DEPARTMENT OF BUSINESS AND SOCIAL STUDIES

COURSE TITLE: FINANCIAL MANAGEMENT II

FINANCIAL MANAGEMENT II

Contact hours: 42

Purpose Develop further learner understanding of financial management and apply financial management tools in decision making for business

Expected Learning Outcomes of the Course

By the end of the course unit the learners should be able to:-

i) Describe agency theory as it apply in finance
ii) Explain and use methods of capital budgeting in financial decision making
iii) Gain deeper understanding of capital markets, financial planning and control
iv) Acquire skills in financial computation and analysis
v) Appreciate the discipline of financial management in the context of business management

Course Content

Agency theory; Capital Budgeting decisions, evaluation methods, asset replacement decisions, duration problems; Inflation analysis; Risk analysis; Dividend theories and policy; Capital structure theories

Course Outline

Week 1

Topic 1: AGENCY THEORY

Sub Topics:

- Explanation of Agency theory
- Various types of agency problems
- Solutions to the various type of agency problems

Week 2, 3 & 4

Topic 2: CAPITAL BUDGETING DECISIONS

Sub Topics:

- Characteristics of Capital Budgeting Decisions
- Steps in investment decisions:- Generating investment proposals; Estimating future cash flows; Evaluating the cash flows; Making the selection decision & implementation; Re-evaluation (for replacement decision)
- Duration problems:- Comparing projects with unequal Life
- Capital Rationing
- Capital Budgeting and Inflation

Week 5, 6 &7

Topic 3: RISK ANALYSIS IN CAPITAL BUDGETING

Sub Topics:

- Causes of Risk
- Perspectives on Risk
- Methods of dealing with risk in capital budgeting: Risk adjusted discount rate approach; Certainly equipments approach; Sensitivity analysis; Scenario analysis; Breakeven analysis; Hillier model; Simulation analysis; Decision tree analysis; Corporate risk analysis

Week 8, 9 & 10

Topic 4: DIVIDEND THEORIES AND POLICY

Sub Topics:

- Gordon Model
- Traditional Position
- Miller and Modigliani Position
- Rational Expectations Hypothesis: A Way of Reconciliation
- Dividend Decisions
- Dividend Policy Formulation

Week 11, 12 & 13

Topic 5: CAPITAL STRUCTURE THEORIES

Sub Topics:

- Assumptions and Definitions
- Net Income Approach
- The Net Operating Income Approach
- The Traditional View
- The Modigliani and Miller Hypothesis With Out Taxes
- The M-M Hypothesis under Corporate Taxes
- Miller Hypothesis with Corporate and Personnel Taxes
- Financing Distress

Course Assessment

Examination - 70%; Continuous Assessment Test (CATS) - 20%; Assignments - 10%; Total - 100%

Recommended Text Books:

i) Eugene F. Brigham Michael C. Ehrhardt, (2007), *Financial Management: Theory and Practice,* 12 edition, South-Western College Publishers

ii) Van Horne J.C (2003), *Fundamentals of Finance Management* (9th Edition) Prentice- Hall

Text Books for further Reading:

i) Chandra P, (2000), *Fundamentals of Financial Management* (3rd Edition) ,McGraw Hill

ii) I M Pandey(2008); *Financial Management;* Vikas Publishing House Pvt Ltd

iii) Geoffrey Woodhall (2004); *Financial Management;* Palgrave

Note: Sit in CATs cover work up to week 7 in the course outline

Module Compiler: Kennedy M Waweru

Table of Contents

1.0 TOPIC 1: AGENCY THEORY

Learning Objectives

By the end of this chapter the learner should be able to:

i) Explain the agency theory
ii) Describe the various types of agency problems
iii) Discuss the solutions to the various type of agency problems

1.1 Introduction

Agency refers to the relationship which submits between two parties, one party called the principal engages another one called agent and gives agent authority and mandate to act on the principal's benefit.

The actions of agent are binding on the principal. In finance, stockholders are owners of the firm and are therefore the principal. However, they are not involved on the management of running of the firm for a number of reasons.

i) They may not have the necessary skills and expenditure of managing the firm.

ii) They may not have them to run the firm.

iii) They may be geographically dispersed to manage the firm.

iv) They may be too many to manage a single firm.

Therefore enjoy management directors who ask on their behalf the directors are the Agents. They are given capital authority and other resources for use or that they can generate profits on behalf of principle stakeholders.

The concept of entrusting resources with individuals where they are expected to give an account of how the resources are used is called stewardship. The directors/top management are required to combine the where they have utilized he resources entrusted. Usually a conflict of interest arises when the agents pursue their own interest at the expense of the stockholders.

1.2 Types of Agency relationships

i) Shareholders versus Management

ii) Shareholders versus Long-term Creditors

iii) Shareholders versus Auditors

iv) Shareholders versus Government

v) Shareholders versus Branches

1.2.1 Shareholders versus Management

The management of a firm take some actions which are inconsistent with the goal of shareholders of wealth maximization and this will cause a conflict of interest.

The various causes of this conflict include the following:

i) *Incentive Problem*

Top managers have a fixed salary and may not have the incentive/motivation to work harder in order to maximize the shareholders wealth. This is because, irrespective of the benefit they make, their records is fixed they will therefore maximize on leisure's and work less. This will be against the interest of the shareholders hence the conflict.

ii) *Consumption of perks/perquisites*

Perquisites refer to the high salaries and generous fringe benefits which directors' award themselves. This will take the form of directors' remuneration, expensive cars, expensive holidays, expensive assistance, post office etc. all these will constitute an expense to the company and will therefore reduce the amount of dividend paid to ordinary shareholders and who are the true owners of the company. Therefore, the consumption of perks by directors is against the interest of shareholders as it reduces their wealth.

iii) *Differences in Risk Profile*

Shareholders prefer high risk; high return projects since they have diversified investments that is, if one firm or project one collapses it will have an insignificant effect on their overall wealth. Managers on the other hand, will prefer low return investment since they have a personal fear of losing their jobs in case of a given project/company collapsing. This is because managers do not have multiple jobs and can therefore not be diversified. This forces them to strive for returns for shareholders and not necessarily the maximum. This difference is risk profile is therefore a source of conflict.

iv) *Difference in Investment/Evaluation Horizon*

Managers prefer to undertake profit which are profitable in the short-term so that they can take credit when they are still in the company shareholders. On the other hand, prefer long-term investment which is consistent with the going concern concept of the

firm. A conflict will therefore occur since directors will undertake short term investment against shareholders' desire for long term investment projects.

v) Management Buyout

The management may attempt to acquire the business of the principal (shareholders). They would do this by forming nominees companies who buy the shares of the company at the stock exchange. Once they get a majority shareholding. This is equivalent of staging a coup and taking over the business of the shareholders. This causes conflict between agency and principal.

Solutions to the preceding type of agency problem

i) Compensation plans
ii) Board of Directors
iii) Takeovers
iv) Specialist Monitoring
v) Auditors

1.2.2 Shareholders versus Long-term Creditors

The shareholders who are the owners of the firm have the responsibility to raise capital for the business. Where they are unable to rise, they go to long-term creditors. These creditors will extend loans to the firm with hopes that, they will get interest of the principal amount. In such a situation a debt holder becomes the principal while shareholder the agent. The interest charged will depend on the riskiness of the borrower, the existing capital structure, asset backing as well as the expected capital structure and the future asset structure of the firm.

Debenture traders may require security for their loan either having a specific charge or a general charge on all the assets of the business. Shareholders may prejudice the position of creditors hence conflict of interest in the following ways.

i) Disposal of assets used as collateral for the debt

In this case, the bond holder (creditor) is exposed to more risk because he/she may not receive the loan given in case of liquidation of the firm.

ii) Assets/investment situation

In this case, the shareholder and the bondholder will agree on a specific low risk project. However, this project may be substituted for a high risk project whose flows have

a high standard deviation. This exposes the bond holders because should the project collapse they may not recover all the amounts lend.

iii) Payment of high dividends

Dividends may be paid from the current net profit and the existing retained earnings. Retained earnings are an internal source of finance.

The payment of high dividends will lead to a low level of capital investment and this will reduce the market value of the shares and the bond.

Also the firm may borrow debt to finance the payment of the bonds, from which no returns are expected this will also reduce the value of the firms and the bond.

iv) Borrowing more debt capital

A firm may borrow more debt using the same assets as collateral for the new debts. The value of the old debt will therefore be reduced if the new debt takes priority on the collateral incase of the firm is liquidate.

This exposes the first bond holders/lenders to more risk.

v) Under investment

This is where the firm fails to undertake a particular project or fails to invest money or capital in the entire project if there is an expectation that, most of the returns from the project will benefit the bond holders. This will lead to the reduction in the value of the firm and subsequently in the value of the bond.

Solutions of the above type of agency problems

The Bond holders can take the following actions to protect themselves against the actions of the shareholders:-

i) Improve restrictive debt grants

This involves including strict terms and conditions in the loan agreement or bond covenant. These restrictions may include; No disposal of assets without permission of lenders; No payment of dividends from retained earnings; No borrowing of additional debts until the current debt capital is fully repaid or serviced.

The bond holders may recommend the type of project to be undertaken in relation to the risk level of the project. Maintenance of a given liquidity level by the borrower as

indicated by the current ratio. Restriction on merges and acquisitions especially where any merger or acquisition will change the future cash flow pattern of the borrower

ii) Sinking fund provisions

Some amounts of profits to be transferred annually into a fund for the purpose of the loan repayment.

iii) Callability provision

This is where the debt lender is given a lee way to demand early payment of the debt by the borrower. If the borrower fails to pay interest charges on the due date, the lender might demand the repayment of the due loan before the end/lapse of the repayment period in which case the debt is said to have been "called".

iv) Convertibility

This will enable the lender to convert the bond into ordinary shares so that the bond holder becomes a shareholder. This is particularly so if the borrower is unable to pay on the debt and is facing liquidation.

v) Refuse to Lend

The bond holders may refuse to provide capital to the borrower who has been involved in the misuse of debt capital in the past. Such a borrower will not be in a position to undertake viable project due to lack of investment capital.

Alternatively, the lender can charge higher rates as deterrent mechanism.

vi) Representation

The bond holder nay demand to have a representative in the board of directors of the borrowing company where the representative will oversee proper utilization of the debt capital

vii) Transfer of Assets

On provision of debt capital, the lender may demand that, the assets used as collateral will be transferred to the firm (legal Ownership) passes to the lender and upon repayment of the loan, the asset is transferred back to the borrower.

1.2.3 Shareholders versus Auditors

Shareholders appoint auditors to satisfy the financial statement and to establish whether they show a true and fair view of the state of as at a particular date.

Auditors are supposed to monitor the performance of management on behalf of the shareholders. Since auditors act on behalf of shareholders; they become agents, while the shareholders become the principal.

Auditors may prejudice the interest of shareholders, thus causing agency problems in the following ways:

i) Colluding with the management in the performance of their duties whereby their independence is compromised.

ii) Demanding very high audit fees although there is insignificant audit work due to the strong accounts in existence.

iii) Issuing unqualified reports which might be misleading of which may make the public to lose upon relying on them.

iv) Failure to apply professional cadre and due to diligence in the performance of the audit work

i) Firing

ii) Auditors may be removed from office by shareholders at the Annual General Meeting (AGM).

iii) Legal Action

iv) Shareholders can institute legal proceedings against the auditors who issue misleading reports, hence leading to investment losses.

v) Disciplinary Action by the Profession governing Accounting Practice

vi) The profession governing Accounting practice in the country in question e.g. IGPAK in Kenya can also intervene on behalf of the shareholders. Such may be through suspension of the auditors, withdrawal of the practicing certificate, fines and penalties etc.

1.2.4 Shareholders versus Government

Shareholders and by extension the company operate in the environment using license granted by the government. The government will expect the company to operate the business in a manner which is beneficial to the entire economy and society.

The government is the principal and the company is the agent. The company also carries on business on behalf of the government because the conclusive investment environ ent for the company and benefits from the company inform of taxes.

The company and its shareholders may take some actions that may prejudice the interest/position of the government as the principal.

These actions include the following:

i) Tax Evasion, this involves failure to give the accurate picture of the earning of the firm to minimize the tax liability.

ii) Involvement in illegal business in the firm e.g. drug trafficking, smuggling e.t.c.

iii) Lukewarm reception to social responsibility calls by the government.

iv) Lack of adequate interest in the safety of employees and the products and services of the company including lack of environment awareness concerns by the firms.

v) Avoiding certain types and areas of investment as encouraged by the government through incentives so that investment can be done in such areas.

Solutions to the preceding agency problem

The government can take the following actions to protect itself and its interest.

i) Incurring monitoring costs

For example the government will incur costs associated with statutory audits, investigation of company's under company's Act, back duty in the investigation cost to recover tax evaded in the past and VAT refund audits.

ii) Opening investment incentives

To encourage investments in given areas and locations, the government offers incentives in form of capital allowance laid down in the second schedule of Cap 470.

iii) Legislations

The government has provided a legal framework to govern the operations of the company and provide protection to certain people in the society e.g. regulations associated to disclosure of information, minimum wages and salaries, environmental protection e.t.c., guidelines on minimum disclosure in financial statements

1.2.5 Head Office versus Branch

Multi-national companies have diverse operations set up in different geographical locations. The head office will Act as the Principal and the subsidiary will act as the Agent. The subsidiary will pursue their own goals, hence creating an agency relationship. *These conflicts can be resolved in the following ways:-*

i) Frequent transfer of managers

ii) Adopting a global strategic planning to ensure better communication of its vision.

iii) Having a voluntary code of Ethical practices to guide the brand management.

iv) An elaborate performance reporting system providing a two way feedback mechanism.

v) Performance contracts for managers with commensurate compensation package for the same.

Review Questions

i) Explain the solutions available to the agency problem that arises between shareholders and management

ii) How does the notion of risk and reward govern te behavior of managers?

iii) Should the managers of a firm own szeable amounts of stock in the company?what are the pros and cons?

iv) Explain the solutions available to the agency problem created by issuers of debentures and the loanees

v) During the last few decades, a number of enviromental, hiring and other regulatory changes have been impsed on businesses. In the view of these regulatory changes, is maximization of shareholder wealth any longer a realistic objective?

Main Reference for the Topic

1. Van Horne, J. C. and Wachowicz, J. M., (2001), "Fundamentals of Financial Management", 11th Edition, New Delhi: Pearson Education Inc.pp 1-11,

Supplementary References

2. Bhalla, V. K., (2002), "Financial Management and Policy", 3rd Edition, An ol Publications PVT.,
3. Ross, S.A., et. Al., (2001), "Essentials of Corporate Finance", 3rd Edition, New York: McGraw-Hill/Irwin.,

2.0 TOPIC 2: CAPITAL BUDGETING (INVESTMENT DECISIONS)

Learning Objectives

By the end of this chapter the learner should be able to:

i) Explain the characteristics of capital budgeting decisions
ii) Describe the steps in involved in investment decisions
iii) Comparing projects with unequal Life
iv) Discus the causes and implications of capital rationing
v) Explain the effect of inflation on capital budgeting

Definition

Capital budgeting deals with the allocation of funds to competing projects; they involve commitment of funds to receive future benefits.

2.1 Characteristics of Capital Budgeting Decisions

(i) They involve investment in fixed assets whose useful life is more than the effect of the investment decision and therefore felt longer

(ii) They affect the firm's cash flows and therefore may change the risk complexion of the firm.

(iii) They affect the company's profitability and therefore will affect the valve of the firm.

(iv) Most are irreversible because it is difficult to get a second hand market for fixed assets

2.2 Steps in Investment Decisions

(i) Generating investment proposals

(ii) Estimating future cash flows

(iii) Evaluating the cash flows

(iv) Making the selection decision & implementation

(v) Re – evaluation (for replacement decision)

2.2.1 Generating Investment Proposals

Usually, investment proposals are generated by other departments, not the finance department. E.g. the marketing department will generate proposal on new product development; production department would generate replacement proposals; Research and development would come up with new technology, exploration etc. Other external sources include the government through law legislation, competitors etc.

2.2.2 Estimating Cash Flows

In capital budgeting we are interested in after tax incremental cash flows. We are interested in operating as opposed to financing cash flows. In calculating the incremental cash flow, it is helpful to place the project cash flows in to three categories based on timing:

1. Initial cash out flow :The initial net cash investment
2. Interim incremental net cash flows: Those net cash flows occurring after the initial cash investment but not including the final period's cash flow.
3. Terminal year incremental net cash flow: The final period net cash flow (it is singled out for attention because a particular set of cash often occur at project termination)

(a) Cost of new assets
(b) + Capitalized expenditures (e.g. installation costs, shipping costs)
(c) **+ (-)** Increased (decreased) level of "net" working capital
(d) **-** Net proceeds from sale of old assets(s) if the investment is a replacement decision.
(e) **+ (-)** Taxes (tax savings) due to the sale of "old" assets if the investment is a replacement decision
(f) = Initial cash out flow

Basic Format for Determining Interim and Terminal Year Incremental Net Cash Flow

(a) Net increase (decrease) in operating revenue less (plus) any net increases (decrease) in operating expenses excluding depreciation
(b) **- (+)** Net increase (decrease) in depreciation charges
(c) = Net change in income before taxes
(d) **- (+)** Net increase (decrease) in taxes
(e) = Net change in come after taxes
(f) **+ (-)** Net increase (decrease) in tax depreciation charges
(g) = *Incremental cash flow for the terminal year before project wind up*
(h) **+ (-)** Final salvage valve (disposal/ reclamation) of 'new' assets
(i) **- (+)** Taxes (tax saving) due to sale or disposal of "new" assets

(j) **+ (-)** Decrease (increase) level of net working capital

(k) **=** *Terminal year incremental net cash flow*

Note: Items (a) to (g) constitute interim cash flows while (h) to (k) constitute terminal year net cash flows

Illustrations:

1. Example of Asset Expansion

Lake Victoria Fish Ltd is considering the introduction of a new fish flaking facility at a cost of Ksh 90,000. The equipment has a useful life of your years and salvage value of Ksh16,500, and installation costs equal Ksh 10,000

Assuming accelerated depreciation of 33.33%, 44.45% 14.81% and 7.41%, and further that the machinery will be housed at an abandoned warehouse with no alterative use. The facility is expected to generate additional net operating revenue before depreciation and taxes as follows:

	End of Year			
	1	2	3	4
Net Cash Flows	35,167Ksh.	36,250Ksh.	55,725Ksh.	32,258

If tax rate equal 40% estimate the projects relevant incremental cash flows

Step 1: Estimating Initial Cash Flow

Cost of new asset	90,000 Ksh.
+ Capitalized expenditures (Shipping & installation)	10,000 Ksh.
= Initial cash out flow	100,000 Ksh.

Step 2: Calculating Interim Incremental Net Cash Flows

	End of Year			
	1	2	3	4*
Net operating revenue excluding depreciation	35,167	36,250	55,725	32,258
- Depreciation charges	(33,330)	(44,450)	14,810	(7,410)
= Net change in income before taxes	*1,837*	*(8,200)*	*40,915*	*24,848*
- (+) Net increase (decrease) in taxes (40% rate)	(735)	3280	(16,366)	(9939)
= Net change in income after taxes	*1,102*	*(4920)*	*24,549*	*14,909*
+ Depreciation charges	33,330	44,450	14,810	7,410
= Net incremental cash flow for year 1 to 3	*34,432*	*39,530*	*39,359*	*22,319**

Step 3: Calculating Terminal Year Incremental Net Cash Flows

= Incremental cash flow for the terminal year before word up concerns	22,319*
+ Final salvage value of "new" assets)	16,500
- Taxes due to sale of "new" assets	(6,600)
Terminal year incremental net cash flows	32,219

The expected incremental net cash flows from the project are:

	End of Year				
	0	1	2	3	4
Net Cash Flows	(100,000)	34,432	39,530	39,359	32,219

2. Example of Asset Replacement

Assume Lake Victoria Fish Ltd is considering purchasing a new fishing boat to replace an old are and wishes to obtain cash flow information to evaluate the project. The purchase price is $18,500 and shipping costs is $1,500. The old fishing boat has remaining useful life of 2 years and may be sold at its depreciated (tax) book value of $2000. The old boat will have no salvage value at the end of its useful life. The new boat with produce cash savings of $7,100 per your before taxes for the next 4 years after which it will not have any salvage value nor cash savings. Assume the old boats was originally bought for $9,000 including capitalized expenditures, and further that accelerated depreciation of 33.33%, 44.45% 14.81% and 7.41%, accelerated depreciation of 33.33%, 44.45% 14.81% and 7.41%, is used what are the projects cash flows?

