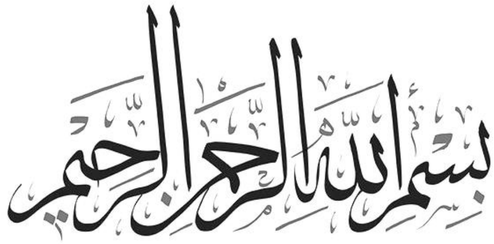
Financial Management I

Summary Notes

by: Muawiya Majdalawi



سامحونا على الخط اذا كان صغير او مش واضح /: وسامحونا على الخرابيش /:

- **بالنسبة للحفظ .. الحفظ جدا مهم بالمادة خصوصا امتحان الفاينل نصو حفظ .. المعلومات الي معلم عليها بالبرتقالي ركزو عليها مهمة كثير للحفظ يعني بيجي منو بالامتحان .. بس لا تبصم بصم .. افهم فهم بعدين احفظ لانو ممكن يلعب بـ صيغة السؤال بالامتحان وانت رح تفكر انو المعلومة جديدة عليك او ما مرت عليك ..**
- **المادة سهلة لمن يتابعها اول بـ اول لا تخليها تتراكم عليك ..**
- **اسئلة الكتاب في نهاية كل شابتر مهمة جداً جداً حلوهم ..**
- **لا تفكر انو رح يجيبلك اسئلة معقدة بالامتحان .. رح يجيبو تقريباً نفس اسئلة الكتاب بس انت كون معود حالك عالحل عشان ما تنسى القوانين .. كثير طلاب لما يطلع من الامتحان بحكيلك لما احل الاسئلة ما بطلع معي اجوبة ليش هيك بصير معي !!! لانو مش معود حالو عالحل بالمرة وبقرأ المادة قراءة فـ اوعى تغلط نفس الغلطة :)**
- **اوعى تخلي طالب يخوفك ويحبطك من المادة ويحكيلك المادة صعبة وكلهم برسبو فيها وابصر شو .. لا تسمع لـ كلامو وخلي عندك ثقة بنفسك لانو الطلاب يا الله ما اشطرهم بالتخويف والاحباط /:**
- **واخر شي .. بالتوفيق للجميع وان شاء الله يا رب تنزلوها A+ ..**
  ان شاء الله تكونو استفدتو .. ☺

ادعولنا بالخير :)

أخوكم : Muawiya Majdalawi

ادارة مالية ١ صيفي ثاني --- (٢) / /

CH.1 :- Net Present value and other Investment criteria

* طرق لتقييم اي شروع سيتم بناؤه في المستقبل من افضل الطرق

1 NET PRESENT VALUE :- (NPV)

The difference between an investment market value and its cost.

* An Investment Should be accepted if the net Present value is positive and rejected if its negative

* Discounted Cash flow valuation (DCF)

↳ the process of valuing an Investment by discounting it future cash flow

* $P.V = \frac{CF}{(1+r)^t}$, $NPV = -Cost + \sum P.V_1 + P.V_2 ---$

Ex :- The Project costs 100,000 , R = 10%

Year	C.F		P.V CF
0	-100,000		
1	20,000	$\frac{20,000}{(1+0.1)}$ =	18181.81
2	30,000		24793.38
3	20,000		15026.29
4	40,000		27320.53

, ☒ increasing the projects initial cost at time Zero
⇒ will decrease the NPV of a project

(2)

* لا يمكننا الموافقة او رفض المشروع من خلال قيم C.F المتوقعة ، يجب ايجاد "القيم الحالية الصافية" للـ C.F لكل السنوات ثم نجمعهم ، ونطرحهم من تكلفة المشروع وبناءاً على مجموع P.V نحدد اذا كان المشروع ناجح ام لا

$* \sum PVCF = 85322.01$

$* NPV = -100.000 + 85322 = -14678$ negative
⇒ Reject

P.g 262:-

Example:-

Year	Cash Inflow	Cash out flow	R = 15 %
0		Cost "-30	Net C.F
1	+20	-14	+6
2	20	-14	6
3	20	14	6
4	20	14	6
5	20	14	6
6	20	14	6
7	20	14	6
8	20	14	8

2+6

The assets of this project will value $\$\boxed{2}$ at end of the project
Salvage value

☒ in final Year of the project, the salvage value handled to be cash inflow to the project

II When the project has a net present value of Zero

⇒ The project's cash inflows equal it's cash outflow in current dollar terms

(3)

0	1	2	3	4	5	6	7	8
-30	+6	6	6	6	6	6	6	8

$\underbrace{+6 \quad 6 \quad 6 \quad 6 \quad 6 \quad 6 \quad 6}_{\text{Annuity}}$

$$NPV = -30000 + 6000 * \left(\frac{1 - \frac{1}{(1+r)^t}}{r} \right) + \frac{2000}{(1+0.15)^8}$$

$$\Rightarrow -30000 + 6000 * \left(\frac{1 - \frac{1}{(1.15)^8}}{0.15} \right) + \frac{2000}{(1.15)^8}$$

$NPV = -30 + 27578 = -2422$ ⇒ Should be rejected

*Decesion Rule :-

* If $NPV > 0$ ⇒ Accept the project
  ⇒ $I.O < \sum P.V\ C.F$
  ⇒ Project adds value

If $NPV < 0$ ⇒ Reject the project
  ⇒ $I.O > \sum P.V\ C.F$
  ⇒ Destroys value

* an increase in the salvage value, will increase the net present value of a project

(4)

[2] Pay back Period :-

⇒ the Amount of time Required for the investment to Recover it initial cost

* Decesion Rule :-

- If calculated Payback Period > Required Payback Period
  ⇒ Reject the Project

If calculated Payback Period ≤ Required Payback Period
⇒ Accept the project

Example : A Project with the following estimated Cashflows based on the Pay back Period Criteria and if the Required Payback Period is 2 Years Should this Project be Accepted?

Year	C.F	Accumulated CF
0	-100,000	-100,000
1	+30,000	-70.000
2	20000	-50.000
3	50000	0 ⇒ Payback = 3 Years
4	20.000	+20,000
5	10.000	+30000

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Example :- Required Payback Period = 2.5 Years

Year	CF	Accumalated CF
0	-60,000	-60,000
1	+6000	-54000
2	10,000	-44,000
3	20,000	-24,000
4	20,000	-4000
5	5000	+1000
6	15,000	+16000

→ 0

نأخذ جزء 4000 من 5000 حتى نوصل للصفر

$$\text{PayBack Period} = 4 \text{ Years} + \frac{4000}{5000} = 4.8 \text{ Years}$$

⇒ Reject

Disadvantages :-

① NO Standard payback Period

② Ignores the time value of money

③ Ignores the C.F after the cutoff Point

④ Biased against long-term projects, such as Research and development, and new projects

[3] Discounted Pay back :-

* The amount of time required to recover the initial outlay from future cashflow

* Decesion Rule :-

- If the required discounted Pay back Period < Calculated discounted Pay back ⇒ Reject the project

- If the required discounted Pay back ≥ Calculated discounted Pay back ⇒ Accept

[*] The NPV is Zero when the sum of the discounted cashflows equals the initial investment

[*] The payback period is used more frequently even though discounted payback period is a better method

[*] Applying the discounted payback period decision rule to all projects may cause :- some $\boxed{\text{positive}}$ net present value projects to be $\boxed{\text{rejected}}$

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4 Average Accounting return (AAR) :-

