**INTRODUCTION**

**Financial management is that managerial activity which is concerned with the planning and controlling of the firm’s financial resources**. It was a branch of economics till 1890, and as a separate discipline, it is of recent origin. Still, it has no unique body of knowledge of its own, and draws heavily on economics for its theoretical concepts.

In general financial management is the effective & efficient utilization of financial resources. It means creating balance among financial planning, procurement of funds, profit administration & sources of funds.

**Definitions of financial management:**

* According to **Solomon**, “Financial management is concerned with the efficient use of an important economic resource, namely, capital funds.”
* According to **J. L. Massie**, “Financial management is the operational activity of a business that is responsible for obtaining and effectively utilizing the funds necessary for efficient operation.”
* According to **Weston & Brigham**, “Financial management is an area of financial decision making harmonizing individual motives & enterprise goals.”
* According to **Howard & Upton**, “Financial management is the application of the planning & control functions of the finance function.”
* According to **J. F. Bradley**, “Financial management is the area of business management devoted to the judicious use of capital & careful selection of sources of capital in order to enable a spending unit to move in the direction of reaching its goals.”

**Main features of financial management:**

On the basis of the above definitions, the following are the main characteristics of financial management-**Analytical Thinking-**Under financial management financial problems are analyzed and considered. Study of trend of actual figures is made and ratio analysis is done.

* **Continuous Process-**previously financial management was required rarely but now the financial manager remains busy throughout the year.
* **Basis of Managerial Decisions-** All managerial decisions relating to finance are taken after considering the report prepared by the finance manager. The financial management is the base of managerial decisions.
* **Maintaining Balance between Risk and Profitability-**Larger the risk in the business larger is the expectation of profits. Financial management maintains balance between the risk and profitability.
* **Coordination between Process-** There is always a coordination between various processed of the business.
* **Centralized Nature-** Financial management is of a centralized nature. Other activities can be decentralized but there is only one department for financial management.
* [**Areas/Scope of financial management**](http://www.mbaknol.com/financial-management/areasscope-of-financial-management/)
* Financial management, at present is not confined to raising and allocating funds. The study of financial institutions like stock exchange, capital, market, etc. is also emphasized because they influenced under writing of securities & corporate promotion. The scope of Financial Management has widened to cover capital structure, dividend policies, profit planning and control, AND depreciation policies. Some of the functional areas covered in financial management are as follows:-

1. **Determining financial needs:-** A finance manager is supposed to meet financial needs of the enterprise. For this purpose, he should determine financial needs of the concern. Funds are needed to meet promotional expenses, fixed and working capital needs. The requirement of fixed assets is related to types of industry. A manufacturing concern will require more investments in fixed assets than a trading concern. The working capital needs depend upon scale of operations. Larger the scale of operations, the higher will be the needs for working capital. A wrong assessment of financial needs may jeopardize the survival of a concern.
2. **Choosing the sources of funds:-** A number of sources may be available for raising funds. A concern may be resort to issue of share capital and debentures. Financial institutions may be requested to provide long-term funds. The working capital needs may be met by getting cash credit or overdraft facilities from commercial bands. A finance manager has to be very careful & cautions in approaching different sources.
3. **Financial analysis and interpretation:-** The analysis & interpretation of financial statements is an important task of a finance manager. He is expected to know about the profitability, liquidity position, short term and long-term financial position of the concern. For this purpose, a number of ratios have to be calculated. The interpretation of various ratios is also essential to reach certain conclusions Financial analysis and interpretation has become an important area of financial management.
4. **Cost-volume profit analysis:-** This is popularly known as “CVP relationship”. For this purpose, fixed costs, variable costs and semi variable costs have to be analyzed. Fixed costs are more or less constant for varying sales volumes. Variable costs vary according to the sales volume. Semi-variable costs are either fixed or variable in the short-term. The financial manager has to ensure that the income of the firm will cover its variable costs, for there is no point in being in business, if this is not accomplished. Moreover, a firm will have to generate an adequate income to cover its fixed costs as well. The financial manager has to find out the break-even point that is, the point at which the total costs are matched by total sales or total revenue.
5. **Working capital management:-** Working capital refers to that part of firm’s capital which is required for financing short-term or current assets such as cash, receivables and inventories. It is essential to maintain proper level of these assets. Finance manager is required to determine the quantum of such assets.
6. **Dividend policy: -** Dividend is the reward of the shareholders for investments made by them in the shares of the company. The investors are interested in earning the maximum return on their investments whereas management wants to retain profits for future financing. These contradictory aims will have to be reconciled in the interests of shareholders and the company. Dividend policy is an important area of financial management because the interest of the shareholders and the needs of the company are directly related to it.
7. **Capital budgeting: -** Capital budgeting is the process of making investment decisions in capital expenditures. It is an expenditure, the benefits of which are expected to be received over a period of time exceeding one year. It is expenditure for acquiring or improving the fixed assets, the benefits of which are expected to be received over a number of years in future. Capital budgeting decisions are vital to any organization. Any unsound investment decision may prove to be fatal for the very existence of the concern.
8. [Objectives of Financial Management](http://www.mbaknol.com/financial-management/objectives-of-financial-management/)
9. Financial management provides a frame work for selecting a proper course of action and deciding a viable commercial strategy.  The main objective of a business is to maximize the owner’s economic welfare.  This objective can be achieved by;
10. Profit Maximization, and
11. Wealth Maximization.

**1. Profit Maximization.** Profit earning is the main aim of every economic activity.  A business being an economic institution must earn profit to cover its costs and provide funds for growth.  No business can survive without earning profit.  Profit is a measure of efficiency of a business enterprise.  Profits also serve as a protection against risks which cannot be ensured.  The accumulated profits enable a business to face risks like fall in prices, competition from other units, adverse government policies etc.  Thus, profit maximization is considered as the main objective of business.  The following arguments are advanced in favor of profit maximization as the objective of business:

1. When profit-earning is the aim of business then profit maximization should be the obvious objective.
2. Profitability is a barometer for measuring efficiency and economic prosperity of a business enterprise
3. Economic and business conditions do not remain same at all times.  There may be adverse business conditions like recession, depression, severe competition etc. A business will be able to survive under unfavorable situation, only if it has some past earnings to rely upon. Therefore, a business should try to earn more and more when situation is favorable.
4. Profits are the main sources of finance for the growth of a business. So, a business should aim at maximization of profits for enabling its growth and development.
5. Profitability is essential for fulfilling social goals also.  A firm by pursuing the objective of profit maximization also maximizes socio-economic welfare.

However, profit maximization objective has been criticized on many grounds. They are:

* A firm pursuing the objective of profit maximization starts exploiting workers and the consumers. Hence, it is immoral and leads to a number of corrupt practices.
* It is also argued that profit maximization should be the objective in the conditions of perfect competition and in the wake of imperfect competition today, it cannot be the legitimate objective of a firm
* One has to reconcile the conflicting interests of all the parties connected with the firm.  Thus, profit maximization as an objective of financial management has been considered inadequate.  Even as an operational criterion for maximizing owner’s economic welfare, profit maximization has been rejected because of the following drawbacks;
* The term ‘profit’ is vague and it cannot be precisely defined.  It means different things for different people. Should we consider short-term profits or long-term profits? Does it mean total profits or earnings per share? Even if, we take the meaning of profits as earnings per share and maximize the earnings per share, it does not necessarily mean increase in the market value of share and the owner’s economic welfare.
* Profit maximization objective ignores the time value of money and does not consider the magnitude and timing of earnings.  It treats all earnings as equal when they occur in different periods. It ignores the fact that cash received today is more important than the same amount of cash received after, three years.
* It does not take into consideration the risk of the prospective earnings stream.  Some projects are more risky than other.
* The effect of dividend policy on the market price of shares is also not considered in the objective of profit maximization.

**2. Wealth Maximization.** Wealth maximization is the appropriate objective of an enterprise. When the firm maximizes the stockholder’s wealth, the individual stockholder can use this wealth to maximize his individual utility.  It means that by maximizing stockholder’s wealth the firm is operating consistently towards maximizing stockholder’s utility.

A stockholder’s current wealth in the firm is the product of the number of shares owned, multiplied with the current stock price per share.

This objective helps in increasing the value of shares in the market. The share’s market price serves as a performance index or report card of its progress.  It also indicates how well management is doing on behalf of the shareholder.

However, the maximization of the market price of the shares should be in the long run. Every financial decision should be based on cost-benefit analysis.  If the benefit is more than the cost, the decision will help in maximizing the wealth.

**Implications of Wealth maximization.** There is a rationale in applying wealth maximizing policy as an operating financial management policy.  It serves the interests of suppliers of loaned capital, employees, management and society.  Besides shareholders, there are short-term and long-term suppliers of funds who have financial interests in the concern.  Short-term lenders are primarily interested in liquidity position so that they get their payments in time. The long-term lenders get a fixed rate of interest from the earnings and also have a priority over shareholders in return of their funds. Wealth maximization objective not only serves shareholder’s interests by increasing the value of holdings but ensures security to lenders also. The economic interest of society is served if various resources are put to economical and efficient use.

**Criticism of Wealth Maximization.** The wealth maximization objective has also been criticized by certain financial theorists mainly on following accounts;

1. It is a prescriptive idea. The objective is not descriptive of what the firms actually do.
2. The objective of wealth maximization is not necessarily socially desirable.
3. There is some controversy as to whether the objective is to maximize the stockholders wealth or the wealth of the firm which includes other financial claimholders such as debenture holders, preferred stockholders, etc.,
4. The objective of wealth maximization may also face difficulties when ownership and management are separated as is the case in most of the large corporate form of organizations.

In spite of all the criticism, we are of the opinion that wealth maximization is the most appropriate objective of a firm and the side costs in the form of conflicts between the stockholders and debenture holders, firm and society and stock holders and managers can be minimized.

**SEPARATION OF OWNERSHIP FROM MANAGEMENT AND THE AGENCY CONFLICT**

In large businesses separation of ownership and management is a practical necessity. Major corporations may have hundreds of thousands of shareholders. There is no way for all of them to be actively involved in management: It would be like running Egerton University through a series of small meetings for all its students, lecturers and administrators. Authority has to be delegated to managers.

The separation of ownership and management has clear advantages. It allows share ownership to change without interfering with the operation of the business. It allows the firm to hire professional managers. But it also brings problems if the managers’ and owners’ objectives differ. This is referred to as the AGENCY CONFLICTS whereby rather than attending to the wishes of shareholders, managers may seek a more leisurely or luxurious working lifestyle; they may shun unpopular decisions, or they may attempt to build an empire with their shareholders’ money. Such conflicts between shareholders’ and managers’ objectives create *principal–* *agent problems.* The shareholders are the principals; the managers are their agents.

