What is Financial Market

A financial market is a word that describes a marketplace where bonds, equity, securities, currencies are traded. Few financial markets do a security business of trillions of dollars daily, and some are small-scale with less activity. These are markets where businesses grow their cash, companies decrease risks, and investors make more cash.

Meaning of Financial Markets

A Financial Market is referred to space, where selling and buying of financial assets and securities take place. It allocates limited resources in the nation's economy. It serves as an agent between the investors and collector by mobilising capital between them.

In a financial market, the stock market allows investors to purchase and trade publicly companies share. The issue of new stocks are first offered in the primary stock market, and stock securities trading happens in the *secondary market*.

Types of Financial Markets

- **Over the Counter (OTC) Market –** They manage public stock exchange, which is not listed on the NASDAQ, American Stock Exchange, and New York Stock Exchange. The OTC market dealing with companies are usually small companies that can be traded in cheap and has less regulation.
- **Bond Market –** A financial market is a place where investors loan money on bond as security for a set if time at a predefined rate of interest. Bonds are issued by corporations, states, municipalities, and federal governments across the world.
- **Money Markets –** They trade high liquid and short maturities, and lending of securities that matures in less than a year.
- **Derivatives Market –**They trades securities that determine its value from its primary asset. The derivative contract value is regulated by the market price of the primary item — the derivatives market securities, including futures, options, contracts-for-difference, forward contracts, and swaps.
- **Forex Market –** It is a financial market where investors trade in currencies. In the entire world, this is the most liquid financial market.

Functions of Financial Market

Mentioned below are the important functions of the financial market.

- It mobilises savings by trading it in the most productive methods.
- It assists in deciding the securities price by interaction with the investors and depending on the demand and supply in the market.
- It gives liquidity to bartered assets.
- Less time-consuming and cost-effective as parties don't have to spend extra time and money to find potential clients to deal with securities. It also decreases cost by giving valuable information about the securities traded in the financial market.

Classification of Financial Market

The financial market can be classified into three different forms.

1. **By Nature of Claim**

    1. **Debt Market –** It is a market where fixed bonds and debentures or bonds are exchanged between investors.
    2. **Equity Market –** It is a place for investors to deal with equity.

2. **By Maturity of Claim**

    1. **Money Market –** It deals with monetary assets and short-term funds such as a certificate of deposits, treasury bills, and commercial paper, etc. which mature within twelve months.
    2. **Capital Market –** It trades medium and long-term financial assets.

3. **By Timing of Delivery**

    1. **Cash Market –** It is a market place where trade is completed in real-time.
    2. **Futures Market –** Here, the delivery or compensation of products are taken in the future specified date.

4. **By Organizational Structure**

    - **Exchange-Traded Market –** It has a centralised system with a patterned procedure.
    - **Over-the-Counter Market –** It has a decentralised organisation with customised procedures

What are Financial Markets and Institutions?

Financial markets dispense efficiently flow of investments and savings in the economy and facilitate the growth of funds for producing goods and services. The right blend of financial products and instruments and financial markets and institutions fuels the demands of investors, receiver and the overall economy of a country.

Financial markets (bonds and stocks), instruments (derivatives, bank CDs, and futures), and institutions (banks, pension funds, insurance companies, and mutual funds) give the investors the opportunities to specialize in specific services and markets. As quoted by Demirgcc-Kunt and Levine "Financial markets and financial institutions together contribute to economic growth and not the relative mix of these two factors".

Concept of Financial Market

In an economy, money flows in circles. One very important aspect of this is turning savings into investment. Every business needs funds to get started and to run in the long term. These funds will be made available to them through various functions of the financial market. Let us learn about the concept of the financial market.

To understand the structure and the importance of financial markets, we must first understand their role in our economy. Now every economy has two basic sectors when it comes to funds

– savings and investment. Savings is what we refer to when individual households save money. And investment is the capital that industries require to start and run their businesses.

Now the economy must provide a link between savings and investments. One obvious way to convert savings into investment is via banks. Alternatively, savings can be turned into investments through financial markets. Households will use their savings to buy financial instruments and commodities such as shares, stocks, debentures etc. This is the whole concept of the financial market.

This way a financial market serves an allocative function and mobilize idle funds to be put to more productive use. When the allocation of funds is done well, there are some added benefits, such as

- The rate of return on their savings will be higher for householders, than what a bank offers.
- The resources will be invested in firms that have high productivity and show great promise in the economy.

Functions of Financial Markets

1] **Mobilizing Funds**

In a successful economy, money should never sit idle. Investors that have savings must be linked with industries that require investment. So financial markets will enable this transaction, where investors can invest their savings according to their choices and risk assessment. This will utilize idle funds and the economy will boom.

2] **Price Determination**

The financial commodities traded in a financial market get their prices from the rules of demand and supply. The investors or the household are the suppliers of the funds, and the industries are the ones demanding them. The interaction between the two and other market factors will help determine the prices.

3**] Liquidity**

The instruments sold in the financial market tend to have high liquidity. This means at any given time the investors can sell their financial commodities and convert them to cash in a very short period. This is an important factor for investors who do not want to invest long term.

4] **Easy Access**

Both investors and industries need each other. The financial market provides a platform where both the buyers and sellers can find each other easily without spending too much time, money or effort.

Money Market and Capital Market Instruments

Financial Market plays a very important role in development of any country because it is place where liquidity requirement who needs money like industries to meet their expansion plans and those who want to earn better rate of interest on the surplus funds are met .Individuals and financial institution having surplus money come to earn better rate of interest Financial market

is a platform where buyers and sellers are involved in sale and purchase of financial products like shares, mutual funds, certificate of deposit ,bonds and so on.

Any industry like reliance ,tatas or government needs money to meet liquidity requirement come to financial market .Financial market act as intermediary between those who need money and who want to invest their money to earn better rate of interest.

Financial market are divided in two types depends on duration for which they need money.

There are two types of financial market :

1. Money Market
2. Capital Market

Money Market

It is one part of financial market where instruments like securities, bonds having short term maturities usually less than one year are traded is known as Money market. Organization or Financial institutions having short term money requirement less than one year to meet immediate needs like buying inventories, raw material, paying loans come to Money Market. It involves lending and borrowing of short term funds. Money market instruments like treasury bills, certificate of deposit and bills of exchange are traded their having maturity less than one year. Investment in money market is safe but it gives low rate of return.

Money Market is regulated by R.B.I in India and instrument having maturity less than one year usually traded in money markets

Major Players in Money Market: -

1. RBI
2. Central Government
3. State Governments
4. Banks
5. Financial Institutions
6. Micro Finance Institutions
7. Foreign Institutional Investors (FII)
8. Mutual Funds

Money Market Instruments

As per the Reserve Bank of India, the term 'Money Market' is used to define a market where short-term financial assets with a maturity up to one year are traded. The assets are a close substitute for money and support money exchange carried out in the primary and secondary market. In other words, the money market is a mechanism which facilitate the lending and

borrowing of instruments which are generally for a duration of less than a year. High liquidity and short maturity are typical features which are traded in the money market. The non-banking finance corporations (NBFCs), commercial banks, and acceptance houses are the components which make up the money market.

Money market is a part of a larger financial market which consists of numerous smaller sub-markets like bill market, acceptance market, call money market, etc. Besides, the money market deals are not out in money / cash, but other instruments like trade bills, government papers, promissory notes, etc. But, the money market transactions can't be done through brokers as they have to be carried out via mediums like formal documentation, oral or written communication.

What are Money Market Instruments?

As the name suggests, money market instrument is an investment mechanism that allows banks, businesses, and the government to meet large, but short-term capital needs at a low cost. They serve the dual purpose of allowing borrowers meet their short-term requirements and providing easy liquidity to lenders.

Examples of Money Market Instrument

- Banker's Acceptance
- Treasury Bills
- Repurchase Agreements
- Certificate of Deposits
- Commercial Papers

Features of Money Market Instruments

- **Liquidity**: They are considered highly liquid as they are fixed-income securities which carry short maturity periods of a year or less.
- **Safety**: Since the issuers of money market instruments have strong credit ratings, it automatically means that the money instruments issued by them will also be safe.
- **Discounted price**: One of the main features of money market instruments is that they are issued at a discount on their face value.

Functions of Money Market Instruments

Provides Funds

The Money Market Instruments help to provide short-term funds to the private and public institutions who need finance for their working capital requirements. These funds are provided by discounting the trade bills through commercial banks, brokers, discount houses, and acceptance houses. Therefore, the money market instruments, in turn, can help the development of trade, industry and commerce within and outside the country.

Use of Surplus Funds

Money market instruments provide opportunity to the banks and financial institutions to use their surplus funds profitably for a small period of time. They include commercial banks as well as large non-financial corporations, states and other local governments.

No need to borrow from banks

In case of a developed money market, there is no need to borrow money from commercial and central bank. However, if there is a short of cash requirement, they can call in some of their loans from the money market. Also, the most of the commercial banks would rather prefer to recall their loans than recalling it from the central banks at a higher rate of interest.