* $AAR = \frac{\text{Average Net incom}}{\text{Average Book value}}$

→ Avergge Net income $(ANI) = \frac{NI_1 + NI_2 + \dots + NI_n}{n}$

⇒ Average Book value $(ABV) = \frac{\text{Ending B.v} + \text{Begining B.v}}{2}$

↳ only when we have Stright line Depreciation basis

* Decesion Rule :-

If the AAR ≥ Required Rate of return (RRR) → Accept

If the AAR < RRR ⇒ Reject

P.g 293 / Q4 :- $\boxed{R = 14\%}$ Discounted Pay Back *

Year	C.F	Discounted	Accumulated C.F Discounted
0	-7000	~~[illegible]~~	
1	4200	3684.21	-3315.78
2	5300	4078.18	762.4 →0
3	6100	4117.32	
4	7400	4381.4	

$\Rightarrow 1 + \frac{3315.78}{4078.18}$

$\Rightarrow 1 + 0.81$

$\Rightarrow 1.81$ years

P.g 293

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Q6 :- installation cost = 15,000,000

* Average net income = $\frac{1,938,200 + 2,201,600 + 1,876,000 + 1,329,500}{4}$

$\Rightarrow$ 1,836,325

Average Book value = $\frac{15,000,000 + 0}{2}$

$\Rightarrow$ 7,500,000

* AAR = $\frac{1,836,325}{7,500,000}$ = 0.2448 $\Rightarrow$ 24.48 %

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[5] Internal Rate of Returns:- (IRR)

⇒ Is a discount Rate that makes the net present value equals $\boxed{\text{Zero}}$ & NPV = 0

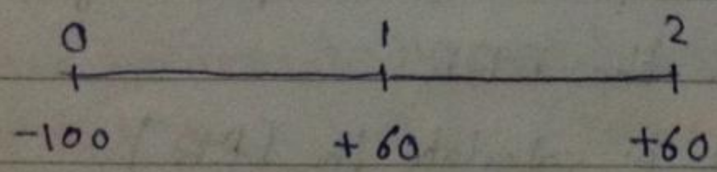
$$NPV = -I.O + \frac{CF}{(1+IRR)^1} + \frac{CF}{(1+IRR)^2} + \frac{CF}{(1+IRR)^N} + \ldots = 0$$

* Decesion Rules:-

- If the IRR ≥ R.R.R → Accept
- " " " < R.R.R → Reject

P.g 275

Example:- a project with the following projectal CF



If the R.R.R = 15%, Should we accept this project based on IRR Criterion?

* The Relationship between IRR and NPV is negative

* طريقة حساب IRR

$$0 = -100 + \frac{60}{(1+IRR)^1} + \frac{60}{(1+IRR)^2}$$

* we use trial and error to find the Root of the equation

* نعمل على تجربة الصح والخطأ لإيجاد الـ Discount Rate حتى نوصل لـ 0

Discount Rate	NPV
0 %	$-100 + \frac{60}{(1+0)^1} + \frac{60}{(1+0)^2} = 20$
5 %	$-100 + \frac{60}{(1+.05)} + \frac{60}{(1+.05)^2} = 11.56$
10 %	
IRR = 13.1 %	$-100 + \frac{60}{(1+.131)^1} + \frac{60}{(1+.131)^2} = 0$
15 %	$-100 + \frac{60}{(1+.15)} + \frac{60}{(1+.15)^2} = -2.46$

* because IRR < RRR → Reject

* if you are required to whether to accept / Reject a project and you have given the RRR

(Assume you are not required to calculate the IRR)

⇒ Find NPV at the RRR

if $NPV_{at\ RRR} < 0$ → Reject (Because RRR > IRR)

if $NPV_{at\ RRR} > 0$ → Accept (Because RRR < IRR)

* The IRR is equal to the required return when the NPV is equal to Zero

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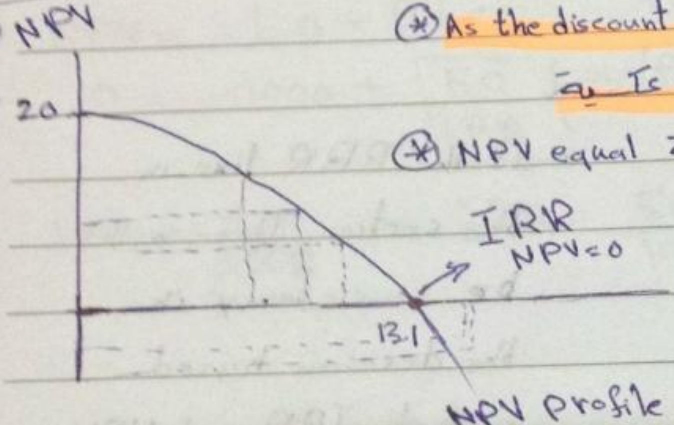
Discount Rate	NPV
0 %	20
5 %	11.56
10 %	4.13
15 %	-2.46

⇒ NPV Schedual



(*) As the discount rate increase, the NPV decrease

* العلاقة بين NPV و IRR علاقة عكسية

(*) NPV equal zero at R = 13 %

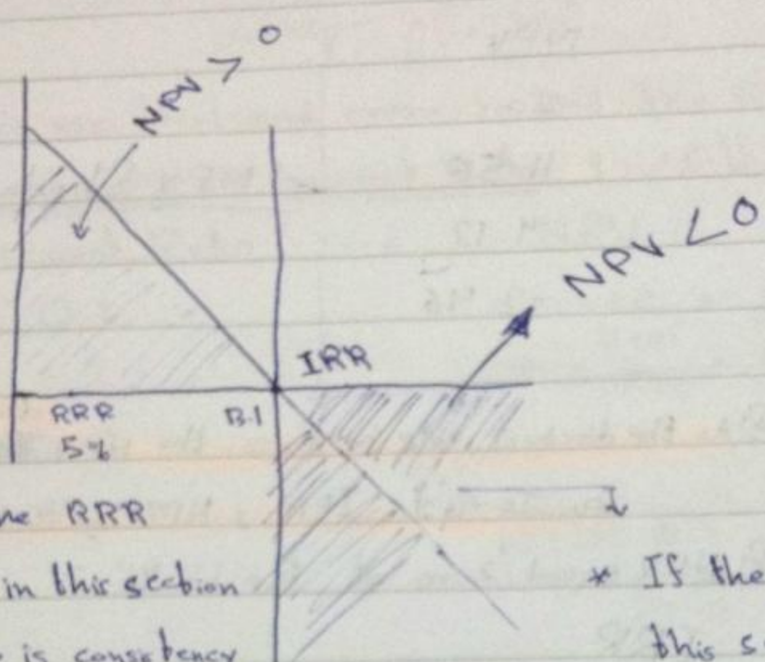
* curve represent the relationship between project profile NPV and discount Rate (NPV Profile)

علاقة عكسية

* There is negative relationship between NPV and discount Rate

صح

* The NPV is positive at any discount rate less than 13.1 % and negative at any discount Rate above 13.1 %



* If the RRR lies in this section there is consistency between NPV and IRR

in this section

IRR > RRR → Accept

NPV > 0 → Accept

* If the RRR lies in this section There will be consistency in the decesion based on both IRR and NPV

IRR < RRR → Reject

NPV < 0 → Reject

* In normal case both NPV and IRR will Coincide in there

* Multiple rates of returns - The possibility that ~~more~~ more than one discount rate will make the NPV of an Investment Zero

(14)

Example :- A Project with 50$ Cash inflow each year and for ever (Perpetual Cashflows) if the I.O = 1000 and the RRR = 5 %

Calculate the IRR and recomend whether to accept / Reject this project

$NPV = -I.O + PV\ C.F$

$0 = -1000 + \boxed{\frac{50}{IRR}} \rightarrow$ (Perpetual Cashflows)

$1000 = \frac{50}{IRR} \Rightarrow IRR = \frac{50}{1000} = 5\% \Rightarrow$ Accept this project at IRR = RRR

IS always the recomendation of IRR and NPV criterial Coincide ? NO . then When ?