Shareholders want management to increase the value of the firm, but managers may have their own axes to grind or nests to feather. **Agency costs** are incurred when

(1) Managers do not attempt to maximize firm value and

(2) Shareholders incur costs to monitor the managers and influence their actions.

Of course, there are no costs when the shareholders are also the managers. That is one of the advantages of a sole proprietorship. Owner–managers have no conflicts of interest.

**COSTS OF THE AGENCY RELATIONSHIP**

There are costs involved with any effort to minimize the potential for conflict between the principal’s interest and the agent’s interest. Such costs are called ***agency costs***, and they are of three types: monitoring costs, bonding costs, and residual loss.

***Monitoring costs*** are costs incurred by the principal to monitor or limit the actions of the agent. In a corporation, shareholders may require managers to periodically report on their activities via audited accounting statements, which are sent to shareholders. The accountants’ fees and the management time lost in preparing such statements are monitoring costs. Another example is the implicit cost incurred when shareholders limit the decision-making power of managers. By doing so, the owners may miss profitable investment opportunities; the foregone profit is a monitoring cost. The board of directors of corporation has a ***fiduciary duty*** to shareholders; that is the legal responsibility to make decisions (or to see that decisions are made) that are in the best interests of shareholders. Part of that responsibility is to ensure that managerial decisions are also in the best interests of the shareholders. Therefore, at least part of the cost of having directors is a monitoring cost.

***Bonding costs*** are incurred by agents to assure principals that they will act in the principal’s best interest. The name comes from the agent’s promise or bond to take certain actions. A manager may enter into a contract that requires him or her to stay on with the firm even though another company acquires it; an implicit cost is then incurred by the manager, who foregoes other employment opportunities.

Even when monitoring and bonding devices are used, there may be some divergence between the interests of principals and those of agents. The resulting cost, called the ***residual loss***, is the implicit cost that results because the principal’s and the agent’s interests cannot be perfectly aligned even when monitoring and bonding costs are incurred.

**REVIEW QUESTIONS**

1. In most large corporations, ownership and management are separated. What are the main implications of this separation? (8 mks)

**2.** What are agency costs and what causes them? How can agency conflicts be minimized? (**Need further reading here**) (4 mks)

**3.** Discuss the scope of financial management (8 mks).

**PRINCIPLES OF VALUATION**

**TIME VALUE OF MONEY AND THE OPPORTUNITY COST OF CAPITAL**

Your guest house has burned down, fortunately without injury to you or your employees, leaving you with a vacant lot worth Ksh. 500,000 and a check for Ksh. 2,000,000 from the fire insurance company. You consider rebuilding, but your real estate adviser suggests putting up an office building instead. The construction cost would be Ksh. 3,000,000, and there would also be the cost of the land, which might otherwise be sold for Ksh. 500,000. On the other hand, your adviser foresees a shortage of office space and predicts that a year from now the new building would fetch Ksh. 4,000,000 if you sold it. Thus you would be investing Ksh. 3,500,000 now in the expectation of realizing Ksh. 4,000,000 a year hence. You should go ahead if the **present value (PV)** of the expected Ksh. 4,000,000 payoff is greater than the investment of Ksh. 3,500,000. Therefore, you

need to ask, What is the value today of Ksh. 4,000,000 to be received one year from now, and is that present value greater than Ksh. 3,500,000?

**CALCULATING PRESENT VALUE**

The present value of Ksh. 4,000,000 one year from now must be less than Ksh. 4,000,000. After all, *a shilling today is worth more than a shilling tomorrow,* because the shilling today can be invested to start earning interest immediately. This is the first basic principle of finance.

Thus, the present value of a delayed payoff may be found by multiplying the payoff by a **discount factor** which is less than 1. (If the discount factor were more than 1, a Shi lling today would be worth *less* than a Shilling tomorrow.) If *C*1 denotes the expected payoff at period 1 (one year hence), then

Present value (PV) = discount factor x *C*1

This discount factor is the value today of Ksh. 1 received in the future. It is usually expressed as the reciprocal of 1 plus a *rate of return:* The rate of return *r* is the reward that investors demand for accepting delayed payment.

Now we can value the real estate investment, assuming for the moment that the Ksh. 4,000,000 payoff is a sure thing. The office building is not the only way to obtain Ksh. 4,000,000 a year from now. You could invest in Government of Kenya securities (Treasury Bills) maturing in a year. Suppose these securities offer 7 percent interest. How much would you have to invest in them in order to receive Ksh. 4,000,000 at the end of the year?

To calculate present value, we discount expected payoffs by the rate of return offered by equivalent investment alternatives in the capital market. This rate of return is often referred to as the **discount rate, hurdle rate,** or **opportunity cost** **of capital.** It is called the *opportunity cost* because it is the return foregone by investing in the project rather than investing in securities. In our example the opportunity cost was 7 percent.

Always remember: A Ksh. in the hand today is worth more than a Ksh. Promised sometime in the future, i.e., money has time value!

If you have it today, you can invest it or use it. It is rather difficult to invest or use a promise of some future funds.

1. Future Value and Compounding

* Investing for single period

FV = P (1+r), where P = principal invested, and r = the interest rate on the investment.

What is the FV of Ksh.500 invested for one year at 10%; FV = Ksh.500 (1.10) = Ksh.550.

* Investing for more than one period

FV = P (1+r)t, where t = the number of periods in the future

What is the FV of Ksh.500 invested for 2 years at 10%; FV = Ksh.500 (1.10)2 = Ksh.500 (1.21) = Ksh.605

Note: there are two elements in the Ksh.105 interest;

* + There is the interest on the principal; Ksh.50 each year (total Ksh.100), and
  + There is the interest on the first year’s interest; Ksh.50 x .10 = Ksh.5

This is the result of compounding. For example, the same Ksh.500 left on deposit for 5 years, at simple and compound interest would be, after 5 years: Simple interest: Ksh.750, Compound interest: Ksh.805

How does one calculate the factor (1+r)t ? You can do it manually, using your calculator, your computer or the Future Value Tables (found, along with Present Value and Annuity Tables, in most basic financial management textbooks).

* The Financial Tables
  + For any interest rate and time period, the table will give the value of Ksh.1 for that number of periods in the future.

1. Present Value and Discounting
   * What is Present Value?

It is the current value of a future cash flow(s), discounted at an appropriate discount factor (or interest rate). This follows the same principle as compounding.

Alternatively: What will we need today, invested at that same rate, to give us an amount equal to the future cash flow?

Recall that FV = P (V)(1+r)t ; let’s do some simple algebra, then

PV = FV/(1+r)t , where r is the discount rate for t periods of time in the future

* Let’s look at a single period example:

An antique auto dealer can buy a “mint condition” 2003 Toyota auto for Ksh.60,000. He is certain that he can resell the car in one year for Ksh.70,000. He also has the opportunity to make a well-collateralized loan to an acquaintance for one year at 12% (assume essentially no risk). What should he do?

Before solving this problem, let’s introduce the concept of “Opportunity Cost.” Opportunity cost is simply the best alternative financial opportunity that exists, at the same risk level as the one under consideration. In the auto example, it is the 12% certain, that he can earn on the loan. Therefore, the appropriate discount rate is 12%.

PV = Ksh.70,000/(1+0.12) = Ksh.62,500 vs. the Ksh.60,000 that he must pay for the car today. If he made the loan, then his PV (at 12%, of course) is Ksh.60,000. (If he makes the loan to his acquaintance, he will receive in one year Ksh.67,200 – his Ksh.60,000 plus the 12% interest, or Ksh.7200. Ksh.67, 200/1.12) = Ksh.60, 000.)

* Present value of multiple periods

Suppose that your favorite uncle promises you Ksh.100, 000 for your 30th birthday, which is 8 years from now. He also says that if you are in a hurry, he will give you Ksh.50, 000 tomorrow, which is your 22nd birthday. You know that you can earn 7.5% (per year) on an 8 year government bond. What do you want to do?

PV = FV/(1+r)t , which in this case is PV = Ksh.100,000/(1+0.075)8

PV = Ksh.56,070 vs. the Ksh.50,000 you can have tomorrow. So, unless you badly need the cash now, you would be better off to accept the Ksh.100,000 on your 30th birthday.

Alternatively, FV8 = (Ksh.50,000)(1+0.075)8 = Ksh.89,175 vs. the Ksh.100,000

* An interesting approximation: The Rule of 72

To quickly and easily estimate how long it will take to double an investment, with a given compound interest rate, r, take 72/r.

For example, how long will it take to double Ksh.10,000 @ 6%, 8.25%, and 10%? 72/6 = 12 years (actually 11.89 years); 72/8.25 = 8.73 years (actually 8.74 years); 72/10 = 7.2 years (actually 7.27 years).

1. The Present and Future Value of Multiple Cash Flows

* There are two ways to calculate the future value or the present value of multiple cash flows:

**FUTURE VALUE**: Compound the accumulated value period by period, or calculate the FV of each cash flow and sum them.

**PRESENT VALUE:** Discount back one period at a time, summing as you go, or discount each amount to time period 0 (the present), and sum them.

Let’s look at some examples:

**FUTURE VALUE**

Assume you deposit Ksh.2000 today (t0), Ksh.1000 in one year (t1) and Ksh.3000 in two years (t2), all at 8%. What will your deposit be worth at the end of the third year?

FV = (Ksh.2000)(1.08)4 + (Ksh.1000)(1.08)3 + (Ksh.3000)(1.08)2 = Ksh………………

**PRESENT VALUE**

You know that you will need Ksh.1200 one year from now, Ksh.1500 after two years, and Ksh.2000 after 3 years. How much will you have to deposit today @ 8% to have the necessary amounts?

PV = Ksh.1200/1.08 + Ksh.1500/(1.08)2 + (Ksh.2000)/(1.08)3 = Ksh.3985

Suppose your stock broker told you that if you made an investment with him of Ksh.4200, you could have Ksh.1200 in one year, Ksh.1500 in 2 years, and Ksh.2200 in 3 years. Would you do it? By inspection of the previous example, would you do it?

You are offered an investment that pays Ksh.5000 after 4 years, Ksh.6000 after 5 years and Ksh.8000 after 6 years. You want to earn 12% on this investment. How much would you pay for it today?