Step 1: Estimating Initial Cash Flow

Cost of "new" asset	18,500
+ Capitalized expenditures	1,500
- Net proceeds from sale of old boat	(2,000)
+ **(-)** Taxes (Tax savings) due to sale of old boat	0
= *Initial cash out flow*	*18,000Ksh.*

Step 2: Estimating the Difference in Depreciation Resulting from Acceptance of the Project

	End of Year			
	1	2	3	4
New boat depreciable basis	20,000	20,000	20,000	20,000
(x) Accelerated depreciation	× 0.3333	× 0.4445	× 0.1481	× 0.0741
= New boat depreciation	*6,666*	*8,890*	*2,962*	*1482*
Old boat depreciable basis	9000	9000	9000	9000
(x) Accelerated depreciation	× 0.1481	× 0.0741	× 0	× 0
= old boat remaining depreciation	*1,333*	*667*	*0*	*0*
Net increase in depreciation new boat – old boat depreciation	*5,333*	*8223*	*2962*	*1482*

Step 3: Calculating Interim Incremental Net Cash Flows

	End of Year			
	1	2	3	4*
Net change in operating revenue	7,100	7,100	7,100	7,100
- Depreciation	(5333)	(8223)	(2962)	(1482)
= Net change in income before taxes	*1767*	*(1123)*	*4138*	*5618*
(+) Net increase (decrease) in taxes	(707)	(449)	(1655)	(2247)
= Net change in income after taxes	*1060*	*(674)*	*2483*	*3371*
+ Depreciation	5333	8223	2962	1482
= Incremental net cash flow for years 1to 3	*6393*	*7549*	*5445*	*4853**

Step 4: Calculating Terminal Year Incremental Net Cash Flows

- Incremental cash flow for terminal year before wind up concerns	4,853*
+ Final salvage value	0
- Taxes (tax savings) due to disposal of asset	0
Terminal year incremental net cash flows	4,853

Expected incremental cash flows for the project are:

	End of Year				
	0	1	2	3	4
Net Cash Flows	(18,000)	6,393	7,549	5,445	4,853

2.2.3 Evaluating the Cash Flows

Features of a sound investment evaluation method

(i) It should be consistent with the overall objective of the firm- shareholders wealth maximization; maximize the net present value.

(ii) It should be a measure of the projects over all profitability and hence should consider all cash flows.

(iii) It provide a means of distinguishing between acceptable and non-acceptable projects

(iv) It should provide a ranking of projects in order of economic importance

(v) Should be rational and consistent

(vi) Should be applicable to any conceivable investment project

1. Discounted cash flow methods
2. Non-discounted cash flow methods

1. Non-Discounted Cash Flow Methods

2.2.3.1 Accounting (average) rate of return (ARR)

$$ARR = \frac{Average\ annual\ profits}{\text{Average investment}} \times 100$$

Where average investment = ½ (cost of project + salvage value)

Illustration:

Assume 900,000 Ksh. is invested in a project with the following after tax net profits.

Year	1	2	3
Net profit	20,000	10,000	30,000

The life of the project is 3 years and no salvage value, compute ARR of the project

$$Average\ \_\ profits = \frac{20,000 + 10,000 + 30,000}{3} = 20,000$$

Average investment = ½ (90,000 +0) = 45,000

$$ARR = \frac{20,000}{45,000} \times 100 = 44\%$$

Advantages of ARR

(i) Easy to compute and use

(ii) Computed from readily available accounting

information *Disadvantages of ARR*

(i) Ignores time value of money

(ii) Ignores uncertainty of cash flows and there is no consideration of risk in calculation

(iii) Uses accounting profits rather than cash flows

(iv) Doesn't give a decision criteria

(v) Not consistent with share holder wealth maximization

2.2.3.2 Non-discounted pay back period

This is the number of year taken to recover the original (initial) investment from annual cash flows. The lower the pay back period the better the project is

Illustration:

Assume the company wants the invest in two mutually excusive projects of 1000 Ksh. each generating the following cash flows

Year	A	B	Cumulative frequency of A	Cumulative frequency of B
1	500	100	500	100
2	400	200	900	300
3	300	300	1200	600
4	400	400	1300	1000
5	-	500	1300	1500
6	-	600	1300	2100

Pay back for A = $2 + \frac{100}{300} = 3.33 years$

Pay back for B = 4 years

The management should undertake project A since it has a lower pay book period

***Exercise: Calculate the payback period for the previous asset expansion and asset replacement examples.** **check 2.7 years each*

Advantages of Non-discounted pay back period

(i) Easy to calculate

(ii) Uses project cash flows

(iii) Can be used as an indicator of projects risk. The longer the pay back period the higher the risk of project

Disadvantages of Non-discounted pay back period

(i) Ignores time value of money
(ii) Ignores cash flows beyond bay back period
(iii) doesn't show/give a decision criteria
(iv) Not consistent with share holder wealth maximization

2. Discounted Cash Flow Methods

2.2.3.3 Net Present Value (NPV) Method

$$NPV = \sum_{t=1}^{n} \frac{C_t}{(1+K)^t} - Io$$

Where; C = cash flow at the end of period

K = required rate of return

n = useful life of project

Io = initial cost of project

NPV = present value of cash flow – present value of initial cost

Decision criteria for NPV

NPV > 0, Accept the project – it maximizes should holders wealth

NPV < 0, Reject the project

NPV = 0, Indifferent

Illustration:

A firm is considering investing in a project which costs 6,000 Ksh. and has the following cash flows

YR	1	2	3	4
C.F	1500	3000	2000	2500

The cost of capital is 10% and the project has no salvage value. Using the NPV method advise the firm on whether to invest in the project

YR	CF	PVIF (10%)	P.Vs
1	1500	0.9091	1363.65
2	3000	0.8264	2479.20
3	2000	0.7513	1502.60
4	2500	0.6830	1707.50
		Total P.Vs =	7053.00
		Less project cost	(6000.00)
		NPV =	1053.00

Decision: Accept the project since NPV >0

Exercise: Calculate the NPVs for the project expansion and replacement example. Assume a required rat of return of 9%

Advantages of NPV

(i) Considers time value of money

(ii) Consistent with shareholder wealth maximization

(iii) Gives a decision

(iv) Recognizes uncertainty of cash flow by discounting

Disadvantages of NPV

Gives absolute values which cannot be used to compare project of different sizes

2.2.3.4 Internal Rate of Return (IRR)

IRR is the discount rate that equates the NPV of a project to zero. It is the project rate of return (Yield)

$$\sum_{t=1}^{n} \frac{C_t}{(1+R)^t} - I_o = 0$$

Where; R = IRR

It should be noted that IRR is computed using a trial and error method. However, financial calculators are programmed to compute IRR

Steps in the IRR trial and error calculation method

(i) Compute the NPV of the project using an arbitrary selected discount rate

(ii) If the NPV so computed is positive then try a higher rate and if negative try a lower rate.

(iii) Continue this process until the NPV of the project is equal to zero

(iv) Use linear interpolation to determine the exact rate

Linear interpolation is given by: $LR + (HR - LR)\frac{NPV_{LR} - 0}{NPV_{LR} - NPV_{HR}}$ Where; LR = Lower rate and HR = higher rate

Illustration:

A project has the following cash flows

YR	1	2	3	4
C.F	300	400	400	900

The cost of the project is 1500 Ksh. Determine whether project is acceptable if the cost of capital is 18% using the IRR method.

1. We first select an arbitrary discount rate say 9% and compute the NPV

YR	C.F	PVIF (9%)	P.Vs
1	300	0.9174	275.22
2	400	0.8417	336.68
3	700	7722	540.54
4	900	7084	637.56
		Total P.Vs=	1790.00
		Less cost	(1500.00)
		NPV at 9%=	290

2. Since, NPV at 9% is positive and large we select another discount rate larger than 9%, say 15%

YR	C.F	PVIF (15%)	P.Vs
1	300	0.8696	260.88
2	400	0.7561	302.44
3	700	0.6575	460.25
4	900	0.5718	514.62
		Total P.Vs	1538.19

Less cost	(1500.00)
NPV at15%	38.19

3. Since, NPV at 15% is positive but not large, we select a slightly higher rate, say, 18%

YR	C.F	PVIF (18%)	P.Vs
1	300	0.8475	254.25
2	400	0.7182	287.28
3	700	0.6086	426.02
4	900	0.5158	462.22
		Total P.Vs	1431.77
		Less cost	(1500.00)
		NPV at 15%	- 68.23

Since NPV at 15 is negative, IRR therefore lies between 15% and 18%, and since zero NPV will the between -38.23 and 38.19, to get the correct (exact) IRR we have to interpolate between 15% and 18% using interpolation formula

$$IRR = 15 + (18 - 15)\frac{38.19 - 0}{38.19 - (-68.23} = 16.08\%$$

Decision: Reject the project since IRR is less than the required rate of return (cost of capital)

Exercise: Calculate the IRRs for the project expansion and replacement example.

Advantages of IRR

(i) Can be used to compare projects of different sizes

(ii) Considers time value of money

(iii) Uses project cash flows

Disadvantages of IRR

(i) Some project have multiple IRRs if their NPV profile crosses the x-axis more than once (project cash flow signs change several time)

(ii) Some project may theoretically have no IRR if their NPV profile doesn't cross the x-axis (no negative cash flow)

(iii) Assumes re-investment of cash flows occurs of project's IRR which could be exorbitantly high

(iv) Doesn't provide a decision criteria

2.2.3.5 Profitability Index (PI)

It is also referred to as the present value index (PVI). It is the relative measure of project's profitability and can used to compare project of different sizes PI = present value of cash flows/Initial cost

Decision criteria:

If, PI >1, Accept project

PI < 1, Reject project

PI = 1, Indifferent

Illustration: A project has the following cash flows

YR.	C.F.
1	300
2	400
3	700
4	400

If the required rate of return is 9% and the project initial cost is 1500 Ksh., calculate the PI of the project and advice if the project is acceptable

YR	CF	PVIF 9%	PVs
1	300	0.9174	275.52
2	400	0.8417	336.68
3	700	0.7722	540.54
4	900	0.7084	637.46
		Total PV =	1790.00

$$PI = \frac{PVofC.F}{\text{int } ial \text{ cost}} = \frac{1790}{1500} = 1.193$$

Decision: The project is acceptable since PI > 0

Advantages of PI

(i) Recognized time value of money

(ii) Consistent with shareholders wealth maximization objects

(iii) Compares projects of different sizes

(iv) Gives a decision criteria disadvantages

(v) Inapplicable for projects with no negative cash flows

Exercise: 1. Calculate the PIs for the project expansion and replacement examples using 10% as the required rate of return (cost of capital).

2. Read on discounted payback method and calculate the discounted pay back method for the project expansion and replacement examples using 10% as the discount rate.

2.3 Comparing Projects with Unequal Life

If we are choosing between two mutually exclusion alternatives with significantly different lives, an adjustment would be necessary in order to come up with a logical comparison. Two procedures may be used in order to compare projects with unequal lives.

(i) Replacement chain method

(ii) Equivalent annual annuity method

1. Replacement Chain (Common Life) Approach

This is a method of comparing projects of unequal lives which assumes that each project can be repeated as many times as necessary to reach a common life span. The NPVs over the life span are then compared and the project with the higher common life NPV is chosen.

Illustration:

Consider the following projects

(A) Year	0	12% 1	2	3	4	5	6
Cash flows	40,000	8,000	14,000	13,000	12,000	11,000	10,000.

NPV_A at 12% = 6,491 Ksh.

(B) Year	0	12% 1	2	3
Cash flow	-20,000	7000	13000	12000

NPV_B at12% = 5,155Ksh.

From the face of it project A appears better than B but in order to make a proper comparison, we need to replace project B so that its life equals that of A. Its cash flow and NPV will be as follows;

Year	0	12%	1	2	3*	4	5	6
Cash flows	- 20,000		7000	13000	-8000*	7000	13000	12000

**Note that during year three, there will be a cash flow of 12,000(end of first B project) and -20,000 (beginning of second B project). Thus 12,000 - 20,000 = -8,000*

The NPV for project B is now 8,824 Ksh. while that of A remains at 6491 Ksh. In this case project B is the worth while investment

The replacement chain method is however cumbersome if the of the lowest common denominator for the lives of two projects is high e.g. a project of 6 year and another of 10 year will have replacement chain analysis of over 30 years.

(2) Equivalent Annual Annuity (EAA) Approach

This is a method which calculates the annual payments a project would provide if it were an annuity. When comparing project of unequal lives, the one with the higher EAA should be chosen.

The steps in EAA are:

1. Find each project's NPV over its initial life
2. Divide this value by the PVIFA using the required rate of return and life of the projects. PVIFA can be read from the tables or calculated using the formula

$$PVIFA = \frac{1 - \frac{1}{(1+r)^n}}{r}$$ Where; r = required rate of return, and, n = project life

Illustration:

Using the data from previous example find the EAA

Project A has NPV = 6491, Project B has NPV = 5155

$$EAA_{(A)} = \frac{6491}{PVIFA_{12\%,6}} = \frac{6491}{4.111} = 1578.93$$

$$EAA_{(B)} = \frac{5155}{PVIFA_{12\%,3}} = \frac{5155}{2.402} = 2146.13$$

Project B is the chosen since it has a higher EAA

2.4 Capital Rationing

This is a situation where a constraint (or budget ceiling) is placed on the total size of capital expenditures during a particular period

2.4.1 Causes of Capital Rationing

(A) Capital constraints a rising from the market (external capital rationing)

As the firm goes for more capital, the additional capital comes at an increased cost to the form. The increase in price of capital is so great that it renders low return projects undesirable.

(B) Managerial imposed capital constraint (internal capital rationing)

i) Policy of reliance on internally generated funds

ii) Dilution effect:- to prevent outsiders from gaining control of the form

iii) Capital rationing for units of on organization:- fixed allocation from the headquarters to departments

iv) Higher cut off ratio:- setting the firms at off rte for investments higher than the firms cost of money.

v) Organizational limits on the growth of the firm:- when the desirable investment is larger than the size of the firm it is thought that the firm will be unable to exploit the project due to short term constraints on the availability of managerial talent.

Methods of Selecting Investment Proposal under a Capital Constraint

1. Profitability

Index Steps:

A. Compute the index for all proposals

B. For mutually exclusive proposals retain the one having the positive index

C. Rank them in the order of their index values

D. Begin with the proposal having the highest index value until their accumulated total costs exhaust the available capital.

Illustration: Assume a firm has only 300,000 Ksh. to invest and has four available projects with the following characteristics:

Project	PV of Inflows	Cost	PI	NPV
1	230,000	200,000	1.15	30,000
2	141,250	125,000	1.13	16,250
3	194,250	175,000	1.11	19,250
4	162,000	150,000	1.08	12,000

How does the firm choose the projects to invest in, given the 300,000 Ksh. capital constraint?

It can only choose project 2 and 3 because they have the greatest NPV among the combinations that use not more than 300,000 Ksh. PI can be used to solve simple problems where there is one period capital constraints. It can also be used to compare mutually exclusive projects. It is however not applicable for multi-period constraints.

For multi-period constraints we either use ***linear or integer programming***

Illustration: Consider the following two period capital constraint

Project	Period 1 Constraint = 50,000	Period 2 Constraint = 20,000	NPV
1	12,000	3,000	14,000
2	54,000	7,000	17,000
3	6,000	6,000	17,000
4	6,000	2,000	15,000
5	3,000	35,000	40,000
6	6,000	6,000	12,000
7	48,000	4,000	14,000
8	36,000	3,000	10,000
9	18,000	3,000	12,000

Linear programming requires that we maximize NPV subject to the budget constraint

I.e. *Maximize:*

$14x_1 + 17x_2 + 17x_3 + 15x_4 + 40x_5 + 12x_6 + 14x_1 + 10x_8 + 12x_9$ ..... (*i*)

Subject to:

$S_1 + 12x_1 + 54x_2 + 6x_3 + 30x_5 + 6x_6 + 48x_2 + 36x_8 + 10x_9 \leq 50$..... .(*ii*)

$S_2 + 3x_1 + 7x_2 + 6x_3 + 2x_4 + 35x_5 + 6x_6 + 4x_2 + 3x_8 + 3x_9 \leq 20$..... (*iii*)

$0 \leq x_1 , x_2 ...x_9 \leq 1$..... (*iv*)

The LP problem can be solved by a computer using the LP model. LP however leads to acceptance of partial projects which may not be acceptance in practice. ***Integer programming*** may be applied where expressions (i) through (ii) remain unchanged while expression (iv) is changed to $X_J = (0,1)$, Indicating that the project is either accepted completely or rejected. Thus linear programming is applicable where projects can be accepted as fractions while integer programming is applicable where projects cannot be accepted in fractions

2.5 Inflation and Capital Budgeting

Does inflation have an impact in capital budgeting analysis? The answer is a qualified yes in that inflation does have an impact on the numbers that are used in a capital budgeting analysis, but it does not have an impact on the results of the analysis if certain conditions are satisfied. To show what this statement means consider the following illustration.

Illustration:

XYZ Company wants to purchase a new machine that costs $36,000. The machine would provide annual cost savings of $ 20,000, and it would have a three year life with no salvage value. For each of the nest three years, the company expects a 10% inflation rate in the cash flow associated with the new machine. If the company's cost of capital is 23.2%, should the new machine be purchased?

To answer this question, it is important to know how the cost of capital was derived. Ordinarily, it is based on the markets rates of return on the company's various sources of financing- both debt and equity. This market rate of return includes expected inflation; the higher the expected rate of inflation, the higher the market rate of return on debt and equity. When the inflationary effect is removed from the market rate of return, the results is called a real rate of return. For example, if the inflation rate of 10% is removed from martin's cost of capital of 23.2 %, the "Real cost of the capital" is only 12%, as shown in below (You can simply subtract the inflation rate from the market cost of capital to obtain the real cost of capital. The computations are a bit more complex than that)

Reconciliation of the market based and real cost of capital

The real cost of capital……..12.0%
The Inflation factor……10.0
The combined effect (12% × 10% = 1.2%)……1.2%
The market based cost of capital……23.2%

Solution A: Inflation not considered

Items	***Year(s)***	***Cash flows $***	***12% Factor***	***Present Value of Cash Flows $***
Initial investments	*Now*	*(36,000)*	*1.000*	*(36,000)*
Annual cost Savings	*1 - 3*	*20,000*	*2.402*	*48,040*
Net Present Value				*12,040*

Solution B: Inflation considered

Items	***Year(s)***	***Cash flows $***	***Price index numbers***	***Price adjusted cash flows***	***23.2% factor***	***Present value of cash flows $***
Initial investments	*Now*	*(36,000)*	*1.000*	*(36,000)*	*1.000*	*(36,000)*
Annual cost savings	*1*	*20,000*	*1.100*	*22,000*	*0.812*	*17,864*
	2	*20,000*	*1.210*	*24,200*	*0.659*	*15,948*
	3	*20,000*	*1.331*	*26,620*	*0.535*	*14,242*
Net present value						*12,054*

When performing a net present value analysis, one must be consistent. The market based cost of capital reflects inflation. Therefore, if a market based cost of capital is used to discount cash flows, then the cash flows should be adjusted upwards to reflect the effects of inflation in forthcoming periods. Computations for XYZ Company under this approach are given in solution B above

On the other hand, there is no need to adjust the cash flows upwards if the "real cost of capital" is used in the analysis (since the inflationary effects have been taken out of the discount rate). Computations for XYZ Company under this approach are given is solution A above. Note that under solutions A and B that the answer will be the same (within rounding error) regardless of which approach is used, so long as one is consistent and all of the cash flows associated with the project are affected equally by inflation.