① When the project has non conventional Cashflow

Cashflow → Conventional: 0, 1, 2, 3, ..., N : $-I.O$, $+CF_1$, $+CF_2$, $+CF_3$, ..., $+CF_N$

Cashflow → Non: 0, 1, 2, 3, 4, 5 : $-I.O$, $+CF_1$, $-CF_2$, $-CF_3$, $+CF_4$, $+CF_5$

In non conventional → Multiple IRR

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* In case of non conventional cash flows we can not use the IRR criteria as it may result in a misleading recomendation (Contradict with the NPV reconendation)

[*] the Second Problem with the application of the IRR appears ⇒ when have two or more mutually exclusive projects

P.g 279

* Mutually Exclusive ⇒ accepting one project result and rejecting the other one

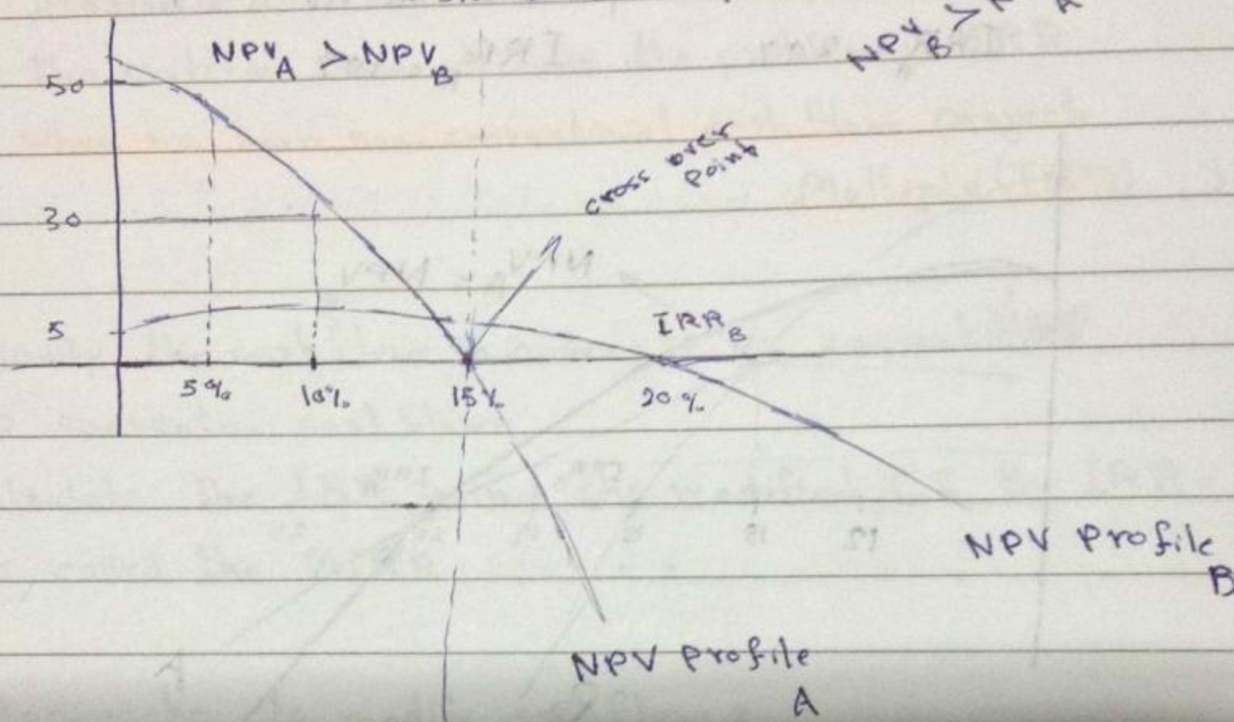
Examples_ Consider projects A and B which are mutually exclusive $IRR_A = 15\%$, $IRR_B = 20\%$

Based on IRR criteria, any investor Should Choose? Project B with the higher IRR

[*] if a Firm accepts project A it will not be feasible to also accept project B because both projects would require the simultaneous and exclusive use of the same piece of machinery. These projects are considered to be 8- mutually exclusive

we accepted project B while

we should've accepted A



* In case of mutually exclusive project we may take a missleading decesion

* we need to look at the relative NPV's to avoid the possibility of choosing incorrectly

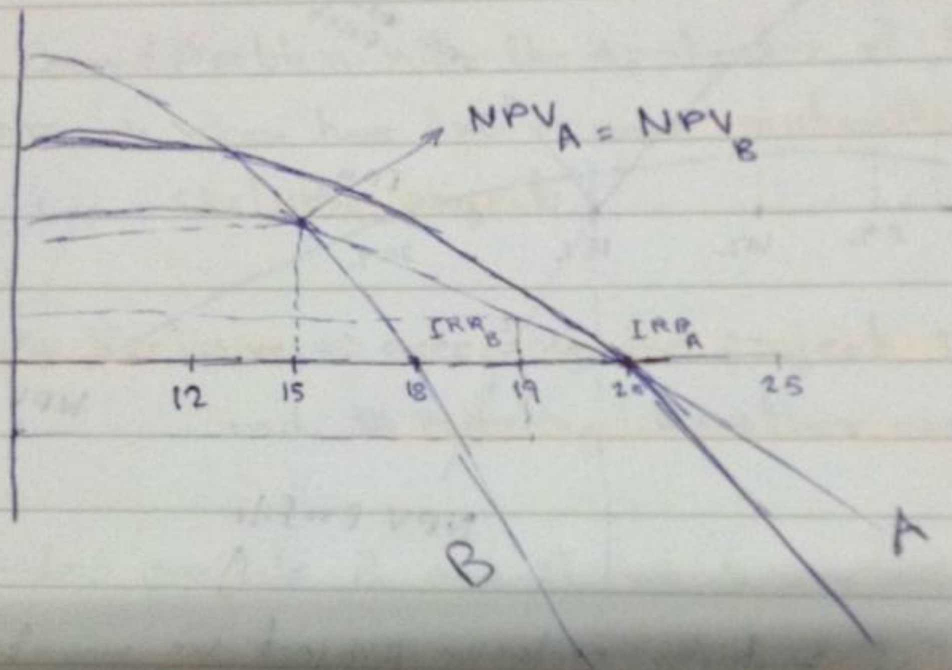
* The option with the higher NPV is preferred, regardless of the relative returns

(17)

Example 2- Consider two mutually exclusive project (A, B)

if the cross over point occurs at 15 %

$IRR_A = 20\%$, $IRR_B = 18\%$



if the RRR = 12% → choose B

if the RRR = 25% → Both will yield negative NPV and should be rejected

if the RRR = 19 % → Accept A

(18)

[6] Modified Internal Rate of Return (MIRR)

* this criterion comes to solve the problem in IRR when we have non-conventional cash flows projects Multiple (IRR)

- Modify the cash flows in order to be conventional to convention cash flows
- calculate the IRR using the modified C.F the IRR is called the MIRR

⊛ Approaches to modify cash flows:

[1] Discounting Approache
[2] Reinvestment Approache
[3] Combination Approache

[1] Discounting Approach :- Discounting all negative cashflows to time Zero

[2] Reinvestment Approach :- Reinvested all positive cash flo to the end of the project

(19)

Pg 283 - Example

Year	CF
0	-60
1	+155
2	-100

CF in this project is non-conventional MIRR ? assum R = 20%

time ←

① **Discounting Approache** :- Discounting all negative cash flow to Zero time

Year	Modified CF
0	$-60 + \frac{-100}{(1+0.20)^2} = -60 - 69.44 = -129.44$
1	+155
2	0

$$* \Rightarrow NPV = 0 = -129.44 + \frac{155}{(1+MIRR)^1} = 129.44 = \frac{155}{(1+MIRR)}$$

$$\Rightarrow MIRR = \boxed{19.74\ \%}$$

Posative ←

② **Reinvestment Approach** :- All Cash inflow will be reinvested to the end of the project