Helps Government

The money market instruments prove helpful to the government in borrowing short-term funds on the basis of treasury bills at low interest rates. Besides, it would lead to inflationary pressures in the economy if the Government had to issue paper money or borrow from the central bank.

Helps in Monetary Policy

The existence of a well-developed money market will help in successfully implementing the monetary policies of central bank. Is only through money market the central banks can control the banking system and therefore Influence commerce and the industry.

Helps in Financial Mobility

The Monet market helps in financial stability by smoothening the transfer for funds from one sector to another. And, financial mobility is important for the development of commerce and industry.

Promotes Liquidity and Safety

Apart from encouraging savings and investments, the money market instruments promote liquidity and safety of financial assets.

Equilibrium between Demand and Supply of Funds

The money market brings a balance between the demand and supply of loanable funds by allocating saving into investment channels.

Economy in Use of Cash

The money market instruments deal with assets which are not cash but equivalent to cash and thus help in economizing the use of cash. And hence it can be considered as a convenient way to transfer funds from one place to another.

Important Objectives of Money Market Instruments

Following are the objectives of served by a money market:

- The money markets not only help in the storage of short-term surplus funds but also help in lowering short term deficits.

- Money markets helps the central bank in regulating liquidity in the economy.
- Money market assists the short-term fund users to fulfill their needs at a very reasonable rate.
- It helps in the development of capital market and trade and industry.
- Money markets help in designing effective monetary policies.
- It also facilitates in streamlined functioning of commercial banks.

Instruments of the Money Market

Following are the types of Money Market Instruments:

Promissory Note:

A promissory note is one of the earliest type of bills. It is a financial instrument with a written promise by one party, to pay to another party, a definite sum of money by demand or at a specified future date, although it falls in due for payment after 90 days within three days of grace. However, Promissory notes are usually not used in the business, but USA is an exception.

Bills of exchange or commercial bills

The bills of exchange can be compared to the promissory note; besides it is drawn by the creditor and is accepted by the bank of the debater. The bill of exchange can be discounted by the creditor with a bank or a broker. Additionally, there is a foreign bill of exchange which becomes due for payment from the date of acceptance. However, the remaining procedure is the same for the internal bills of exchange.

Treasury Bills (T-Bills)

- The Treasury bills are issued by the Central Government and known to be one of the safest money market instruments available. Besides, they carry zero risk, so the returns are not attractive. Also, they come with different maturity periods like 1 year, 6 months or 3 months and are also circulated by primary and secondary markets. The central government issues them at a lesser price than their face-value.
- The difference of maturity value of the instrument and the buying price of the bill, which is decided with the help of bidding done via auctions, is basically the interest earned by the buyer.
- There are three types of treasury bills issued by the Government of India currently that is through auctions which are 91-day, 182-day and 364-day treasury bills.

Call and Notice Money

Call and Notice Money exist in the market. With respect to Call Money, the funds are borrowed and lent for one day, whereas in the Notice Market, they are borrowed and lent up to 14 days, without any collateral security. The commercial banks and cooperative banks borrow and lend funds in this market. However, the all-India financial institutions and mutual funds only participate as lenders of funds.

Inter-bank Term Market

The inter-bank term market is for the cooperative and commercial banks in India who borrow and lend funds for a period of over 14 days and up to 90 days. This is done without any collateral security at the rates determined by markets.

Commercial Papers (CPs)

- Commercial papers can be compared to an unsecured short-term promissory note which is issued by top rated companies with a purpose of raising capital to meet requirements directly from the market.
- They usually have a fixed maturity period which can range anywhere from 1 day up to 270 days.
- They offer higher returns as compared to treasury bills. They are automatically not as secure in comparison. Also, Commercial papers are traded actively in secondary market.

Certificate of Deposits (CD's)

- This functions as a deposit receipt for money which is deposited with a financial organization or bank. The Certificate of Deposit is different from a Fixed Deposit receipt in two ways. i. Certificate of deposits are issued only of the sum of money is huge. ii. Certificate of deposit is freely negotiable.
- The RBI first announced in 1989 that the Certificate of Investments have become the most preferred choice of organization in terms of investments as they carry low risk whilst providing high interest rates than the Treasury bills and term deposits.
- CD's are also issued at discounted price like the Treasury bills and they range between a span of 7 days up to 1 year.
- The Certificate of Deposit issued by banks range from 3 months, 6 months and 12 months.
- Note: CD's can be issued to individuals (except minors), companies, corporations, funds, non–resident Indians, etc.

Banker's Acceptance (BA)

- A Banker's Acceptance is a document that promises future payment which is guaranteed by a commercial bank. Also, it is used in money market funds and will specify the details of repayment like the date of repayment, amount to be paid, and details of the individual to which the repayment is due.
- BA's features maturity periods that range between 30 days up to 180 days.

Repurchase Agreements (Repo)

- Repo's are also known as Reverse Repo or as Repo. They are loans of short duration which are agreed by buyers and sellers for the purpose of selling and repurchasing.
- However, these transactions can be carried out between RBI approved parties.

- Note: Transactions can only be permitted between securities approved by RBI like the central or state government securities, treasury bills, central or state government securities, and PSU bonds.

Capital Market

Capital market is also very important part of Indian financial system .This segment of financial market meant to meet long term financial needs usually more than one year or more .Companies like manufacturing , infrastructure power generation and governments which need funds for longer duration period raise money from capital market. Individuals and financial institutions who have surplus fund and want to earn higher rate of interest usually invest in capital market .**S.E.B.I. regulate the capital market in India** .It set the transparent mechanism rules and regulations for investors and borrowers .It task is to protect the interest of investors and promote the growth of capital market.

Capital market can be primary market and secondary market . In primary market new securities are issued where as in secondary market already issue securities are traded.

Capital market is divided into two

1.Equity

2.Bond

Capital Market Instruments

1. Shares

2. Debentures

3. Bonds

Equities

Equity market generally know as stock .In this company want to raise money issue shares in share market like B.S.E.or N.S.E.to individual or financial institutions who want to invest their surplus money

Shares can be issued in two ways:

If company issuing share for first time that it is know as I.P.O.(Initial Public Offering).IPO of any company issued in primary market and if company issuing shares for second or third time than it is know as FPO(Follow on Public Offering) and trading of already issued shares take place in secondary market.

Share gives ownership right to individuals who subscribe to it ,in this way company has to dilute his ownership right Same way public sector undertakings dilute up to 49 percent of their ownership and keep remaining 51 percent with them so that they have majority control.

A person earns from shares is company make profit which is distributed among share holders know as dividend and if company make loss value of share also falls so shares are high risk instruments

Bond or Debt

Bond market is also know as Debt market. A debt instrument is used by government or organization to generate funds for longer duration. The relation between person who invest in debt instrument is of lender and borrower .This gives no ownership right .A person receives fixed rate of interest on debt instrument.

If any company or organization want to raise money for long term purpose without diluting his ownership that it is know as Debentures. These are backed by security so there is no risk involves but return on these instrument is low as compared to shares .Company pay fixed rate of interest on debentures.

If government want to generate funds to meet long term needs like infrastructure it issue bonds know as sovereign bonds which are backed by government security so there is no risk

Characteristics of Financial Instruments

1. **Term deposits**: These are cash deposits remunerated at a fixed maturity date and rate, determined in advance.

Characteristics:

- Yield: payment of interests;
- Duration: short-term (up to 4 years), medium-term (4-8 years) or long-term (more than 8years);
- Interests: interests depend on the terms and conditions of the deposit; e.g. fixed interest for the entire duration or variable interest often linked to financial market rates (e.g. LIBOR or EURIBOR).

2. **Bonds**: A bond is a certificate or evidence of a debt on which the issuing company or governmental body promises to pay the bondholders a specified amount of interest for a specified length of time, and to repay the loan on the expiration date. A bond may be in bearer or registered form. At issuance, the par value of one bond represents a fraction of the total amount of the loan. The interest payments on bonds may be either fixed or variable. The duration of the loan as well as the terms and conditions of repayment are determined in advance. Certain structured products may take the form of a bond and, therefore, these products will be described under the chapter "structured products". The purchaser of a bond (the creditor) has a claim against the issuer (the debtor).

Characteristics:

- Yield: interest payments, possible increases in value (difference between the purchase/issuance price and the sale/redemption price);
- Duration: short-term (up to 4 years), medium-term (4-8 years) or long-term (more than 8years); ν Currency: national currency of the investor or foreign currency. It can be provided that repayment of capital and interest payments can be made in different currencies. In such a case,

an option can be associated to the bond in order to limit the exchange rate risk;

- Form: individual documents with specific nominal values (which can be delivered to the investor) or collectively represented by a global certificate, which is deposited with a custodian bank;
- Issue price: at par (100% of the nominal value), below par (the issue price is lower than the nominal value) or above par (the issue price is higher than the nominal value);
- Place of issuance: it can be the domestic market of the investor or also a foreign market;
- Repayment:
  - ✓ scheduled repayment: unless otherwise provided for or unless the issuer becomes insolvent, the loans are repaid either on the maturity date, or through annual instalments (generally after a lockin period), or at different dates determined by drawing lots (generally after a lock-in period);
  - ✓ unscheduled repayment: the issuer may reserve the right to repay at a date he will determine, at his own discretion, at a later stage;
- Interests: interests depend on the terms and conditions of the loan; e.g. fixed interest for the entire duration or variable interest often linked to financial market rates (e.g. LIBOR or EURIBOR). In this latter case, a minimum and/or maximum rate can be provided;
- Particular features (e.g. relations between the issuer and the investor): set out in the terms and conditions of issue of the relevant bond.