PV = Ksh.5000/(1.12)4 + Ksh.6000/(1.12)5 + Ksh.8000/(1.12)6 = Ksh.3178 + Ksh.3405 + Ksh.4053 = Ksh.10,636

1. **VALUING LEVEL CASH FLOWS: ANNUITIES AND PERPETUITIES**

**ANNUITY CASH FLOWS**

An annuity is a series of constant cash flows that occur at regular intervals for a fixed number of periods, for example:

The repayment of a mortgage or car loan

Lease payments on a property

* The Present Value of an Annuity

We could simply discount all of the cash flows at the appropriate rate, but it could become cumbersome. There is a shortcut.

The Present Value of a series of *t* cash flows, of an amount, *C,* at a discount rate, *r*, can be represented by the following equation

1 .

1 - (1+r)t

APV = C x .

r

We can calculate by hand, or use the annuity tables in any financial management text to get the value of

1 .

1 - (1+r)t

. = PVIAF (PV interest annuity factor)

r

Example:

How much can you afford to spend for a new car which you will finance?

1. You examine your budget and find that you can afford Ksh.632/month for 48 months.
2. You go to your bank and find that they will give you a loan for 48 months @ 1% interest per month (12% per year).

Your bank loan payments are an annuity

1 – (1/1+0.01)48

APV = Ksh.632 x 0.01 = Ksh.632 (1 – 0.6203) = Ksh.24, 000

0.01

You can afford to pay Ksh.24,000 for the car.

Alternatively, we can go to the annuity tables (PV) and find the PVIF for 48 periods at 1.0% = 37.9740. Then 37.9740 x Ksh.632 = Ksh.24, 000.

* The Future Value of an Annuity

Same principles as the APV, but it is the value at the end of *t* periods of a constant stream of cash flows, *C*, at an interest rate of *r*.

(1+r)t - 1

The value is given by AFV = C x r

(Future value annuity table gives the value of the factor to multiply times C)

* The Present Value of a Perpetuity

A Perpetuity is an annuity where the cash flow stream is infinite (t = ∞)

This is a convergent infinite series where PV = C/r

All we need to do is look at the APV equation at *t* goes to ∞; we see that

APV∞ = C x (1-0)/r which = C/r

The perpetuity is an important concept in valuation practice, so remember it!!

Some examples

1. You are thinking of buying preferred shares of stock in a company that will pay you Ksh.8.00 per year dividend. You know that you can get 5% on similar risk investments elsewhere. What is the most that you should be willing to pay for these shares?

A non-callable preferred stock is like a perpetuity, so PV = C/r, and PV = Ksh.8.00/0.05 = Ksh.160

1. JBS Corp. wants to sell preferred shares at Ksh.100/share. A similar issue from another company is priced at Ksh.60 per share and pays Ksh.5 per share annual dividend. What dividend must JBS Corp. pay to get their price of Ksh.100?

Ksh.60 = Ksh.5/r, so r = 0.0833, which is what JBS preferred stock will have to yield.

(Ksh.100)(0.0833) = Ksh.8.33 as the annual dividend

**VALUATION OF SECURITIES (VALUATION MODELS)**

The objective of financial management is to maximize the market value of the firm’s equity shares. The finance manager therefore needs to understand how shares are valued and how the interaction between financing, investment and dividend decisions influence this value. The total firm’s value is the value of equity plus the value of equity (share capital) plus the value of non-equity claims (debt). The finance manager needs to also understand how the non-equity claims are valued.

The knowledge of valuation of securities is also important to investors (shareholders) and debt holders as this helps them in deciding whether they should buy or sell securities at the prevailing market prices.

What are financial securities? These are documents which represent or acknowledge the firm’s indebtness to investors e.g. the holders of ordinary shares, preference shares, corporate bonds, commercial paper, treasury bonds and treasury bills have all purchased the relevant documents from corporations as well as the government. Financial securities are traded in the capital market. The market price for such securities is determined by the forces by the forces of demand and supply. However, the forces of demand and supply are also influenced by non- economic factors such as rumors, and speculation on the part of investors. Consequently it is necessary to value these securities using established or fundamental formulae known as valuation models.

**REASONS FOR VALUATION OF SECURITIES/ BUSINESS**

* 1. **For liquidation purposes**

When the company is to be liquidated, its assets will be valued in order to determine the amount to be realized from the sale of the assets.

* 1. **For mergers and acquisitions**

When the mergers and acquisitions take place, there is a need to determine the value of each company in order to establish whether there will be any additional benefits (Synergy) that will be realized from the merger.

* 1. **In order to use securities as collateral**

There is need to value securities when the security holder invests or uses the security as collateral to obtain loans from banks.

* 1. **For sale of the security**

Investors could require valuation of their securities when they want to sell them in the market in order to determine whether the security is over-valued or undervalued or efficiently priced by the market forces.

* 1. **For quotation or listing of the companies**

The company has to value its securities when it is being listed in the stock exchange for the first time.

* 1. **For insurance or taxation purposes**

Assets of the company will have to be valued for tax purposes especially when granting capital allowances and when they are to be insured in order to ensure that the assets are not under-valued.

* 1. **For sale of branch or subsidiary**

The company will value its securities when there is a sale of a branch or subsidiary to external parties.

**THEORIES OF VALUATION**

There are three theories of valuation namely:

1. The fundamental theory.
2. The technical or chartist theory.
3. The random walk theory.
4. **The fundamental theory**

It states that the theoretical or intrinsic value of a security equals the present value (PV) of all the expected future benefits to be realized from the securities.

1. **The technical (Chartist) theory**

The theory is based on the belief that history repeats itself. It states that past price movements will be repeated in future. Thus if past price movements are plotted or charted on a graph it is possible to estimate the future price of the security. This theory identifies three price patterns:

* **The primary trend**

This is the price movement which has been observed, charted or plotted for a period of more than one year.

* **The secondary trend**

These are price movements which have been observed or charted for a period of less than one year.

* **The tertiary trend**

These are price movements observed or charted over very short periods of time- weekly or daily.

1. **The random walk theory**

It is based on the importance of information in the valuation of securities. It states that the security prices will behave in a random manner depending on the information that has been released into the market. The information released into the market will attract different reaction from investors. Because of this, the random walk theory states that the theoretical value of a security will never be an exact figure due to the random receipts and reaction to such information. This theory leads to the efficient market hypothesis which states that information whether good or bad, once released into the market will quickly reflected in the security prices.

**EFFICIENT MARKET HYPOTHESIS**

**TYPES OF MARKET EFFICIENCY**

There are three types of market efficiency, namely:

* + 1. Information processing efficiency

Information processing efficiency contends that once information has been released into the market, it should be quickly reflected in security prices.

* + 1. Allocative efficiency

The stock exchange should allow investors to allocate resources in an optimal manner among the companies in the stock exchange.

* + 1. Operational efficiency

The transactions cost of buying and selling securities in the stock exchange should be such that they do not discourage the buying and selling of securities. Time taken to execute transactions should also be as minimal as possible e.g. what time does it take from when a shareholder executes a sale order and the receipt of the cash from the sale. In our discussions below, our focus is on **INFORMATION PROCESSING EFFICIENCY**

The **EFFICIENT MARKET HYPOTHESIS** states that should a company release bad news into the market, it will lead to a decline in the security prices. On the other hand should a company release good news, such as declaring high dividends, it will lead to an increase in security prices. The efficiency of the stock market is determined by the speed at which new information is reflected in the security price. An efficient capital market has the following characteristics:

* Information, whether good or bad is quickly reflected in security prices.
* Transactions costs e.g. commission paid to a broker should be MINIMAL so that they do not discourage the buying and selling of securities.
* Investors should NOT obtain high returns for having received information earlier than others. Ideally all investors should information at the same time.
* There are NO investors who will buy securities in large quantities with the aim of influencing security prices by creating an artificial shortage.
* NO investors will make abnormal gains simply because they are experienced or knowledgeable because the stock market efficiency will not allow this.

**LEVEL/ FORM/ DEGREE OF MARKET EFFICIENCY**

Fama divided the overall efficient market hypothesis (EMH) and the empirical tests of the hypothesis into three sub- hypotheses depending on the information set involved:

(1) Weak-form EMH,

(2) Semi- strong-form EMH, and

(3) Strong-form EMH.

**The weak-form EMH** assumes that current stock prices fully reflect all security market information, including the historical sequence of prices, rates of return, trading volume data, and other market-generated information, such as odd-lot transactions, block trades, and transactions by exchange specialists. Because it assumes that current market prices already reflect all past returns and any other security market information, this hypothesis implies that past rates of return and other historical market data should have no relationship with future rates of return (that is, rates of return should be independent). Therefore, this hypothesis contends that you should gain little from using any trading rule that decides whether to buy or sell a security based on past rates of return or any other past market data (This is a vindication to the Technical analysts- Chartists).

**The semi strong-form EMH** asserts that security prices adjust rapidly to the release of all public information; that is, current security prices fully reflect all public information. The semi strong hypothesis encompasses the weak-form hypothesis, because all the market information considered by the weak-form hypothesis, such as stock prices, rates of return, and trading volume, is public. Public information also includes all nonmarket information, such as earnings and dividend announcements, price-to-earnings (P/E) ratios, dividend-yield (D/P) ratios, price book value (P/BV) ratios, stock splits, news about the economy, and political news. This hypothesis implies that investors who base their decisions on any important new information after it is public should not derive above-average risk-adjusted profits from their transactions, considering the cost of trading because the security price already reflects all such new public information.

**The strong-form EMH** contends that stock prices fully reflect all information from public and private sources. This means that no group of investors has monopolistic access to information relevant to the formation of prices. Therefore, this hypothesis contends that no group of investors should be able to consistently derive above-average risk-adjusted rates of return. The strong form EMH encompasses both the weak-form and the semi strong-form EMH. Further, the strong form EMH extends the assumption of efficient markets, in which prices adjust rapidly to the release of new public information, to assume perfect markets, in which all information is cost free and available to everyone at the same time.

**CAUSES OF MARKET INEFFICIENCY/ ANOMALIES**

* **INSIDER TRADING**

This occurs when investors seek to obtain additional information from relatives or friends who could be working for the corporation in which they intend to purchase securities upfront. Such investors end up receiving information earlier than other investors in the market.

* **TAXATION EFFECT**

Companies that are required to pay tax are likely to report lower profits compared to those required not to pay taxes. Hence, investors may end up over valuing companies that don’t pay taxes while undervaluing the security prices of those companies that pay taxes.

