Investment Appraisal

Chapter 8

Lesson Goals

- Understand what is meant by time value money
- Be able to carry DCF analysis to assess the viability of a proposed investment proposal
- Be able to interpret a discounted cash flow analysis in commercial terms

Introduction

- Successful companies always looking to change and develop
- Management is faced with different proposals
- Not single way of assessing and comparing different proposals
- Factors taken into account
  - Consistent with company's long term plans
  - Risk attached to proposals
  - Availability of necessary resources

Introduction

- One important criteria
  - Return on investment
  - Usual way is DCF
- DCF tool is used for
  - Share price of a company
  - Purchase or lease it
  - Most financially appealing proposals
  - A proposed project is worthwhile

The Time Value of Money

- The promise of 103RS for 100RS in a years time
- DCF – discounted cash flow analysis
- $1 \div (1 + r)t$ is known as discount factor

The Time Value of Money

TABLE 8.1 *Discount factors for periods up to five years*

Interest Rate (%)	1	2	3	4	5
3	0.9709	0.9426	0.9151	0.8885	0.8626
4	0.9615	0.9246	0.8890	0.8548	0.8219
5	0.9524	0.9070	0.8638	0.8227	0.7835
6	0.9434	0.8900	0.8396	0.7921	0.7473
7	0.9346	0.8734	0.8163	0.7629	0.7130
8	0.9259	0.8573	0.7938	0.7350	0.6806
9	0.9174	0.8417	0.7722	0.7084	0.6499
10	0.9091	0.8264	0.7513	0.6830	0.6209
15	0.8696	0.7561	0.6575	0.5718	0.4972
20	0.8333	0.6944	0.5787	0.4823	0.4019

The Time Value of Money

- 1000 Rs payable in 4 years time with discount/interest rate 8% ?
  - 1000 x 0.7350 = 735

The Time Value of Money

- Car Example
  - Buy or lease
  - **New Wolsey Hornet £8995 or only £500 down and £400 per month for 24 months**
  - Using the idea of discount factors, we can calculate the present value of each of those monthly payments
  - If we add the present value of all those payments to the £500 that we have to pay immediately, we shall obtain the present value of the total of the payments we have to make
  - If this is more than £8,995, we shall be better off buying the car outright immediately.

The Time Value of Money

- Car Example
  - The result of applying this function (NPV) to a sequence of 24 payments of £400 with a discount rate of 0.2466 per cent per month (3% annual) is a net present value of £9,310.30.
  - To this we must add the £500 down payment
  - This shows that the NPV of the payments on easy terms is £9,810.30.
  - Clearly we shall be much better off by buying the car outright for £8,995 if we have the money available.

APPLYING DCF TO A SIMPLE INVESTMENT PROJECT

- **The essence of investment is that money is spent now so as to produce benefits in the future**;
  - Benefits in monetary terms, get present value
  - To do this, we calculate the net cash flows that the project will generate over each year of its life and convert these to a present day value.
  - Then we add these up to get the NPV of the project as a whole.

APPLYING DCF TO A SIMPLE INVESTMENT PROJECT

- New van cost – 10,000
- 500 insurance and 150 road tax – annual cost
- Maintenance
  - 200 in first two years
  - 300, 400, 500 in year 3, 4 ,5 respectively
- Van to be sold at 2000 – end of year 5
- Interest rate 10 %
- Van hire cost 35 a day – 100 days a year
- Inflation 5%

APPLYING DCF TO A SIMPLE INVESTMENT PROJECT

TABLE 8.2 *DCF analysis of van purchase versus leasing*

	Year 0	Year 1	Year 2	Year 3	Year 4
Buying a van					
Van purchase/sale	(10000)				2000
Tax and insurance	(650)	(683)	(717)	(752)	(790)
Maintenance	(200)	(210)	(331)	(463)	(608)
Annual cash flow	(10850)	(893)	(1048)	(1215)	602
NPV of annual flow	(10850)	(812)	(866)	(914)	412
Total NPV	(13030)				
Continuing to rent					
Annual costs	(3500)	(3675)	(3859)	(4052)	(4254)
NPV of annual costs	(3500)	(3341)	(3189)	(3044)	(2906)
Total NPV	(15980)				

Software Product Proposal

- Development
  - 3 people – 1st year
  - 1 and ½ - 2nd year
  - 35000 per year staff cost
- Release
  - 2nd year
  - 1 person for maintenance full time
- Sales and marketing
  - 10,000 and 20,000 in 1st and each next four years resp
- 100 copies to be sold in 5 years with 5000 a copy

DCF Analysis of a software project

	Year 0	Year 1	Year 2	Year 3	Year 4
Development cost	105,000	55,125			
Maintenance			38,588	40,517	42,543
Sales and marketing	10,000	21,000	22,050	23,153	24,310
Number of sales		10	20	40	30
Revenue		50,000	100,000	200,000	150,000
Net cash flow	(115,000)	(26,125)	39,363	136,331	83,147
Discount factor	1	0.9091	0.8264	0.7513	0.6830
Present value	(115,000)	(23,750)	32,529	102,425	56,789
Cumulative present value	(115,000)	(138,750)	(106,221)	(3,796)	52,993

DCF Analysis of a software project

- Pay-back period
  - Time required to get positive cash flow
- IRR – internal rate of return
  - Cost of capital required for NPV to be zero
- Proposal to be rejected when;
  - NPV not positive
  - Pay-back time is greater than a threshold
  - IRR is less than current cost of capital
  - Between 2 projects, with highest NPV is selected, or highest IRR or shortest pay-back time

PITFALLS OF DCF

- Too precise in nature
  - Rely on assumptions
  - Uncertainty not handled
- DCF analysis incase of a software project
  - Most software takes more time then anticipated
  - Most software doesn’t work correctly
  - Not being able to sell copies as much as anticipated
  - Risk, that competitor will launch similar project

PITFALLS OF DCF

- Do DCF analysis with different assumptions and changes
- If results vary with small changes-not good-high risk
- In the above example
  - If in year 3, sales drop from 40 to 20, cash flow does not become positive
  - Project high risk, as sale not to predicted accurately for this long
  - If price increased to 6000, NPV rises to 117420 - pay-back period falls to 2 years
  - This sensitivity of changes in sales and price is characteristics of software project development