Several points should be noted about solution B, where the effects of inflation are explicitly taken into account. First, note that the annual cost savings are adjusted for the effects of inflation by multiplying each year's cash savings by price-index number that reflects a 10% inflation rate. Second, note that the net present value obtained in solution B, where inflation is explicitly taken into account, is the same, within rounding error, to that obtained in solution A, where the inflation effects are ignored. This result may seem surprising, but it is logical. The reason is we have adjusted both the cash flows and the discount rate so that they are consistent, and these adjustments cancel each other across the two solutions.

Throughout the topic we assumed for simplicity that there is no inflation. In that case, the market based and real costs of capital are the same, and there is no reason to adjust the cash flow for inflation since there is none. When there is inflation, the unadjusted cash flows can be used in the analysis if all of the cash flows are affected equally by inflation and the real cost of capital is used to discount the cash flows. Otherwise, the cash flows should be adjusted for inflation and the market based cost of capital should be used in the analysis.

Review Questions

i) Beta Pharma may buy a DNA testing Equipment costing Ksh 6M. This equipment s expected to reduce labor cost of the clinical staff by Ksh 2M annually. The equipment has a useful life of fie years but falls in the three-year property class for cost recovery (depreciation) purposes. No salvage value is expected at the end. The corporate tax rate for Beta Pharma is 38 percent and its required rate of return is 15 percent what are the relevant cash flows?

ii) Does inflation affect capital budgeting analysis? Discuss

iii) In question (i) suppose that 6 percent inflation savings from labor costs is expected over the last four years

a) What are the relevant cash flows

b) If working capital of Ksh 1M were required in addition to the cost of the

equipment and this additional investment were needed over the life of the project, what would be the effect on the relevant cash flows?(All other things are the same as in question (iii) part (b).)

Main Reference for the Topic:

1. Van Horne, J. C. and Wachowicz, J. M., (2001), "Fundamentals of Financial Management", 11th Edition, New Delhi: Pearson Education Inc.,

Supplementary references

2. Bhalla, V. K., (2002), "Financial Management and Policy", 3rd Edition, Anmol Publications PVT.,
3. Chandra P, (2009), Financial Management Theory and Practice, 7th Edition, Tata McGraw-Hill New Delhi

3.0 TOPIC THREE: CAPITAL BUDGETING AND RISK- Risk Analysis

Learning Objectives

By the end of this chapter the learner should be able to:

i) Explain the causes of risk
ii) Describe the perspectives on risk
iii) Discuss the various methods of dealing with risk in capital budgeting

3.1 Introduction

Risk is inherent in almost every business decision. More so in capital budgeting decision as they involve costs and benefits extending over a long period of time during which many things can change in unanticipated ways.

A research and development project may be more risky than an expansion project and the latter tends to be more risky than a replacement project. In view of such differences, variations in risk need to be considered explicitly in capital investment appraisal. Risk analysis is one of the most complex and slippery aspects of capital budgeting.

3.2 Perspectives on Risk

You can view a project from at least three different perspectives:

Stand alone risk- This represents the risk of a project when it is viewed in isolation.

Firm risk- Also called corporate risk; this represents the contribution of a project to risk: the firm.

Market risk- This represents the risk of a project from the point of view of a diversified investor. It is also called systematic risk.

Since the primary goal of the firm is to maximize shareholder value, what matters finally is the risk that a project imposes on shareholders. If shareholders are well diversified market risk is the most appropriate measure of risk.

In practice, however, the project's stand-alone risk as well as its corporate risk are considered important. Why? The project's stand-alone risk is considered important-for the following reasons:

i) Measuring a project's stand-alone risk is easier than measuring its corporate risk a, far easier than measuring its market risk.

ii) In most of the cases, stand-alone risk, corporate risk, and market risk are correlated. If the overall economy does well, the firm too would do well.

iii) The proponent of a capital investment is likely to be judged on the performance of that investment.

iv) In most firms, the capital budgeting committee considers investment proposals one at a time.

i) Undiversified shareholders are more concerned about corporate risk than market risk.

ii) Empirical studies suggest that both market risk and corporate risk have a bearing on required returns. Perhaps even diversified investors consider corporate risk in addition to market risk when they specify required returns.

iii) The stability of over-all corporate cash flows and earnings is valued by managers, workers, suppliers, creditors, customers, and the community in which the firm operates. If the cash flows and earnings of the firm are perceived to be highly volatile and risky, the firm will have difficulty in attracting talented employees, loyal customers, reliable suppliers, and dependable lenders. This will impair its performance and destroy shareholder wealth.

Recognizing the importance of stand-alone risk, firm risk, and market risk, we will discuss risk from all the three perspectives.

3.3 Causes of Risk

i) Insufficient number of similar investments – Thus opportunity for outcomes to average out

ii) Bias in data and its assessment

iii) Changing external economic environment invalidating past experiences

iv) Misinterpreting data

v) Errors of analysis

vi) Managerial talent availability and emphasis

vii) Salvageability of investment

viii) Obsolescence

3.4 Methods of Dealing with Risk in Capital Budgeting

Different techniques have been suggested and no single technique can be deemed as best in all situations. The variety of techniques suggested to handle risk in capital budgeting fall into two broad categories:

i) Approaches that consider the standalone risk of a project

ii) Approaches that consider the risk of a project in the context of the firm or in the context at the market.

This chapter discusses different techniques of risk analysis explores various approaches to project selection under risk, and describes risk analysis in practice. The techniques are discussed in the following order

i) Risk adjusted discount rate approach

ii) Certainly equipments approach

iii) Sensitivity analysis

iv) Scenario analysis

v) Breakeven analysis

vi) Hillier model

vii) Simulation analysis

viii) Decision tree analysis

ix) Corporate risk analysis

3.4.1 Risk Adjusted Discount Rate Approach

The approach is based on the premise that the riskiness of a project may be accounted for by adjusting the discount rate (cost of capital). Relatively risky projects have relatively high discount rates while relatively safe projects have relatively low discount rates.

Remember CAPM which was expressed as: $\overline{R} = R_f + (\overline{R}_m - R_f)\beta$, where the expected return was said to be function of the risk free rate plus a risk premium. This expression can be re expressed as follows: $K_a = R_f + \alpha_a$

Where: K_a = the risk adjusted cost of capital for project

R_f = the risk free rate

α_a = the risk adjustment premium

As the risk increase so does α_a and K_a such that, α_a can be expressed as a function of the proportional relations between the standard deviation of the total firms cash flows i e.

$$\alpha_a = \frac{V_a}{V_{firm}} \alpha_{firm}$$

Where; V_a = coefficient of variation of project '*a'*

V_{firm} = coefficient of variation of the firm

α_{firm} = the risk premium association with the entire firm

Note: $V = \frac{\sigma}{\bar{X}}$

V, expressesσ in relative terms in order to help compare project of different size

The relationship between V_a and V_{firm} will proportionally increase or decrease K_a above or below K_{firm} such that if: $\frac{V_a}{V_{firm}} > 1, then, K_a > K_{firm}$ and if, $\frac{V_a}{V_{firm}} < 1, then, K_a < K_{firm}$

Therefore the NPV for a project can be adjusted for risk in the following manner:

$$NPV = \sum_{t=1}^{n} \frac{C_t}{(1 + K_a)^t} - I_0$$

Where K_a is the risk adjusted discount rate given as;

$$K_a = R_f + V_{firm}^{\alpha} \alpha_{firm}$$

3.4.2 Certainly Equivalent Approach

Proponents of this approach object to the use of a discount rate that lumps together the risk free rate and risk premium. They conclude that two important things account for the valuation process: time value of money and risk attitudes, which should be separated.

The decision rule associated with certainty equivalent approach is to undertake a project if its certainty equivalent NPV is greater than zero. Certainty equivalent of the cash flows Ct can be calculated in several ways some of these are:

(a) Reducing the cash flow estimate by a sufficient number of standard deviations to ensure that the occurrence will be certain under the normal distribution. This is done by reducing the cash flow estimates by 3 standard deviations (i.e. to be 99.72% certain that the occurrence will be at least equal to the certainty equivalent)

Illustration: If Ct = 3000, δ = 500

Then, $CE_{(t)}$ (certainty equivalent for period t) = 3000 – 3 (500) = 1500 If the project has a 3 year life and cost 5000 with no salvage value and risk free rate is 7% then the certainty equivalent NPV will Be;

$$CE_{NPV} = \frac{1500}{(1.04)^1} + \frac{1500}{(1.07)^2} + \frac{1500}{(1.07)^3} - 5000 = -1063.55$$

(b) Reducing the cash flow estimate by a factor "B" that reflects the financial manager's willingness to trade the estimate for the certainty equivalent

B_t = certain cash flows$_t$ / Estimated cash flows$_t$

Illustration: Using the above example suppose the managers is only certain of 2000 of the 3000

B = 2000/3000=0.67

$$CE_{NPV} = \frac{0.67(3000)}{(1.07)^1} + \frac{0.67(3000)}{(1.07)^2} + \frac{0.67(3000)}{(1.07)^3} - 5000 = 274.88$$

(c) A time adjusted method where if the manager feels less certain of estimated cash flow over time, then B is reduced as the uncertainty of the future increases

Illustration: In our example suppose B_1= 0.67. B_2 = 0.50 and B_3 = 0.40. The CE_{NPV} will be:

$$CE_{NPV} = \frac{0.67(3000)}{(1.07)^1} + \frac{0.50(3000)}{(1.07)^2} + \frac{0.40(3000)}{(1.07)^3} - 5000 = 831.75$$

Other approaches that could be used to deal with risk in capital budgeting include decision trees, sensitivity analysis, Monte Carlo simulation etc.

3.4.3 Sensitivity Analysis

Since the future is uncertain, one may like to know what will happen to the viability of the project when some variable like sales or investment deviates from its expected value. In other words, you may want to do "what if" analysis or sensitivity analysis.

To understand the nature of sensitivity analysis, let us consider an example. Suppose you are the financial manager of Pembe Flour Mills. Pembe is considering setting up a new flour mill near Kitale. Based on Pembe previous experience, the project staff of Pembe has developed the figures shown in Exhibit 13.2 (Note that the salvage value has assumed to be nil and the cost of capital to be 12 percent.)

Cash Flow Forecast for Pembe's Flour Mill Project in dollars

	Year 0	***Years 1-10***
Investment	*(20,000)*	
Sales		*18,000*
Variable costs (66.67% of sales)		*12,000*
Fixed costs		*1,000*
Depreciation		*2,000*
Pre-tax profit		*3,000*
Taxes		*1,000*
Profit after taxes		*2,000*
Cash flow from operation		*4,000*
Net cash flow	*(20,000)*	*4,000*

Since the cash flow from operations is an annuity, the NPV of the flour mill project is:

$$- 20{,}000{,}000 + 4{,}000{,}000 \times \text{PVIFA}\ (r = 12\%, n = 10)$$

$$= -20{,}000{,}000 + 4{,}000{,}000 \times 5.650 = 2{,}600{,}000$$

NPV based on the expected values of the underlying variables looks positive. You however, aware that the underlying variable can vary widely and hence you would like to explore the effect of such variations on the NPV. So you define the optimist and pessimistic estimates for the underlying variables. These are shown in the left hand co1umns of Exhibit the figure below. With this information, you can calculate the NPV for optimistic and pessimistic values of each of the underlying variables.

To do this, vary one variable at a time. For example, to study the effect of an adverse variation in sales (from the expected $18 million to the pessimistic $15 million),

you maintain the values of the other underlying variables it their expected levels (This means the investment is held at $20 million, variable costs as a proportion of sales are held at 66.67 percent, fixed costs are held at $I million, so an and so forth.)

Sensitivity of NPV to Variations in the Value of Key Variables ($ in million)

	Range			*NPV*		
Key Variable	*Pessimistic*	*Expected*	*Optimistic*	*Pessimistic*	*Expected*	*Optimistic*
Investment	*24*	*20*	*18*	*-0.65*	*2.60*	*4.22*
Sales	*15*	*18*	*21*	*-1.17*	*2.60*	*6.40*
Variable cost as percentage of sales	*70*	*66.67*	*65*	*0.34*	*2.60*	*3.73*
Fixed costs	*1.3*	*1.0*	*0.8*	*1.47*	*2.60*	*3.33*

The NPV when the sales are at their pessimistic level and other variables at their expected level is shown on the right side of the above table. Likewise you can calculate the effect of variations in the values of the underlying variables. The NPVs for the pessimistic expected and optimistic forecasts are shown on the right side of the table Evaluation very popular method for assessing risk, sensitivity analysis has certain merits:

i) It shows how robust or vulnerable a project is to changes in values of the underlying variables.

ii) It indicates where further work may be done. If the NPV is highly sensitive changes in some factor, it may be worthwhile to explore how the variability of the critical factor may he contained.

iii) It is intuitively very appealing as it articulates the concerns that project eva1uating normally have.

Notwithstanding its appeal and popularity, sensitivity analysis suffers from several shortcomings:

i) It merely shows what happens to NPV when there is a change in some variable, without providing any idea of how likely that change will be.

ii) Typically, in sensitivity analysis only one variable is changed at a time. In the real world, however, variables tend to move together.

iii) It is inherently a very subjective analysis. The same sensitivity analysis may lead decision maker to accept the project while another may reject it. .

3.4.4 Scenario Analysis

Insensitivity analysis, typically one variable is varied at a time. In scenario analysis several variables are varied simultaneously. Most commonly three scenarios are considered: expected (or normal) scenario, pessimistic scenario and optimistic scenario and optimistic scenario. In the normal scenario all variables assume their normal values in the pessimistic scenario all the variables assume their pessimistic values and in the optimistic scenario all variables assume their optimistic values

	Key Variable	*Pessimistic Scenario*	*Expected Scenario*	*Optimistic Scenario*
1	*Investment*	*24*	*20*	*18*
2	*Sales*	*15*	*18*	*21*
3	*Variable cost*	*10.5 (70%)*	*12 (66.7%)*	*13.65 (65%)*
4	*Fixed costs*	*1.3*	*1.0*	*0.8*
5	*Depreciation*	*2.4*	*2.0*	*1.8*
6	*Pre-tax profit*	*0.8*	*3.0*	*4.75*
7	*Tax*	*0.27*	*1.0*	*1.58*
8	*Profit after tax*	*0.53*	*2.0*	*3.17*
9	*Annual cash flow from operations*	*2.93*	*4.0*	*4.97*
10	*NPV (9) × PVIFA (12%, 10 yrs) - (1)*	*(7.45)*	*2.60*	*10.06*

Scenario analysis may be regarded as an improvement over sensitivity analysis because it considers variations in several variables together. However, scenario analysis has its own limitations:

It is based on the assumption that there are few well-delineated scenarios. This may not be true in many cases. For example, the economy does not necessarily lie in three discrete states, viz., recession, stability, and boom. It can in fact be anywhere on the continuum between the extremes. When a continuum is converted into three discrete states some information is lost.

Scenario analysis expands the concept of estimating the expected values. Thus, in a case where there are 10 inputs the analyst has to estimate 30 expected va1ues (3 ×10) to do the scenario analysis.

3.4.4 Break-even Analysis

In sensitivity analysis we ask what will happen to the project if sales decline or costs increase or something else happens. As a financial manager, you will also be interested in knowing how much should be produced and sold at a minimum to ensure that the project

does not ‘lose money’. Such an exercise is called break even analysis and the minimum quantity at which loss is avoided is called the break-even point. The break -even point may be defined in accounting terms or financial terms.

Accounting Break-even Analysis Suppose you are the financial manager of Pembe Mills is considering setting up a new flour mill near Kitale. Based on Pembe previous experience, the project staff of Pembe has developed the figures shown in the previous example.

Note that the ratio of variable costs to sales is 0.667 (12/18). This means that every dollar of sales makes a contribution of $ 0.333. Put differently, the contribution margin ratio is 0.333. Hence the break-even level of sales will be:

$$\frac{Fixed\ cos\ t + Depreciation}{Contribution\ m\ arg\ in\ ratio} = \frac{1+2}{0.33} = \$9Million$$

A variant of the accounting break-even point is the *cash break-even point* which is defined as the level of sales at which the firm neither makes cash profit nor incurs a cash loss. The cash break even sales is defined as:

$$\frac{Fixed\ cos\ t}{Contribution\ m\ arg\ in\ ratio} = \frac{1}{0.33} = \$3Million$$

Financial Break-even Analysis- The focus of financial break-even analysis is on NPV and not on accounting profit, at what level of sales will the project have a zero NPV?

To illustrate how the financial break-even level of sales is calculated, let us go back to Pemble mill project. The annual cash flow of the project depends on sales as follows:

Variable costs: 66.67 percent of sales

Contribution: 33.33 percent of sales

Fixed costs: $ 1 million

Depreciation: $ 2 million

Pre-tax profit: 0.333 × Sales) - $ 3 million

Tax (at 33.3%) 0.333 (0.333 Sales - $ 3 million)

Profit after tax .667 (0.333 x Sales -$ 3 million)

Cash flow (4 + 7): Es. 2 million + .667 (0.333 × Sales - $ 3 million)

= 0.222 Sales

Since the cash flow lasts for 10 years, its present value at a discount rate of 12 percent is:

PV (cash flows) = 0.222 Sales × PVIFA (10 years, 12%)

= 0.222 Sales z 5.65(1

= 1.254 Sales

The project breaks even in NPV terms when the present value of these cash flows equals the initial investment of Es. 20 million. Hence, the financial break-even occur, when PV (cash flows) = Investment

1.254 Sales = $ 20 million

Sales = $ 15.95 million

Thus, the sales for the flour null must be $15.95 million per year for the investment to have a zero NPV. Note that this is significantly higher than $ 9 million which represents the accounting break-even sales

3.4.5 Hillier Model

Under certain circumstances, the expected net present value and the standard deviation of net present value may be obtained through analytical derivation as suggested by F.S. Hillier. Two cases of such analysis are discussed here: *(i)* no correlation among cash flows and *(ii)* perfect correlation among cash flows.