↳ future

Year	modified C.F
0	-60
1	0
2	$-100 + \underbrace{155(1+0.2)^1}_{\text{future value}} = +86$

$$\boxed{f.v = CF * (1+r)^t}$$

$$\frac{60(1+MIRR)^2}{60} = \frac{86}{60} \Rightarrow \sqrt{(1+MIRR)^2} = \sqrt{1.4333} \qquad \sqrt{1.4333} = 1.1972$$

$$\Rightarrow 1+MIRR = 1.1972$$

(20)

$$\Rightarrow 0.1972 \Rightarrow 19.72\%$$

NPV = 0

$$0 = -60 + \frac{0}{(1+MIRR)^1} + \frac{86}{(1+MIRR)^2}$$

$$60 = \frac{86}{(1+MIRR)^2} \Rightarrow MIRR = \boxed{19.72\%}$$

③ Combined Approach :-

* Discounted all negative values to time zero
* Reinvested all posative values to the end of project

Year	modified CF
0	$-60 - \frac{100}{(1+0.20)^2} = -129.44$
1	0
2	$0 + 155(1+0.20)^1 = +186$

NPV = 0

$$0 = -129.44 + \frac{0}{(1+MIRR)^1} + \frac{186}{(1+MIRR)^2}$$

$$129.44 = \frac{186}{(1+MIRR)^2} \Rightarrow MIRR = 19.87\%$$

/ /

(21)

7 Profitability Index (PI) :-

$$\boxed{* \; PI = \frac{P.V\ C.F}{I.O}}$$

$NPV = -I.O + P.V\ CF$

* $NPV < 0$ X → $I.O > P.V\ CF$ → $PI < 1$ ⇒ Reject
* $NPV > 0$ ✓ → $I.O < P.V\ CF$ → $PI > 1$ ⇒ Accept
* $NPV = 0$ ⇒ the project earns a return exactly equal to the discount rate
* $PI = 1.5$ ⇒ each dollar invested in this project will add 0.5
* $PI = 0.7$ ⇒ each dollar invested in this project will ~~destroy~~ destroy 0.3

Examples- if $R = 10\%$

Year	CF
0	-100
1	+60
2	+30
3	+70

$$PI = \frac{\frac{60}{(1+0.1)^1} + \frac{30}{(1+0.1)^2} + \frac{70}{(1+0.1)^3}}{100} = \frac{131.93}{100} = 1.3193 > 1$$

Accept

CH: 10   / /

making capital investment decisions   CH 10   (23)

Pro forma financial statement :-

Example :- Project with following projected information

* unit of sales = 50,000 unit
* Price per unit = 4$ / unit
* variable cost = 2.5
* Fixed cost = 12,000 → (fixed assets)
* Capital spending = 90,000
* Depreciation = $\frac{90,000}{3 \text{ Years}} = 30,000$
* Project life = 3 Years
* working capital = 20,000 Per year
* Tax rate = 34 % , * NO Interest

Step 1 : Projected Capital Required

	Year 0	Year 1	Year 2	Year
NWC	20,000	20,000	20,000	20,0
Net fixed Asset	90,000	60,000	30,000	0
Total investment (capital)	$\boxed{110,000}$	80,000	50,000	20,0

↓ initial outlay

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Step 2 Projected income statement

Sales revenue	50,000 * 4 =	200,000
- variable cost	50.000 * 2.5 =	125,000
- fixed cost		12,000
- Depreciation		30,000
EBIT		33,000
- Taxes	(33,000 * 0.34) =	11,220
- Interest		0
NI		21,780

* Project Cashflow = Project operating cashflow (OCF)
  - Project change in NWC
  - Project capital spending

$OCF_{\text{each Year}}$ = EBIT + Depreciation - Taxes
= 33,000 + 30,000 - 11,220 = 51780$ Per year

Step 3: Projected CF

	Year 0	Year 1	Year 2	Year 3
OCF	0	51,780	51.780	51.780
Δ NWC	-20,000	0	0	+20,000
capital spending	-90,000	0	0	0
CF	-110,000	51.780	51,780	71,780

* Alternatives definitions of operating cashflow :-

① $OCF = EBIT + Depreciation - taxes$

② The Bottom up approach :-

$OCF = NI + Depreciation$

$= 21,780 + 30,000 = 51,780$

③ Top-down approach :-

$OCF = sales - costs - taxes$

$= 200,000 - 137,000 - 11,220$

④ tax shield approach :-

$$OCF = \underbrace{(Sales - cost) * (1 - T)}_{\text{After tax net sales}} + \underbrace{(Depreciation) * (T)}_{\text{Tax shield or Depreciation shield}}$$

$$\text{After tax Net sales} = (sales - cost)(1 - T)$$

$$= \underbrace{(sales - costs)}_{\text{Net Sales}} - \underbrace{T(sales - costs)}_{\text{Taxes}}$$

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⇒ Tax sheild = (0.34) * (30,000) = 10,200

OCF = (200,000 − 137,000) * (1 − 0.34) + 10,200

= $ 51,780

Example: Based on the market study and the tecnical study of a 3-Years project that requires 80,000 capital spending a straight line depreciation and 20,000 salvage value. The following information was reached:-

	Year 1	Year 2	Year 3
unit of Sales	20,000	25,000	30000
Price of Sales	5	4.5	4
V.C	2.5	2.5	2
F.C	10,000	8000	7000
working capital	10,000	10,000	10000

* tax rate: 34 %, R = 10 %

Recomend whether to accept or reject this project based on NPV ?

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1) Capital required :-

I.O = capital spending + working capital

= 80,000 + 10,000 = 90,000 $

Projected capital requirment

	Year 0	Year 1	Year 2	Year 3
NWC	10,000	10,000	10,000	10,000
Fixed assets	80,000	60,000	40,000	20,000
Total Investment	90,000	70,000	50,000	30,000

Amount depreciated = $\underbrace{80,000}_{\text{fixed asset}}$ - Salvage value = 80,000 - 20,000

3 Years — Total depreciation = 60,000

60,000 ÷ 3 = 20,000 each Year = 20,000

2) Projected income statement

	Year 1	Year 2	Year 3
Sales	100,000	112,500	120,000
- V.C	- 50,000	62,500	60,000
- F.C	- 10,000	8000	7000
- Dep	- 20,000	20,000	20,000
EBIT	20,000	22,000	33,000
- Taxes	- 6800	-7480	-11220
NI	13,200	14,520	21,780

3) OCF each Year :-

$OCF = EBIT + Dep - Tax$ or,

or $OCF = NI + Dep$

	Year 1	Year 2	Year 3
NI	13,200	11,520	21,780
+ Dep	20,000	20,000	20,000
OCF	33,200	34,520	41,780

4) Project Cashflow :- CF = OCF

دلتا ← التغير − ΔNWC

− Capital spending

	Year 0	Year 1	Year 2	Year 3
OCF	—	33,200	34,520	41,780
ΔNWC	− 10,000	0	0	+ 10,000
capital spending	− 80,000	0	0	Salvage value + 20,000
C.F	− 90,000	33,200	34,520	71,780

Year	C.F
0	− 90,000
1	+ 33,200
2	34,520
3	71,780

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$$NPV = -90{,}000 + \frac{33{,}200}{(1.1)^1} + \frac{34{,}520}{(1.1)^2} + \frac{71{,}780}{(1.1)^3}$$

$$= -90{,}000 + 11.2640.12$$

$$= 22.640.12 > 0 \quad \text{Accept}$$

CH 11

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project Analysis and Evaluation

Forecasting risk :- The possibility that errors in projected cash flows will lead to incorrect decisions (estimation risk)