3. **Floating rate bonds:** Floating rate bonds can take several forms, such as for instance: Floor floater bonds, which are variable-interest bonds which pay a minimum level of interest. Therefore, in the event that the sum of the reference rate and the spread falls below this level, the investor will receive payment of interests at least at the minimum rate determined in advance. Conversely, for cap floater bonds, the rate of interest paid to the investor is limited to a maximum amount determined in advance. For these bonds, it is not possible to anticipate, as of their issue, the actual yield of the investment since the latter vary according to the fluctuations of market rates.

   For certain variable-interest bonds, it can be provided that the interest rate moves in the opposite direction to market rates (i.e. reverse floating rate bonds). For these medium or long-term bonds, the interest rate payable to the investor is calculated according to the difference between a fixed rate of interest and a reference rate (e.g. 16% minus LIBOR). This means that the investor's interest income rises when the reference rate falls. The price of these bonds is usually subject to higher market fluctuations than the fixed-rate bonds having the same maturity. There are also convertible floating rate bonds which give the investor or the issuer (depending on the terms and conditions of the bonds) the right to convert the note into a normal fixed-interest bond. If the issuer reserves this right, the actual yield of the bond may be lower than that contemplated by the investor.

4. **Zero bonds:** Zero bonds do not have interest coupons attached. Instead of periodic payments of interests, the investor receives the difference between the redemption price and the issue price (in addition to the repayment of the principal amount). Such bonds are usually issued at a discount to their nominal value, and redeemed on maturity at par. The size of the discount granted to the investor depends on the maturity of the bond, the borrower's creditworthiness and prevailing market interest rates. Hence, such bonds offer investors a fixed lump-sum payment at a future date if the bond is held until maturity (which may have various tax implications depending on the countries). On the contrary, if the bond is sold before maturity, the investor will only receive payment of the sale price of the bonds. Therefore, if market interest rates increase, the price of these bonds falls more sharply than for other bonds with the same maturity and credit rating. Moreover, in case of foreign currency denominated zero bonds, there is also an increased exchange rate risk because interest payments are not made on a regular basis over the life of the bond but there is only payment of a lump sum at a future date determined in advance.
5. **Combined-interest bonds or step-up bonds:** For combined-interest bonds or step-up bonds, the investor does not receive interest payments at a single, fixed rate over the entire life of the bond. However, such bonds are similar to fixed-rate bonds in so far as the interest rate is determined in advance and does not depend on fluctuations in market rates. Instead, the rate of interest only changes during the term of the bond, following a pattern agreed at the time of issue. Indeed, with combined-interest bonds, it is agreed that there will be no coupon for the first years of the life of the bond but an above-average coupon will be paid to the investor for the remaining years. These bonds are usually issued and redeemed at par. With step-up bonds, a relatively low coupon is paid initially, and a very high one is paid to the investor for the following years. These bonds are usually issued and redeemed at par.
6. **Phased interest rate bonds:** These bonds are actually a hybrid of fixed and variable-interest notes. They usually have a maturity of 10 years, and pay a fixed coupon for the first years. Afterwards, during a period of several years, the investor will receive interests calculated on the basis of a variable interest rate in line with market rates. For the last years of the life of the bond, the bond reverts to paying a fixed rate of interest to the investor.
7. **Index-linked bonds:** For these bonds, the redemption amount and/or interest payments are determined on the basis of the level of an index or of a managed account determined in advance - at redemption or on the interest payment date – and thus are not fixed. These bonds are often zero bonds. Such bonds are usually issued in two "tranches": bull bonds (bonds which appreciate in value if the index rises) and bear bonds (bonds which appreciate in value if the index falls). The investor runs the risk of price losses if the value of the index falls (bull bonds) or if the value of the index rises (bear bonds).
8. **Subordinated bonds**: For these bonds, investors ought to inquire about the ranking of the debenture compared to other debentures of the issuer since, in case of a bankruptcy of the issuer, those bonds will only be reimbursed after repayment of all higher ranked creditors (preferential and pari passu bonds).

However, generally, the better the position of the creditor in case of insolvency is, the lower the return of the bond will be.

9. **Convertible/warrant bonds**: In this case, the investor is granted the right to exchange the bonds, at a specific time or within a specific period, for shares in the issuer at a ratio determined in advance. There is usually a minimum lock-in period during which an investor cannot exercise his right of conversion. In case the right of conversion is not exercised, the bonds remain fixed-interest notes, repayable at par on maturity. Because they offer a conversion right, such bonds usually offer a lower interest rate than ordinary bonds. The price of these bonds is essentially determined by the price of the underlying shares. Indeed, if the price of the shares drops, the price of the bonds falls as well. Therefore, the risk of price losses is higher than for bonds without conversion rights (but usually lower than the risk of price losses associated to a direct investment in the relevant shares). There are also bonds which give the investor the right to subscribe for shares, in addition to the bond and not as an alternative. This subscription right is certificated by a warrant which is detachable from the bond. This warrant can be traded separately. The shares in the issuer can be purchased by the investor on surrender of the warrant, on terms agreed in advance. The investor continues, in addition hereto, to hold the bond until maturity. As for bonds with conversion rights, the periodic interest payments are usually relatively low. Moreover, the price of such bonds, with the warrant attached, will equally track the price of the underlying shares. If the bonds are without the warrant attached, they amount to traditional bonds and, therefore, their price is mainly determined by market rates. Certain special forms of the bonds described in the preceding paragraph give the holder of the warrant the right to buy or sell another bond determined in advance at a fixed price.
10. **Shares:** A share is a certificate evidencing the rights of the shareholder, to whom it is granted, in a company. Share may take bearer or registered form. One share of stock represents a fraction of the share capital of a corporation.

    Characteristics:

    - Yield: dividend payments and increases in value of the financial instrument are possible;
    - Shareholder's rights: financial and ownership rights; those rights are determined by the law and the articles of incorporation of the issuing company;
    - Transferability: unless otherwise provided by law, the transfer of bearer shares does not, as a matter of principle, require any formalities, as opposed to the transfer of registered shares which is often subject to limitations.

    Bonus certificates: Bonus certificates represent patrimonial rights as defined in the terms and conditions of issue of those bonds.

    Characteristics:

    In general, they come in the form of par value debt instruments that entitle their holder to a part of the profit of the company. As a matter of principle, fixed or variable distribution bonus certificates must be distinguished from bonus certificates with option or conversion right.

11. I**nvestment funds:** An investment fund is a company or an organized joint ownership which is collecting funds from a certain number of investors and which is engaged in reinvesting those funds according to the principle of risk spreading and to make its stockholders or members benefit from the results of its asset management.

    Characteristics:

    - Open-ended funds: in an open-ended fund, the number of shares/units and, consequently, of participants cannot, in principle, be determined. The mutual fund may issue new shares/units or redeem existing shares/units. Towards investors, the mutual fund is obliged to redeem shares/units, at its own expenses, at the agreed redemption price and in line with the contractual provisions;
    - Closed-ended funds: in a closed-ended fund, the issue of shares/units is limited to a number determined in advance. As opposed to open-ended funds, the redemption of the shares/units by the fund is not mandatory. Shares/units may only be sold to third parties or, in some cases, on the stock- exchange. The price of the shares/units depends on market offer and demand.

12. **Derivatives:** Derivatives are financial instruments the value of which varies according to the value of an underlying asset; the underlying asset may be the price of a share, a market index, an interest rate, a currency, the price of raw materials or even another derivative. Concerning derivatives, a distinction must be made in particular between: a) Option transactions, which give to one of the parties the right, but not the obligation, to enter into a transaction. One party (the seller of the option) is irrevocably bound to perform while the other one (the purchaser of the option) is free to exercise the option or not; b) Forward transactions, where the parties enter into a transaction which will have to be performed at a specified date in the future. In a forward transaction, parties bind themselves irrevocably to perform the transaction concluded between them at the specified date. Transactions on such products trigger higher risks of losses and can even lead to the total loss of the invested funds. Since such transactions can lead to margin calls over the life of the product, investors must ensure that they have sufficient liquid assets before entering into such transactions.

13. **Option transactions:** Options are derivative instruments the value of which tracks the evolution of the value of the underlying asset. The purchaser of an option receives, after having paid a premium to his counterpart, the seller of the option, the right to purchase (call) or to sell (put) the underlying asset at maturity or during a certain period for a strike price determined in advance. The characteristics of the option can be standardised or defined on a case-by-case basis between the purchaser and the seller.