* **SMALL COMPANY EFFECT**

Research conducted suggests that security prices of small companies tend to be undervalued, and vice versa.

**THE CONCEPT OF VALUE**

The term value is often used in different concepts as follows:

* **Book value**

This is the value of the firm’s balance sheet. It often represents a historical rather than a measure of the current worth. Thus the net book value of a firm represents the depreciated value of assets less outstanding liabilities. From the accounting perspective, this net book value represents the amount of owners’ equity in the firm.

Criticism

* It is based on accounting conventions policies and estimates that are subject to a great deal of subjectivity.
* Historical balance sheet figures of which the book values are based are often very divergent from economic values. They do not reflect a firm’s earnings power. Hence book values cannot be regarded as good estimates of true investment values.
* **Liquidation/ disposal value**

This is the value that could be realized if an asset(s) were sold individually and not as part of a going concern e.g. If a product line is discontinued, the machinery used in its production might be sold. The sale price would be its disposal value and would be determined independently of the firm’s value. Similarly, if a firms operations were discontinued and all its assets were sold as a separate as a separate collection and then used to repay liabilities, the total net sales proceeds would represent the firms liquidation value. Hence the liquidation valuation model involves the computation of the liquidation value per share (LVPS).

**Criticism**

Although the LVPS appears better than BVPS, it has several limitations, namely:

* It is often difficult to estimate what amount would be realized from the liquidation of the various assets.
* It does not reflect the firm’s earnings capability. LVPS only makes sense for those firms that are better dead than alive. Such firms are not viable and their intrinsic values cannot be determined.
* **Going concern value**

This is the amount realized if the firm is sold as a going concern rather than on the basis of liquidating its assets. The buyer is willing to pay a price on the basis of the expectations of the firm’s future profits/ cash flows.

* **Substitution value**

This is the amount of money that could be paid to purchase the next available substitute for the production process. It involves determining the value of a security by looking at the value of a similar security of a

competitor company in the same industry. The problem arises when the competitor in question has much higher (or lower) earnings capacity that makes comparison faulty e.g. EABL vs. Keroche

Criticism

* Firms do not have similar productive assets for the purpose of using one security as a substitute of another.
* No two firms are identical operating characteristics. Even firms in the same industry have different operating policies, management styles, different sizes, different sizes of diversification, technology, e.t.c.
* **Replacement value**

Replacement value is based on the cost of replacing the existing assets. This is the amount that will be needed in order to purchase an asset with the same productive capacity like the one being replaced. However, only productive fixed assets can be replaced at a go since current assets are circulating assets.

Criticism

* Based only on a portion of the assets.
* Replacement value can be subjectively determined.
* **Intrinsic value**

This is the theoretical value of the asset (security) and can be defined as the present value of the expected future cash flows. It is the value as perceived by investors given the amount, timing, and riskiness of future cash flows. Given the riskiness, uncertainty of future cash flows, the investor determines an appropriate discount rate to use in computing the present (intrinsic) value of the asset. Once the investor has determined the intrinsic value of the security, it is compared with the market value. If intrinsic value is greater than market value, then the security is undervalued and vice versa.

Criticism

* Is based on historical data.
* Different models may provide different intrinsic values.
* **Market values**

This is the observable value of an asset/ security in the market place. It the market price of a security that is influenced by market forces i.e. demand and supply. Other factors, however, do affect the market value of securities, namely economic factors, political factors, nature or quality of management, the firms earnings power (both current and expected), rumors and speculations on the part of investors, the industry in which the company operates, the investors required rate of return e.t.c.

**VALUATION MODELS**

Valuation models are classified into the following categories:

* 1. The general/ basic valuation model.
  2. The bond valuation model.
  3. The equity valuation models.
* Dividend valuation model.
* Earnings capitalization model.
* Liquidation valuation model.
* Book valuation model.
  + 1. **THE GENERAL VALUATION MODEL**

The model states that the value of any real asset or financial security equals the present value of the benefits (expressed as cash flows) expected from it, discounted at a given rate of return. In other words the value of a security is equivalent to the present value of a capital project.

The value of a security, therefore, depends on two factors, namely:

* The expected cash flow from the security.
* The appropriate discounting rate: if the discounting rate used is that of an individual investor or a group of investor, the obtained value is known as intrinsic, fair or true value of the security to a particular investor or group of investors. However if the discounted rate used is the market rate, then the value obtained value is called the market value of a security. It is important to determine the intrinsic value of a security so that the investor can make correct judgment as to whether the security is over-valued or under-valued by the market.

Is the value of the assets now.

Is the cash flow expected from asset j in year t.

Is the required rate of return on the assets.

Is the useful life of the assets.

The general valuation model is applied in bond valuation.

**BOND VALUATION**

A bond/ debenture is an instrument of debt issued either by a business or a government. Valuation model of bonds depend on whether it is redeemable or perpetual. The value of a redeemable debt is the total present value of all expected future cash flows discounted at a given rate of return.

**Redeemable bonds**

+

Vo is the value of the bond today.

I is the periodic interest payment based on the par value.

T is the tax rate.

F is the fixed redemption value of the bond.

Kd is the cost of the bond.

n is the maturity period of the bond.

**Example 1**

Suppose you buy Ksh. 1,000,000 worth of 10% 10 year bonds with a Ksh. 1000 par value per bond. If your required rate of return is 12%, what is the most that you would pay for this bond? For simplicity, assume interest is payable once a year. Take tax rate of 30%.

**Solution**

+

+

There is an annuity of Ksh. 100 (1-0.3) per bond per year for 10 years, and a final payoff of Ksh. 1000 per bond in the 10th year.

100(1-0.3) x PVIAF (10, 12%) + 1000 x PVIF (10, 12%)

70 x 5.65 + 1000 x 0.322= Ksh. 717.50 per bond.

In reality interest on bonds is paid more than once in a year. In Kenya, for example, the government and corporations pay interest twice per annum, with each payment being half of the annual coupon.

+

**Example 2**

We shall evaluate the above example 1, where coupons are paid semi-annually.

+

There is an annuity of Ksh. 35 per bond per half year for 20 periods. At the 20th period, there is a lump sum payment of Ksh. 1000 per bond. Note that the discount rate will now be 12%/2= 6%.

35 x PVIAF (20, 6%) + 1000 x PVIF (20, 6%)

35 x 11.47 + 1000 x 0.312

Ksh. 713.45 per bond.

This is the actual value of the bond.

**Example 3**

You plan to buy a 12%, 5 year bond with a par value of Ksh. 1000. Coupons are payable semi-annually. What is the most you would pay for the bond given that your required rate of return is 12 %?

= Ksh. 1,177.00 you would be willing to pay a premium on the bond (Show your workings).

**IMPORTANT NOTE: The Interest Tax Shield**

An interesting element introduced into the capital structure decision is the reduction of taxes due to the payment of interest on debt. We refer to the benefit from interest deductibility as the ***interest tax shield***, since the interest expense *shields* income from taxation. The tax shield from interest deductibility is:

Tax shield = (Tax rate) (Interest expense)

If Firm L has Ksh.10, 000 of 10% debt and is subject to a tax of 30% on net income, the tax shield is:

Tax shield = 0.30 [Ksh. 10,000(0.10)] = 0.30(Ksh. 1,000) =Ksh. 300. A Ksh. 1,000 interest expense means that Ksh. 1,000 of income is not taxed at 30%.

How does this tax shield affect the value of the firm? The tax shield reduces the net income of the firm that goes to pay taxes. This is the reason why, in bond valuation, taxes are considered. Note that on the contrary, ordinary and preferred dividends are not allowable for tax purposes. As a result, they generate no tax shield.

**Irredeemable bonds**

The value of a perpetual/ irredeemable bond is given by:

Where i is annual interest.

Kd is the cost of debt/ RRR of bondholder.

**EQUITY VALUATION MODELS**

* + 1. **The dividend capitalization model (The Gordon Sharpone Model) (The Gordon Dividend Growth Model)**

The value of an equity share is equal to the present value of dividends expected from its ownership plus the present value of the proceeds from its sales.

***Single period model***

Po= + =

D1 is the dividend expected at the end of year 1.

P1 is the price expected at the end of year 1.

Ks is the cost of equity or RRR by investor.

Po is the value of a share now.

Suppose that the price is expected to increase at a constant rate, g, annually.

Po=

Po=

**NB**: D1= Do (1+g)

**Example 1**

ABC Company LTD has a cost of equity of 16%. The company has just paid a dividend of Ksh. 0.75 per share, and dividends are expected to grow at 8% p.a. Determine the value of a share of ABC Company LTD.

**Example 2**

H Company LTD has a cost of equity of 16%. The company expects to pay a dividend of Ksh. 0.75 per share in its next payout (Year end), and dividends are expected to grow at 8% p.a. Determine the value of a share of H Company LTD.

**Example 3**

The table below shows the dividend payout for Harbin LTD for 5 years.

|  |  |
| --- | --- |
| YEAR | DIVIDEND PER SHARE (KSH) |
| 2006 | 0.20 |
| 2007 | 0.25 |
| 2008 | 0.35 |
| 2009 | 0.50 |
| 2010 (Latest dividend) | 0.60 |

* 1. What is the worth of a share of Harbin LTD given a cost of equity of 35%?
  2. Suppose, instead, that YOU as an individual investor have an interest in the stock and your required rate of return is 12%. If the share is currently selling at Ksh. 60 per share, is it overvalued or undervalued? Why? Show all your workings.
     1. **Equity valuation using the earnings capitalization method**

P/E Ratio = MPS/EPS

Thus given P/E and EPS, then

Po (MPS) = P/E x EPS.

Practitioners prefer the earnings capitalization model approach mainly due to its simplicity. The procedure used to estimate intrinsic or theoretical value of an equity share involves the following steps:

* Estimate the EPS.
* Forecast the growth rate of EPS.
* Assess the risk exposure, Ks.
* Establish the P/E multiple or ratio.
* Develop a value anchor and a value range

1. The investment analyst typically begins equity valuation by forecasting the EPS for the current year and probably for the next year. This is done by examining the pattern of the reported EPS over a number of years and also by the impression garnered by plant visits and interviews with the management.
2. The growth rate can be estimated by evaluating the past pattern of EPS to determine any consistency in growth. If the growth is relatively stable, then the growth rate could be estimated by:

- 1

n is the duration/ periods of growth.

g is the constant growth rate.

Alternatively, if a relatively stable profit and cost structure is expected in the foreseeable future, g may be equated to the growth rate in sales (turnover).