II Scenario Analysis :- The determination of what happens to NPV estimation under different cash flow scenarios

* Best case :- High revenues , low costs
* worst case :- low revenues , high costs

Example:- A project has initial cost 200,000 and the project has a 5 Years life , no salvage value , R= 12% , T= 34%

	base case	worst case	best case
Unit sales	6,000	5.500	6.500
Price per unit	80	75	85
variable cost	60	58	62
Fixed cost per unit	50,000	45.000	55,000
NPV	15.567	-111,719	159,504

(21)

Sales	480,000
variable costs	360,000
Fixed costs	50,000
Depreciation	40,000
EBIT	30,000
Taxes	10,200
NI	19,800

OCF = 30,000 + 40,000 − 10,200
= 59,800

at 12% in 5 Year, Annuity Factor 3.6048

Base NPV = −200,000 + 59,800 × 3.6048
= 15,567

[2] Sensitivity Analysis :- Investigation of what happens to NPV when only one variable is changed

- if unit of sales change by +5%

⇒ in order the sensitivity of the project to unit sales we need to calculate the NPV before and after the change

التغير %

* if $\Delta NPV\% > \Delta X\%$ ⇒ sensitivity is higher
* if $\Delta NPV\% < \Delta X\%$ ⇒ sensitivity is low

3) Simulation Analysis :- A Combination of Scenario and Sensitivity analysis

4) Break Even Analysis :- Common tool for analyzing the relationship between sales volume and profitability

- Accounting Break even $\Rightarrow$ $NI = 0$
- Cash Break even $\Rightarrow$ $OCF = 0$
- Financial Break even $\Rightarrow$ $NPV = 0$

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شرط

* Accounting Breakeven :- Condition : NI = 0

NI = 0

$\Rightarrow$ (Sales − V. Cost − F.C − D)(1 − T) = 0

(P.Q − V.Q − F.C − D)(1 − T) = 0

Divid by (1 − T) or Assume that there is no taxes

P.Q − V.Q − F.C − D = 0

Q(P − V) = FC + D

$$\Rightarrow \boxed{Q_A = \frac{FC + D}{P - V}} \Rightarrow \text{Accounting Breakeven}$$

① * at Q_A :- Pay back period of this project operating at Q_A equals the life of the project

② * NPV < 0

③ * IRR = Zero

(35)

② Cash ~~flow~~ Break even :

Condition : OCF=0 The OCF must equal Zero

$OCF = EBIT + D - T$ ⇒ * Assume no taxes

$OCF = 0 = P.Q - v.Q - FC - \cancel{D} + \cancel{D}$

$\Rightarrow Q(P-v) = FC \Rightarrow \boxed{Q_c = \frac{FC}{P-v}}$

at Q_c :

① Project never pay back

② $IRR = -100\%$

③ $NPV < 0 \Rightarrow NPV = -I.0$ ⇒ The NPV is negative

Based on the previous examples (Accounting

$Q_c = \frac{5000}{20-10} = 500 \Rightarrow OCF = 0$

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Example:- A project with required Initial out lay of 100,000 and expected to generate 20,000 per year from the coming 3 Years, if the fixed cost 50000 and the price of unit 20 which is produce at 10 variable cost per unit, if the fixed assets of this project depreciate to zero at a stright line

Calculate A the Accounting Break even

B if the project operates at Q_A then;

1- will accept the project if the required pay period 2 Year

2- will you accept the project based on NPV ?

3- " " " " " " & R.RR = 10% ?

(1)

(A) $Q_A = \frac{FC + D}{P - V}$

$= \frac{50000 - 33333.33}{20 - 10}$

$= \frac{16,666.67}{10}$

$= 1666.67 \Rightarrow NI = 0$

$D = \frac{100,000}{3} = 33333.3\bar{3}$

(1)

(B) Payback = Project life

$\Rightarrow$ 3 Years $\Rightarrow$ Reject

(2) NPV < 0 $\Rightarrow$ Reject

(3) IRR = 0

$\Rightarrow$ IRR < RRR $\Rightarrow$ Reject

(36)

③ Financial Break even :-

Condition : NPV = 0

$NPV = 0 = -I.O + \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \dots$

⇒ Assuming :- ① No working capital
② No capital spending at time Zero ⇒ CF = OCF

to calculated Q_F ⇒ Step 1

① ⇒ $0 = -I.O + \frac{OCF_1}{(1+r)^1} + \frac{OCF_2}{(1+r)^2} + \dots$

$\Rightarrow OCF^* = EBIT + D - \underset{\text{Zero}}{T}$

$OCF = P.Q - V.Q - FC - D + D$

$P.Q - V.Q = OCF + FC$

$Q(P-V) = OCF + FC \Rightarrow \boxed{Q_F = \frac{OCF^* + FC}{P-V}}$ Step 2

* at Q_F :- ① NPV = 0
② Discounted pay back period = project life
③ IRR = Required Rate of Return

* The present value of the cash inflows exactly offsets the initial cash outflow

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Example :- Consider a project with $I.O = 3500$ and life project of 5 Years, if this project is expected to generate a fixed amount each year during its life. Given : $Fc = 500$, $P = 40$, $v = 30$

① Calculate the financial break even when $RRR = 20\%$

② " " Discounted payback period at Q_F

③ " " IRR at Q_F

① $Q_F = \frac{FC + OCF^*}{P - V}$

Annuity

$$NPV = 0 = -I.O + \left[\frac{OCF}{(1+r)^1} + \frac{OCF}{(1+r)^2} + \cdots + \frac{OCF}{(1+r)^5} \right]$$

$$\Sigma P.V \text{ of annuity} = OCF^* * \text{Annuity factor}$$

$$= OCF * \left(\frac{1 - \frac{1}{(1+r)^t}}{r} \right) = OCF * (2.9906)$$

$$NPV = 0 = -3500 + OCF^*(2.9906) \Rightarrow 3500 = OCF^*(2.9906)$$

$$\Rightarrow OCF^* = \frac{3500}{2.9906} = 1170$$

$$Q_F = \frac{FC + OCF}{P - V} = \frac{50 + 1170}{40 - 30} = \frac{1670}{10} = 167 \text{ units}$$

② Discounted payback period = 5 Years

③ IRR = RRR = 20%

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Operating Leverage :- The degree of dependence a firm places on it's fixed costs

Given the Same level of FC

→ OCF may increase

* $DOL = \boxed{1 + \frac{FC}{OCF}}$ How much the OCF will increase as a result to increase in the quantity sold

if $FC = 500$, $OCF = 1500$

$DOL = 1 + \frac{FC}{OCF} = 1.3\bar{3}$ ⇒ if Q ↑ by 10%

then OCF ↑ by (10%) 1.3

⇒ 13%

* $\boxed{\text{degree of operating leverage}}$:- The relationship between the percentage change in operating C.F and the percentage change in quantity sold

(39)

* Capital Rationing :- The situation that exists if a firm has positive NPV projects but the firm cannot initiate any of the projects due to a lack of ~~fi~~ financing

* Soft rationing :- The procedure of allocating a fixed amount of funds for capital spending to each business unit

* Hard rationing : The situation that occurs when a business cannot raise financing for a project under any circumstances

Return, Risk, and Security Market line :

investor
- Rutrn : Include all types of proceeds from investment
  - profit
  - Dividends
  - interest
- Risk

* if you want Return, then you must accept Risk (losses)

* Risk : probability of having harmful outcome as a result to uncertainty

* because we are uncertain about the futur, we use Expected Return

⇒ E(r) : is the expected return on a risky Assets in the future

* State of Economy :⇒	Probability of occurate		Rate of Return if state occure
① Boom	0.10	*	30 %
② Normal	0.60	*	10 %
③ Recession	0.30	*	-20 %
	1.00		