    Characteristics:

    - Duration: the duration of the option starts from the day of the subscription until the day of the maturity of the option right;
    - Link between the option and the underlying asset: this link underlines the number of units of the underlying asset that the holder of the option

has the right to purchase (call) or to sell (put) by exercising his option right;

- Strike price: the strike price is equal to the price agreed upon earlier at which the holder of the option may purchase or sell the underlying asset when he exercises his option right;
- Strike date: options which can be exercised on any trading day up until the maturity date are called "American style" options. Options which can be exercised only on their maturity date are called "European style" options. The latter can nonetheless be traded on the secondary market before their maturity if the market is liquid;
- Conditions of exercise: the option can be with physical settlement, in which case the buyer of a call option can demand physical delivery of the underlying asset against payment of the strike price or the buyer of a put option can deliver to the seller of the option the underlying asset, against payment of the strike price by the seller. The option can also be with cash settlement, in which case the difference between the strike price and the market value of the underlying asset is due, provided nonetheless that the option is "in-the-money";
- Options "in-the-money", "out-of-the-money", "at-the-money": A call option is "in-the-money" if the market value of the underlying is higher than the strike price. Conversely, a call option is "out-of-the-money" if the current market value of the underlying asset is lower than the strike price.

A put option is "in-the-money" if the market value of the underlying asset is lower than the strike price. Conversely, a put option is "out-of-the-money" if the current market value of the underlying asset is higher than the strike price. When the market value and the strike price are the same, the option is "in-the-money";

- Price of the option: The price of an option depends on its intrinsic value as well as on a variety of factors (time value), in particular the remaining life of the option and the volatility of the underlying asset. The time value reflects the chance that the option will be "in-the-money". Therefore, this latter value is higher for long duration options with a very volatile underlying asset.
- Margin: over the lifetime of an option, the seller must provide as collateral, either the corresponding amount of the underlying asset or another form of collateral. The margin is determined by the bank. Stock-exchanges stipulate a minimum margin for listed options. If the margin cover provided by the investor proves to be insufficient, the bank is entitled to request additional collateral, sometimes at a very short notice;
- Form:
    - ✓ Option certificates (warrants, listed options): the rights and obligations associated to the relevant option are securitised. They are sometimes listed on the stock-exchange.

- ✓ Traded options: these are standardised options for which the rights and obligations are not securitised and which are traded on certain specific stock-exchanges.
- ✓ Over-the-counter (OTC) options: these are options traded outside a stock-exchange or agreed directly off-exchange between the parties. Their level of standardisation depends on market practices. They can also be tailor-made to meet investors' needs. This type of option is not listed and rarely takes the form of a certificate;

- **Leverage**: every change in the price of the underlying asset entails a proportionally higher change in the price of the option right;
  - ✓ Purchase of a call or a put: the buyer of a call option speculates on a rise of the price of the underlying over the life of the option, which causes an increase in the value of his option right. Conversely, the buyer of a put option benefits from a drop in the price of the underlying;
  - ✓ Sale of a call or a put: the seller of a call option anticipates price drops of the underlying asset whereas the seller of a put profits from a rise in the value of the underlying asset.

14. **Forward transactions Futures**: are contracts traded on a stock-exchange and standardised as regards the quantity of the underlying asset and as regards the maturity date of the transaction. Over-the-counter (OTC) or forward contracts are contracts that are not traded on a stock-exchange and which may be standardised or individually negotiated between purchaser and seller.

Characteristics:

- ✓ Initial required margin: be it a future purchase or sale of an underlying asset, an initial margin is fixed when the contract is concluded. This margin is generally expressed in percentage of the value of the contract;
- ✓ Variation margin: during the entire life of the contract, a variation margin is periodically determined and required from the investor. It represents the accounting benefit or loss, derived from the modification of the contractual price or the price of the underlying asset. The variation margin may exceed the initial required margin by far. The computation method for the variation margin, be it during the life of the contract or at closing, depends on the stock-exchange rules and on the specific contractual provisions of each contract. The investor must immediately provide the bank with variation margin upon request from the latter;
- ✓ Liquidation: in general, the investor may, at any time during the life of the contract, sell off or liquidate the contract before maturity, either by selling the contract or by entering into an opposite contract as regards the delivery and reception obligations. In this latter case, the provisions of the opposite contract will be such as the delivery and reception obligations arising from both contracts cancel one another out. The liquidation puts an end to the risk positions incurred: gains and losses accumulated until liquidation are realised;
- ✓ Settlement: contracts that have not been sold off until settlement must be performed by the relevant parties. Contracts having as underlying tangible

property assets may be performed by effective delivery of the assets as well as by cash settlement (although physical delivery settlement is more common) while contracts having as underlying reference rates (to the exception of currencies) cannot be performed by actual delivery of the underlying. In case of an effective delivery of the underlying, the contractual obligations need to be performed in full, whereas for cash settlement contracts, only the difference between the price agreed upon when concluding the contract and the market price upon performance of the contract is payable. Therefore, investors need more available funds for contracts providing for the actual delivery of the underlying asset than for contracts providing for cash settlement.

15. **Structured products with capital protection (e.g. GROI, PIP, PEP, GRIP)**

Characteristics:

- ✓ Two elements: such products consist generally of two elements: a fixed-income investment (e.g. bond or money market investment) and an option or combination of options. This enables the investor to participate in the price movements of one or more underlying assets while at the same time limiting potential losses. The capital protection component may, if applicable, only cover a portion of the capital invested. Moreover, the participation and protection elements can be separated into two separate components in order to ensure the independency of the two components or even to permit to sell them separately;
- ✓ Capital: fully or partially secured (upon maturity). The capital protection component determines how much of the nominal value of the structured product will be paid out to the investor, irrespective of any price movements in the option component;
- ✓ Yield: the option component or direct investment in a risky underlying asset determines how and to what extent the investor can benefit from price movements in the underlying. Therefore, this component determines the potential return over and above the capital protection component;
- ✓ Flexibility: these products can be tailored to suit the needs of each client and are adaptable to all types of underlyings.

16. **Structured products without capital protection:** convertible reverse or discount certificate

Characteristics:

- ✓ Term product: the investor receives a guaranteed coupon in a given currency but accepts a risk on his capital on maturity;
- ✓ Underlying assets: shares, indexes, baskets, etc…;
- ✓ Capital: protected if the market value of the underlying is not lower than the strike price on maturity;
- ✓ Repayment: in cash or by delivery of the underlying, at a strike price determined in advance, if this strike price has fallen or been exceeded. On the maturity date, if the price of the underlying asset is higher than the strike price, the investor receives the guaranteed coupon plus 100% of the capital initially invested (in cash). If the price of the underlying asset is lower than the strike price, the investor receives the guaranteed coupon plus the underlying asset at the strike price;

- ✓ Flexibility: such products can be adapted to all types of underlyings;
- ✓ Discount certificate: in this case, the investor receives the coupon only upon maturity but originally purchases this product at a discount.

17. **Collateralised debt obligations (CDO)**

Characteristics: Collateralised debt obligations are also structured products based on an underlying basket or portfolio of debt instruments, which can be bonds, loans and/or credit default swaps. A CDO is usually divided into several tranches providing different levels of risk exposure for the basket of underlying debt instruments. Commonly, the most junior tranche is an "own funds" tranche and the tranches then go up in increasing seniority and correspondingly higher credit ratings.

18. **Covered options (e.g. BLOC warrants, DOCUs, GOALs)**

Characteristics:

- ✓ Limited loss: when purchasing a covered option, the investor purchases an underlying asset (share, bond or currency) and, at the same time, writes a call option on that same asset. In return, the investor is paid a premium. The latter limits his loss in case the price of the underlying falls;
- ✓ Limited potential gain: the potential return from any increase in the underlying asset's market value is limited to gains up to the option's strike price;
- ✓ Collateral: for traditional covered options, the investor must lodge the underlying asset as collateral, thus becoming a passive investor;
- ✓ Synthetic covered options: this type of product is based on the idea of duplicating or reproducing traditional covered options. But this duplication is achieved by means of a single transaction. Both the purchase of the underlying asset and the writing of the call option are carried out synthetically using derivatives. The purchase price of such a product is identical to that of the underlying minus the premium received for the sale of the call option. Hence, the synthetic product is sold more cheaply than its underlying;
- ✓ Settlement: either cash settlement or physical delivery of the underlying are possible upon maturity: If the market value of the underlying is higher than the strike price, the investor is paid a specified cash amount as settlement. If, however, it is lower than the strike price, the investor receives physical delivery of the underlying asset.

19. **Certificates/EMTN (e.g. PERLES)**

Characteristics:

- Diversification: a certificate entitles an investor to purchase a right which is based on several underlyings or has a value derived from several indicators;
- Main types of certificates: o index certificates: these reflect a whole market being based on an official index (e.g. DAX, CAC, etc…);
  - ✓ region certificates: these are derived from a series of indexes or companies from a certain region (e.g. Eastern Europe, Pacific area, etc…);
  - ✓ basket certificates: these are derived from a selection of national or international companies active in the same sector (e.g. biotechnology, telecoms, etc..), indexes, bonds or other underlyings;
- Guarantee: these certificates are securitised;
- Maturity and trading: the maturity of these certificates usually ranges between one to three years. However, these certificates can be traded at any time;

- Limited duration: they are incorporated in an instrument and thus these certificates have a limited duration;
- Investor's rights: no voting right and no right to dividend/interests in relation to the underlying assets;
- Repayment: repayment occurs upon maturity and equals:
  - ✓ a set amount per index point for an index certificate;
  - ✓ the difference between the market value upon maturity and the strike price for a region or basket certificate.