1. The assessment of risk exposure

The equity analysts are interested in three types of business risks:

* **Business risk**- this refers to the variability in operating income (EBIT). It is influenced by among others, variability in demand, prices, inputs costs, and the use of operating leverage.
* **Financial risk**- it represents the risk arising from the use of debt capital (Financial leverage).
* **Market risk (Beta)** - this refers to variability in share prices and the most commonly used measure of market risk. Equality beta reflects the sensitivity of the common shares to the general price movements.

The assessment of risk helps determine the cost of equity (Ks).

1. ESTABLISHING THE P/E MULTIPLE/ RATIO

There are a number of factors that influence the P/E multiple. These are- growth prospects, risk exposure, shareholder perception of the management and liquidity of the stock. The P/E ratio can be developed from the constant growth model as:

Po=

Dividing both sides by E, we get

=

Where Ks is the risk exposure/ cost of equity.

And g represents the growth prospects.

**EXAMPLE 1**

The projected EPS of XYZ ltd is Ksh. 5.00 and the appropriate P/E ratio is estimated at 12.

Determine the value anchor and value range.

Po = EPS x P/E Multiple

= 5.00 x 12= Ksh. 60

Value range= 60 ± 10

Ksh. 50 ≤ Po ≤ Ksh. 70

**EXAMPLE 2**

XYZ LTD expects to pay a dividend of Ksh.4.00 per share. The payout ratio is normally 40%. The dividends are expected to grow at 10%. The required rate of return by the investor is 12%. Using the earnings capitalization model, what is the value of a share of XYZ LTD, given?

Po= dividing both sides by E, we shall get:

=

D1= 4.00,

D1= 40% \* EPS

EPS= D1/40% = 4/40%= 10

= = 20

Thus P/E ratio is 20

Po= EPS x P/E Multiple

Po= 10 x 20= Ksh. 200.00

Value range is Value range= 200 ± 5 = Ksh. 195 ≤ Po ≤ Ksh. 205

1. **Equity valuation using the book value model**

This involves the computation of the book value per share (BVPS).

BVPS= net worth/ number of shares outstanding

Net worth= share capital + All reserves

BVPS is fundamentally rooted in financial accounting. Hence it can be established relatively quickly from published sources. The proponents of this measure also argue that it is an objective measure of value. However, critics argue that BVPS is based on accounting conventions and policies which are characterized by a great deal of subjectivity. The balance sheet figures on which BVPS is based are often very divergent from economic values. They do not reflect earnings power. Hence BVPS cannot be regarded as a good proxy or good estimate of true investment values.

1. **Equity valuation- the liquidation valuation model**

This involves the computation of liquidation value per share (LVPS).

LVPS =

**VALUATION OF REDEEMABLE PREFERENCE SHARES**

These are preference shares issued that has a definite maturity period. A holder of preference shares is entitled to a fixed return on his/ her investment known as the preference dividend (Do). The annual preference dividend is based on:

* The par value of the security (Po).
* The dividend rate.

Annual preference dividend (Do) = coupon rate x par value.

Valuation of preference shares is based on the general valuation model. The value of a preference share is arrived at by discounting the annual dividend to be received over the life of the security and the par value to be received back on maturity. Since the dividend received is constant, then for redeemable preference shares, it is an annuity: thus----

MVp= Do x PVIAF n, i% + Po x PVIF n, i%

**Example 1**

ABC LTD issued Ksh. 10, 10% preference shares on January 1, 2010. The shares will be redeemable on 31st December, 2013. If your required rate of return is 16%, what is the worth of this share to you?

**VALUATION OF IRREDEEMABLE PREFERENCE SHARES**

These are preference shares that are perpetual. Holders of these shares expect to earn a constant or fixed annual dividend per annum in perpetuity. The model used to determine their value is similar to the one used in valuing perpetuities.

MVp = Dp/ Kp

Dp is the annual preference dividend based upon the coupon rate and par value.

Kp is the cost of preference share capital or the minimum required rate of return by preference shareholder.

MV is the market value.

**APPLICABILITY OF VALUATION MODELS IN DEVELOPING COUNTRIES**

Most of the valuation models we have discussed are based on several limiting assumptions.

* + 1. Perfect capital markets
* No transaction costs.
* No taxation.
* No restrictions on trading.
* Borrowing and trading at risk free rates.
* Many investors such that no one investor can influence the market price.
  + 1. Efficient capital markets
* Information is freely available to all market participants.
* Share prices quickly adjust to incorporate all the new information in an unbiased manner.
* The operational efficiency- low operational costs.
* Pricing efficiency.
* Allocative efficiency.

Most of the developing capital markets do not satisfy the assumptions underlying both perfect and efficient markets. Hence the applicability of many financial models based on these assumptions are doubtful.

**RISK AND RETURN**

In evaluating investments, risk and return should be evaluated since they are important in decision making. You may have learnt of the tradeoff between risk and return i.e. the higher the risk, the higher the expected return, and vice versa.

**Risk**

Whenever you make a financing or investment decision, there is some uncertainty about the outcome. Uncertainty means not knowing exactly what will happen in the future. The greater the uncertainty, the greater the risk. Risk is the degree of uncertainty. Types of risks are discussed below

* + 1. ***Cash flow risk*** is the risk that the cash flows of an investment will not materialize as expected. For any investment, the risk that cash flows may not be as expected—in timing, amount, or both—is related to the investment’s business risk.
       - **Business Risk**: ***Business risk*** is the risk associated with operating cash flows. Operating cash flows are not certain because neither are the revenues nor the expenditures comprising the cash flows.
* ***Revenues:*** depending on economic conditions and the actions of competitors, prices or quantity of sales (or both) may be different from what is expected. This is ***sales risk***.
* ***Expenditures:*** *operating costs are comprised of fixed costs and variable costs. The greater the fixed component of operating costs, the less easily a company can adjust its operating costs to changes in sales.* The risk that comes about from the mix of fixed and variable costs is known as ***operating risk***. The greater the fixed operating costs relative to variable operating costs, the greater the operating risk.
* ***Financial risk*** is the risk associated with how a company finances its operations. If a company finances with debt (Bonds), it is legally obligated to pay the amounts comprising its debts when due. By taking on fixed obligations, such as debt and long-term leases, the company increases its financial risk. If a company finances its business with equity, either generated from operations (retained earnings) or from issuing new equity, it does not incur fixed obligations and thus lowers its financial risk.

Therefore, cash flow risk of a security includes both its business risk *and* its financial risk.

* ***Default Risk***

When you invest in a bond, you expect interest to be paid (usually semiannually) and the principal to be paid at the maturity date. However, the more burdened a firm is with debt—required interest and principal payments— the more likely it is that payments promised to bondholders will not be made and that there will be nothing left for the owners. We refer to the cash flow risk of a debt security as ***default risk*** or ***credit risk***. Technically, default risk on a debt security depends on the specific obligations comprising the debt. Default may result from:

■ Failure to make an interest payment when promised (or within a specified period).

■ Failure to make the principal payment as promised.

■ Failure to make sinking fund payments (that is, amounts set aside to pay off the obligation), if these payments are required.

■ Failure to meet any other condition of the loan.

■ Bankruptcy.

Why do financial managers need to worry about default risk? Because they invest their firm’s funds in the debt securities of other firms; because they are concerned about how investors perceive the risk of their own debt securities; and because the greater the perceived default risk of a firm’s securities, the greater the firm’s cost of financing.

* + 1. ***Reinvestment Rate Risk***

Another type of risk is the uncertainty associated with reinvesting cash flows, not surprisingly called ***reinvestment rate risk***.

* + 1. ***Interest Rate Risk***

***Interest rate risk*** is the sensitivity of the change in an asset’s value to changes in market interest rates. You should remember that market interest rates determine the rate we must use to discount a future value to a present value. The value of any investment depends on the rate used to discount its cash flows to the present. If the discount rate changes, the investment’s value changes. Suppose you buy a Kenya Government Treasury Bond that matures in five years. There is no default risk, since the government could simply print more money to pay the interest and principal. Does this mean there is no risk when you own a Treasury bond? No. You need to do something with the interest payments as you receive them and the principal amount when it matures. You could stuff them under your mattress, reinvest in another Treasury bond, or invest them otherwise. If yields have been falling, however, you cannot reinvest the interest payments from the bond and get the same return you are getting on the bond. When your Treasury bond matures, you face reinvestment risk.

* + 1. ***Purchasing Power Risk***

***Purchasing power risk*** is the risk that the price level may increase unexpectedly. If a firm locks in a price on your supply of raw materials through a long-term contract and the price level increases, it benefits from the change in the price level and your supplier loses—the firm pays the supplier in cheaper currency. If a firm borrows funds by issuing a long-term bond with a fixed coupon rate and the price level increases, the firm benefits from an increase in the price level and its creditor is harmed since interest and the principal are repaid in a cheaper currency.

* + 1. ***Currency Risk***

Currency risk is the risk that the *relative values* of the domestic and foreign currencies will change in the future, changing the value of the future cash flows. As financial managers, we need to consider currency risk in our investment decisions that involve other currencies and make sure that the returns on these investments are sufficient compensation for the risk of changing values of currencies.