Uncorrelated cash flows- when the cash flows of different years are uncorrelated, the cash flow for year *t* is independent of the cash flow for year *t- m*. Put differently, there is no relationship between cash flows from one period to another. In this case the expected net present value and the standard deviation of net present value are defined as follows:

$$\overline{NPV} = \sum_{t=1}^{n} \frac{\overline{C}_t}{(1+K_a)^t} - I$$

$$\sigma(NPV) = \sum_{t=1}^{n} \frac{\sigma_t^2}{(1+i)^{2t}}^{1/2}$$

where $\overline{NPV}$ is the expected net present value, C_t $\overline{\text{is}}$ the expected cash flow for year *t, i* the risk-free interest rate, I is the initial outlay σ(NPV) is the standard deviation of the present value, and σ_t is the standard deviation of the cash flow for year t. Note that in the above formulae the discount rate is the risk-free interest rate because we

try to separate the time value of money and the risk factor. The risk of the project: reflected in σ(NPV), is considered in conjunction with $\overline{NPV}$ computed with the risk free discount rate. If $\overline{NPV}$ is computed using a risk-adjusted discount rate and then if this is viewed along with σ(NPV), the risk factor would be doubled counted. Let us look at an example. A project involving an outlay of $10,000 has the following benefits associated with it:

Year 1		*Year 2*		*Year 3*	
Net Cash Flow	*Probability*	*Net Cash Flow*	*Probability*	*Net Cash Flow*	*Probability*
$3,000	*0.3*	*$2,000*	*0.2*	*$3,000*	*0.3*
5,000	*0.4*	*4,000*	*0.6*	*5,000*	*0.4*
7,000	*0.3*	*6,000*	*0.2*	*7,000*	*0.3*

Calculate $\overline{NPV}$ and σ(NPV), assuming that i = 6 percent

$$\overline{NPV} = \sum_{t=1}^{3} \frac{\overline{C}_t}{(1+K_a)^t} - I$$

$$= \frac{5,000}{1.06} + \frac{4,000}{(1.06)^2} + \frac{5,000}{(1.06)^3} - 10,000 = \$2,475$$

$$\sigma(NPV) = \sum_{t=1}^{n} \frac{\sigma_t^2}{(1+i)^{2t}}^{1/2}$$

$$= \frac{2,400,000}{1.06} + \frac{1,600,000}{(1.06)^2} + \frac{2,400,000}{(1.06)^3}^{2/2} = \$2,258$$

Perfectly Correlated Cash Flows- If cash flows arc perfectly correlated, the behavior of cash flows in all periods is alike. This means that if the actual cash flow in one year is σ standard deviations to the left of its expected value, cash flows in other years will also be σ standard deviations to the left of their respective expected values. Put in other words, flows of all years are linearly related to one another. The expected value and the standard deviation of net present value, when cash flows are perfectly correlated, are as follows:

$$\overline{NPV} = \sum_{t=1}^{n} \frac{\bar{C}_t}{(1 + K_a)^t} - I$$

$$\sigma(NPV) = \sum_{t=1}^{n} \frac{\sigma_t}{(1 + i)^t}$$

Let us consider an example. An investment project involves a current outlay of $10,000. The mean and standard deviation of cash flows, which are perfectly correlated, are as follows:

Year	$\overline{C_t}$	σ_t
1	*$ 5,000*	*1,500*
2	*3,000*	*1,000*
3	*4,000*	*2,000*
4	*3,000*	*1,200*

Calculate $\overline{NPV}$ and σ(NPV), assuming a risk free interest rate of 6 percent

$$\overline{NPV} = \sum_{t=1}^{n} \frac{\bar{C}_t}{(1 + K_a)^t} - I$$

$$= \frac{5,000}{1.06} + \frac{3,000}{(1.06)^2} + \frac{4,000}{(1.06)^3} + \frac{3,000}{(1.06)^4} - 10,000 = \$3,121$$

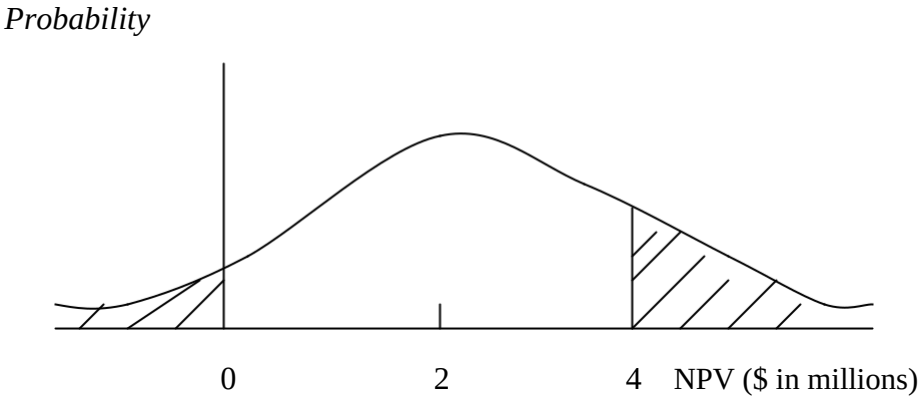
$$\sigma(NPV) = \sum_{t=1}^{n} \frac{\sigma_t}{(1 + i)^t}$$

$$= \frac{1,500}{1.06} + \frac{1,000}{(1.06)^2} + \frac{2,000}{(1.06)^3} \frac{1,200}{(1.06)^4} = \$4,935$$

Standardizing the Distribution- Knowledge of $\overline{NPV}$ and σ(NPV) is very useful for evaluating the risk characteristics of a project. If the NPV of a project is approximately normally distributed, we can calculate the probability of NPV being less than or more than a certain specified value. This probability is obtained by finding the area under the probability distribution curve to the left or right of the specified value. Suppose the probability distribution of NPV is as shown in the figure below. If we want to calculate the probability distribution curve to the left of 0, this is indicated by the shaded region on the left. If we are interested in finding the probability that NPV exceeds a certain value,

say $4 mil we calculate the area under the probability distribution curve to the right of $4 mil, this area is shown as the shaded region on the right.

Area under a Normal Distribution Curve



How can we calculate the area to the left or right of a specified point? To calculate area to the left or right of a specified point, we use the following procedure.

Step 1 Standardize the difference between the specified point and $\overline{NPV}$. To do this difference between the specified point and $\overline{NPV}$ is divided by σ(NPV). The standardized difference may be referred to as Z. The purpose of standardization is to transform the actual distribution of NPV into a standard normal distribution. The standard normal distribution has a mean of 0 and standard deviation of 1

Step 2- Refer to the standard normal distribution table and find the probability to the left (or right depending on our interest) of the Z value obtained in step I.

To illustrate the above procedure suppose that a project's $\overline{NPV}$ and σ(NPV) are $96,000 and $60,000 respectively and we want to find the probability that NPV will be less than 0. This may be done as follows.

Step 1- The standardized difference between the specified point (NPV = 0) and $\overline{NPV}$ = 96,000 is:

$$\frac{0 - 96{,}000}{60{,}000} = -1.6$$

Step 2- The cumulative probability up to Z = -1.6 as seen from the standard normal distribution table. This means that there is a 5.5 percent chance that NPV will be equal to or less than 0.

3.4.6 Simulation Analysis

Sensitivity analysis indicates the sensitivity of the criterion of merit (NPV, IRR, or any other) to variations in basic factors and provides information of the following type: If the quantity produced and sold decreases by 1 percent, other things being equal, the NPV falls by 6 percent. Such information, though useful, may not he adequate for decision making. The decision maker would also like to know the likelihood of such occurrences. This information can be generated by simulation analysis which may be used for developing the probability profile of a criterion of merit by randomly combining values of variables which a bearing on the chosen criterion.

Procedure- *The steps involved in simulation analysis are as follows:*

1. Model the project. The model of the project shows how the net present value is related to the parameters and the exogenous variables. (Parameters are input variables specified by the decision maker and hold constant over all simulation runs. Exogenous variables are input variables which are stochastic in nature and outside the control of the decision maker).
2. Specify the values of parameters and the probability distributions of the exogenous variables.
3. Select a value, at random, from the probability distributions of each of the exogenous variables.
4. Determine the net present value corresponding to the randomly generated values of exogenous variables and pre-specified parameter values.
5. Repeat steps (3) and (4) a number of times to get a large number of simulated net present values.
6. Plot the frequency distribution of the net present value.

In real life situations, simulation is done only on the computer because of the computational tedium involved. However, to give you an idea of what goes on in simulation, we will work with a simple example where simulation ha been done manually.

Pharma Chemicals is evaluating an investment project whose net present value has been modelled as follows:

$$NPV = \sum_{t=1}^{n} \frac{Annual\ Cash\ Flow}{(1 + Risk - Free\ Rate)^{t}} - Initial\ Ivestment$$

In the NPV model embodied in the equation above the risk-free rate and the initial investment are parameters with the following values: risk-free rate = 10 percent and initial investment = $13,000. The annual cash flow and the project life (n) are stochastic exogenous variables with the following distributions:

Annual Cash Flow Project Life

Annual Cash Flow			***Project Life***	
Value	*Probability*		*Value*	*Probability*
$ 1,000	0.02		3yrs	0.05
1,500	0.03		4	0.10
2,000	0.15		5	0.30
2,500	0.15		6	0.25
3,000	0.30		7	0.15
3,500	0.20		8	0.10
4,000	0.15		9	0.03
			10	0.02

The firm wants to perform 10 manual simulation runs for this project. To perform the simulation runs, we have to generate values, at random, for the two exogenous variables: annual cash flow and project life. For this purpose, we have to (i) set up the correspondence between the values of exogenous variables and random numbers, and (ii) choose some random number generating device. The table below shows the

correspondence between various variables and two digit random numbers. The table presents a table of random digits that will be used for obtaining two digit random numbers.

Now we are ready for simulation. In order to obtain random numbers from the table, we may begin anywhere at random in the table and read any pair of adjacent columns (since we are interested in a two-digit random number) and read column-wise or row-wise.

For our example, let us use the first two columns of the table. Starting from the top, will read down the column. For the first simulation run we need two, two-digit random numbers, one for the annual cash flow and the other for the project life. These numbers are 53 and 97 and the corresponding values for annual cash flow and project life are $3,000 and 9 years respectively. We go further in this manner. The table shows the random numbers so obtained and the results of simulation.

Annual Cash Flow				***Project Life***			
Value	*Probability*	*Cumulative Probability*	*Two digit random numbers*	*Value*	*Probability*	*Cumulative Probability*	*Two digit random numbers*
$ 1,000	0.02	0.02	00 to 01	3yrs	0.05	0.05	00 to 04
1,500	0.03	0.05	2 to 04	4	0.10	0.15	05 to 14
2,000	0.15	0.20	05 to 19	5	0.30	0.45	14 to 44
2,500	0.15	0.35	20 to 34	6	0.25	0.70	45 to 69
3,000	0.30	0.65	35 to 64	7	0.15	0.80	70 to 84
3,500	0.20	0.85	65 to 84	8	0.10	0.85	85 to 94
4,000	0.15	1.00	86 to 99	9	0.03	0.98	95 to 97
				10	0.02	1.00	98 to 99

Random Numbers	
53…	81…
97…	70…
66…	38…
99…	75…
30…	48…
81…	83…
19…	90…
09…	33…
31…	58…
67…	52…

Simulation Results

Run	***Annual Cash Flow***		***Project Life***		
	Random Number	*Corresponding vale of annual flow*	***Random Number***	*Corresponding value of annual flow*	*Net present value*
1	53	3,000	97	9	4277
2	66	3,500	99	10	8506
3	30	2,500	81	7	(829)
4	19	2,000	09	4	(7660)
5	31	2,500	67	6	(2112)
6	81	3,500	70	7	4039
7	38	3,000	75	7	1605
8	48	3,000	83	7	1605
9	90	4,000	33	5	2163
10	58	3,000	52	6	66

Evaluation An increasingly popular tool of risk analysis, simulation offers certain advantages:

i) Its principal strength lies in its versatility. It can handle problems characterized by (a) numerous exogenous variables following any kind of distribution, and (b) complex interrelationships among parameters, exogenous variables, and endogenous variables. Such problems often defy the capabilities of analytical methods.

ii) It compels the decision maker to explicitly consider the interdependencies and uncertainties characterizing the project.

Simulation, however, is a controversial tool which suffers from several shortcomings:

i) It is difficult to model the project and specify the probability distributions of exogenous variables.

ii) Simulation is inherently imprecise. It provides a rough approximation of the prob. ability distribution of net present value (or any other criterion of merit). Due to imprecision, the simulated probability distribution may be misleading when a tail the distribution is critical.

iii) A realistic simulation model, likely to be complex, would most probably be constructed by a management scientist, not the decision maker. The decision maker lacking understanding of the model, may not use it.

iv) To determine the net present value in a simulation run the risk-free discount rate used. This is done to avoid prejudging risk which is supposed to be reflected in they dispersion of the distribution of net

present value. Thus the measure of net present value takes a meaning, very different from its usual one that is difficult to interpret

3.4.7 Decision Tree Analysis

To analyze such situations where sequential decision making is involved decision tree analysis is helpful.

The key steps in decision tree analysis are a follows:

Delineate the decision tree

Evaluate the alternatives

Delineate the Decision- Tree Exhibiting the anatomy of the decision situation,

the decision e shows:

The decision points (typically represented by squares), the alternative options available for experimentation and action at these points, and the investment outlays associated with these options.

The chance points (typically represented by circles) where outcomes are dependent on the chance process, the likely outcomes at these points along with the probabilities thereof, and the monetary values associated with them.

Evaluate the Alternatives- Once the decision tree is delineated and data about probabilities and outcomes gathered, decision alternatives may be evaluated as follows:

i) Start at the right-hand end of the tree and calculate the NPV at various chance points
that come first as you proceed leftward.

ii) Given the NPVs of chance points in step 1, evaluate the alternatives at the final stage decision points in terms of their NPVs.

iii) At each final stage decision point, select the alternative which has the highest NPV and truncate the other alternatives. Each decision point is assigned a value equal to
the NPV of the alternative selected at that decision point.

iv) Proceed backward (leftward) in the same manner, calculating the NPV at chance points, selecting the decision alternative which has the highest NP at

various decision points, truncating inferior decision alternatives, and assigning NPVs to decision points, till the first decision point is reached.

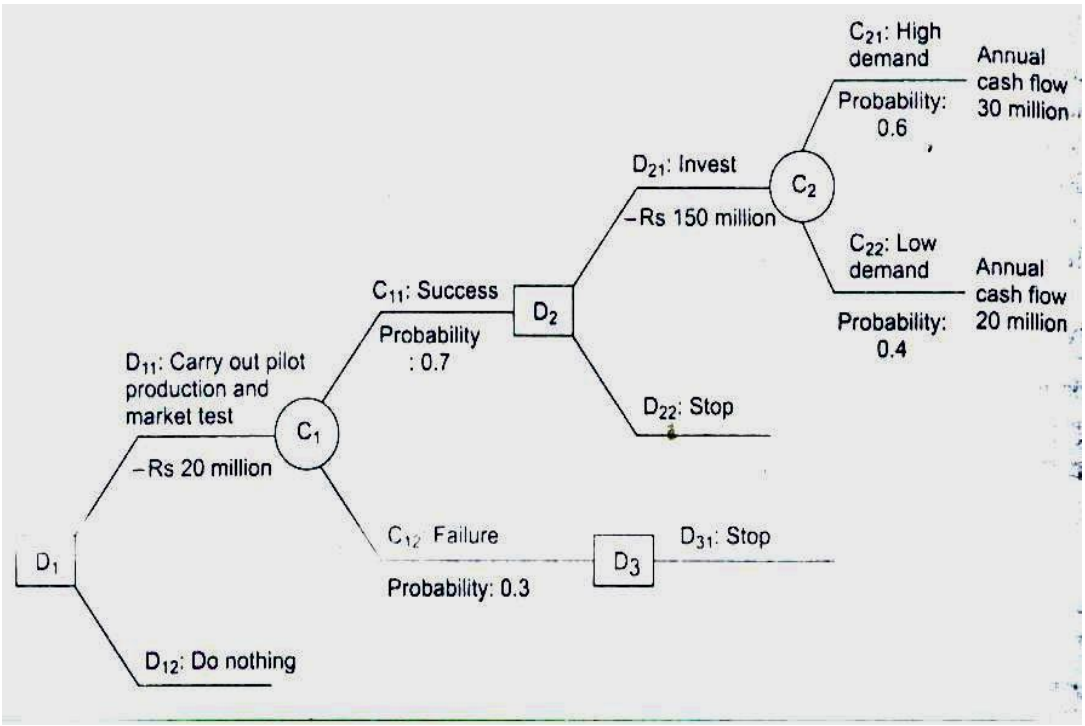
Illustration

General electric have come up with an electric cycle. The firm is ready for pilot production and test marketing. This will cost $20 million and take few weeks. Management believes that there is a 70 percent chance that the pilot production and test marketing will be successful. In case of success, G.E. can build a plant costing $150 million very quickly. The plant will generate an annual cash inflow of $30 million for 20 if the demand is high or an annual cash inflow of $21million if the demand is moderate. High demand has a probability of 0.6; moderate demand has a probability 0.4.

Start at the right-hand end of the tree and calculate the NPV at chance point C, that comes first as we proceed leftward. Advice G.E. on the best course of action

Solution

Decision tree



i) Start at the right-hand end of the tree and calculate the NPV at chance point C_2, that comes first as we proceed leftward.

NPV (C_2) = 0.6 [30 x PVIEA (20, 12%)] 0.4 [20 x PVIEA (20, 12%)] = $194.2 million

ii) Evaluate the NPV of the decision alternatives at D_2 the last stage decision point.

Alternative	*NPV*
D_{21} (Invest $150 million)	$ 44.2 million
D_{22} (Stop)	0

iii) Select D_{21} and truncate D_{22} as NPV (D_{21}) > NPV (D_{22}).

iv) Calculate the NPV at chance point C_1 that comes next as we roll backwards.

NPV (C_1) = 0.7 [44.2] - 0.3 [0J = $30.9 million

v) Evaluate the NPV of the decision alternatives at D_1 the first stage decision point

Alternative	*NPV*
D_{11} (Carry out pilot production and market test at a cost of $20 million)	$ 10.9 million
D_{12} (Do nothing)	0

Based on the above evaluation, we find that the optimal decision strategy is as follows Choose D_{11} (carry out pilot production and market test) at the decision point D_1 and wait for the outcome at the chance point C_1. If the outcome at C_1 is C_{11} (success), invest $150 million; if the outcome at C_1 is C_{12} (failure) stop.

3.4.8 Corporate Risk Analysis

A project's corporate risk is its contribution to the overall risk of the firm. Put differently, it reflects the impact of the project on the risk profile of the firm's total cash flows.

On a stand-alone basis a project may be very risky hut if its returns are not highly correlated or, even better, negatively correlated-with the returns on the other projects its corporate risk tends to be low.

Aware of the benefits of portfolio diversification, many firms consciously pursue a strategy diversification. Unilever Limited, for example, has a diversified portfolio comprising, in the main, of the following businesses: soaps and detergents, personal care products, food, and tea.

The proponents of diversification argue that it helps in reducing the firm's overall risk exposure. As most businesses are characterized by cyclicality it seems desirable that there two to three different lines of business in a firm's portfolio.

The logic of corporate diversification for reducing risk, however, has been questioned. Why should a firm diversify when shareholders can reduce risk through personal diversification? All that they have to do is to hold a diversified portfolio of securities or participate in a mutual fund scheme. Indeed, they can do it more efficiently.

There does not seem to be an easy answer. Although shareholders can reduce risk through personal diversification there are some other benefits from corporate diversification. Stable earnings and cash flows enable a firm to attract talent, to secure commitment from various stakeholders, to exploit tax shelters fully, and to check adverse managerial incentives

Review Questions

i) Vitz Ltd uses a simulation approach to judge investment projects. Three factors are employed: Market demand, in units; price per unit minus cost per unit (on an after tax basis); and investment required at time 0. These factors are felt to be independent of one another. In analyzing a new consumer product with a one year product life, Vitz Ltd estimates the following probability distributions

Market Demand		*Price minus cost per unit*		*Investment required*	
Probability	*Units*	*Probability*	*Dollars*	*Probability*	*Dollars*
0.15	*26,000*	*0.30*	*6.00*	*0.30*	*160,000*
0.20	*27,000*	*0.40*	*6.50*	*0.40*	*165,000*
0.30	*28,000*	*0.30*	*7.00*	*0.30*	*170,000*
0.20	*29,000*				
0.15	*30,000*				

a) Using a table of random umbers or some other random process, simulate 20 or more trials of these three factors and compute the internal rate of return on this one year investment trial

b) Approximately what is the most likely return? How risky is the project?

ii) Karen Dogs Ltd is considering opening a new branch location. If it constructs an office and 100 dog cages at its new location, the initial outlay will be Ksh 1M and the project is likely to produce net cash flows of Ksh 170,000 per year for 15

years, after which the leasehold on the land expires and the project s left with no residual value. The company required rate of return is 18 percent. If the location proves favorable Karen Dogs Ltd will be ale to expand by another 100 cages at the end of four years. This second stage expansion would require a Ksh 200,000 outlay. With the additional 100 cages installed, incremental net cash flows of Ksh 170,000 per year for years 5 through15 would be expected. The company believes that there is a fifty-fifty chance that the location will prove a favorable one.

a) Is the initial project acceptable? Why?

b) What is the value of the option to expand? What is the project worth with this option? Is the project now acceptable? Why?

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4.0 TOPIC 4: DIVIDEND THEORIES AND POLICY

Learning Objectives

By the end of this chapter the learner should be able to:

i) Explain various theories on dividend policy
ii) Explain the factors influencing dividend decisions
iii) Discuss the Dividend Policy Formulation

4.1 Introduction

Dividend policy of a firm determines what proportion of earnings is paid to holders by way of dividends and what proportion is ploughed back in the firm for investment purposes.