20. **Alternative" investments and off shore funds**

Characteristics: An "alternative investment" consists in an investment in a domestic or foreign investment fund the style of which is completely different from traditional investments in shares and bonds due to the type of investments made by the relevant fund. Hedge funds are the most usual alternative investments. Their investment style is often based on short sales, leverage effects and derivatives. Hedge funds can choose freely the products and markets (including emerging markets) in which they want to invest and their trading methods. Such funds usually set high minimum investment requirements for investors. The remuneration of the managers of these funds is often linked to the performance of said fund. Investments in private equity funds are also included in this category (venture capital, financing of acquisitions of companies). The word "off shore" funds points to investment funds located in offshore centres, like for example the Bahamas, the Bermudas, the Cayman Islands, Panama or the Dutch West Indies. Each fund has its own risks and therefore it is not possible to describe in details the risks associated to investments in such products in the present document but it is only possible to provide summary information. Consequently, the investor must inquire, on a case-by-case basis, before investing in such products, for instance by consulting the prospectus of the fund.

21. **Investments in real estate:** Real estate investments comprise investments into "real" assets, such as residential housing, office buildings, retail properties, etc… Characteristics: Such investments are generally made through investment funds or listed investment companies, thus providing a certain degree of diversification. Such diversification generally reduces portfolio volatility and serves as a hedge against inflation. Some real estate investments may have elements of private equity investments.

Derivatives: Meaning, participants & types

Derivatives are contracts which derive their value from the underlying asset. These are widely used to speculate and make money. Some use them as a risk transfer vehicle as well.

What are derivatives?

Derivatives are financial contracts whose value is dependent on an underlying asset or group of assets. The commonly used assets are stocks, bonds, currencies, commodities and market indices. The value of the underlying assets keeps changing according to market conditions. The basic principle behind entering into derivative contracts is to earn profits by speculating on the value of the underlying asset in future. Imagine that the market price of an equity share may go up or down. You may suffer a loss owing to a fall in the stock value. In this situation, you may

enter a derivative contract either to make gains by placing accurate bet. Or simply cushion yourself from the losses in the spot market where the stock is being traded.

Why do investors enter derivative contracts?

Apart from making profits, there are various other reasons behind the use of derivative contracts. Some of them are as follows:

- **Arbitrage advantage**

Arbitrage trading involves buying a commodity or security at a low price in one market and selling it at a high price in the other market. In this way, you are benefited by the differences in prices of the commodity in the two different markets.

- **Protection against market volatility**

A price fluctuation of asset may increase your probability of losses. You can look for products in the derivative market which will help you to shield against a reduction in the price of stocks that you own. Additionally, you may buy products to safeguard against a price rise in case of stocks that you are planning to buy.

- **Park surplus funds**

Some individuals use derivatives as a means of transferring risk. However, others use it for speculation and making profits. Here, you can take advantage of the price fluctuations without actually selling the underlying shares.

Who participates in derivatives market?

Each type of individual will have an objective to participate in the derivative market. You can divide them into following categories based on their trading motives:

- **Hedgers**

These are risk-averse traders in stock markets. They aim at derivative markets to secure their investment portfolio against the market risk and price movements. They do this by assuming an opposite position in the derivatives market. In this manner, they transfer the risk of loss to those others who are ready to take it. In return for the hedging available, they need to pay a premium to the risk taker.

Imagine that you hold 100 shares of XYZ company which are currently priced at Rs. 120. Your aim is to sell these shares after three months. However, you don't want to make losses due to a fall in market price. At the same time, you don't want to lose opportunity to earn profits by selling them at a higher price in future. In this situation, you can buy a put option by paying a nominal premium that will take care of both the above requirements.

- **Speculators**

These are risk-takers of the derivative market. They want to embrace risk in order to earn profits. They have a completely opposite point of view as compared to the hedgers. This difference of opinion helps them to make huge profits if the bets turn correct. In the above

example, you bought a put option to secure yourself from a fall in the stock prices. Your counterparty i.e. the speculator will bet that the stock price won't fall. If the stock prices don't fall, then you won't exercise your put option. Hence, the speculator keeps the premium and makes a profit.

- **Margin traders**

A margin refers to the minimum amount that you need to deposit with the broker to participate in the derivative market. It is used to reflect your losses and gains on a daily basis as per market movements. It enables to get a leverage in derivative trades and maintain a large outstanding position. Imagine that with a sum of Rs. 2 lakh you buy 200 shares of ABC Ltd. of Rs 1000 each in the stock market. However, in the derivative market you can own a three times bigger position i.e. Rs 6 lakh with the same amount. A slight price change will lead to bigger gains/losses in the derivative market as compared to stock market.

- **Arbitrageurs**

These utilize the low-risk market imperfections to make profits. They simultaneously buy low-priced securities in one market and sell them at higher price in another market. This can happen only when the same security is quoted at different prices in different markets. Suppose an equity share is quoted at Rs 1000 in stock market and at Rs 105 in the futures market. An arbitrageur would buy the stock at Rs 1000 in the stock market and sell it at Rs 1050 in the futures market. In this process he/she earns a low-risk profit of Rs 50.

What Are The Different Types Of Derivative Contracts?

The four major types of derivative contracts are options, forwards, futures and swaps.

- **Options**

Options are derivative contracts which gives the buyer a right to buy/sell the underlying asset at the specified price during a certain period of time. The buyer is not under any obligation to exercise the option. The option seller is known as the option writer. The specified price is known as strike price. You can exercise American options at any time before the expiry of the option period. European options, however, can be exercised only on the date of expiration date.

- **Futures**

Futures are standardised contracts which allow the holder to buy/sell the asset at an agreed price at the specified date. The parties to the future contract are under an obligation to perform the contract. These contracts are traded on the stock exchange. The value of future contracts are marked-to-market everyday. It means that the contract value is adjusted according to market movements till the expiration date.

- **Forwards**

Forwards are like futures contracts wherein the holder is under an obligation to perform the contract. But forwards are unstandardised and not traded on stock exchanges. These are available over-the-counter and are not marked-to-market. These can be customised to suit the requirements of the parties to the contract.

- **Swaps**

Swaps are derivative contracts wherein two parties exchange their financial obligations. The cash flows are based on a notional principal amount agreed between both the parties without exchange of principal. The amount of cash flows is based on a rate of interest. One cash flow is generally fixed and the other changes on the basis of a benchmark interest rate. Interest rate swaps are the most commonly used category. Swaps are not traded on stock exchanges and are over-the-counter contracts between businesses or financial institutions.

How To Trade In Derivatives Market?

- You need to understand the functioning of derivative markets before trading. The strategies applicable in derivatives are completely different from that of the stock market.
- Derivative market requires you to deposit margin amount before starting trading. The margin amount cannot be withdrawn until the trade is settled. Moreover, you need to replenish the amount when it falls below the minimum level.
- You should have an active trading account which permits derivative trading. If you are using services of a broker, then you can place orders online or on the phone.
- For selection of stocks, you have to consider factors like cash in hand, the margin requirements, the price of the contract and that of the underlying shares. Make sure that everything is as per your budget.
- You can choose to stay invested till the expiry to settle the trade. In this scenario, either pay the entire outstanding amount or enter into an opposing trade.

Time Value of Money

Most of the financial decisions, such as acquisitions of assets or procurement of funds affect firm's cash flows in different time periods. If the firm acquires an asset today, it will require an immediate cash outlay; but the benefit of this asset will be received in future. Thus, while making financial decision, the firm will have to compare the total cash inflows with cash outflows. The logical way is to recognise the time value of money and make appropriate adjustments for time.

The concept of time value of money is that the value of money received today is more than the value of the same amount of money received after a certain period. That is, money received in the future is not as valuable as money received today. The sooner one receives money, the better it is. This phenomenon is referred to as "time preference for money". The reasons for time preference of money are the following.

a) The future is always uncertain and involves risk.

b) Generally, people prefer to use their money for satisfying their present needs than deferring them for future.

c) Money has time value because of the opportunities available to invest money at earlier dates at some interest to enhance future earnings.

Techniques of Time Value of Money

There are two techniques for adjusting the time value of money, namely (1) Compounding or Future Value Approach and (2) Discounting or Present Value Technique.

1) Compounding or Future Value Approach

The future value shows how much a sum of money becomes at some future period. In compound or future value approach the money invested today appreciates because the compound interest is added to the principal.