Suppose you are evaluating the investment in a new product. You do not know and cannot know precisely what the future cash flows will be. But from past experience, you can at least get an idea of possible cash flows and the likelihood—the probability—they will occur.

|  |  |  |
| --- | --- | --- |
| SCENARIO | CASH FLOW Ksh. | PROBABILITY OF CASH FLOW |
| Product success | 4,000,000.00 | 40% |
|  |  |  |
| Product flop | –2,000,000.00 | 60% |

But what is the expected cash flow in the first year? The expected cash flow is the average of the possible cash flows, weighted by their probabilities of occurring:

Expected cash flow = 0.40(Ksh. 4,000,000) + 0.60(–Ksh. 2,000,000) = Ksh. 400,000.00 A general formula for expected value is:

Expected value=*E*(*x*) =*p*1*x*1+*p*2*x*2+*p*3*x*3+........... + *pnxn* +........................ + *pNxN*, where

*E*(*x*) = the expected value

*n* = possible outcome

*N* = number of possible outcomes

*pn* = probability of the *n*th outcome

*xn* = value of the *n*th outcome

Measure of risk that does tell us something about how much to expect and the probability that it will happen is the standard deviation. The ***standard deviation*** is a measure of dispersion that considers the values and probabilities for each possible outcome. The larger the standard deviation, the greater the dispersion of possible outcomes from the expected value. The standard deviation considers the distance (deviation) of each possible outcome from the expected value and the probability associated with that distance:

Standard deviation of possible outcomes is given by:

Compute and fill the table below. As an investor, which of the 2 products would you choose? Why. Distinguish between the following investors- Risk neutral, risk averse, and risk preference.

|  |  |  |
| --- | --- | --- |
| SCENARIO | PROBABILITY (%) | POSSIBLE RETURN ON INVESTMENT (%) |
| **Product A** |  |  |
| Success | 25 | 24 |
| Moderate Success | 50 | 10 |
| Failure | 25 | -4 |
| **Product B** |  |  |
| Success | 10 | 40 |
| Moderate Success | 30 | 30 |
| Failure | 60 | -5 |
|  |  |  |

|  |  |  |
| --- | --- | --- |
|  | Expected return | Standard Deviation |
| Product A | 10% | 9.9% |
| Product B | 10% | 18.57% |

**RETURN AND THE TOLERANCE FOR BEARING RISK**

Investors may fall into one of the following three categories:

* Risk averse investors: These are investors who do not like risk- i.e. given two investments, they would choose the one with less risk for a given level of returns- like in the example above, most investors would choose product A to B. This is not to mean, however that risk averse investors cannot take risk. It means they will take more risk only when they feel that they are adequately compensated for it.
* Risk neutral investors are indifferent towards risk- they do not need additional compensation to bear more risk. In the above example, a risk neutral investor would choose either of asset A or B.
* A risk preference person likes risk—someone even willing to pay to take on risk. Are there such people? Yes. Consider people who play the lotteries (SMS), where the expected value is always negative: The expected value of the winnings is less than the cost of the lottery ticket/SMS.

In evaluating investments, we assume that investors are risk averse, and that risk is something bad that ought to be avoided. Additional risk is to be taken only if there is adequate compensation in terms of higher returns.

This is the basis of the risk-return tradeoff- ***the higher the risk, the higher the expected return.***

**EXPECTED RETURN, RISK AND DIVERSIFICATION**

Businesses will rarely consider investing in one project at a time. Consider a roadside kiosk- the proprietor will rarely stock one product (say cigarettes), but rather in a collection of products (Cigarettes, soap, soft drinks e.t.c.). A bigger business will also have a collection of assets- buildings, inventory, stocks and bonds, e.t.c. A collection of investments is referred to as a portfolio. In any portfolio, one investment may do well while another does poorly. The projects’ cash flows may be “out of sync” with one another. Diversification helps an investor to avoid ***putting all eggs in one basket,*** just in case that particular basket gets torn! The investment in assets whose returns are out of step with one another is the whole idea behind diversification. Diversification is the combination of assets whose returns do not vary with one another in the same direction at the same time. Diversification is a way of reducing risk. Which is the other way of reducing risk?

**Expected return of a portfolio**

In the example above, suppose you had Ksh. 20,000.00 and you decide to invest the cash in asset A and asset B as follows:

* All the Ksh. 20,000 in asset B
* Ksh. 5000 in asset A, and Ksh. 15,000 in asset B
* Ksh. 10,000 in asset A and Ksh. 10,000 in asset B.
* Ksh. 15,000 in asset A and Ksh. 5000 in asset B
* All the Ksh. 20,000 in asset A

What is the expected return from the portfolio in each case? The expected return from a portfolio is simply the weighted average of the returns of each asset in the portfolio. The weights used are the proportions of cash placed in each asset.

E(Rp)= W. E(Ra) + Wb. E(Rb) + ……………………. + Wn. E(Rn)

In the case above;

* E(Rp)= (0%\*10) + (100%\*10) =
* E(Rp)= (25%\*10) + (75%\*10) =
* E(Rp)= (50%\*10) + (50%\*10) =
* E(Rp)= (75%\*10) + (25%\*10) =
* E(Rp)= (0%\*10) + (100%\*10) =

Example 1

You have Ksh. 10,000 that you wish to invest. After surveying the market, you choose to put your money in Savings Development Bonds (SDBs) of the Government of Kenya that have a coupon of 12%, and in shares that have an expected return of 15%. What would be your expected return if:

* You invest 90% of your cash in SDBs and 10% in shares?
* You invest 60% of your cash in SDBs and 40% in shares?
* You invest Ksh. 7,000 of your cash in SDBs and the remainder in shares?

**Risk of a portfolio (2 asset portfolio)**

Unlike the expected return, the risk of a portfolio is NOT merely the weighted average of the risks of the securities in the portfolio! The formula below summarizes how to calculate risk (Variance) of a portfolio

Where: is the weight of asset A in the portfolio

Is the standard deviation of returns of asset A

Is the standard deviation of returns of asset B

Is the correlation coefficient between the returns of asset A and asset B

**NB:** To get the standard deviation, you take the square root of the variance

**Computing the correlation coefficient**

The correlation coefficient is a standardized measure of the degree of relationship between the returns of two assets. It is the tendency for two or more sets of data—in our case returns—to vary together. It will always fall between +1 and -1.

* A correlation coefficient of +1 indicates a perfect, positive correlation between the two assets’ returns.
* A correlation coefficient of –1 indicates a perfect, negative correlation between the two assets’ returns.
* A correlation coefficient of 0 indicates no correlation between the two assets’ returns.
* A correlation coefficients falling between 0 and +1 indicates positive, but not perfect positive correlation between the two assets’ returns.
* A correlation coefficient falling between –1 and 0 indicates negative, but not perfect negative correlation between the two assets’ returns.

The correlation coefficient is computed as follows:

Where Cov (a,b) is the covariance of returns between asset A and B.

And so, how do you compute covariance?

Take the following example of probability distributions of returns for asset A and asset B.

|  |  |  |
| --- | --- | --- |
| Probability | Return on asset A (%) | Return on asset B (%) |
| 0.2 | 8 | 17 |
| 0.1 | 10 | 13 |
| 0.3 | 12 | 9 |
| 0.05 | 13 | 12 |
| 0.02 | 10 | 12 |
| 0.3 | 11 | 8 |
| 0.03 | 15 | 6 |

REQUIRED:

* 1. The expected return of asset A and of asset B.
  2. The variance and standard deviations of returns for assets A and B.
  3. The covariance of returns between asset A and B.
  4. The expected return and standard deviation of returns if you invested in a portfolio comprised of:
     + All in asset B
     + 20% of asset A and 80% of asset B.
     + 40% of asset A and 60% of asset B.
     + 60% of asset A and 40% of asset B
     + 80% of asset A and 20% of asset B
     + All in asset A.

**CAPITAL ASSET PRICING MODEL**

William Sharpe took the idea that portfolio return and risk are the only elements to consider and developed a model that deals with how assets are priced. This model is referred to as the ***capital asset pricing model (CAPM***).

All the assets in each portfolio, even on the frontier, have some risk. Now let’s see what happens when we add an asset with no risk—referred to as the risk-free asset. Suppose we have a portfolio along the efficient frontier that has a return of 4% and a standard deviation of 3%. Suppose we introduce into this portfolio the risk-free asset, which has an expected return of 2% and, by definition, a standard deviation of zero. If the risk-free asset’s expected return is certain, there is *no* covariance between the risky portfolio’s returns and the returns of the risk-free asset. A portfolio comprised of 50% of the risky portfolio and 50% of the risk-free asset has an expected return of (0.50)4% + (0.50)2% = 3%. What is the portfolio standard deviation? Compute. 0.0866.

If we look at all possible combinations of portfolios along the efficient frontier and the risk-free asset, we see that the best portfolios are no longer those along the entire length of the efficient frontier; rather, the best portfolios are now the combinations of the risk-free asset and one— and only one—portfolio of risky assets on the frontier. The portfolios comprised of the risk-free asset and this one risky portfolio are shown in Exhibit 10.8. These portfolios differ from one another by the proportion invested in the risk-free asset; as less is invested in the risk-free asset, both the portfolio’s expected return and standard deviation increase.



Sharpe demonstrates that this one and only one portfolio of risky assets is the ***market portfolio***—a portfolio that consists of all assets, with the weights of these assets being the ratio of their market value to the total market value of all assets.

If investors are all risk averse—they only take on risk if there is adequate compensation—and if they are free to invest in the risky assets as well as the risk-free asset, the best deals lie along the line that is tangent to the efficient frontier. This line is referred to as the ***capital market line*** ***(CML)***. If the portfolios along the capital market line are the best deals and are available to all investors, it follows that the returns of these risky assets will be priced to compensate investors for the risk they bear *relative to that* *of the market portfolio*. Since the portfolios along the capital market line are the best deals, they are as diversified as they can get—no other combination of risky assets or risk-free asset provides a better expected return for the level of risk or provides a lower risk for the level of expected return.

The CML specifies the returns an investor can expect for a given level of risk. The CAPM uses this relationship between expected return and risk to describe how assets are priced. The CAPM specifies that the return on any asset is a function of the return on a risk-free asset plus a risk premium. The return on the risk free asset is compensation for the time value of money. The ***risk premium*** is the compensation for bearing risk. Putting these components of return together, the CAPM says:

Expected return on an asset = Expected return on a risk-free asset + Risk premium

The market portfolio therefore represents the most well-diversified portfolio—the portfolio that consists of all the assets in a market. The only risk in a portfolio comprising all assets is nondiversifiable risk. As far as diversification goes, the market portfolio is the best you can do, because you have included everything in it.

Thus, if we assume that investors hold well-diversified portfolios (approximating the market portfolio), the only risk they have is nondiversifiable risk. If assets are priced to compensate for the risk of assets *and* if the only risk in your portfolio is nondiversifiable risk, then it follows that compensation for risk applies to only nondiversifiable risk. Let’s refer to this nondiversifiable risk as ***market risk***.

Because the market portfolio is made up of all assets, each asset possesses some degree of market risk. Since market risk is systematic across assets, it is often referred to as ***systematic risk***, and diversifiable risk is referred to as ***unsystematic risk***. Further, the risk that is not associated with the market as a whole is often referred to as ***company-specific risk*** when referring to stocks, since it is risk that is specific to the company’s own situation—such as the risk of lawsuits and labor strikes—and is not part of the risk that pervades all securities. The measure of an asset’s return sensitivity to the market’s return, its market risk, is referred to as that asset’s ***beta, ß***.