If a firm's capital budgeting decision is independent of its dividend policy, a higher dividend payment will entail a greater dependence on external financing. Thus the dividend policy has a bearing on the choice of financing. On the other hand, if a firm's Capital budgeting decision is dependent on its dividend decision, a higher payment will shrink its capital budget and vice versa. In such a case, the dividend policy has a bearing on capital budgeting decision.

Discussions on dividend policy and firm value assumes that the investment decision of a firm is independent of it dividend decision. However, there are some models which assume that investment and dividend decisions are related. Two such models are and the Walter model Gordon model.

4.2 Dividend Theories

4.2.1 Walter Model

James Walter has proposed a model of share valuation which supports the view that the dividend policy of the firm has a bearing on share valuation. His model is based on the following assumptions:

i) The firm is an all-equity financed entity. Further, it will rely only on retained earnings to finance its future investments. This means that the investment decision is dependent on the dividend decision.

ii) The rate of return on investments is constant.

iii) The firm has an infinite life

Valuation Formula- Based on the above assumptions, Walter put forward the following valuation formula:

$$P = \frac{D + (E - D)/r}{k}$$

Where *P* is the price per equity share, *D* is the dividend per share, *E* is the earnings per share, (*E* - *D*) is the retained earnings per share, *r* is the rate of return on investments, and *k* is the cost of capital.

As per Walter's equation, the price per share is a sum of two components:

$$P = \frac{D}{k} + \frac{(E - D)r}{k}$$

The first component is the present value of an infinite stream of dividends and the component is the present value of an infinite stream of returns from retained earnings.

The table below gives example of Walter model for three cases growth, normal and declining firm

Growth firm: r>k	***Normal firm: r=k***	***Declining firm: r<k***
r = 20 percent	*r* = 15 percent	*r* = 10 percent
k =15 percent	*k* =15 percent	*k* =15 percent
E=$4	*E*=$4	*E*=$4
If *D* = $4	If *D* = $4	If *D* = $4
$P = \frac{4 + (0)0.20/0.15}{0.15}$	$P = \frac{4 + (0)0.15/0.15}{0.15}$	$P = \frac{4 + (0)0.10/0.15}{0.15}$
= $26.67	= $26.67	= $26.67
If *D* = $2	If *D* = $2	If *D* = $2
$P = \frac{2 + (0)0.20/0.15}{0.15}$	$P = \frac{2 + (0)0.15/0.15}{0.15}$	$P = \frac{2 + (0)0.10/0.15}{0.15}$
=$31.11	=$26.67	=$22.22

Implications

i) When the rate of return is greater than the cost of capital (r > k), the price per share increases as the dividend payout ratio decreases

ii) When the rate of return is equal to the cost of capital (r = k), the price per share does not vary with changes in dividend payout ratio.

iii) When the rate of return is lesser than the cost of capital (r < k), the price per share increases as the dividend payout ratio increases

Thus Walter model implies that:

i) The optimal payout ratio for a growth firm (r > k) is nil.

ii) The optimal payout ratio for a normal firm (r = k) is irrelevant.

iii) The optimal payout ratio for a declining firm (r < k) is 100 percent

Clearly these policy implications lead to very extreme courses of action which make limited sense in the real world. Despite this simplicity or naivete, the Walter model is a useful tool to show the effects of dividend policy under varying profitability assumptions.

4.2.2 Gordon Model

Myron Gordon proposed a model of stock valuation using the dividend capitalization approach. His model is based on the following assumptions:

i) Retained earnings represent the only source of financing for the firm. Thus, like the Walter model the Gordon model ties investment decision to dividend decision

ii) The rate of return on the firm's investment is constant.

iii) The growth rate of the firm is the product of its retention ratio and its rate of return. This assumption follows the first two assumptions.

iv) The cost of capital for the firm remains constant and it is greater than the growth rate.

v) The firm has a perpetual life.

vi) Tax does not exist.

Valuation Formula Gordon's valuation formula is:

$$P_0 = \frac{E_1(1-b)}{k - br}$$

where P_0 is the price per share at the end of year *0*, E_1 is the earnings per share at the end of year *1*, *(1 -b)* is the fraction of earnings the firm distributes by way of dividends, *b* is the fraction of earnings the firm retains, *k* is the rate of return required by the shareholders *r* is the rate of return earned on investments made by the firm, and *br* is the growth rate of, earnings and dividends.

The table below gives example of Walter model for three cases growth, normal and declining firm

Growth firm: r>k	***Normal firm: r=k***	***Declining firm: r<k***
r = 20 percent	r = 15 percent	r = 10 percent
k =15 percent	k =15 percent	k =15 percent
E=\$4	If b = 0.25	If b = 0.25
If b = 0.25	If D = \$4	If D = \$4
$P_0 = \frac{(0.75)4}{0.15-(0.25)(0.20)}$	$P_0 = \frac{(0.75)4}{0.15-(0.25)(0.15)}$	$P_0 = \frac{(0.75)4}{0.15-(0.25)(0.20)}$
= \$30	= \$26.67	= \$24
If b = 0.50	If b = 0.50	If b = 0.50
$P_0 = \frac{(0.50)4}{0.15-(0.50)(0.20)}$	$P_0 = \frac{(0.50)4}{0.15-(0.50)(0.15)}$	$P_0 = \frac{(0.50)4}{0.15-(0.50)(0.10)}$
=\$40.00	=\$26.67	=\$20.00

Implications

i) When the rate of return is greater than the discount rate *(r > k)*, the price per share increases as the dividend payout ratio decreases

ii) When the rate of return is equal to the discount rate *(r = k)*, the price per share remains unchanged in response to variations in the dividend payout ratio.

iii) When the rate of return is less than the discount rate *(r< k)*, the price per share increases as the dividend payout ratio increases

Thus the basic Gordon model leads to dividend policy implications as that of the alter model:

i) The optimal payout ratio for a growth firm *(r > k)* is nil.

ii) The payout ratio for a normal firm is irrelevant.

iii) The optimal payout ratio for a declining firm *(r < k)* is 100 percent.

4.2.3 Traditional Position

Traditional position expounded eloquently by Graham and Dodd holds that the stock market places considerably more weight on dividends than on retained earnings according to them:

Their view is expressed quantitatively in the following valuation model

$$P = m(D + E/3)$$

Where, P is the market price per share, D is the dividend per share, E is the earnings per share, and m is a multiplier.

According to this model, in the valuation of shares the weight attached to dividends is equal to four times the weight attached to retained earnings. This is clear from following version of the above equation in which E is replaced by $(D + R)$.

$$P = m\, D + \frac{D + R}{3}$$

The weights provided by Graham and Dodd are based on their subjective judgments and not derived from objective, empirical analysis. Notwithstanding the subjectivity of these weights, the major contention of the traditional position is that a liberal payout has a favorable impact on stock price

4.2.4 Miller and Modigliani Position

Miller and Modigliani (MM, hereafter) have advanced the view that the value of a firm solely on its earning power and is not influenced by the manner in which its Earnings are split between dividends and retained earnings. This view, referred to as the ***"dividend irrelevance" theorem***, is presented in their celebrated 1961 article. In this article MM constructed their argument on the following assumptions.

i) Capital markets are perfect and investors are rational: information is freely available, transactions are instantaneous and costless, securities are divisible, and no investor can influence market prices.

ii) Floatation costs are nil.

iii) There are no taxes.

iv) Investment opportunities and future profits of firms are known with certainty (MM drop this assumption later).

v) Investment and dividend decisions are independent.

The substance of MM argument may be stated as follows: If a company retains earnings instead of giving it out as dividends, the shareholder enjoys capital appreciation equal to the amount of earnings retained. If it distributes earnings by way of dividends instead of retaining it, the shareholder enjoys dividends equal in value to the amount by which his capital would have appreciated had the company chosen to retain its earnings. Hence, the division of earnings between dividends and retained earnings is irrelevant from the point of the shareholders.

To prove their argument MM begin with the simple valuation model:

$$P_0 = \frac{1}{(1+p)}(D_1 + P_1)$$

Where P_0 is the market price per share at time 0 D_1 is the dividend per share at time 1 P_1 is the market price per share at time and r is the discount rate applicable to the risk class to which the firm belongs(this rate is assume to remain unchanged)

From the above expression the value of outstanding equity shares at time 0 is obtained as follows:

$$nP_0 = \frac{1}{(1+p)}\{nD_1 + (n+m)P_1 - mP_1\}$$

Where n is the number of outstanding equity shares at time 0, nP_0 is the total market value of outstanding equity shares at time 0, nD_1 is the total dividend s in year 1 payable on the equity shares outstanding at time 0, m is the number of equity share issued at time 1 at price P_1 (the prevailing market price at time 1), $(n + m)P_1$ is the total market value to all outstanding share at time 1, mP_1 is the market vale of shares issued at time 1 and r is the discount rate

What is the total amount of new equity stock issued at time 1, mP_1, equal to*?* It is equal to the total investment at time 1 less the amount of retained earnings, in symbols:

$$mP_1 = 1 - (X - nD_1)$$

Where *1* is the total investment at the end of the year *1* and *X i*s the total net profit of the firm for the year *1*

$$nP_0 = \frac{1}{(1+p)}\{(n+m)P_1 - I_1 - X_1\}$$

As D_1 is no found in this equation and as $(n+m)\,P_1$, I_1, X_1, and r are independent of D_1 MM reach the conclusion that the value of the firm does not depend on its dividend decision.

Note that $(n+m)\,P_1$, the value of the equity of the firm at the end of year 1 is in no way affected by the dividend paid at the end of the year (D_1) Why? The reason is simple: D_1 influences P_1 and m in a mutually offsetting manner. If the firm pays more D_1, P_1 decreases but m increases on the other hand, if the firm pays less D_1, P_1 increases but m decreases. The foregoing analysis can be summarized as follows:

MM "dividend irrelevance" theorem rests on their ***"leverage irrelevance"*** theorem. Since the real cost of debt and equity as per MM "leverage irrelevance theorem is the same, it does not mater if the firm raises external finance by issuing debt or a combination of equity and debt.

There is no conflict between the dividend capitalization approach to valuation advocated earlier and the MM "dividend irrelevance" theorem. MM "dividend irrelevance" theorem does not imply that the value of an equity share is not equal to the present value of future stream of dividends expected from its ownership. It merely says that even though the dividend policy of the firm may influence the timing and magnitude of dividend payments it cannot change the present value of total stream of dividends.

Criticisms of MM Position

Information about Prospects- In a world of uncertainty the dividends paid by the company, based as they are on the judgment of the management about future, convey information about the prospects of the company.

Uncertainty and Fluctuations- Due to uncertainty, share prices tend to fluctuate, sometimes rather widely. When share prices fluctuate, conditions for conversion of current income into capital value and vice versa may not be regarded as satisfactory by investors. Some investors who wish to enjoy more current income may be reluctant to sell a portion of their shareholding in a fluctuating market. Such investors would naturally prefer, and value more, a higher payout ratio. Some investors who wish to get

less current income may be hesitant to buy shares in a fluctuating market. Such investors would prefer, and value more, a lower payout ratio.

Offering of Additional Equity at Lower Prices- MM assume that a firm can sell additional at the current market price. In practice, firms following the advice and suggestions of merchant bankers offer additional equity at a price lower than the current market price. This practice of 'underpricing' mostly due to information asymmetry and other market imperfections *ceteris paribus,* makes a shilling of retained earnings more valuable than a shillings of dividends. This is because a higher pay out ration will lead to a greater dilution of the value of equity.

Transaction Costs- In the absence of transaction costs, current income (dividends) and capital gains are alike-a shilling of capital value can be converted into a shilling of current income and vice versa. In such a situation if a shareholder desires current income shares) greater than the dividends received, he can sell a portion of his capital equal in value to the additional current income sought. Likewise, if he wishes to enjoy income less than the dividends paid, he can buy additional shares equal in value difference between dividends received and the current income desired. In the real s however, transaction costs are incurred. Due to transaction costs, shareholders who have preference for current income would prefer a higher payout ratio and shareholders who have preference for deferred income would prefer a lower payout ratio.

Differential Rates of Taxes- MM assume that the investors are indifferent between a shilling of dividends and a shilling of capital appreciation. This assumption is true when the rate of taxation is the same for current income and capital gains. In the real world, the effective tax on capital gains is lower than that for current income. Due to this difference, investors may prefer capital gains to current income.

Unwise Investments- MM assume that firms, rational as they are, do not invest beyond the point where the rate of return is equal to the cost of capital. In practice, however many firms invest in sub-marginal projects because of easy availability of internally generated funds. If a firm has such a tendency, its dividend policy matters. Its shareholders would benefit if liberal dividends are paid and would suffer if modest dividends are paid.

The thrust of the above criticisms is that the dividend policy of the firm matters preference of investors for current income, the difficulty in converting capital value into current income, and the possibility of imprudent investments, suggest that a liberal ayout

4.2.5 Rational Expectations Hypothesis: A Way of Reconciliation

John F. Muth wrote a paper entitled "Rational Expectations and the Theory of Price Movements," which was published in 1961 This has been recognized as one of the most influential contributions to economics in the last few decades as it challenges the intellectual foundations of the traditional macroeconomic theories propounded by Keynesians as well as monetarists.

What is the central argument of the rational expectations hypothesis? In very simple terms it says that what matters in economics is not what actually happens but the difference between what actually happens and what was supposed or expected to happen. Hence only the surprises in policy would have the kind of effects the policy maker is striving to achieve.

The implications of the rational expectation hypothesis for the dividend policy a firm are that: If the dividend announced is equal to what the market expected, there would be no change in the market price of the share, even if the dividend were higher (or for that matter lower) than the previous dividend. The market, expecting the dividend to be higher, had discounted it. Put differently, the higher expectation was reflected in the market price already. Hence the announcement of the higher dividend would not have any impact the market price.

4.3 Dividend Decisions

4.3.1 Plausible Reasons for Paying Dividends

Investor Preference for Dividends- If taxes and transaction costs are ignored, dividend and capital receipts should be perfect substitutes. Yet there appears to be a strong preference for dividends. Why? Explanations are based on the behavioral principles of self-control and aversion for regret. In essence argument is that investors have a preference for dividends due to behavioral reasons. Hence, dividends and capital receipts are not perfectly substitutable.

Information Signaling- management often has significant information about the prospects of the firm that it cannot (or prefers not to) disclose to investors. The information gap between management and shareholders generally causes stock prices to be less than what they would he under conditions of information symmetry.

According to signaling theory, these firms need to take actions that cannot be easily imitated by firms that do not have such promising projects. One such action is to pay more dividends, Increasing dividends suggests to the market that the firm is confident of its earning prospects that will enable it to maintain higher dividends in future as well. By the same token, a decrease in dividends is perceived as a negative signal by the market because firms are reluctant to cut dividends.

Clientele Effect- Investors have diverse preferences some want more dividend income; others want more capital gains; still others want a balanced mix of dividend income and capital gains. Over a period of time, investors naturally migrate to firms which have a dividend policy that matches their preferences. The concentration of investors in companies with dividend policies that are matched to their preferences is called the clientele effect. The existence of a clientele effect implies that (a) firms get the investors they deserve (b) it will be difficult for a firm to change an established dividend policy.

Agency Costs If shareholders have complete faith in the integrity and rationality of management, there is no reason why a company that has profitable investment opportunities should pay any dividend. In reality, however, shareholders rarely consider management as a perfect agent. They are concerned that management may squander money over uneconomic projects. And, that is when the relevance of dividends lies. Several scholars have argued that dividends can mitigate agency costs. Other reasons include:

i) Bird in the Hand Theory

ii) Temporary Excess Cash

4.3.2 Determination of the Payout Ratio

Conditions relevant for determining the payout ratio are as follows:

i) Funds requirement

ii) Liquidity

iii) Access to external sources of financing

iv) Shareholder preferences

v) Differences in the cost of external equity and retained earnings

vi) Control

vii) Taxes

4.3.3 Dividend Policy Formulation

While formulating its dividend policy a firm should bear in mind the following considerations:

i) Investment decisions have the greatest impact on value creation.

ii) External equity is more expensive than internal equity (retained earnings) because issue costs and underpricing.

iii) Most promoters are averse to dilute their stake in equity and hence are reluctant issue external equity.

iv) There is a limit beyond which a firm would have real difficulty in ranting debt financing.

v) The dividend decision of the firm is an important means by which the management conveys information about the prospects of the firm.

i) Don't pay dividends at the expense of positive NPV projects.

ii) Minimize the need to sell external equity.

iii) Define a target dividend payout ratio along with a target debt-equity ratio, taking into account the investment needs, managerial preferences, capital market norms and tax code.

iv) Accept temporary departures from the target dividend payout ratio and the target, debt-equity ratio.

v) Avoid dividend cuts.

4.3.4 Bonus Shares

Bonus shares can be issued only out of free reserves built out of the genuine r share premium collected in cash only

Reasons for Issuing Bonus Shares

i) The bonus issue tends to bring the market price per share within a more popular price range.

ii) It increases the number of outstanding shares. This promotes more active trading

iii) The nominal rate of dividend tends to decline. This may dispel the impressions of profiteering.

iv) The share capital base increases and the company may achieve a more respectable size in the eyes of the investing community.

v) Shareholders regard a bonus issue as a firm indication that the prospects of the company have brightened and they can reasonably look for an increase in total dividends.

vi) It improves the prospects of raising additional funds. In recent years many firms have issued bonus shares prior to the issue of convertible debentures or other financing instruments.

Review Questions

i) *What are the implications of the Walter model? What are the implications of Gordon's basic model?*

ii) *State the traditional position on the relationship between dividend policy and share valuation.*

iii) *Critically evaluate the evidence trotted by the traditionalists in support of their position*

iv) *Discuss the considerations in formulating dividend policy for a firm*

v) *Explain the factors to be considered in determining the payout ratio*

vi) *What considerations are made when deciding on the payout ratio*

vii) *Why would companies decide to issue bonus shares*

viii) *What is the central argument of the rational expectations hypothesis?*

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5.0 TOPIC 5: CAPITAL STRUCTURE THEORIES

Learning Objectives

By the end of this chapter the learner should be able to discuss the following theories on capital structure:

i) Net Income Approach
ii) The Net Operating Income Approach
iii) The Traditional View
iv) The Modigliani and Miller Hypothesis With Out Taxes
v) The M-M Hypothesis under Corporate Taxes
vi) Miller Hypothesis with Corporate and Personnel Taxes

5.1 Introduction

Capital of a firm is a mix (or proportion) of a firm permanent long term financing representing by debt, preferred stock and common stock

Given that is firm has a certain structure of assets, which offers net operating earnings of given size and quality, and given a certain structure of rates in the capital markets in there some specific degree financing leverage at which the market value of firm's securities will higher (or the cost of capital will be lower) than at other degrees of leverage?

This question has been the basis of extensive work on capital structure and has resulted in a number of theories which we shall now focus on.

5.2 Assumptions and Definitions

In order to grasp the elements of the capital structure and the values of the firm or the cost capital properly we make the following assumptions.

- Firms employ only two types of capital debt and equity
- The total assets of the firm are given and the degree of leverage can be changed by selling debts to repurchase shares or selling shares to retire debt.
- Investors have the same probability distribution of expected future operating earnings for a given firm.
- The firm has policy of paying 100 per cent dividends.
- The operating earnings of the firm are not expected to grow.
- The business risk is assumed to be constant and independent of capital structure and financial risk.
- The corporate and personal income taxes do not exist this assumption is relaxed later on.

In our analysis of capital structure theories we shall use the following basic definitions:

S= market value for ordinary shares

D= market value of debt

V= total market value of the firm ($S+D$)

$NOI = \overline{X}$ = expected net operating income i.e. earning before interest an taxes (*EBIT)*

INT= interest charges (*i.e.*, $K_d D$)

$NI = \overline{Y}$ = net income or shareholders earnings (*EBIT-INT)* when corporate taxes do not exist.