* The expected return on a stock given various states of the economy is equal to the weighted average of the returns for each economic state

* $E(r) = \sum_{i=1}^{n} Prob(S_i) * R(S_i)$ where $\underline{\underline{n}}$ number of possible states

$E(r) = prob(Bom) * R(Boom)$
$+ Prob(Normal) * R(Boom)$
$+ Prob(Recession) * R(Recession)$

$\Rightarrow (0.10)(30\%) + (0.6)(10\%) + (0.30)(-20\%) =$

p.g 402 – 13.1 :

Example :-

State of Economy	Probability of state of Economy	Stock L	Stock U
Recession	0.50	-20%	30%
Boom	0.50	70	10
	1.00		

$\Rightarrow E(R_U) = 0.50 \times 30\% + .50 \times 10\% = \boxed{20\%}$

$E(R_L) = 0.50 \times -20\% + 0.50 \times 70\% = \boxed{25\%}$ ✓

* The $E(R_L)$ is higher than $E(R_U)$, so we must take $E(R_L)$

1) Individual Stocks :-

$E(r) = \sum prob(s_i) * R(s_i)$

* σ^2 = variance = $\sum prob(s_i) * (R(s_i) - E(r))^2$

⇒ weighted Average of squared deviations of stock return around the E(r)

Example :

		prob	Rate of Return L	Rate of Return U
	recession	0.50	-20%	30%
	Boom	0.50	70%	10%

$E(R_L) = 25\%$, $E(R_u) = 20\%$

* $\sigma_L^2 = Prob(recession) * (R_L^{recession} - E(R_L))^2 + Prob(Boom) * (R_L^{Boom} - E(R_L))^2$

$= 0.50 * (-20\% - 25\%)^2 + 0.50 * (70\% - 25\%)^2$

$= 0.2025 \Rightarrow \sigma_L = \sqrt{\sigma_L^2} = 45\%$

* $\sigma_u^2 = 0.50 * (30\% - 20\%)^2 + 0.50(10\% - 20\%)^2$

$= 0.01 \Rightarrow \sigma_u = \sqrt{0.01} = 10\%$

* Standard deviation measures which type of risks?

⇒ Total Risk type

*Risk Premuims:- Amount of Compansation for Risk

Assets
1. risky → Bond Stock $E(R_i)$
* Risk premuim = $E(R_i) - R_F$
2. risky free → T-bills R_F

2) Portfolio set of risky assets :-

Assume investor is tending to form a portfolio with total amount of 30,000, after analyzing his assets choices he decide to invest of the following $E(R_p) = w * E(r)$

Stocks		weights(w_i)		E(r)
1- Ahli banks	5000	$\frac{5000}{30{,}000} = 0.17$	*	5 %
2-	10,000	$\frac{10{,}000}{30{,}000} = 0.33$	*	10 %
3- jordan potas	50,000	$\frac{5000}{30000} = 0.17$	*	10 %
4- orange	10,000	$\frac{10{,}000}{30{,}000} = 0.33$	*	20 %
		1.00		

* $w_i = \frac{\text{amount invested in stock}}{\text{TV of Portfolio}}$

Total value ← TV

/ /

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$E(R_p)$ = Expected Return of Portfolio

$= \sum w_i * E(R_i)$

$\Rightarrow E(R_p) = (0.17)(\%1.5) + (0.33)(10\%) + (0.17)(10\%) + (0.33)(20\%)$

$= 0.201 \Rightarrow 20.1\%$

* The expected rate of return on a stock portfolio is a weighted average where the weights are based on the market value of the investment in each stock

* Portfolio : A group of assets such as stocks and bonds held by an investor

* investors tend to own more than just a single Stock, bond, or other assets

4.5

Examples- Investor is considering a portfolios to be as following :-

$E(r)_p = W * E(r)$

Stock	amount of investor	$E(r_i)$	*	w_i
A	10,000	10%	*	$\frac{10,000}{40,000} = 0.25$
B	20,000	20	*	$\frac{20,000}{40,000} = 0.5$
C	5000	3	*	$\frac{5000}{40000} = 0.125$
D	5000	5	*	$\frac{5000}{40,000} = 0.125$
total =	40,000			$\boxed{1.00}$

* the Sum of weights must be $\boxed{1.00}$

$$E(R_p) = w_A E(R_A) + w_B E(R_B) + w_C E(R_C) + w_D E(R_D)$$
$$= (0.25)\,10\% + (0.5)\,20\% + (0.125)\,3\% + (0.125)\,5\%$$
$$\Rightarrow 13.5\%$$

* Portfolios Variance (σ_p^2)

Steps :

① Calculate the $E(R_p) = \sum w_i * E(R_i)$

② Calculate Portfolio Return at each state of Economy

$R_p(S_i) = \sum w_i * R(S_i)$

③ $\sigma_p^2 = \sum Prob(s_i) \left(R_p(s_i) - E(R_p)\right)^2$

④ $\sigma_p = \sqrt{(\sigma_p^2)}$

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Examples:-

State of Economy	probability of State occurance	Return if State occurs: Stock A	Stock B	Stock C
Boom	0.40	10 %	15 %	20%
Bust	0.60	8 %	4%	0%

* if investor has invested equal amount in each stock

$W_A = W_B = W_C = 1/3$

$E(R_P) = ? \Rightarrow \Sigma w_j E(r_j)$

$\sigma_P^2 = ?$

$\sigma_P = ?$

$\sigma_T = ?$

① $E(R_A) = \Sigma \text{Prob}(s_i) * R_A(s_i)$

$= (0.40)(10\%) + (0.60)(8\%) \Rightarrow 8.8\%$

$E(R_B) = (0.40)(15\%) + (0.60)(4\%) \Rightarrow 8.4\%$

$E(R_C) = (0.40)(20\%) + (0.60)\ 0\% \Rightarrow 8\%$

$E(R_P) = \Sigma w_j \overset{E}{(}R_j)$

$= \left(\frac{1}{3}\right)(8.8\%) + \left(\frac{1}{3}\right)(8.4\%) + \left(\frac{1}{3}\right)(8\%) = 8.4\%$

/ /

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$$\sigma_A^2 = \Sigma \, Prob(s_i) * [R_A S_i - E(R_A)]^2$$
$$= (0.40)\,[10\% - 8.8\%]^2 + (0.60)\,[8\% - 8.8\%]^2 =$$

$$\sigma_A = \sqrt{\sigma_A^2}$$

$$\sigma_B^2 = (0.40)\,[15\% - 8.4]^2 + (0.60)\,[4\% - 8.4]^2 =$$

$$\sigma_B = \sqrt{\sigma_B^2}$$

$$\sigma_c^2 = (0.40)\,[20\% - 8\%]^2 + (0.60)\,[0 - 8\%]^2 =$$

$$\sigma_c = \sqrt{\sigma_c^2}$$

$$R_p(Boom) = \Sigma \, w_j R_j$$
$$= \left(\tfrac{1}{3}\right)(10\%) + \left(\tfrac{1}{3}\right)(15\%) + \tfrac{1}{3}(20\%) = \boxed{15\%}$$

$$R_p(Bust) = \left(\tfrac{1}{3}\right)(8\%) + \left(\tfrac{1}{3}\right)(4\%) + \left(\tfrac{1}{3}\right)(0\%) = \boxed{4\%}$$

(4.8)