The expected return on an individual asset is the sum of the expected return on the risk-free asset and the premium for bearing market risk. Let *ri* represent the expected return on asset *i*, *rf* represent the expected return on the risk-free asset, *rm* represent the expected return on the market, and B*i* represent the degree of market risk for asset *i*. Then:

Rj= rm+Bi (rm-rf)

The term (rm – rf), is the market risk premium—if you owned all the assets in the market portfolio, you would expect to be compensated (rm – rf) for bearing the risk of these assets. B is measure of market risk, which serves to fine-tune the risk premium for the individual asset. For example, if the market risk premium were 2% and the B for an individual asset were 1.5, you would expect to receive a risk premium of 3% since you are taking on 50% more risk than the market. For each asset there is a beta. If we represent the expected return on each asset and its beta as a point on a graph and connect all the points. the result is the ***security market line (SML)***, as shown in Exhibit 10.9. As you can see in the figure:

1. The greater the B, the greater the expected return.

2. If there were no market risk (beta = 0.0) on an asset, its expected return would be the expected return on the risk-free asset.

3. If the asset’s risk is similar to the risk of the market as a whole (beta = 1.0), that asset’s expected return is the return on the market portfolio.

EXHIBIT 10.9 **Security Market Line that Describes the Relation Between Expected Asset Returns and Beta**

****

We can get a good idea of the portfolio’s market risk by using a beta that represents the composition of the assets in the portfolio. To determine the portfolio’s beta, we need to know the weighted average of the betas of the assets that make up the portfolio, where each weight is the proportion invested in each asset. Let Bp indicate the beta of the portfolio, wi indicate the proportion invested in each the asset i, and βi indicate the beta for asset i. If there are S assets in the portfolio, then:

B*p* = *w*1B1+*w*2B2+*w*3B3+.................+*wS*B*S*

Limitations of the CAPM

As we have seen, the CAPM allows us to focus on the risk that is important in asset pricing—market risk. However, there are some drawbacks to applying the CAPM.

1. A beta is an estimate. For stocks, the beta is typically estimated using historical returns. But the estimate for beta depends on the method and period in which is it is measured. For assets other than stocks, beta estimation is more difficult.

2. The CAPM includes some unrealistic assumptions. For example, it assumes that all investors can borrow and lend at the same rate.

3. The CAPM is really not testable. The market portfolio is theoretical and not really observable, so we cannot test the relation between the expected return on an asset and the expected return of the market to see if the relation specified in the CAPM holds.

4. In studies of the CAPM applied to common stocks, the CAPM does not explain the differences in returns for securities that differ over time, differ on the basis of dividend yield, and differ on the basis of the market value of equity (the so called “size effect”).

**THE ARBITRAGE PRICING MODEL**

An alternative to CAPM in relating risk and return is the arbitrage pricing model, which was developed by Stephen Ross. The ***arbitrage pricing*** ***model (APM)*** is an asset pricing model that is based on the idea that identical assets in different markets should be priced identically. While the CAPM is based on a market portfolio of assets, the APM doesn’t mention a market portfolio at all. Instead, the APM states that an asset’s returns should compensate the investor for the risk of the asset where the risk is due to a number of economic influences or company factors. Therefore, the expected return on the asset *i*, *ri*, is:

*ri* = *rf*+δ1First factor+δ2Second factor + δ3Third factor + …

where each of the δ’s reflect the asset’s return sensitivity to the corresponding economic factor. The APM looks much like the CAPM, but the CAPM has one factor—the market portfolio. There are many factors in the APM. What if an asset’s price is out of line with what is expected? That’s where arbitrage comes in. Any time an asset’s price is out of line with how market participants feel it should be priced—based on the basic economic influences—investors will enter the market and buy or sell the asset until its price is in line with what they think it should be.

The APM provides theoretical support for an asset pricing model where there is more than one risk factor. Consequently, models of this type are referred to as ***multifactor risk models*.** There are three types of multifactor risk models: statistical factor models, macroeconomic factor models, and fundamental factor models.

In a ***statistical factor model*** a statistical technique called factor analysis is used to derive risk factors that best explain observed asset returns. Let’s suppose that there are six “factors” identified by the model that are statistically found to best explain common stock returns. These “factors” are statistical artifacts. The objective in a statistical factor model then becomes to determine the economic meaning of each of these statistically derived factors. Because of the problem of interpretation, it is difficult to use the factors from a statistical factor model. Instead, practitioners prefer the two other models described below, which allow them to prespecify meaningful factors, and thus produce a more intuitive model.

In a ***macroeconomic factor model***, observable macroeconomic variables are used to try to explain observed asset returns. An example of a proprietary macroeconomic factor model is the Burmeister, Ibbotson, Roll, and Ross model. In this model, there are five macroeconomic factors that have been found that do a good job of explaining common stock returns. They are unanticipated changes in the following macroeconomic variables: investor confidence (confidence risk); interest rates (time horizon risk); inflation (inflation risk); real business activity (business cycle risk); and market index (market timing risk).

The most common model used by practitioners is the ***fundamental factor model***. It uses company and industry attributes and market data todetermine the factors that best explain observed asset returns. The mostoften used fundamental factor model for explaining common stock returnsis the one developed by the firm of Barra. In the Barra model the risk factors,

referred to as risk indexes, are indexes of stock price volatility, stock price momentum, market capitalization (size) of the firm, earnings growth, earnings yield, book-to-value ratio, earnings variability, exposure to foreign currencies, dividend yield, and leverage.

**CAPITAL BUDGETING**

**INTRODUCTION TO CAPITAL BUDGETING**

**ACCOUNTIN PROFITS VS CASH FLOWS**

**CAPITAL BUDGETING TECHNIQUES**

**CAPITAL BUDGETING UNDER CONDITIONS OF INFLATION**

Inflation refers to an increase in price levels or a decline in purchasing power of money. During periods of inflation, nominal revenues and costs increase but debt obligations and the cost of capital may remain unchanged. When evaluating investment proposals under conditions of inflation, we adjust the future cash flows using the prevailing inflation rates. An alternative and simpler approach is to adjust the discount rate/ hurdle rate using the inflation rate. To make these adjustments, we use the Fischer equation.

**Illustration**

Assume an investor lends Ksh. 100 and expects to receive Ksh. 115.50 at the end of the year which includes principal and interest. Assume that the prevailing inflation rate is 5%. Determine the equivalent value of the cash flow at the end of one year from now. Determine the real rate of interest.

**Solution**

To get real rate of interest, we adjust the interest in the Ksh. 115.50 (i.e. the Ksh. 15.50) for inflation.

FV= PV (1+r) n

=100(1+5%)= Ksh. 105.00thus you would need an equivalent of Ksh. 105 in one year to purchase a basket of goods worth Ksh. 100 today. Thus the real interest rate (the nominal rate adjusted for inflation) will be:

= 115.5-105= Ksh. 10.50

=10%.

Using the Fischer equation, the adjusted discount rate to use for evaluating projects is calculated as follows:

M is the cost of capital.

J is the inflation rate.

**Example 1**

You plan to purchase a heavy commercial vehicle that goes for Ksh. 10,500,000.00. You expect that the vehicle will generate a cash flow of Ksh. 2,500,000.00 per annum for 6 years after which you expect to dispose the vehicle off for Ksh. 1,500,000.00. Given that your cost of capital is 15%, and the prevailing inflation rate is 6%, is it wise to invest in this project.

**Solution**

We have 2 options

1. Adjust the cost of capital/ discount rate.
2. Adjust the cash flow.

Adjusting the discount rate is by far the easiest.

= 8.5%. We then use this adjusted cost of capital to evaluate the project. Do this!

Option 2 is to adjust cash flows, the approach is as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | cash flow (Ksh. 000) | Inflation Adjusted cash flow | PVIFn,15% | TOTAL |
| 0 | (10,500) | -10500(1+10%) 0 |  |  |
| 1 | 2500 | 2500(1+10%) 1 |  |  |
| 2 | 2500 | 2500(1+10%) 2 |  |  |
| 3 | 2500 | 2500(1+10%) 3 |  |  |
| 4 | 2500 | 2500(1+10%) 4 |  |  |
| 5 | 4000 (2500+1500) | 4000(1+10%) 5 |  |  |

**CAPITAL BUDGETING UNDER CONDITIONS OF RISK**

Risk arises when the future is uncertain and where a range of possible future outcomes is expected. Risk can also arise when there is a possibility of the actual outcome deviating from the expected outcome. Uncertainty may vary with the time period such that the variables that occur much later into the future (e.g. salvage value) may be more uncertain than those that occur much sooner, (e.g. initial cost). The following assumptions are made when making capital budgeting decisions under conditions of risk.

1. The set of possible net investment values for an investment alternative are known with certainty.
2. Each set of possible cash flows is known with certainty.
3. The required rate of return is a function of the risk return characteristics of a project.
4. Decision makers/ managers are risk averse.

The tools of analysis applied are

1. Simple tools of analysis;
   1. Expected monetary value (EMV).
   2. The standard deviation.
   3. The coefficient of variation.
   4. The Beta coefficient.
2. Complex tools of analysis
   1. Sensitivity analysis.
   2. Utility theory.
   3. Simulation analysis.

**Simulation analysis**

Consider the following scenario: A project is expected to generate the following cash flows

|  |  |
| --- | --- |
| Probability | Cash flow (Ksh. Millions) |
| 0.2 | 2 |
| 0.3 | 1.5 |
| 0.4 | 3 |
| 0.1 | 4 |

Run a simulation analysis on the cash flows on the project. Use the following random numbers 20, 25, 19, 50, 60, 90, 95.

Simulation is a statistically based behavioral approach that applies predetermined probability distribution and random numbers to estimate the outcome of variables of risky investments. By using different values the decision maker can develop a probability distribution. This analysis helps the decision maker to let all decision factors change simultaneously or at the same time and the effects of such simultaneous change analyzed.

In the illustration above, we shall approach in the following way:

|  |  |  |  |
| --- | --- | --- | --- |
| Probability | Cum probability | Random numbers (\*) | Cf (Millions) |
| 0.2 | 0.2 (20) | 00-19 | 2 |
| 0.3 | 0.5 (50) | 20-49 | 1.5 |
| 0.4 | 0.9 (90) | 50-89 | 3 |
| 0.1 | 1 (100) | 90-99 | 4 |

From this analysis, the distribution is:

|  |  |
| --- | --- |
| Random numbers | CF(Millions) |
| 20 | 1.5 |
| 25 | 1.5 |
| 19 | 2 |
| 50 | 3 |
| 60 | 3 |
| 90 | 4 |
| 95 | 4 |

**Sensitivity analysis**

This is also called the ‘what if’ analysis. This is a behavioral approach that uses a number of possible values for a given variable. It is a way of analyzing changes in projects NPV, IRR for a given change in one decision variable.