The future value at the end of period 1 can be calculated by a simple formula

$$V_1 = V_0(1+i)$$

Where V_1 = future value at the period 1

V_0 = original sum of money (value of money at time

0) i = rate of interest

For example, the future value of Rs 100 after one year at 10% interest rate will be

$$V_1 = 100(1+\frac{10}{100})$$

$$V_1 = \text{Rs } 110$$

Then the value after two years

$$V_2 = 110(1+\frac{10}{100})$$

$$V_2 = \text{Rs } 121$$

Similarly the value after three years

$$V_3 = 121\left(1+\frac{10}{100}\right)$$

$$V_3 = \text{Rs } 133.10$$

We can generalise the above formula to find the future value of current sum of money at period 'n' as

$$V_n = V_0(1+i)^n$$

For example the value of Rs 100 after ten years will be

$$V_{10} = 100(1+\frac{10}{100})^{10}$$

$$V_{10} = 100(1.10)^{10}$$

$$V_{10} = 259.4$$

It can be noted that the second year's interest will be paid on both original principal and the interest earned at the end of the first year. This paying of interest is called "compounding".

2) Discounting or Present Value Technique

Present value is the exact opposite of compound or future value. Present value shows what the value is today of future sum of money. Present value is the current worth of future cash flows. The present value of the money to be received in future date will be less because we have lost the opportunity of investing it at some interest.

Thus, the present value of money to be received in future will always be less. It is for this reason that the present value technique is called discounting. Present value can be calculated by the formula

$$V_0 = \frac{V_n}{1+i}$$

Where, $V_0 = \text{Present Value}$

$V_n = \text{Future Vlaue in the period } n$

i = Rate of interest

For example, the present value of Rs 1000 to be received to be received after one year at 10% time preference rate (rate of interest), will be

$$V_0 = \frac{1000}{1+\frac{10}{100}}$$

$$V_0 = \frac{1000}{1.10} = \text{Rs.}909$$

In many instances, we may have to calculate the present value several sum of money, each occurring at different period of time. If series of payments is represented by R_1, R_2, R_3.....R_n, the present value of the series of payment will be

$$V_0 = \frac{R_1}{1+i} + \frac{R_2}{(1+i)^2} + \cdots + \frac{R_n}{(1+i)^n}$$

$$V_0 = \sum_{t=1}^{n} \frac{R_t}{(1+i)^t}$$

Where R_t is the payment at period t. We can calculate the present value of a series of payments by finding out present values of such individual payments and then adding these present values.

Example:

Calculate the present value of the following cash flows assuming a discount rate of 10%.

Year	Cash Flows (in Rupees)
1	1100
2	2420

3	6655

$$V_0 = \frac{R_1}{1+i} + \frac{R_2}{(1+i)^2} + \frac{R_3}{(1+i)^3}$$

$$V_0 = \frac{1100}{1+0.1} + \frac{2420}{(1+0.1)^2} + \frac{6655}{(1+0.1)^3}$$

V_0 = 1000 +2000+5000 = Rs 8000.

Net Present Value Method

The net present value method is one of the discounted cash flow or time adjusted method.

This is generally considered as the best method for evaluating capital investment proposals. This method takes into consideration the time value of money and attempts to calculate the return on investments by introducing the factor of 'time element'. It recognises the fact that a

Rupee earned today is worth more than the same Rupee earned tomorrow. In this method, an appropriate rate of interest should be selected as the minimum rate of return and present value of total investment outlay is calculated.

The present value of Rs. 1 can be calculated as PV $=\frac{1}{(1+r)^n}$ where r = rate of discount or interest and n= number of years.

The present value for all cash inflows for a number of years can be found as

$$PV = \frac{A_1}{1+r} + \frac{A_2}{(1+r)^2} + \frac{A_3}{(1+r)^3} + \cdots + \frac{A_n}{(1+r)^n}$$

Where A_1, A_2,... A_n are the future cash flows, that is, profit after tax before depreciation.

5. Internal Rate of Return Method Internal rate of return of capital budgeting takes into account the time value of money. It is also known as "time adjusted rate of return", "discounted cash flow", "discounted rate of return" etc.

Under this method, cash flows of a project are discounted at a suitable rate, which equates the net present value so calculated to the amount of investment. Under this method, since discount rate is determined by internally, the method is called as internal rate of return method. Internal rate of return can be defined as that rate of discount at which the present value of cash flows is equal to the present value of cash outflows. That is,

$$C = \frac{A_1}{1+r} + \frac{A_2}{(1+r)^2} + \frac{A_3}{(1+r)^3} + \cdots + \frac{A_n}{(1+r)^n}$$

Where C= initial outlay.

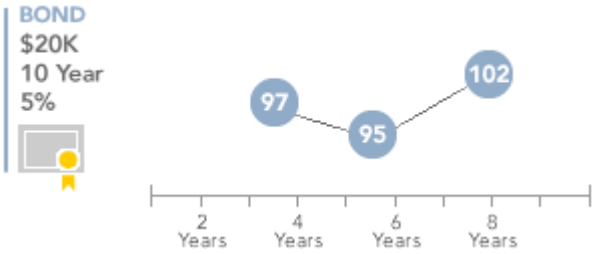
This method measures the rate of return which earnings are expected to yield on investments. The discounted rate of return is that rate of interest which, when applied to a series of future cash flows, brings the sum of their present values to the same level as the original investment. The merit of internal rate of return method is (a) it considers the time value of money (b) it

considers the cash flows over the entire life of the project and (c) the calculation of the cost of capital is not a precondition for the use of this method.

Bond Prices

If you buy a new bond and plan to keep it to maturity, changing prices, market interest rates, and yields typically do not affect you, unless the bond is called. But investors don't have to buy bonds directly from the issuer and hold them until maturity; instead, bonds can be bought from and sold to other investors on what's called the secondary market. Similar to stock, bond prices can be higher or lower than the face value of the bond because of the current economic environment and the financial health of the issuer.

How price is measured?



Price is important when you intend to trade bonds with other investors. A bond's price is what investors are willing to pay for an existing bond.

In the online offering table and statements you receive, bond prices are provided in terms of percentage of face (par) value.

Example: You are considering buying a corporate bond. It has a face value of $20,000. At 3 points in time, its price—what investors are willing to pay for it—changes from 97, to 95, to 102.

Price and interest rates

The price investors are willing to pay for a bond can be significantly affected by prevailing interest rates. If prevailing interest rates are higher than when the existing bonds were issued, the prices on those existing bonds will generally fall. That's because new bonds are likely to be issued with higher coupon rates as interest rates increase, making the old or outstanding bonds generally less attractive unless they can be purchased at a lower price. So, higher interest rates mean lower prices for existing bonds.

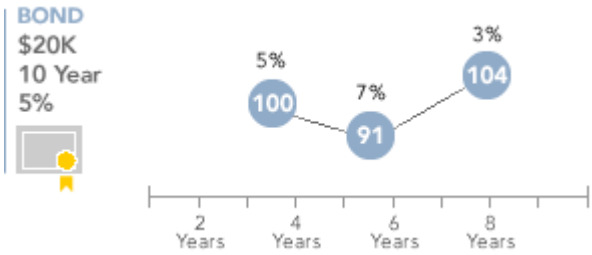
If interest rates decline, however, bond prices of existing bonds usually increase, which means an investor can sometimes sell a bond for more than the purchase price, since other investors are willing to pay a premium for a bond with a higher interest payment, also known as a coupon.

This relationship can also be expressed between price and yield. The yield on a bond is its return expressed as an annual percentage, affected in large part by the price the buyer pays for it. If the prevailing yield environment declines, prices on those bonds generally rise. The opposite is true in a rising yield environment—in short, prices generally decline.

Example: Price and interest rates

Let's say you buy a corporate bond with a coupon rate of 5%. While you own the bond, the prevailing interest rate rises to 7% and then falls to 3%.

1. The prevailing interest rate is the same as the bond's coupon rate. The price of the bond is 100, meaning that buyers are willing to pay you the full $20,000 for your bond.



2. Prevailing interest rates rise to 7%. Buyers can get around 7% on new bonds, so they'll only be willing to buy your bond at a discount. In this example, the price drops to 91, meaning they are willing to pay you $18,200 ($20,000 x .91). At a price of 91, the yield to maturity of this bond now matches the prevailing interest rate of 7%.

3. The prevailing interest rate drops to 3%. Buyers can only get 3% on new bonds, so they are willing to pay extra for your bond, because it pays higher interest. In this example, the price rises to 104, meaning they are willing to pay you $20,800 (20,000 x 1.04). At a price of 104, the yield to maturity of this bond now matches the prevailing interest rate of 3%.

More factors that affect price

Financial health of the issuer

The financial health of the company or government entity issuing a bond affects the coupon that the bond is issued with—higher-rated bonds issued by creditworthy institutions generally offer lower interest rates, while those less financially secure companies or governments will have to offer higher rates to entice investors.

Similarly, the creditworthiness of the issuer will affect the bond's price on the secondary market. If the issuer is financially strong, investors are willing to pay more since they are confident that the issuer will be capable of paying the interest on the bond and pay off the bond at maturity. But if the issuer encounters financial problems—and especially if it's downgraded by one of the ratings agencies (for more, see Bond ratings)—then investors may become less confident in the issuer. As a result, prices may fall.

The risk that the financial health of the issuer will deteriorate, known as credit risk, increases the longer the bond's maturity.

Inflation

Inflationary conditions generally lead to a higher interest rate environment. Therefore, inflation has the same effect as interest rates. When the inflation rate rises, the price of a bond tends to drop, because the bond may not be paying enough interest to stay ahead of inflation. Remember that a fixed-rate bond's coupon rate is generally unchanged for the life of the bond.