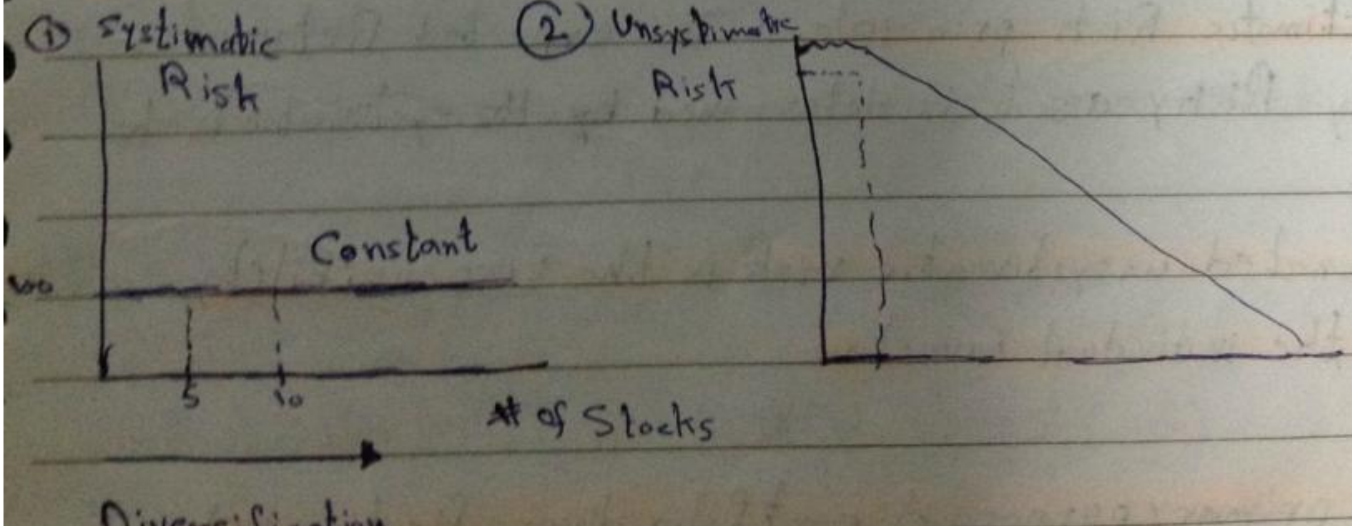
→ the variance of portfolio

$$\sigma_p^2 = Prob(Boom) * [R_p(Boom) - E(R_p)]^2 + Prob(Bust) * [R_p\ Bust - E(R_p)]^2$$

$$= (0.40) * [15\% - 8.4\%]^2 + 0.60 * [4\% - 8.4\%]^2$$

* investor invest through portfolio inorder to reduce Total risk by diversification

Risk
- Systematic Risk : Risk that resulted from the system
  - ① Can not be diversified
  - ② " " " affected
  - ③ " " " avoided
- Unsystematic
  - * can be effectively eliminated by portfolio diversation
  - * is irrelevant to a well diversified investor



(49)

* Total Risk = Systimatic Risk + Unsystimatic Risk
(σ)

* our main concern as an investor is the systimatic Risk

⇒ Systimatic Risk principle :- The expected Return on any Risky asset is determined by the systimatic Risk

* Eliminated unsystimatic risk is the responsibility of the individual investor

* The primary purpose of portfolio diversification is to eliminate asset-specific risk

* Systimatic Risk can be measured through What is called Beta Coefficient

Beta (β) :- measures the amount of Systimatic Risk in each risky asset

* The systimatic risk of the market is measured by a beta of 1.0
* Sensitivity to market risk
- each security has beta
* a portfolio beta is a weighted average of the betas of the individual securities contained in the portfolio

Stock	σ	β	W
A	3	1.2	0.1
B	0.8	0.7	0.4
C	2.0	0.5	0.3
D	1.8	1.5	0.2

highiest risk ⇐ D

* Beta for portfolio :-

$\beta_p = \sum w_j \beta_j$ j : represent the individual Risky asset

$$\beta_p = w_A \beta_A + w_B \beta_B + w_c \beta_c + w_D \beta_D$$

$$= (0.1)(1.2) + (0.4)(0.7) + (0.3)(0.5) + (0.2)(1.5)$$

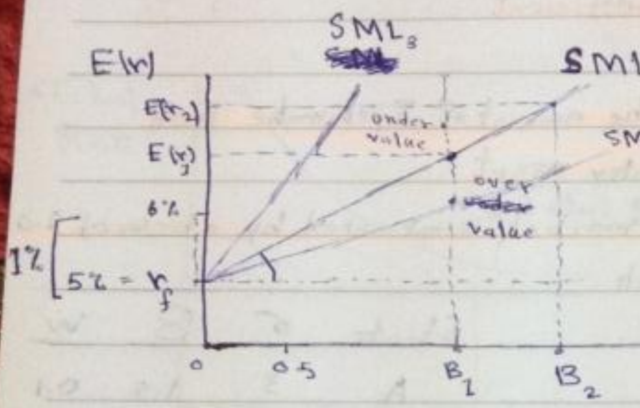
$$\Rightarrow \boxed{0.85}$$

① * The SML Approach can be applied to firms that Retain all of their earnings

(5.1)

② * SML Approach assumes a firm future risks are similar to it's past risk.

* Security market line : (SML)



risk premium = $E(r_1) - r_f$

$$\text{Slope} = \frac{E(r_i) - r_f}{B_1}$$

$$\boxed{\frac{E(r_A) - r_f}{B_A}}$$

③ : * Risk - reward Ratio must be the same for all the assets in the market (constant)

* we should chose the steeper SML_3 because the Steeper curve the higher the risk reward ratio

SML : A Positively sloped straight line desplaying the relationship between expected return and Beta

a stock with an actual return that lies above the security market line has a higher return than expected for the level of risk assumed

* Capital Assets Pricing model (CAPM)

Start with: two stock A, B

if $\frac{E(r_A) - r_f}{\beta_A} > \frac{E(r_B) - r_f}{\beta_B}$

* All investors will prefer A
* Demand on A is higher $\longrightarrow P_A \uparrow \Rightarrow E(A) \downarrow$

$\Rightarrow \frac{E(r_A) - r_f}{\beta} \downarrow$

* Demand on B is lower $\rightarrow P_B \downarrow \Rightarrow E(r_B) \uparrow$

$\Rightarrow \frac{E(r_B) - r_f}{\beta} \uparrow$

* $\Longrightarrow \frac{E(r_A) - r_f}{\beta_A} = \frac{E(r_B) - r_f}{\beta_B} = \overset{etc}{\cdots\cdots} = \frac{E(r_m) - r_f}{\beta_m}$

$\Rightarrow$ * $\beta_m = 1 \Rightarrow \frac{E(r_i) - r_f}{\beta_i} = E(r_m) - r_f$

$\Rightarrow E(r_i) = \underbrace{r_f}_{①} + \underbrace{\beta_i \, (E(r_m) - r_f)}_{②} \Longrightarrow$ * CAPM equations

① opportunity cost — ② Total systematic risk in the market

① - time value

③ Amount of systematic risk that is affecting the risky assets

* Total Portfolio is equally as risky as the market = $\boxed{1}$

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Example: Investor is invested to buy stocks ABC and XYZ

if $r_f = 5\%$, $\underbrace{\text{market risk premium}}_{(E(r_m) - r_f)} = 10\%$

$B_{ABC} = 0.7$, $B_{XYZ} = 0.9$,

Calculate $E(r_{ABC})$ and $E(r_{XYZ})$ and decide which one to choose ?

$$E(r_{ABC}) = r_f + B_{ABC}(E(r_m) - r_f)$$

$$= 5\% + 0.7\,(10\%) = 5\% + 7\% = 12\%$$

$$E(r_{XYZ}) = r_f + B_{XYZ}(E(r_m) - r_f)$$

$$= 5\% + 0.9\,(10\%) = 14\%$$

what is the market Return ?

$E(r_m) - r_f = 10\%$

$\Rightarrow E(r_m) = 10\% + 5\% = 15\%$

* The beta of risk-free asset is zero such as Treasury bills

* The beta of the market is 1.0

* Market Risk premium = market Return − risky free assets

$= E(r)_m - r_f$

CH14 Cost of Capital

Minimum required return required by the issuer.