The capitalization rates or costs associated with the different earnings stream and the value of different securities can be defined as follows:

Debt; Cost of debt= $k_d = \frac{INT}{D}$ 1

Value of debt= $D = \frac{INT}{K_d}$ 2

Equity; cost of equity $k_e = \frac{DIV_1}{P_0} + g$ 3

Where, DIV is dividend per share, P_0 current market price per share and g growth rate. When a firm distributes all earnings as dividends the cost of equity can also be calculated as follows:

$$K_e = \frac{NOI - INT}{V - D} = \frac{NI}{S} = \frac{\overline{X} - K_d D}{S} \quad .....3$$

Weighted average cost of capital

The overall cost of capital is: $k_o = \frac{\overline{X}}{V} = \frac{NOI}{V}$ 4

The overall cost of capital is the weighted average of the cost equity and the cost of debt thus;

$$k_o = k_e w_e + k_d w_d = k_e \frac{S}{S+D} + k_d \frac{D}{S+D} = k_e \frac{S}{V} + k_d \frac{D}{V} \quad ..... 5$$

The weighted cost of capital can also be defined as follows

$$k_o = k_e \frac{S}{V} + k_d \frac{D}{V} = k_1 - \frac{D}{V} + k_d \frac{D}{V}$$

$$= k_e - k_e \frac{D}{V} + k_d \frac{D}{V} = k_e - (k_e - k_d)\frac{D}{V} \quad 6.....$$

Similarly from equation (5) an alternate formula for the equity can be derived as follows;

$$k_o = k_e \frac{S}{S+D} + k_d \frac{D}{S+D}$$

$$k_e \frac{S}{S+D} = k_o - k_d \frac{D}{S+D}$$

$$k_e = k_o \frac{S+D}{S} - k_d \frac{D}{S+D} \frac{S+D}{S}$$

$$= k_o \left(1 + \frac{D}{S}\right) - k_d \frac{D}{S}$$

$$= k_o + k_o \frac{D}{S} - k_d \frac{D}{S} = k_o + (k_o - k_d)\frac{D}{S} \quad .....7$$

Total value of the firm is;

$$V = (S+D) = \frac{\overline{X}}{k_o} = \frac{NOI}{k_o} \quad .....8$$

The equation and definition described above are valid under any the capital structure theories. The controversy is with behavior of the variables like k_o , k_e *and* V etc.

5.3 Capital Structure Theories

5.3.1 Net Income Approach ……. *Capital Structure Matters*

The essence of the net income (NI) approach is that the firm can increase its or lower the overall cost capital by increasing the debt in the capital structure the crucial assumptions of the approach are:

- The use of debt does not change the risk perception of investors as result the equity capitalization rate k_o and the debt capitalization rate k_d , remain constant with changes in leverage.

- The debt capitalization rate is less than the equity capitalization rate (i.e. $k_d < k_e$)
- The corporate income taxes do not exist.

The first assumption implies that if k_e and k_d are constant increased use of debt by magnifying the shareholders earnings will result in higher value of the firm via higher values of equity consequently the overall or the weighted average cost of capital k_o will decrease. The overall cost of capital is measured by equation (4)

$$k_o = \frac{\overline{X}}{V} = \frac{NOI}{V} \quad \text{.....4}$$

It is obvious from equation (4) that with constant annual net operating income (NOI), the overall cost of capital would decrease as the value of the firm V increases. The overall cost of capital k_o can also be measured by equation;

$$k_o = k_e - (k_e - k_d)\frac{D}{V} \quad \text{.....6}$$

In equation (6) as per the assumption of the NI approach, k_e and k_d are constant and k_d is less than k_e therefore k_o will be equal to k_e if the firm is fully equity financed. V increases as the overall cost of capital k_o decreases or as D/V increases. Equation (6) also implies that the overall cost of capital k_d will be equal to k_e if the firm does not use any debt i.e. $D/V = 0$ and that k_o will approach k_d as D/V approach one.

Illustration

Assume that a firm has an expected annual net operating income of Ksh. 100,000 an equity rate k_e of 10 per cost and Ksh. 500,000 of 6 per cent debt. The value of the firm according to the *NI* approach will be as follows.

Value of the firm

Net operating income *(NOI)*	100,000
Total cost of debt $INT = k_d D$ (Ksh. 500,000×0.06)	30,000
Net income (*NI)* available to shareholders, *NOI – INT*	70,000
Market value of equity, *S* (Ksh. 70,000/0. 10)	700,000

Market value of debt, *D* (Ksh. 30,000/0.06)	500,000
Market value of the firm *V= S + D*	**1,200,000**

The costs of equity and debt respectively, 10 per cent and 6 per cent are assumed to be constant under the NI approach.

The overall cost of capital k_o is:

$$k_o = \frac{NOI}{V} = \frac{100,000}{1,200,000} = 0.0833 \text{ or } 8.33\%$$

or

$$k_o = k_e \frac{S}{V} + k_d \frac{d}{V} = 0.06\frac{500,000}{1,200,000} + 0.10\frac{700,000}{1,200,000} = 0.0833 \text{ 0r } 8.33\%$$

What if the debt employed is increased to Ksh. 700,000 what is value of the firm and the cost of capital?

Value of the firm

Net operating income *(NOI)*	100,000
Total cost of debt *INT = k_d D* (Ksh. 700,000×0.06)	42,000
Net income (*NI)* available to shareholders, *NOI – INT*	58,000
Market value of equity, *S* (Ksh. 58,000/0. 10)	580,000
Market value of the firm *V= S + D*	**1,280,000**

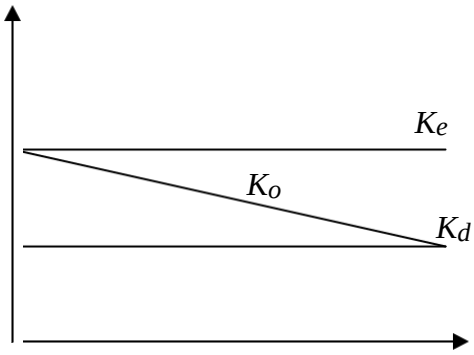
The overall or weighted average cost of capital k_o is:

$$k_o = \frac{NOI}{V} = \frac{100,000}{1,280,000} = 0.0781 \text{ or } 7.81\%$$

or

$$k_o = k_e \frac{S}{V} + k_d \frac{d}{V} = 0.06\frac{700,000}{1,280,000} + 0.10\frac{580,000}{1,280,000} = 0.0781 \text{or } 7.81\%$$

Thus by increasing debt proportion in the capital structure the firm is able to increase it's value of the firm and lower the average cost capital.



The above figure indicates the under *NI* approach k_e and k_d are assumed not to change with leverage. As the proportion of debt is increase in the capital structure, being less costly, it causes weighted average cost of capital to decrease and approach the cost of debt.

The optimum capital is structure would occur at the point where the value of the firm is maximum and overall cost of capital is minimum. Under the *NI* approach the firm will have the maximum value and the lowest cost of capital when it is almost all debt financed.

5.3.2 The Net Operating Income Approach *……. Capital Structure Does Not Matter*

According to the net operating income *(NOI)* approach the market value of the firm is not affected by the capital structure changes. The market value of the firm is found not by capitalized the net operating income at the overall or the weighted average cost of capital which is a constant. The value of the firm *V* is determined by equation (8).

$$V = (S + D) = \frac{X}{k_o} = \frac{NOI}{k_o} \quad \text{.....8}$$

Where k_o is the overall capitalization rate, which depends on the business risk of the firm. It is independent of financial mix. If *NOI* and k_o are independent of capital structure changes, the critical assumptions of the *NOI* approach are:

- The market capitalizes the value of the firm as a whole. Thus the split between debt and equity is not important.

- The market uses an overall capitalization rate k_o to capitalize the net operating income and k_o depends on the business risk. If the business risk is assumed to remain unchanged k_o is a constant.
- The use of less costly debt funds increases the risk of shareholders. This causes the equity capitalization rate to increase. Thus the advantage of debt is offset exactly by the increase in the equity – capitalization rate k_e .
- The debt – capitalization rate k_d is a constant.
- The corporate income taxes do not exist.

As stated above under *NOI* approach the total value of the firm is found out by out by dividing the net operating income by the overall cost of capital k_o . The market value of equity, *S*, can be determined by subtracting the value of debt *D*, from total market value of the firm *V*, (i.e. $S = V - D$). The cost of equity k_e will be the measured as follows:

$$k_e = \frac{NOI - INT}{V - D} = \frac{NI}{S} = \frac{\overline{X} - K_d D}{S} \quad \text{.....3}$$

Where, *INT* is the interest charges. Alternative the cost of equity can be defined as follows.

$$k_e = k_o + (k_o - k_d)\frac{D}{S} \quad \text{.....} \qquad \text{...7}$$

Equation (7) indicates that if k_o and k_d are constant k_e would increase linearly with debt equity ratio *D/S*.

Illustration

Assume that a firm has an annual net operating income of Ksh. 100,000 an average cost of capital k_o of 10 per cent and an initial debt of Ksh. 500,000 at 6 per cent rate of interest.

Under NOI approach ***the total value of the firm****, V will be:*

Net operating income, *(NOI)*	100,000
Market value of the firm, $V = S + D$ = Ksh. 100,000/0.10	1,000,000
Market value of debt, D	500,000
Market value of the equity, $S = V - D$	500,000

The ***cost of equity*** will be:

$$k_e = \frac{NOI - INT}{V - D} = \frac{NI}{S} = \frac{100,000 - 30,000}{1,000,000 - 500,000} = \frac{70,000}{500,000} = 0.14 \text{ or } 14\%$$

Alternatively,

$$k_e = k_o + (k_o - k_d)\frac{D}{S} = 0.01 + (0.10 - 0.06)\frac{500,000}{500,000} = 0.10 + 0.04 = 0.14 \text{ or } 14\%$$

To verify that the weighted average cost of capital is a constant let us calculate it.

$$k_o = k_e \frac{S}{V} + k_d \frac{D}{V} = 0.14\frac{500,000}{1,000,000} + 0.06\frac{500,000}{1,000,000} = 0.03 + 0.07 = 0.10 \text{ or } 10\%$$

If debt is increased to Ksh. 700,000 the value of the firm would still remain Ksh. 1,000,000 and the value of equity will drop to Ksh. 300,000.

The equity – capitalization rate will be:

$$k_o = \frac{100,000 - 42,000}{300,000} = \frac{58,000}{300,000} = 0.193 \text{ or } 19.3\%$$

$$k_e = 0.10 + (0.1 - 0.06)\frac{700,000}{300,000} = 0.10 + (0.04)(2.33) = 0.193 \text{ or } 19.3\%$$

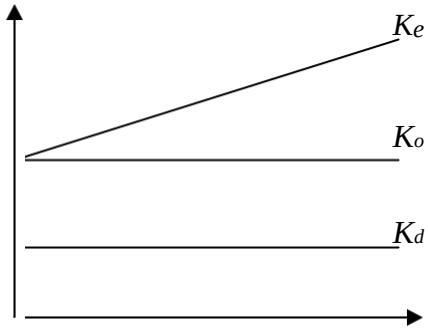
$$\text{And, } k_o = 0.193\frac{300,000}{1,000,000} + 0.06\frac{700,000}{1,000,000} = 0.042 + 0.058 = 0.10 \text{ or } 10\%$$

Thus we find that the weighted cost of capital in constant and the cost of equity increases as debt is substituted for equity capital.

The *NOI* is further illustrated graphically in figure below, it shows that k_e and k_d are constant and k_e increases with leverage continuously. As the average cost of capital, k_o is constant this approach implies that there is not any unique optimum capital structure.

In order words as the cost of capital is the same at all capital structure, every capital structure is optimum.

The effect of Leverage on the cost of Capital (NOI approach)



5.3.3 The Traditional View *…… The Existence of an Optimal Capital Structure*

The traditional view which is also known as an intermediate approach is a compromise between the net income approach and the net operating approach and the net operating approach. According to this view the value of the firm can be increased or he cost of capital can be reduced by a judicious mix of debt and equity capital. This approach very clearly implies that the cost of capital decrease within the reasonable limit of debt and then the cost of capital increases with leverage. Thus, an optimum capital structure exists and it occurs when the cost of capital is minimum or the value of the firm is maximum. The cost of capital declines with leverage because debt capital is cheaper than equity capital within reasonable or acceptable limit of debt. The statement that debt funds are cheaper than equity implies the weighted average cost of capital will decrease with the use of debt.

According to the traditional position, the manner in which the overall cost of capital reacts to changes in capital structure can be divided in to three stages.

First stage: increasing value

In the first stage this rate at which the shareholders capitalization their net income i.e. the cost of equity k_o remains constant or rises slightly with increase debt but it does not increase fast enough to offset the advantage of low cost debt. During this stage the cost debt k_d remains constant of rises negligibly since market views the use of debt as a

reasonable policy. As a result the value of the firm *V*, increases or the overall cost capital $k_o = \overline{X}/V = k_e (S/V) + k_d (D/V)$ falls with increasing leverage.

Under the assumption that k_e remains constant within the acceptable limit of debt the value of the firm will be:

$$V = (S+D) = \frac{\overline{X} - k_d D}{k_e} + \frac{k_d D}{k_d} = \frac{\overline{X} - k_d D}{k_e} + D = \frac{\overline{X}}{k_e} \quad \frac{k_e - k_d}{k_e}$$

Thus, so long as k_e and k_d are constant the value of the firm *V* increases at a constant rate $(k_e - k_d)/k_e$ as the amount of debt increases.

When equation (9) is solved for *NOI /V* we get equation (6)

$$\frac{\overline{X}}{V} = k_o = k_e - (k_e - k_d)\frac{D}{V} \quad \text{.....6}$$

This implies that, with $k_e > k_d$ the average cost of capital will decline with leverage

Second stage: Optimum value

Once the firm has reached a certain degree of leverage, increases in leverage have a negligible effect on the value or the cost of capital of the firm. This is so because the increase in the cost equity due to added financial risk offsets the advantage of low cost debt. Within that range or at the specific point the value of the firm will be maximum or the cost of capital will be minimum.

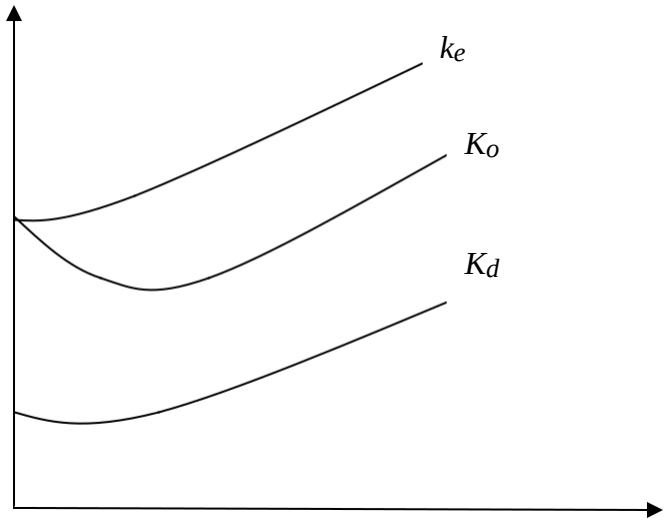
Third stage: Declining value

Beyond the acceptable limit of leverage the value of this firm decreases with leverage or the cost of the capital increases with leverage. This happens because investors perceive a high degree of financial risk and demand a higher equity capitalization rate which offset the advantage of low cost debt.

The overall effect of these three stages is to suggest that the cost of capital is a function of leverage. In declines with leverage and after reaching a minimum point or range starts rising. The relation between costs of capital and leverage is graphically shown in the figure below wherein the overall cost of capital curve k_o is saucer shaped with a horizontal range. This implies that there is a range of capital structure in which the cost of capital is minimized. k_e is assumed to increase slightly in the beginning and then

at a faster rate. In figure below the cost of capital curve is shown to be U – shaped under such a situation there is a precise point at which the cost of capital would be minimum. This precise point defines the optimum capital structure.

The Cost of Capital Behavior (Traditional View – A Variation)



Illustration

Assume that a firm is expecting a net operating income of Ksh. 150,000 on a total investment of Ksh. 1,000,000. The equity capitalization rate is 10 per cent if the firm has no debt but it would increase to 10.56 per cent when the firm substitutes equity capital by issuing debentures of Ksh. 300,000, which can be raised at 6 per cent interest rate whereas Ksh. 600,000 debentures are raised at a rate of interest of 7 per cent but k_e will rise to 12.5%. The market value of the firm, value of shares and the average cost of capital are shown in below.

	No debt	*6% Ksh. 300,000 debt*	*7% Ksh. 600,000 debt*
Net operating income (*NOI*)	150,000	150,000	150,000
Total cost of debt *(INT – k_d D)*	0	18,000	42,000
Net income *NI=NOI-INT* Cost	150,000	132,000	108,000
of equity k_e	0.10	0.1056	0.125
Market value of shares $S=NI / k_e$	1,500,000	1,250,000	864,000
Market value of debt, *D* Market	0	300,000	600,000
value of firm *V=S+D* Average cost	1,500,000	1,550,000	1,464,000
of capital $k_o = NOI/ V$	**0.10**	**0.097**	**0.103**

Criticism of the traditional view

The validity of the traditional position has been questioned on the ground that the market value of the firm depends upon its net operating income and risk attached to it. The form of financing can neither change the net operating income nor the risk attached to it. It simply changes the way in which the income is distributed between equity holders and debt- holders. Therefore, firms with identical net operating income and risk, but differing in their modes of financing should have same total value. The traditional view is criticized for implying that the totally of risk incurred by all security – holders of a firm can be altered by changing the way in which this totality of risks are distributed among the various classes of securities.

Modigliani and Miller also do not agree with the traditional view. They criticized the assumption that the cost of equity remains unaffected by leverage up to some reasonable limit. They assert that sufficient justification does not exist for such an assumption. They do not accept the contention that moderate amounts of debt in "sound firms" do not really add very much to the "riskiness" of the shares.

However the argument of the traditional theories that an optimum capital structure exists, can be supported on the two counts; *the tax deductibility of interest changes and market imperfections.*

5.3.4 The Modigliani and Miller Hypothesis With Out Taxes *…. Capital Structure is Irrelevant*

The Modigliani-Miller (M-M) posits that in the absence of taxes a firm's market value and the cost of capital remain invariant to the structures changes.

Assumptions

The M-M hypothesis can be explained in terms of their ***propositions I and II*** whose assumption as described below.

- *Prefect capital markets:* securities (share and debt instruments) are traded in the perfect capital market situation. This specifically means that (a) investors are free to buy or sell securities (b) they can borrow without same term as the firm do; and (c) they behave rationally. It is also implied that the transaction costs i.e. the cost of buying and selling securities do not exist
- *Homogeneous risk classes:* firm can be grouped in to homogenous risk classes. Firms would be considered to belong to a homogenous risk class if their expected earnings have identical risk characteristics. It is generally implied under the M-M hypothesis that firms within same industry constitute a homogenous class.
- *Risk*: The risk of investors is defined it terms of the variability of the net operating income *(NOI)*, the probability that the actual value of the firm may turn out to be different than their best estimate.
- *No taxes*: In the original formulation of their hypothesis M-M assume that no corporate income taxes exist.
- *Full payout*: Firms distribute all net earning to the shareholders which means a 100 per cent payout.

5.3.4.1 Proposition 1: M-M (1)

Given the above stated assumptions M-M (1) argue that, for firms in the same risk class the total market value is independent of debt equity mix and is given by capitalization the expected net operating income by the rate appropriate to that risk class. This is their ***proposition 1*** and can be expressed as follows:

Value of the firm = Market value of equity + Market value of debt

$$V = (S + D) = \frac{\overline{X}}{k_o} = \frac{NOI}{k_o} \quad \text{.....8}$$

Where;

V = the market value of the firm

S = the market value of the firm's ordinary equity.

D = the market value of debt

X = the expected net operating income on the assets of the firm

k_o = the capitalization rate appropriate to the risk class of the firms.