**FINANCIAL AND OPERATING LEVERAGE**

1. OPERATING LEVERAGE

*Business risk*is the risk associated with operating cash flows. Operating cash flows are not certain because neither do the revenues nor the expenditures that comprise the cash flows.

* ***Revenues:*** depending on economic conditions and the actions of competitors, prices or quantity of sales (or both) may be different from what is expected. This is ***sales risk***.
* ***Expenditures:*** operating costs are comprised of fixed costs and variable costs. The greater the fixed component of operating costs, the less easily a company can adjust its operating costs to changes in sales.

The mixture of fixed and variable costs depends largely on the type of business. For example, fixed operating costs make up a large portion of an airline’s operating costs: No matter how many passengers are flying, the airline still needs to pay gate fees, pay a pilot, and buy fuel. The variable costs for an airline—the costs that change depending on the number of passengers—amount to a little bit of fuel and the cost of the meal.

Even within the same line of business, companies can vary their fixed and variable costs. For example, an airline could develop a system that allows it to vary the number of cabin stewards and baggage handlers according to passenger traffic, varying more of its operating costs as demand changes.

We refer to the risk that comes about from the mix of fixed and variable costs as ***operating risk***. The greater the fixed operating costs relative to variable operating costs, the greater the operating risk. Let’s take a look at how operating risk affects cash flow risk. The proportion fixed costs to total costs of a corporation is called **Operating leverage**. The higher the degree of operating leverage, the riskier is the firm.

Remember back in economics when you learned about elasticity? That’s a measure of the sensitivity of changes in one item to changes in another. We can look at how sensitive a firm’s operating cash flows are to changes in demand, as measured by unit sales. We’ll calculate the operating cash flow elasticity, which we call the ***degree of operating*** ***leverage (DOL)***. The degree of operating leverage is the ratio of the percentage change in operating cash flows to the percentage change in units sold.

Let’s simplify things and assume that we sell all that we produce in the same period. Then,

DOL=

**Example**

ABC Company LTD sells a unit of its product at Ksh. 30.00. If the variable cost per unit is Ksh. 20.00, and the total fixed cost is Ksh. 5000, calculate the DOL when units sold rise from 1000 units to 1500 units.

Solution

|  |  |  |
| --- | --- | --- |
|  | 1000 units sold | 1500 units sold |
| Sales | Ksh. 30,000.00 | 45,000.00 |
| Variable costs | (20,000.00) | (30,000.00) |
| **Contribution** | **10,000.00** | **15,000.00** |
| Less fixed cost | (5,000.00) | (5,000.00) |
| **Operating cash flow** | **5000.00** | **10,000.00** |
|  |  |  |

Percentage change in operating cash flows= 100% (CALCULATE)

Percentage change in units sold = 50% (CALCULATE)

DOL= 100%/50% = 2

Operating cash flows doubled when units sold increased by 50%.

What if the number of units decreases by 25%, from 1,000 to 750, what is the DOL?

We can represent the degree of operating leverage in terms of the basic elements of the price per unit, variable cost per unit, number of units sold, and fixed operating costs. How much do operating cash flows change when the number of units sold changes? It changes by the difference between the price per unit and the variable cost per unit—called the contribution margin—times the change in units sold. The percentage change in operating cash flows for a given change in units sold is:

Q is the units sold (1000 base in this case)

P is the price per unit

V is the variable costs per unit

F is the fixed cost.

Applying the formula for DOL using the data in the example above, we can figure out the sensitivity to change in units sold from 1,000 units:

= 2

A DOL of 2.0 means that a 1% change in units sold results in a 1% \* 2.0 = 2% change in operating cash flow. Why do we specify that the DOL is at a particular quantity sold (in this case 1,000 units)? Because the DOL will be different at different numbers of units sold. For example, at 10,000 units, what is the DOL? (Calculate, and you should get 1.5).

Note that at breakeven point, there are no operating profits and the DOL is undefined. Both sales risk and operating risk influence a firm’s operating cash flow risk. And both sales risk and operating risk are determined in large part by the type of business the firm is in. But management has more opportunity to manage and control operating risk than they do sales risk.

**FINANCIAL LEVERAGE**

***Financial risk*** is the risk associated with how a company finances its operations. If a company finances with debt, it is a legally obligated to pay the amounts comprising its debts when due. By taking on fixed obligations, such as debt and long-term leases, the company increases its financial risk. If a company finances its business with equity, either generated from operations (retained earnings) or from issuing new equity, it does not incur fixed obligations.

It is worth noting that a company with a degree of debt (i.e., bonds) in its capital structure will be worth more than an all equity firm. Why? Remember the INTEREST TAX SHIELD that we studied in valuation- the reduction in taxes (and subsequent increased profitability) as a result of the tax allowability of interest on bonds. Beyond a certain point, however, debt results in FINANCIAL DISTRESS, especially when a firm is unable to honor fixed debt obligations. The proportion of debt to total capital in a corporation is called **Financial Leverage**. The higher the degree of financial leverage, the higher the probability of financial distress, and hence the riskier the firm.

The more fixed-cost obligations (i.e., debt) incurred by the firm beyond a certain point, the greater its financial risk. We can quantify this risk somewhat in the same way we did for operating risk, looking at the sensitivity of the cash flows available to owners when operating cash flows change. This sensitivity, which we refer to as the ***degree of financial leverage (DFL)***, is:

DFL=

The cash flows to owners are equal to operating cash flows, less interest and taxes. If operating cash flows change, how do cash flows to owners change? Suppose operating cash flows change from Ksh. 5,000 to Ksh. 6,000 and suppose the interest payments are Ksh. 1,000 and, for simplicity and wishful thinking, the tax rate is 0%:

|  |  |  |
| --- | --- | --- |
|  | **Operating Cash Flow of Ksh. 5,000** | **Operating Cash Flow of Ksh. 6,000** |
| Operating cash flow | 5000.00 | 6000.00 |
| Less interest | (1000.00) | (1000.00) |
| Less taxes | 0 | 0 |
| Cash flow to owners | 4000.00 | 4000.00 |

A change in operating cash flow from Ksh.5, 000 to Ksh. 6,000—a 20% increase—increased cash flows to owners by Ksh. 1,000—a 25% increase. Calculate the DFL.

What if, instead, our fixed financial costs (interest) are Ksh. 3,000? A 20% change in operating cash flows results in a 50% change in the cash flows available to owners:

|  |  |  |
| --- | --- | --- |
|  | **Operating Cash Flow of Ksh. 5,000** | **Operating Cash Flow of Ksh. 6,000** |
| Operating cash flow | 5000.00 | 6000.00 |
| Less interest | (3000.00) | (3000.00) |
| Less taxes | 0 | 0 |
| Cash flow to owners | 2000.00 | 3000.00 |

Using more debt financing increases the sensitivity of owners’ cash flows.

We can write the sensitivity of owners’ cash flows to a change in operating cash flows as:

Q is the units sold

P is the price per unit

V is the variable costs per unit

F is the fixed cost.

I is the fixed financing costs (interest on debt)

If

Number of units sold = 1,000

Price per unit = Ksh. 30

Variable cost per unit = Ksh.20

Fixed operating costs = Ksh.5, 000

Fixed financing costs = Ksh.1, 000

Then

= 1.25

Again, we need to qualify our degree of leverage by the level of production since DFL is different at different levels operating cash flows.

The firm must produce and sell a sufficient number of units to make a profit for owners. How many units are necessary? The break-even number of units considering both operating (Fixed costs) and financial costs (Interest), indicated as

Combining a firm’s degree of operating leverage with its degree of financial leverage results in the degree of total leverage (DTL), a measure of the sensitivity of the cash flows to owners to changes in unit sales:

DTL=

OR simply DTL= DOL x DFL

Suppose that;

Number of unit sold = 1,000

Price per unit = Ksh. 30

Variable cost per unit = Ksh. 20

Fixed operating cost = Ksh. 5,000

Fixed financing cost = Ksh. 1,000

Calculate the degree of total leverage at 1000 units.

1. DOL= 2 (Calculate)
2. DFL= 1.25 (calculate)
3. DTL= DOL x DFL= 2 x 1.25 = 2.50

OR

= 2.50.

In the case of operating leverage, the fixed operating costs act as a fulcrum: The greater the proportion of operating costs that are fixed, the more sensitive is operating cash flows to changes in sales. In the case of financial leverage, the fixed financial costs, such as interest, act as a fulcrum: The greater the proportion of financing with fixed cost sources, such as debt, the more sensitive cash flows available to owners are to changes in operating cash flows. Combining the effects of both types of leverage, we see that fixed operating and financial costs together act as a fulcrum that increases the sensitivity of cash flows available to owners to changes in the number of units sold.

**Exercises**

1. The Gearing Company has provided you with the following information regarding their operating and financing costs:

Price per unit = Ksh. 50

Variable cost per unit = Ksh. 30

Fixed operating cost = Ksh. 100,000

Fixed financing cost = Ksh. 50,000

a. Calculate its degree of operating leverage at 10,000 units sold.

b. Calculate its degree of financial leverage at 10,000 units sold.

c. Calculate its degree of total leverage at 10,000 units sold.

d. If there is a 1% increase in units sold, what do you expect to be the change in operating cash flows?

e. If there is a 3% decrease in units sold, what do you expect to be the change in cash flows to owners?

1. Suppose that the contribution margin is Ksh. 55 per unit. If fixed costs (operating and financing combined) are Ksh.10 million, what is the break-even number of units produced and sold?

3. The Jonhaux Company produces a product that has a contribution per unit of Ksh. 40. Fixed operating costs are Ksh. 140,000. The Jonhaux Company currently has Ksh. 10 million of bonds outstanding with a coupon rate of 5%.

a. What is the current break-even number of units for Jonhaux considering all fixed costs?

b. The board of Jouhaux is considering a proposal to issue Ksh.1 million additional bonds, with a coupon rate of 6%. How would this proposed financing affect the break-even point?

c. If 20,000 units are produced and sold, what is the degree of operating leverage, the degree of financial leverage, and the degree of total leverage under the current and proposed financial structures?

**Suggested further reading:**

* Fabozzi- Peterson, ***Financial management and analysis, second edition***, John Wiley & Sons, Inc., Hoboken, New Jersey (2003).
* Brealey−Meyers: ***Principles of Corporate Finance, Seventh Edition***, the McGraw−Hill Companies, 2003.