The longer a bond's maturity, the more chance there is that inflation will rise rapidly at some point and lower the bond's price. That's one reason bonds with a long maturity offer somewhat higher interest rates: They need to do so to attract buyers who otherwise would fear a rising inflation rate. That's one of the biggest risks incurred when agreeing to tie up your money for, say, 30 years.

Minimizing bond price confusion

Bond pricing involves many factors, but determining the price of a bond can be even harder because of how bonds are traded. Because stocks are traded throughout the day, it's easier for investors to know at a glance what other investors are currently willing to pay for a share. But with bonds, the situation is often not so straightforward.

Prices on statements may not be what you paid

The price you see on a statement for many fixed-income securities, especially those that are not actively traded, is a price that is derived by industry pricing providers, rather than the last-trade price (as with stocks).

The derived price considers factors such as coupon rate, maturity, and credit rating. The price is also based on large trading blocks. But the price may not consider every factor that can impact the actual price you would be offered if you actually attempted to sell the bond.

Derived pricing is commonly used throughout the industry.

Most bonds are not listed

Most bonds are not listed on an exchange, although there are a few corporate bonds trading on the New York Stock Exchange (NYSE). Of the hundreds of thousands of bonds that are registered in the United States, less than 100,000 are generally available on any given day. These bonds will be quoted with an offered price, the price the dealer is asking the investor to pay. Treasury and corporate bonds are more frequently also listed with bid prices, the price investors would receive if they're selling the bond. Less liquid bonds, such as municipal bonds, are rarely quoted with a dealer's bid price.

What is Bond Yield?

Bond yield is the return an investor realizes on a bond. The bond yield can be defined in different ways. Setting the bond yield equal to its coupon rate is the simplest definition. The current yield is a function of the bond's price and its coupon or interest payment, which will be more accurate than the coupon yield if the price of the bond is different than its face value. More complex calculations of a bond's yield will account for the time value of money and compounding interest payments. These calculations include yield to maturity (YTM), bond equivalent yield (BEY) and effective annual yield (EAY). (Discover the difference between Bond Yield Rate vs. Coupon Rate).

Overview of Bond Yield

When investors buy bonds, they essentially lend bond issuers money. In return, bond issuers agree to pay investors interest on bonds through the life of the bond and to repay the face value of bonds upon maturity. The simplest way to calculate a bond yield is to divide its coupon payment by the face value of the bond. This is called the coupon rate.

If a bond has a face value of $1,000 and made interest or coupon payments of $100 per year, then its coupon rate is 10% ($100 / $1,000 = 10%). However, sometimes a bond is purchased for more than its face value (premium) or less than its face value (discount), which will change the yield an investor earns on the bond.

Bond Yield Vs. Price

As bond prices increase, bond yields fall. For example, assume an investor purchases a bond that matures in five years with a 10% annual coupon rate and a face value of $1,000. Each year, the bond pays 10%, or $100, in interest. Its coupon rate is the interest divided by its par value.

If interest rates rise above 10%, the bond's price will fall if the investor decides to sell it. For example, imagine interest rates for similar investments rise to 12.5%. The original bond still only makes a coupon payment of $100, which would be unattractive to investors who can buy bonds that pay $125 now that interest rates are higher.

If the original bond owner wants to sell her bond, the price can be lowered so that the coupon payments and maturity value equal yield of 12%. In this case, that means the investor would drop the price of the bond to $927.90. In order to fully understand why that is the value of the bond, you need to understand a little more about how the time value of money is used in bond pricing, which is discussed later in this article.

If interest rates were to fall in value, the bond's price would rise because its coupon payment is more attractive. For example, if interest rates fell to 7.5% for similar investments, the bond seller could sell the bond for $1,101.15. The further rates fall, the higher the bond's price will rise, and the same is true in reverse when interest rates rise.

In either scenario, the coupon rate no longer has any meaning for a new investor. However, if the annual coupon payment is divided by the bond's price, the investor can calculate the current yield and get a rough estimate of the bond's true yield.

The current yield and the coupon rate are incomplete calculations for a bond's yield because they do not account for the time value of money, maturity value or payment frequency. More complex calculations are needed to see the full picture of a bond's yield.

Yield to Maturity

A bond's yield to maturity (YTM) is equal to the interest rate that makes the present value of all a bond's future cash flows equal to its current price. These cash flows include all the coupon payments and its maturity value. Solving for YTM is a trial and error process that can be done on a financial calculator, but the formula is as follows:

In the previous example, a bond with $1,000 face value, five years to maturity and $100 annual coupon payments was worth $927.90 in order to match a YTM of 12%. In that case, the five coupon payments and the $1,000 maturity value were the bond's cash flows. Finding the present value of each of those six cash flows with a discount or interest rate of 12% will determine what the bond's current price should be.

Bond Equivalent Yield – BEY

Bond yields are normally quoted as a bond equivalent yield (BEY), which makes an adjustment for the fact that most bonds pay their annual coupon in two semi-annual payments. In the previous examples, the bonds' cash flows were annual, so the YTM is equal to the BEY. However, if the coupon payments were made every six months, the semi-annual YTM would be 5.979%.

The BEY is a simple annualized version of the semi-annual YTM and is calculated by multiplying the YTM by two. In this example, the BEY of a bond that pays semi-annual coupon payments of $50 would be 11.958% (5.979% X 2 = 11.958%). The BEY does not account for the time value of money for the adjustment from a semi-annual YTM to an annual rate.

Effective Annual Yield – EAY

Investors can find a more precise annual yield once they know the BEY for a bond if they account for the time value of money in the calculation. In the case of a semi-annual coupon payment, the effective annual yield (EAY) would be calculated as follows:

If an investor knows that the semi-annual YTM was 5.979%, then he or she could use the previous formula to find the EAY of 12.32%. Because the extra compounding period is included, the EAY will be higher than the BEY.

Complications Finding a Bond's Yield

There are a few factors that can make finding a bond's yield more complicated. For instance, in the previous examples, it was assumed that the bond had exactly five years left to maturity when it was sold, which would rarely be the case.

When calculating a bond's yield, the fractional periods can be dealt with simply; the accrued interest is more difficult. For example, imagine a bond has four years and eight months left to maturity. The exponent in the yield calculations can be turned into a decimal to adjust for the partial year. However, this means that four months in the current coupon period have elapsed and there are two more to go, which requires an adjustment for accrued interest. A new

bond buyer will be paid the full coupon, so the bond's price will be inflated slightly to compensate the seller for the four months in the current coupon period that have elapsed.

Bonds can be quoted with a "clean price" that excludes the accrued interest or the "dirty price" that includes the amount owed to reconcile the accrued interest. When bonds are quoted in a system like a Bloomberg or Reuters terminal, the clean price is used.

Bond Yield Summary

A bond's yield is the return to an investor from the bond's coupon and maturity cash flows. It can be calculated as a simple coupon yield, which ignores the time value of money and any changes in the bond's price or using a more complex method like yield to maturity. The yield to maturity is usually quoted as a bond equivalent yield (BEY), which makes bonds with coupon payment periods less than a year easy to compare. A classic strategy is to use a bond ladder technique to maximize profits with multiple bonds coming into maturity at different times.

Bonds can be purchased through a variety of different sources. A common way to go about purchasing some bond types is to use an investment account through a broker.

REFERENCES

1. https://byjus.com/commerce/what-is-financial-market/#:~:text=Classification%20of%20Financial%20Market,classified%20into%20three%20different%20forms.&text=Debt%20Market%20–%20It%20is%20a,investors%20to%20deal%20with%20equity.
2. https://www.toppr.com/guides/business-studies/financial-markets/concept-of-financial-market/
3. https://www.bankexamstoday.com/2015/01/money-market-and-capital-market.html
4. https://www.coverfox.com/personal-finance/mutual-funds/money-market-instruments/
5. https://www.societegenerale.lu/fileadmin/user_upload/SGLUX/DOCUMENTS/COMPLIANCE/MiFID_Overview_of_the_main_characteristics_and_risks_of_financial_intruments_2020.pdf
6. https://cleartax.in/s/financial-derivatives
7. https://www.investopedia.com/terms/b/bond-yield.asp
8. https://www.fidelity.com/learning-center/investment-products/fixed-income-bonds/bond-prices-rates-yields#:~:text=Coupon%20rate—The%20higher%20a,more%20for%20the%20same%20return.