Proposition 1 can be stated in an equivalent way in terms of the firms average cost of capital which is the ratio of the expected earning to the market value of all security That is;

$$\frac{\overline{X}}{(S+D)} = \frac{\overline{X}}{V} = k_o$$

If we define k_d as the expected return on the firms debt and k_e as the expected return on the firm equity than expected net operating income is given as follows.

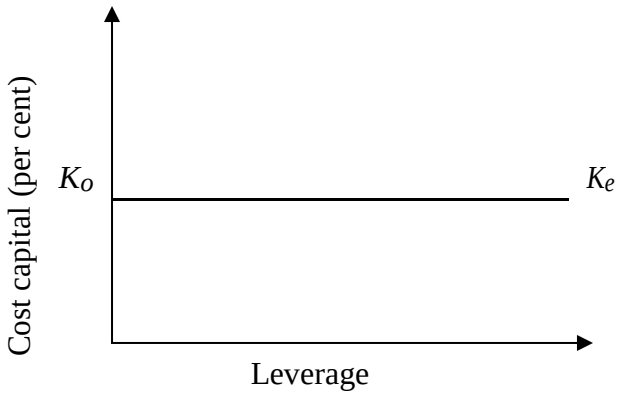
$$\overline{X} = k_o V = k_e S + k_d D \quad \text{..... 10}$$

As given in Equation (5) by definitions

$$k_o = \frac{\overline{X}}{V}$$

$$k_o = k_e \frac{S}{S + D} + k_d \frac{D}{S + D} \quad \text{.....5}$$

The Cost of Capital under M-M (1)



Equation (5) expresses k_o as the weighted average of the expected rate of return of equity and debt capital of the firm. Since the cost of capital is defined as the expected net operating income divided by the total market value of the firm, M-M (1) conclude that the total the market value of the firm is unaffected by the financing mix. It follows that the cost of capital is independent of the capital structure and is equal to the capitalization rate of a pure equity stream of its class. The cost of capital function as hypothesized by M-M (1) shown in the figure above is a constant and is not affected by leverage.

Arbitrage process

The simple principle of M-M (1) is that firms identical in all respects except for capital structure can not command different market values or have different cost of capital. M-M

(1) do not accept the *NI* approach as valid

Their opinion is that if two identical firms except for the degree of leverage have different markets values arbitrage (or switching) will take place to enables investors to engage in personal or home made leverage as against the corporate leverage to restore equilibrium in the market.

Illustration:

Suppose two firms: unlevered firms *U* and *L* have identical expected net operating income ($\overline{X}$) of Ksh. 10,000. The value of the levered firm (V_l) is Ksh. 110,000 the value of equity shares being Ksh. 60,000 and the value of debt (D_l) Ksh. 50,000 and the value of the unlevered firm $(S_u = V_u)$ is Ksh. 100,000. Firm *L* has borrowed at the expected rate of return (k_d) of 6 per cent. Assume further that you hold 10 per cent shares of the levered firm *L*, what is your return investment in the shares of *L*?

Since you own 10 per cent of the shares you are entitled to 10 per cent of the equity income.

Return = 0.10 ($\overline{X} - INT$) (where $INT = k_d D_l$)

= 0.10 (10,000 – 00.6 × 50,000)

= 0.10 (10,000 – 3000) = Ksh. 700

And the value of your investment is

Investment = 0.10 (110,000 – 50,000) = Ksh. 6,000

You can earn this return at less investment through an alternate investment strategy. This you can do selling your investment in firm *L's* shares for Ksh. 6,000 and by borrowing on your personal account equal to your shares of firm corporate borrowing at 6 per cent rate of interest 0.10 (50,000) you have Ksh. 11,000 with you can now buy 10 per cent of the unlevered firm *U's* shares. Your investment will be:

Investment = 0.10 (100,000) = Ksh. 10,000

And your return will be: 0.10 (10,000) = Ksh. 1,000

However since you have borrowed 5,000 at 6 per cent, you will therefore have to pay interest of Ksh. 300: (Interest = 0.06 x 5000 = Ksh. 300) Thus your net return is Ksh. 700 as shown below:

---------- Ksh. -----

Equity return from *U*	1,000
Less: interest on personal borrowing	(300)
Net return	700

Note that you are also with a saving of Ksh. 1,000

---------- Ksh.----

Sale of firm *L's* shares = 0.1 (60,000)	6,000
Add: Borrowing 0.1 (50,000)	5,000
Less: investment in firm *U* = 0.1 (100,000)	(10,000)
Remaining cash	1,000

Due to the advantage of the alternate investment strategy a number of investors will be induced towards it. They will sell their shares and debentures of firms *U* this will increase the price of firm *U's* shares and decrease that of firm *L's* shares. It will continue unit the equilibrium price of firm *U's* and firm *L's* share is reached.

The arbitrage would in the opposite direction if we assume that the value of the unlevered firm *U, (V_u)* is greater than the value of the levered firm *L, (V_l)*

Illustration

Let us assume that $V_u = S_u$ = Ksh. 100,000 and $V_l = S_l + D_l$ = Ksh. 40,000 + Ksh. 50,000 = Ksh. 90,000. Further suppose that you own 10 per cent shares in the unleveled from *U*.

Your return will be: 0.10 (10,000) = Ksh. 1,000

You can design a better investment strategy. You sell your shares in form *U* for Ksh. 10,000. You then buy 10 per cent of firm *L's* shares and debt. Your investment in firm *L* is Ksh. 9,000 i.e. 0.10 (40,000 + 50,000) = 9,000

Since you own 10 per cent of firm of equity and debt of firm *L,* your return will include both equity income and interest income your return is Ksh. 1,000.

You can also calculate your return as follows:

---------- Ksh. ---

Equity income, 0.10 (10,000 – 3,000)	700
Interest income, 006 (5,000)	300
Return	1,000

Note that your alternate investment strategy pays you off the same return at a lesser investment. You are left with Ksh. 1,000 cash.

---------- Ksh. ----

Sale of firm *U's* shares 0.1 (100,000)	10,000
Investment in firm *L's* share 0.1 (40,000)	(4,000)
Investment in firm *L's* debt 0.1 (50,000)	(5,000)
Remaining cash	1,000

Both strategies give the investor same return but his alternative investment strategy costs him less since $V_l < V_u$. In such a situation marginal investors will sell their shares in the unlevered firm and buy the shares and debentures of the levered firm. As a result of this switching the market value of the levered firm's shares will increase and that of the unlevered firm will decline to the equilibrium $V_l = V_u$

On the basis of the arbitrage processes ***M-M (1) conclude that the market of a firm (or its cost of capital) is not affected by leverage.*** Thus the financing (or capital structure) decision is irrelevant. It does not have any impact on the maximization of market price share. This implies that one capital structure is as much desirable as the other.

5.3.4.2 Proposition II: (M-M) II

MM (II) defines the cost equity as M-M (1) i.e.

$$k_e = \frac{X - K_d D}{S} \quad \text{..... 3}$$

Since we know from equation (4) that;

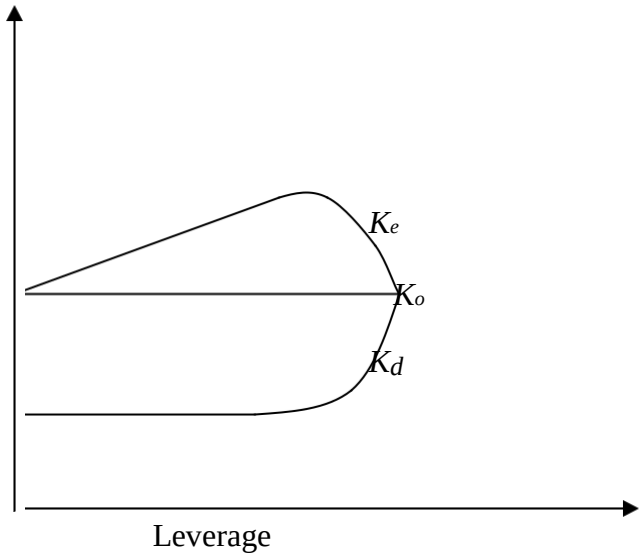
$$k_o = \frac{\bar{X}}{V}$$

And, k_o and V are constant by definition we obtain the following equation;

$$\bar{X} = k_o V = k_e S + k_d D \quad \text{..... 10}$$

Substituting equation (10) in to equation (3) we have:

$$k_e = \frac{k_o (S + D) - k_d D}{S} = \frac{k_o S + k_o D - k_d D}{S} = k_e = k_o + (k_o - k_d)\frac{D}{S} \quad \text{.....7}$$



Equation (7) states that for firm in a given risk in a given risk class. The cost of equity k_o is equal to the constant average cost of capital k_o plus premium for the financial risk which is equal to debt – equity ratio times the spread between the constant average cost of capital and the cost of debt ($k_o – k_d$) D/S.

The cost of equity k_e is a linear function of a leverage measured by the market value of debt to equity *D/S*. Thus leverage will result not only in more earnings per share to shareholders but also increased cost of equity. The benefit of leverage is exactly taken off by increased cost of equity and consequently the firm's market value will remains unaffected.

It should however be noticed that the functional relationship $k_e = (k_o – k_d) D/S$ is valid irrespective of any particular valuation theory. For example M-M (1) assume k_o to be constant, while according to the more popular traditional view k_o is a function of leverage.

The crucial part of the M-M thesis that k_o will not rise even if very excessive sure of leverage is made. This conclusion could be valid of the cost of borrowing k_d remains constant for any degree of leverage.

But in practice, k_d increases with leverage beyond a certain acceptable or reasonable level of debt. However M-M maintains that even if the cost of debt k_d increase k_e will increase at a decreasing rate and may even turn down eventually. This is illustrated in the figure above. M-M insists that the arbitrage process will work and that as k_d increases with debt, k_e will become less sensitive to further borrowing. The reason for this that debt holders in the extreme situations, own the firms assets and bear some of the firm's business risk. Since the risk of shareholders is transferred to debt holders k_e declines.

Criticism of the M-M hypothesis

The arbitrage process is the behavioral foundation for the M-M thesis. The shortcoming of this thesis lie in the assumption of perfect capital market in which arbitrage may fail to work and may give rise to discrepancy between the market values of

levered and unleveled firms. The arbitrage process may fail to bring equilibrium in the capital market for the following reasons.

Leading and borrowing rates discrepancy: The assumption that firms and individual can borrow and lend at the same rate of interest does not hold well in practice. Because of the substantial holding of fixed assets firms have a higher credit standing. As a result they are able to borrow at lower rates of interest that individual.

Non- substitutability of personal and corporate leverage: it is incorrect in assume that personal (home made) leverage is a perfect substitute for "corporate leverage". The existence of limited liability of firms in contrast with unlimited liability of individuals clearly places individuals and firms on a different footing in the capital markets. If a levered firm goes bankrupt all investors stand to lose to the extent of the amount of the purchase price of their shares. But if an investors creates personal leverage then in the event of the firm's insolvency, he would lose not only his principle in the shares of the unleveled company, but will also be liable to return the amounts of his personal loan

Transaction costs: The existence of transaction costs also interferes with the working of arbitrage.

Institutional restrictions: institutional also impede the working of arbitrage because "home made" leverage is not particularly feasible as a number of institutional investors would not be able to substitute personal leverage for corporate leverage simple because they are not allowed to engage in the "home made" leverage.

Existence of corporate tax: The incorporation of the corporate income taxes will also frustrate M-M a conclusions interest charges are tax deductible. This is fact, means. The very existence of interest chares gives the firm a tax advantages. Which allows it to return to its equity and debt holders a larger stream of income than it other wise could have.

5.3.5 The M-M Hypothesis under Corporate Taxes ……. *Relevance of Capital Structure*

M-M's hypothesis that the value of the firms is independent its debt policy is based on the critical assumption that corporate income taxes do not exist in really, corporate income taxes exist and interest paid to debt holders is treated as a deductible

expense. Dividends paid to shareholders on the other hand are not tax deductible. Thus unlike dividends the return to debt holders is not subject to the taxation at the corporate level. This makes debt financing advantages. In their 1963 article M-M show that the value of the firm will increase with debt due to the deductibility of interest charges for tax computation and the value of the levered firm will be higher that of the unleveled firm.

Illustration

Suppose two firms *L* and *U* are identical in all respects except the use of debt. Firm *U* is an all equity financed firm, with Ksh. 10,000 equity capital; while firm *L* employs Ksh. 5,000 debt at a 14 per cent rate of interest. Both firms have an expected earning before interest and taxes of Ksh. 2,500, pay corporate tax at 50% and distribute 100% earnings as dividends to shareholders.

Income for investors of levered and unleveled firms

Income	Firm *U*	Firm *L*
1. EBIT $\overline{X}$	2,500	2,500
2. Interest (INT = k_d)	0	700
3. Profit before tax ($\overline{X}$ - $k_d D$)	2,500	1,800
4. Tax T = 0.5 T ($\overline{X}$ - $k_d D$)	1,250	900
5. Profit after tax ($\overline{X}$ - $k_d D$) -T($\overline{X}$ - $k_d D$) = ($\overline{X}$ - $k_d D$)(1-T)	1,250	900
6. Dividends to shareholders ($\overline{X}$ - $k_d D$) (1-T)	1,250	900
7. Interest to debt holders k_d D	0	700
8. Total income to investors ($\overline{X}$ - $k_d D$)(1-T) + $k_d D$= $\overline{X}$ (1-T) + $T\,k_d D$	1,250	1,600
9. Interest tax shield $T\,k_d D$	0	350

The after tax earnings accruing to investors are as follows. The tax of firm *L* is Ksh. 350 less than of firm *U* the total income (item 8 in the table below) of investors of firm *L* is more by that amount. This amount is the interest tax shield provide by the debt of firm *L* 0.5 × 0.14 × 5,000 = 0.5× 700 = Ksh. 350. Thus interest tax shield = tax rate × interest

$INTS = T \times INT = T \times (k_d D)$

Where; k_d is the cost of debt and D is the amount of debt

Interest tax shield (*INTS)* is an inflow to the firm therefore it is valuable. Suppose that firm *L* will employ debt of Ksh. 5,000 forever. The interest tax shield of 350 becomes a perpetuity. For this we need a discount rate which reflects the risk ness of this perpetual cash flow. The levered firms after tax earnings consists of operating income and interest tax shield as given below;

After tax earnings of all investors – after tax operating income + interest tax shield

$$\overline{X}\,(1-T) + T\,k_d\,D$$

In case of the unleveled firm the after earnings are simply $\overline{X}\,(1-T)$

It will be reasonable to assume that the risk of interest tax shield is the same as that of the interest payments generating them. However the cash flows from interest tax shield can be considered less risky and they should be discounted at14 per cent the rate return required by debt holders.

The present value of firm *L's* per perpetual interest tax shield of Ksh. 350 is:

$$PV\ of\ INTS = \frac{350}{0.14} = Br.2{,}500$$

Under the assumption of permanent debt, we can determine the present value of the interest tax shield as follows:

PV of INTS = (Tax rate× interest)/Cost of debt

$$PVINTS = \frac{Tk_d D}{k_d} = TD \quad \text{.....12}$$

Thus the present value of the interest tax shield *(PVINTS)* is independent of the cost of debt it is simply the corporate tax rate times the amount of permanent debt *(TD)*

What is the total value of firm *L* (levered firm)? It is sum of the present value of the after tax operating income and interest tax shield. The operating income, $\overline{X}\,(1\text{-}T)$ of the levered firm is equal to the after tax earnings of the pure equity (unleveled) firm *U* the equity capitalization rate (the opportunity cost of equity) of a pure equity firm k_u should be used to discount the stream of operating income. Thus the value of firm *L* (the levered

firm) is equal to the value of unleveled firm plus the present value of the interest tax shield as shown in equation (13) below:

Value of levered firm = value of unleveled firm + *PVINTS.*

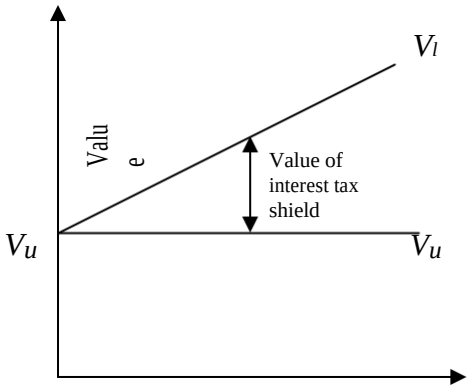
$$V_l = V_u + TD \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots 13$$

We can write equation (13) in its expanded form as follows:

$$V_l = \frac{\overline{X}(1-T)}{k_u} + \frac{Tk_d D}{k_d} \qquad 14$$

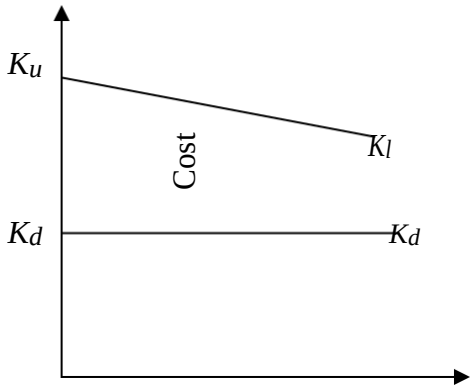
Where V_l *i*s the value of firm with debt $\overline{X}$ *(1-T)* is prenuptial operating income stream of the pure equity firm k_u is capitalization rate k_d is the expected rate of return debt *D* is debt and *T* is the corporate tax rate.

Equation (13) implies that when corporate tax rate *T* is positive *(T>0)* the value of the levered firm will increase continuously with debt. Thus theoretically the value of the firm will be maximum when it employs 100 per cent debt. This shown in the figures below:



Leverage

Value of the Levered Firm



Leverage

Cost of Capital of the Levered Firm

1. Equation (13) can also be written as follows:

$$V_l = V_u + TD$$

$$\frac{V_l}{V_l} = \frac{V_u}{V_l} + \frac{TD}{V_l}$$

$$1 = \frac{V_u}{V_l} + TL \text{ (Setting } D/V_l = L)$$

$$V_l = \frac{V_u}{1-TL}$$

Thus, for $T > 0$, V_l will be maximum when L = 1.0

Under the assumption of the M-M hypothesis with corporate taxes, the levered firm's cost of capital given by the following formula:

$k_l = k_u\ (1 - TL)$ …….. 15

Where; k_l is the levered firm's cost of capital k_u is pure equity capitalization rate T is the corporate ax rate and L is debt ratio.

M-M's tax corrected view suggests that because of tax deductibility of interest a firm can increase its value or lower its cost of capital continuously with leverage. Thus the optimum capital structure is reached when the firm employs 100 per cent debt. But the observed experience does not entirely support this view. In practice firms do not employ large amount of debt nor are lenders ready to lend beyond certain limits.

Why do companies not employ extreme level of debt in practice?

There could be two possibilities. First personal income tax may offset the advantage of the interest tax shield. Second borrowing may involve exit costs (in addition to contractual interest cost) costs of financial distress, which may also offset the advantage of the interest shield. Let us examine these points in the following section.

5.3.6 Miller Hypothesis with Corporate and Personnel Taxes ……. *Economy Wide Optimum Capital Structure*

Investors are required to pay personal taxes on the income earned by them. Therefore, form investors point of view taxes will include both corporate and personal taxes. A firm should thus aim at minimizing the total taxes (both corporate and personal) while deciding about borrowing.

Note that the after tax income available to both shareholders and debt holders is less by the tax rate on account of personal taxes. This present value is same as obtained earlier when the personal taxes were ignored. It is because both cash flows and discount rate have been reduced by the personal tax rate of 40 per cent. Thus;

$$PVINTS = \frac{Corporate,tax,\ rate \times Interest \times (1 - Personal,tax,\ rate)}{Cost,of\ ,\ debt(1 - Personal,tax,\ rate)}$$

$$PVINTS = \frac{Tk_d D(1 - T_p)}{k_d (1 - T_p)} = TD \quad \text{.....16}$$

The value of the levered firm is still given by the following formula;

$V_l = V_u + TD$

In reality however dividends are treated differently from interest for tax purpose. Dividends in the hands of shareholders are tax exempt and tax on capital gains is paid only when they are realized. Thus an individual can defer paying tax on capital gains for a long period if he does not realize them and thus his tax on equity income will be zero.