- Capital Structure
  - Debt
    - Bonds → (W_D)
    - Direct Borrowing → (W_B)
  - Equity
    - Commun Stock → (W_E)
    - preffered Stock → (W_P)

*To calculate the Cost of capital for a firm, we use weighted average approach

* Weighted average cost of capital (WACC)

$$= W_E R_E + W_D R_D (1-T_c)$$

Ex: if a firm with total value of 50,000 \$,

and the total value of Equity = 30,000

" " " Debt = 20,000

value of firm = value of equity + value of Debt

Divide both side by V

$$\Rightarrow 1 = \underbrace{\boxed{\frac{E}{V}}}_{w_E} + \underbrace{\boxed{\frac{D}{V}}}_{w_D}$$

$$\boxed{w_E = \frac{E}{V}} \quad , \quad \boxed{w_D = \frac{D}{V}}$$

$$\Rightarrow w_E = \frac{30,000}{50,000} = \boxed{0.60} \quad , \quad w_D = \frac{20,000}{50,000} = \boxed{0.40}$$

* Debt to equity ratio : 1

$\Rightarrow$ 1 D $\rightarrow$ 1 Equity

$w_E = \frac{1}{2}$, $w_D = \frac{1}{2}$

* Debt to equity ratio : $\frac{1}{4}$

1 Debt $\rightarrow$ 4 equity

$w_D = \frac{1}{1+4} = \frac{1}{5} = 0.20$

$w_E = \frac{4}{5} = 0.80$

Debt to equity ratio : $\frac{1}{7}$

1 D $\rightarrow$ 7 E

$w_D = \frac{1}{8} = 0.125$

$w_E = \frac{7}{8} = 0.875$

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* Cost of Equity (R_E)

① CAPM

* $E(R_i) = r_f + B_i(E(r_m) - r_f)$

* $R_i = r_f + B_i(r(m) - r_f)$

if $r_f = 5\%$, $B = 0.5$, $r(m) = 12\%$

$\Rightarrow R_E = 5\% + 0.5(12-5)$

$= 8.5\%$

② Gordon Constant Growth model.

Assumption:

1) Firm of interest is Growing in Constant rate

2) $R_E > g \rightarrow$ Growth Rate

D_0: Dividend at time Zero

D_1: " " " (1)

|

$D(i)$: " " " (i)

(57)

⇒ if we know D_0

$D_1 = D_0(1+g) = D_0 + g D_0$

$D_2 = D_1(1+g) = D_0(1+g)(1+g)$

$D_3 = D_2(1+g) = D_0(1+g)^2 (1+g)$

$D_3 = D_0(1+g)^3$

⋮

* $D_n = D_0(1+g)^n$
* $D_n = D_1(1+g)^{n-1}$

$$\boxed{* \; R_E = \frac{D_1}{P_0} + g}$$

if $D_4 = 5$, $P_0 = 20$, $g = 4\%$

⇒ $D_4 = D_1(1+g)^{4-1}$ ⇒ $5 = D_1(1+0.04)^3$

⇒ $D_1 = \frac{5}{(1.04)^3} = 4.44\$$

⇒ $R_E = \frac{4.44}{20} + 4\% = 0.222 + 4\%$

$= 0.262 ⇒ 26.2\%$

Cost of Debt :- Minimum required rate of return by lenders

- Direct Borrowing ⇒ R_D = Interest payment on the loan

- Bonds → Coupon payment ← bond Yield

R_D is based on the current yield to maturity of the firms outstanding bonds

* معطيات R_p و W_p بكون عاطيك اياها بالسؤال

Cost of preffered stock :-

Minimum required rate of return by the holding preffered stock

* $P = \frac{C}{R_p}$ → Cash inflow from holding the preffered stock (Dividends)

→ Price of preffered stock

* The R_p is equal to the dividend yield

* $R_p = \frac{C}{P}$

Example: A firm is about to lunchs a new project with

Required Initial outlay = 1,000,000

If the board of director has just decided to finance this project

\$100,000 by preffered stock

\$300,000 by bond

\$600,000 by equity $P_0 = 30\$$

_ if the current Price of share = 30 and the common equity

is expected to be paying 7\$ in the fifth year $\to D_5$

_ if the firm is expected to grow at a constant rate

equals 5% Per year

_ if the prefferd stock Promise to Pay a dividends

in the amount of 6\$, Per Year

$\to C = 6\$$

_ if the bond Yield on simillar $\boxed{\text{bond} = 9\%} \Rightarrow R_D = 0.09$

$\to$ اعطاك اياها جاهزة

_ $T_c = 34\%$

_ WACC = ?

$$WACC = w_E R_E + w_p R_p + w_D R_D (1 - T_c)$$

$$w_E = \frac{600,000}{1,000,000} = 0.6 \quad , \quad W_D = \frac{300,000}{1,000,000} = 0.3$$

$$w_p = \frac{100,000}{1,000,000} = 0.1$$

* Cost of Equity (R_E)
- CAPM → $R_E = r_f + B\left(E(r_m) - r_f\right)$ ×
- Gordon model

$$R_E = \frac{D_1}{P} + g$$

$D_5 = 7\$$

$g = 5\%$

$$R_E = \frac{5.76}{30} + 0.05$$

* $D_1 = \frac{D_5}{(1+g)^4} = \frac{7}{(1.05)^4} = 5.76\$$

$R_E = \boxed{24\%}$

$\boxed{R_D = 9\%}$

* $R_P = \frac{C}{P} = \frac{6}{30}$

$$R_P = \frac{6}{30} = 0.2 = \boxed{20\%}$$

$$WACC = W_E R_E + W_P R_P + W_D R_D$$

$\Rightarrow 0.6(0.24) + (0.1)(0.20) + (0.3)(0.09)(1 - 0.34)$

$\Rightarrow 18\%$

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* Flotation Cost :- (Fa)

Cost of issuing

* Amount to be raised = $\frac{\text{Amount needed}}{1 - f_a}$

Ex:- I.O = 1,000,000

f_a = 7 %

⇒ Amount to be raised = $\frac{1,000,000}{1 - 0.07} = \frac{1,000,000}{0.93} = \boxed{1,075,268.817}$

* Sometimes the firm use multi financing methods.

$\boxed{*}$ $f_a = w_E f_E + w_P F_P + w_D F_D$

Where:

F_E = Flotation cost of issuing common stock

F_P = " " " " preffered Stock

F_D = " " " " Debt

* The Fa is computed as the weighted average of the fa associated with each form of financing.

* Fa increase the initial cash ~~outlay~~ outflow of the project

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Examples:- A firm considering a new progect with $I.0 = 90,000$ \$. The board of directors has just decided to financing this amount as following

\$ 20,000 Preffered Stock
10,000 debt
60,000 common equity

⇒ Total Value of Stocks = 90,000

- if the flotation cost are as following

$F_E = 7\%$, $F_D = 2\%$, $F_p = 10\%$

⇒ Amount to be raised ?

$$F_a = \underbrace{\left(\frac{60,000}{90,000}\right)}_{w_E}(7\%) + \underbrace{\left(\frac{10,000}{90,000}\right)}_{w_D}(2\%) + \underbrace{\left(\frac{20,000}{90,000}\right)}_{w_p}(10\%)$$

$= 7.11\%$

* I.0 = Amount needed = 90,000

$$\Rightarrow \text{Amount to raised} = \frac{90,000}{1 - 0.0711} = 96,888.79$$

* 6888.79 ⇒ Cost issuing

* Flotation cost and NPV :

$NPV = -I_0 + \sum PV.FCF$

* as a result to flotation cost

$\Rightarrow I_0 \uparrow \Rightarrow NPV \downarrow$