Ended December 31 (in thousands)		
	2020	2019
Sales revenue	$3,920	$3,580
Costs and expenses		
Cost of goods sold	1,130	1,050
Selling & administrative expenses	2,400	2,330
Interest expense	10	20
Total costs and expenses	3,540	3,400
Income before income taxes	380	180
Income tax expense	152	72
Net income	$ 228	$ 108

BLOSSOM COMPANY Balance Sheets December 31 (in thousands)		
	2020	2019
Current assets		
Cash and cash equivalents	$330	$360
Accounts receivable (net)	630	560
Inventory	580	510
Prepaid expenses	130	160
Total current assets	1,670	1,590
Property, plant, and equipment (net)	410	380
Investments	170	170
Intangibles and other assets	530	510
Total assets	$2,780	$2,650
Current liabilities	$980	$950
Long-term liabilities	600	500
Stockholders' equity—common	1,200	1,200
Total liabilities and stockholders' equity	$2,780	$2,650

Sunk Costs

Opportunity Cost

Allocated Cost

Side Effects

- Synergy
- Erosion
- Cannibalism

Sunk Cost:

Project A: $10k, $5k spent already

Project B: $0k

Determine the Revenue and the Costs.

How can you estimate Sales?

How can you estimate Costs?

There is an initial Fixed Asset investment, will depreciate over the life of the project.

There may or may not be a salvage value at the end.

Salvage Value = Market Value - t (Market Value-Book Value)

NWC increase and recover

Tax rate

Capital Budgeting

		Year 1	Year 2	Year 3	Year 4
Sales		$8,500	$9,000	$9,500	$7,000
Costs		1,900	2,000	2,200	1,700
Depreciation		4,000	4,000	4,000	4,000
EBT		$2,600	$3,000	$3,300	$1,300
Tax		884	1,020	1,122	442
Net income		$1,716	$1,980	$2,178	$858
OCF		$5,716	$5,980	$6,178	$4,858
Capital spending	–$16,000				
NWC	–200	–250	–300	–200	950
Incremental cash flow	–$16,200	$5,466	$5,680	$5,978	$5,808

For the example above, we do not have a salvage value as the fixed equipment depreciated to zero and the market value is also zero.

Salvage Value = Market Value - t (Market Value-Book Value)

If a fixed asset depreciates and in our books shows as 2,000 when its market value is higher, let's say $8,000 and we sell it at the market price then, the salvage value would be (assume tax rate is 20%):

Salvage Value = 8,000 - 0.20(8,000-2,000) = 6,800

$$NPV = -16{,}200 + 5{,}466 / 1.12 + 5{,}680 / 1.12^2$$

$$+ 5{,}978 / 1.12^3 + 5{,}808 / 1.12^4 = 1{,}154.53$$

Now, I need to calculate how much I could make in the market with $16,ooo and compare it to NPV.

Where is the financing cost? Why didn't we deduct an interest cost When calculating the OCF?

Online poll : 111S20Q20, npv

Now, I need to calculate how much I could make in the market with $16,ooo and compare it to NPV.

Online poll: 111S20Q21, npv

We did not account for any financing cost

Summary – Discounted Cash Flow

- Net present value
  - Difference between market value and cost
  - Accept the project if the NPV is positive
  - Has no serious problems
  - Preferred decision criterion
- Profitability Index
  - Benefit-cost ratio
  - Take investment if PI > 1
  - Cannot be used to rank mutually exclusive projects

Summary – Payback Criteria

- Payback period
  - Length of time until initial investment is recovered
  - Take the project if it pays back in some specified period
  - Does not account for time value of money, and there is an arbitrary cutoff period
- Discounted payback period
  - Length of time until initial investment is recovered on a discounted basis
  - Take the project if it pays back in some specified period
  - There is an arbitrary cutoff period