Interest income, whether received or accrued is taxed in than hands of individual also it is not exempted form tax at the corporate level while dividends are taxed on the corporate level. We therefore may conclude that in general interest income is taxed at a higher rate that equity income at the personal level.

Thus the formula for PNINTS in the care of a positive tax rate for lenders and no personal tax rate for shareholders can be written as follows;

$$PVINTS = \frac{(Corporate,tax,\ rate - Lender's,\ personal,taxes) \times Interest}{Cost,of\ ,\ debt(1 - Lender's,\ personal,tax,\ rate)}$$

$$PVINTS = \frac{(1 - T_{pb})Tk_d D}{k_d (1 - T_{pb})} = \frac{T - T_{pb}}{1 - T_{pb}} D \quad \text{.....17}$$

The total earnings of a firm will be distributed either as interest income or equity income. The personal tax rate on interest income is T_{pb} and on equityT_{pe} . T_{pe} is unlikely to equal T_{pb} mostly it will be less than T_{pb} and in extreme cases it will be equal in zero. Therefore corporate borrowing is advantageous if;

$(1 - T_{pb}) > (1 - T_{pe})(1 - T)$

Thus a firm should stop borrowing when $(1 - T_{pb})$ becomes equal to $(1 - T_{pe})(1\text{-}T)$

How does leverage affect the firm value when the personal tax rates of shareholders and debt holders differ?

Miller has provided a formal answer to this question. We have already shown that the value of the firm will be reduced when the personnel tax of lenders is higher than that of shareholders and further that the interest tax shield *(INTS)* which is the gain from leverage is the difference between the value of the levered and unleveled form and is also given by the product of the corporate tax rate and amount of debt the assumption of perpetual debt no personal taxes is;

$$INTS = k_d DT$$

$$PVINTS = k_d DT / k_d$$

$$PVINT = V_l - V_u = TD \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 18$$

Miller introduced personnel taxes in the model and modified it in the unleveled firm where equity income is taxed at personal tax rate T_{pe} the shareholders' earnings will be:

$$\overline{X}\ (1\text{-T})\ (1- T_{pe}\ ) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 19$$

And when we discount these earnings at the pure equity capitalization rate k_u the value of the unleveled firm will be;

$$V_u = \frac{\overline{X}(1-T)(1-T_{pe})}{k_u} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 20$$

In case of the levered firm the shareholder earnings will be;

$$(\overline{X} - k_d D)\ (1\text{-}T)\ (1\text{-}T_{pe}) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 21$$

And the debt holders' earnings after personal taxes at a rate equal to T_{pb} will be:

$$k_d D\ (1- T_{pb}\ ) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 22$$

The thus the value of the levered firm is the value of the unleveled firm plus the present value of the interest tax shield;

$$= V_u + 1 - \frac{(1-T)(1-T_{pe})}{(1-T_{pb})} D \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 23$$

The second term of equation (23) is the gain from leverage (Viz the present value of the interest tax shield)

$$PVINTS = 1 - \frac{(1-T)(1-T_{pe})}{(1-T_{pb})} D \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 24$$

We can generalize the following from equation (24):

- If $T_{pe} = T_{pb} = 0$ then the present value of the interest tax shield is equal to: *TD* (corporate tax rate *T* times the amount of debt *D*)
- If $T_{pb} > T_{pe}$ then the present value of the interest tax shield will be less than *TD: PVINTS<TD*.
- If $(1- T_{pb}) = (1\text{-T}\ (1- T_{pe})$ then the advantage of leverage will be completely lost.

In terms of the corporate borrowing Miller model (equation (24) indicates the following if the personal tax rate on equity income is zero except the tax exempt debt holders nobody would be interested in lending to the firm.

Therefore to induce debt holders to lend, the firm will have to offer a higher before tax interest rate. This implies that if this rate on the firm of tax exempt investors is say i_o then debt holders with a personal tax rate of T_{pb} will have to be at least offered a rate of interest equal *to* $i_o/(1 - T_{pb})$ otherwise they will not lend. Therefore, firms have to keep raising interest to attract investors in high tax brackets. Firms will be motivated to keep the interest rate rising if the ***corporate tax saving*** is greater than the ***personal tax loss***.

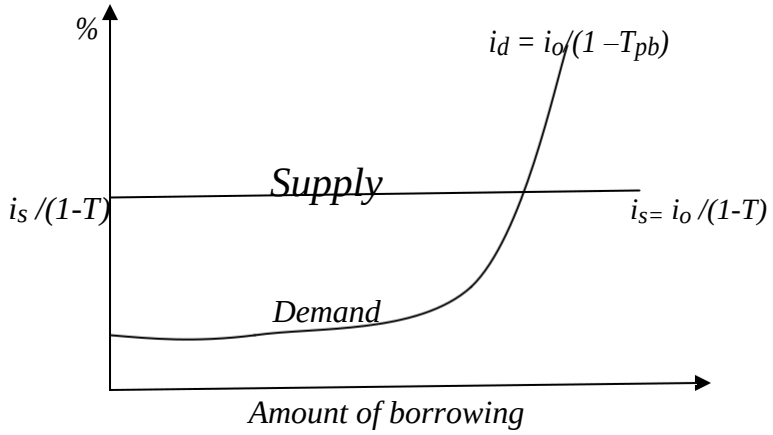
They will stop borrowing once the corporate tax rate *T*. equals the personnel tax rate T_{pb} . Thus in the equilibrium the interest rate should be equal to $i_o / (1\text{-}T)$ *t*o verify this point. Assume that the personal tax rate on equity income is zero, $T_{pb} = 0$ then equation (24) can be written as follows:

$$PVINTS = 1 - \frac{(1-T)}{(1 - T_{pb})} D \quad \text{.....25}$$

The advantage from leverage will become zero once the interest rate offered (i.e. the supply rate i_s) equal the tax exempt rate coupled with taxes (i.e. the demand rate i_d):

$$i_s = \frac{i_o}{1 - T} = i_d = \frac{i_o}{1 - T_{pb}} \quad \text{.....26}$$

And consequently $(1 - T) = (1- T_{pb})$ and, $PVINTS = 0$ if $i_s < i_o/(1 - T)$, the $PVINTS > 0$ and firms will adopts to reach 100% debt in their capital structure. This shown in figure below;



Miller's model had two important implications

- There is an optimum amount of debt in the economy which is determined by the corporate and personal tax rates. In others words. There is an optimum debt equity ratio for all firms in the economy.
- There is no optimum debt equity ratio for a single firm. There are hundreds of firms which have already induced tax except and low tax brackets investors. Therefore a single firm can not gain or lose by borrowing more or less.

- It implies that tax exempt persons or institutions will invest only in debt securities and high tax bracket investors in equities. In practice investors hold portfolio of debt and equity securities.
- The personal tax rate on equity income is not zero. Firms do pay dividends if T_{pe} *is* positive more investors can be induced to invest in debt securities
- Investors in high tax brackets can be induced to invest in debt securities indirectly, they can invest in the corporate bonds.

M-M and Miller's model can be summarized as follow

Under M-M's model the existence of the corporate taxes provides a strong incentive to borrow. In fact it is ideal for a firm to have 100 per cent debt in its capital structure. They ignore personal taxes.

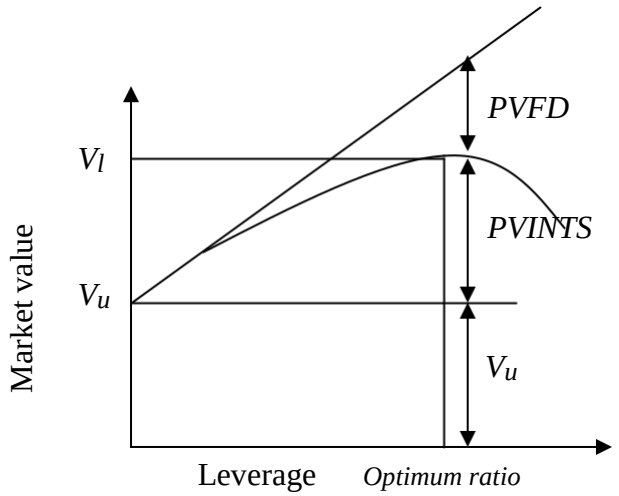
Miller's model considers both the corporate both the corporate as well as the personal taxes. It concludes that the advantage of corporate borrowing is reduced by the personal tax loss. The crucial implication of model is that there is no optimum capital structure for a single form a single but for the economy as a whole there exists an equilibrium amount of aggregate debt.

From a single firm's point of view therefore, the capital structure does not matter Miller's model is based on some controversial assumptions and therefore most people still believe that in balance, there is a tax advantages to corporate borrowing.

5.4 Financing Distress

It is difficult believe that a firm should have 100% debt because of tax advantage. Why don't firm in practice borrow 100% or what is the offsetting disadvantage of debt? The offsetting disadvantage is grouped under the term financial distress. Financial distress occurs when the firm finds it difficult to honor the obligation of creditors. The extreme form of financial distress is insolvency. Insolvency could be very expensive. It involves legal costs. The firm may have to sell its needed assets at distress prices. More important the consideration is the inflexibility of raising funds if the firm has already used heavy amount of debt. Non availability of funds on acceptable terms could adversely affect the operating performance of the firm. Creditors lose patience when a firm is financially distressed they force the firm in to liquidation to realize their claims. They the value of levered firms is given as follows:

Value of levered firm – Value of unlevered firm + *PV* of tax shield = *PV* of financial distress i.e. $V_l = V_u + PVINTS - PVFD$ ……. 27



The figure above shows how the capital structure of the firm is determined as a result of the tax benefits and the costs of financial distress. The present value of the interest tax shield increase with borrowing but so does the present value of the cost of financial distress. However, the cost of financial distress are quite insignificant with moderate level of debt and therefore the value of eh firm increase with debt. With more and more debt and the cost of financial distress increases and therefore the tax benefit shrinks. The optimum point reached when the present value of the tax benefits equal to the present value of the costs of financial distress. The value of the firm is maximum at this point.

5.5 Agency Theory

The theory posts that equity holders and debt holders incur costs associated with monitoring management to ensure that it behaves in ways consistent with the firm's contractual agreement. Regardless of who makes the monitoring express the cost is ultimately borne by the shareholders. Debt holders anticipating high monitoring costs charges higher interest rates which lower the value of the firm to its shareholders.

The presence monitoring cost acts as a disincentive to the insurance of debt monitoring costs like insolvency costs tend to increase at an increasing with leverage.

5.6 Signaling Theory

The theory contends that signal provided by capital structure changes are credible in providing the trend of future cash flows. Actions that increase have been associated with positive equity returns while actions that decrease leverage have been assonated with negative equity reruns, therefore when a firm makes any capital changes it must be mindful of the signal that the proposed transaction will transmit to the market place regarding the firm's present and future earnings prospects and the intentions of its managers. The theory is based on the assumption of information asymmetry between the management and shareholders.

5.7 The Pecking Order Theory

The pecking order theory implies that firms prefer to finance internally and if external financing is required, they will tend to use the safest securities first. Debt tends to be the first security issued and external equity the last resort. The preference of internal financing is based on the desire to avoid the discipline and monitoring that occurs when new securities are sold publicly.

Review Questions

i) Keyland Corporation has earning before interest and taxes of $3Mand a tax rate of 40%. It is able to borrow at an interest rate of 14%, whereas its equity capitalization rate in the absence of borrowing is 18%. The earnings of the company are not expected to grow, and all earnings are paid to shareholders in the form of dividends. In the presence corporate but no personal taxes, what is the value of company in an M-M world with:

- *a) No financial leverage*
- *b) $4 M debt*
- *c) $7M debt*

ii) Oxford Dictionary Company has net operating income of $10m ad $20m of debt with a 7% interest rate. The earnings of the company are not expected to grow, and all earnings are distributed to shareholders in the form of dividends. In all cases assume no taxes

- *a) Using the net operating income approach with an equity capitalization rate of 12.5% at the 20M debt level, compute the total value of firm and the implied overall capitalization rate k_o*
- *b) Assume that the firm issues an additional $10M debt and uses the proceeds to retire common stock. Also assume tat the interest rate and overall capitalization rate remains the same as in (a) above. compute the new total value of the firm and the new implied equity capitalization rate*

Main Reference for the Chapter:

1. Panday, I. M., (2001), “Financial Management”, 8th Edition, New Delhi: Vikas Publishing House,

Supplementary References

2. Van Horne, J. C. and Wachowicz, J. M., (2001), “Fundamentals of Financial Management”, 11th Edition, New Delhi: Pearson Education Inc.,

3. Bhalla, V. K., (2002), “Financial Management and Policy”, 3rd Edition, Anmol Publications PVT.,

4. Ross, S.A., et. Al., (2001), “Essentials of Corporate Finance”, 3rd Edition, New York: McGraw-Hill/Irwin.,

Sample Papers

Mount Kenya University

DEPARTMENT OF ACCOUNTING AND FINANCE

BBM 321: FINANCIAL MANAGEMENT II

Time: 2 Hrs

Instructions to Candidates: *Answer question 1 (Compulsory) and any other TWO questions.*

QUESTION ONE

a) In calculating the increment cash flow, it is helpful to place the project cash flows into three categories based on timing: List these three categories (3 Marks)

b) There are two main methods of evaluating cash flows : what are they (2 Marks)

c) Give one disadvantage and three advantages of Net Present Value (NPV) method (4 Marks)

d) It is said that capital budgeting involves accounting for risk. What are the causes of this Risk (5 Marks)

e) What are the steps taken by a company in the successful administration of capital investments (?)

f)

i) Profitability index is a method of selecting investment proposal under a capital constraint. Give the steps involved in this method (4 Marks)

ii) Assume a firm has only Ksh 300,000 to invest and has four available projects with the following characteristics

Project	PV of Inflows	Cost	Pl	NPV
1	230,000	200,000	1.15	30,000
2	141,250	125,000	1.13	16,250
3	194,250	175,000	1.11	19,250
4	162,000	150,000	1.08	12,000

How does the firm choose the projects to invest in, given the Ksh 300,000 capital constraint using profitability index method (4 Marks)

iii) Where is the profitability index method applicable and not applicable

g) Consider the following two period capital constraints

Project	Period 1 constraint = 50,000	Period 2 constraint = 20,000	NPV
1	12,000	3,000	14,000
2	54,000	7,000	17,000
3	6,000	6,000	17,000
4	6,000	2,000	15,000
5	3,000	35,000	40,000
6	6,000	6,000	12,000
7	48,000	4,000	14,000
8	36,000	3,000	10,000
9	18,000	3,000	12,000

The linear programming problem requires that we maximize NPV subject to budget constraint, formulate this problem (5 Marks)

SECTION B (40 MARKS) ANSWER ANY TWO QUESTIONS

QUESTION TWO

a. Lending institutions require borrowers to satisfy certain conditions before they lend them. Give four of these conditions (4 Marks)

b. What are the objectives of a firm (5 Marks)

c. i)Suppose that a firm has a certainty equivalent of the cash flow Ct as 3000, by using the reducing the cash flow estimate by a sufficient number of standard deviation determine CE_{NPV} given that S=500, and the project has a 3 year life and costs 5000 with no salvage value and the risk free rate is 7% (6 Marks)
ii)suppose the manager is only certain of Ksh 2,000 of the Ksh 3,000 in the firm in part i) using the reducing the cash flow estimate by a factor "B" determine the CE_{NPV} (5 Marks)

QUESTION THREE

a) Under certain conditions a simple formula can be used to forecast additional funds needed (AFN). Give the formula and briefly explain it (4 Marks)

b) How do the following factors affect external capital requirements?
   i. Dividend policy (2 Marks)
   ii. Capital intensity (2 Marks)

c) Consider the following financial statement information for the Glory company

Item	**Beginning**		**Ending**
	Ksh'000'	Ksh'000'	Ksh'000'
Inventory	1543	669	
Accounts receivable	4418	3952	
Accounts payable	2551	2673	
Net Sales	11,500		
Cost of goods sold	8,200		

Calculate the operating and cash cycles (12 Marks)

QUESTION FOUR

a) What are the factors that determine whether managers act in the best interest of stockholders (2 Marks)

b) With respect to financial markets briefly describe the following terms

i. Primary markets (2 Marks)
ii. Secondary markets (2 Marks)
iii. Dealer markets (2 Marks)
iv. Auction markets (2 Marks)
v. Listing (2 Marks)

c)

The Ricardo Company has a weighted average cost of capital (WACC) (Ignoring taxes) of 12 percent. It can borrow at 8 %. Assuming that Ricardo has a target capital structure of 80 percent equity and 20 % debt d)

i. What is the cost of equity (2Marks)
ii. What is the cost of equity if the target capital structure is 50 %equity (2Marks)
iii. Calculate the WACC, using your answer to verify that it is the same in both cases (4 Marks)

QUESTION FIVE

a) Dividends come in several different forms. List the basic types of cash dividend (4 marks)

b) Give three real-world factors that furrow a low payout and three factors that favor a higher payout (6 marks)

c) What is the difference between systematic risk and unsystematic risk (4 marks)

d) Roman invests the following sums of money in common stocks having returns as follows

SECURITY	AMOUNT INVESTED (Ksh)	EXPECTED RETURN %
Mort Drug wse	6,000	14
Kit chemical	11,000	16
Fazo electronics	9,000	17
Northern Kenya utility	7,000	13
Grizzle Restaurants	5,000	20
Part oil	13,000	15
Excell Corporation	9,000	18

i. What is the expected return (percentage) on her portfolio? (3 marks)
ii. What would be her expected return if she quadrupled her investments in Grizzle restaurants while learning everything else the same (3 marks)

Mount Kenya University

DEPARTMENT OF ACCOUNTING AND FINANCE

BBM 321: FINANCIAL MANAGEMENT II

Time: 2 Hrs

Instructions to Candidates: *Answer question 1 (Compulsory) and any other TWO questions.*

Question 1

QUESTION 1

(a) Assume Lake Victoria Fish Ltd is considering purchasing a new fishing boat to replace an old are and wishes to obtain cash flow information to evaluate the project. The purchase price is $18,500 and shipping costs is $1,500. The old fishing boat has remaining useful life of 2 years and may be sold at its depreciated (tax) book value of $2000. The old boat will have no salvage value at the end of its useful life. The new boat with produce cash savings of $7,100 per your before taxes for the next 4 years after which it will not have any salvage value nor cash savings. Assume the old boats was originally bought for $9,000 including capitalized expenditures, and further that accelerated depreciation of 33.33%, 44.45% 14.81% and 7.41%, accelerated depreciation of 33.33%, 44.45% 14.81% and 7.41%, is used:

i) Estimate the firm's incremental net cash flows(10mks)

ii) Assuming the cost of capital is 18%, advice on whether the firm should make the replacement using the IRR criteria.(8mks)

(b) Describe Modigliani and Miller Hypothesis II on capital structure (12mks)

QUESTION 2

(a) Suppose XYZ Corporation has decided in favor of a capital restructuring that involves increasing its existing $5milion in debt to 25milion. The interest rate on the debt is 12% and is not expected to change. The firm currently has one million shares outstanding and the price per share is $40. If the restructuring is expected to increase the return on equity, what is the minimum level for EBIT that XYZ's management must be expecting? Ignore taxes in your answer.(12mks)

(b) Discuss the causes of uncertainty or risk for the estimated cash flows of a project (8mks)

QUESTION 3

(a) Describe the agency theory

(b) Discuss four sources of short term capital

QUESTION 4

(a) Discuss the primary and secondary motives for holding cash

(b) Consider the following projects; the cost of capital is 12%

(A) Year	0	1	2	3	4	5	6
Cashflows	-40,000	8,000	14,000	13,000	12,000	11,000	10,000

(B) Year	0	1	2	3
Cashflows	-20,000	7000	13000	12000

Advice on the project that should be chosen using the equivalent annuity approach

QUESTION 5

Discus the Following models n dividend policy

i) Walters's model 10mks

ii) Gordon's model 10 mks