Capital Asset Pricing Model (CAPM) We now assume an idealized framework for an open market place, where all the risky assets refer to (say) all the tradeable stocks available to all. In addition we have a risk-free asset (for borrowing and/or lending in unlimited quantities) with interest rate rf . We assume that all information is available to all such as covariances, variances, mean rates of return of stocks and so on. We also assume that everyone is a risk-averse rational investor who uses the same financial engineering mean-variance portfolio theory from Markowitz. A little thought leads us to conclude that since everyone has the same assets to choose from, the same information about them, and the same decision methods, everyone has a portfolio on the same efficient frontier, and hence has a portfolio that is a mixture of the risk-free asset and a unique efficient fund F (of risky assets). In other words, everyone sets up the same optimization problem, does the same calculation, gets the same answer and chooses a portfolio accordingly. This efficient fund used by all is called the market portfolio and is denoted by M. The fact that it is the same for all leads us to conclude that it should be computable without using all the optimization methods from Markowitz: The market has already reached an equilibrium so that the weight for any asset in the market portfolio is given by its capital value (total worth of its shares) divided by the total capital value of the whole market (all assets together). If, for example, asset i refers to shares of stock in Company A, and this company has 10,000 shares outstanding, each worth $20.00, then the captital value for asset i is Vi = (10, 000)($20) = $200, 000. Computing this value for each asset and summing over all n (total number of assets) yields the total capital value of the whole market, V = V1 +· · ·+Vn, and the weight wi = Vi/V is the weight used for asset i in the market portfolio. The general idea is that assets under high demand will fetch high prices and yield high expected rates of return (and vice versa); repeated trading of the assets over time adjusts the various prices yielding an equilibrium that reflects this; the optimal weights wi for the market portfolio are thus governed by supply and demand. In the end, we don't need to use the optimization methods nor any of the detailed data (covariances, variances, mean rates, nor even the risk-free rate rf) to determine the market portfolio; we only need all the Vi values. Note in passing that all the weights wi are positive (no shorting exists in the market portfolio). This implies that even if apriori we ruled out shorting of the assets in our framework, the same equilibrium market portfolio M would arise. Also note that since presumably all risky assets available on the open market have a non-zero capital value, all risky assets are included in the portfolio (although some have very small weights). The above equilibrium model for portfolio analysis is called the Capital Asset Pricing Model (CAPM).

Capital market line and CAPM formula Let (σM, rM) denote the point corresponding to the market portfolio M. All portfolios chosen by a rational investor will have a point (σ, r) that lies on the so-called capital market line.

$$\overline{r} = r_f + \frac{\overline{r}_M - r_f}{\sigma_M}\sigma, \qquad (1)$$

the efficient frontier for investments. It tells us the expected return of any efficient portfolio, in terms of its standard deviation, and does so by use of the so-called price of risk

$$\frac{\overline{r}_M - r_f}{\sigma_M}, \qquad (2)$$

the slope of the line, which represents the change in expected return r per one-unit change in standard deviation σ.

If an individual asset i (or portfolio) is chosen that is not efficient, then we learn nothing about that asset from (1). It would seem useful to know, for example, how ri −rf , the expected excess rate of return is related to M. The following formula involves just that, where _M,i denotes the covariance of the market portfolio with individual asset i:

(CAPM Formula) For any asset i

$$\overline{r}_i - r_f = \beta_i(\overline{r}_M - r_f),$$

where

$$\beta_i = \frac{\sigma_{M,i}}{\sigma_M^2},$$

is called the beta of asset i. This beta value serves as an important measure of risk for individual assets (portfolios) that is different from σ_i^2; it measures the nondiversifiable part of risk.

More generally, for any portfolio $p = (\alpha_1, \ldots, \alpha_n)$ of risky assets, its beta can be computed as a weighted average of individual asset betas:

$$\overline{r}_p - r_f = \beta_p(\overline{r}_M - r_f),$$

where

$$\beta_p = \frac{\sigma_{M,p}}{\sigma_M^2} = \sum_{i=1}^{n} \alpha_i \beta_i.$$

Before proving the above theorem, we point out a couple of its important consequences and explain the meaning of the beta. For a given asset i, σ_i^2 tells us the risk associated with its own fluctuations about its mean rate of return, but not with respect to the market portfolio. For example if asset i is uncorrelated with M, then $\beta_i = 0$ (even presumably if σ_i^2 is huge), and this tells us that there is no risk associated with this asset (and hence no high expected return) in the sense that the variance σ_i^2 can be diversified away (recall our example in Lecture Notes 4 of diversification of n uncorrelated assets). The idea would be to collect a large number of uncorrelated (and uncorrelated with M) assets and form a portfolio with equal proportions thus dwindling the variance to 0 so it becomes like the risk-free asset with deterministic rate of return r_f. So, in effect, in the world of the market you are not rewarded (via a high expected rate of return) for taking on risk that can be diversified away. So we can view β_i as a measure of *nondiversifiable risk*, the correlated-with-the-market part of risk that we can't reduce by diversifying. This kind of risk is sometimes called *market* or *systematic* risk. It is not true in general that higher beta value β_i implies higher variance σ_i^2, but of course a higher beta value does imply a higher expected rate of return: you are rewarded (via a high expected rate of return) for taking on risk that can't be diversified away; everyone must face this kind of risk.

Types of assets that would be expected to have high beta values (today) would be those which are deeply related to the general market such as stocks in big name companies like General Electric, Cisco Systems, Coca-Cola, IBM, Procter & Gamble and so on.

Proof :[CAPM formula]

We form a portfolio of asset i and the market portfolio M; (α, 1 − α), with α ∈ [0, 1]. The rate of return is thus r(α) = αri + (1 − α)rM. Asset i is assumed not efficient; it's point lies in the feasible region but not on the efficient frontier. Thus as α varies this portfolio's point traces out a smooth curve in the feasible (σ, r) region α → (σ(α), r(α)) parametrized by α, where

$$\begin{aligned}\overline{r}(\alpha) &= \alpha\overline{r}_i + (1-\alpha)\overline{r}_M \\ &= \alpha(\overline{r}_i - \overline{r}_M) + \overline{r}_M, \qquad (3)\\ \sigma(\alpha) &= \sqrt{\alpha^2\sigma_i^2 + (1-\alpha)^2\sigma_M^2 + 2\alpha(1-\alpha)\sigma_{M,i}}. \\ &= \sqrt{\alpha^2(\sigma_i^2 + \sigma_M^2 - 2\sigma_{M,i}) + 2\alpha(\sigma_{M,i} - \sigma_M^2) + \sigma_M^2}. \qquad (4)\end{aligned}$$

When α = 0, (σ0), r(0)) = (σM, rM) and when α = 1, (σ0), r(0)) = (σi, ri). Thus, the curve touches the captital market line at the market point (σM, rM), but otherwise remains off the captital market line but (of course) within the feasible region where it also hits the point (σi, ri). We conclude that the curve is tangent to the capital asset line at point (σM, rM) and therefore when α = 0 the curve's derivative

$$\frac{d\overline{r}(\alpha)}{d\sigma(\alpha)}_{\alpha=0}$$

is identical to the slope of the capital asset line at point M. The slope (the price of risk) of the line is given by (2). We thus conclude that when α = 0

$$\frac{d\overline{r}(\alpha)}{d\sigma(\alpha)} = \frac{\overline{r}_M - r_f}{\sigma_M}. \qquad (5)$$

The composition rule from calculus yields

$$\frac{d\overline{r}(\alpha)}{d\sigma(\alpha)} = \frac{d\overline{r}(\alpha)/d\alpha}{d\sigma(\alpha)/d\alpha}$$

Differentiating (3) and (4) and evaluating at $\alpha = 0$ yields

$$\frac{d\overline{r}(\alpha)/d\alpha}{d\sigma(\alpha)/d\alpha} = \frac{\overline{r}_i - \overline{r}_M}{(\sigma_{M,i} - \sigma_M^2)/\sigma_M}.$$

From (5) we deduce that

$$\frac{\overline{r}_i - \overline{r}_M}{(\sigma_{M,i} - \sigma_M^2)/\sigma_M} = \frac{\overline{r}_M - r_f}{\sigma_M}.$$

Solving for $\overline{r}_i$ then yields the CAPM formula for asset i, $\overline{r}_i - r_f = \beta_i(\overline{r}_M - r_f)$, as was to be shown. For the more general portfolio result, observe that

$$\begin{aligned} r_p - r_f &= -r_f + \sum_{i=1}^{n} \alpha_i \overline{r}_i \\ &= \sum_{i=1}^{n} \alpha_i(\overline{r}_i - r_f) \\ &= \sum_{i=1}^{n} \alpha_i\beta_i(\overline{r}_M - r_f) \ \textit{(CAPM formula for single asset } i\textit{)} \\ &= (\overline{r}_M - r_f)\sum_{i=1}^{n} \alpha_i\beta_i. \end{aligned}$$

Note that when βp = 1 then rp = rM; the expected rate of return is the same as for the market portfolio. When βp > 1, then rp > rM; when βp < 1, then rp < rM.

Also note that if an asset i is negatively correlated with M, βM,i < 0, then _i < 0 and ri < rf ; the expected rate of return is less than the risk-free rate. Effectively, such a negatively correlated asset serves as insurance against a drop in the market returns, and might be viewed by some investors as having enough such advantages so as to make it worth the low return. Investing in gold is thought to be such an example at times.

Estimating the market portfolio and betas

In the real open market place where the number of assets is enormous, trying to actually construct the market portfolio would be an awsome and unrealistic task for any financial analyst. Thus so-called index funds (or mutual funds) have been created as an attempt to approximate the market portfolio. Such an index is a smaller portfolio made up of what are viewed as the markets' most dominant assets, that captures the essence of M. The most well-known such index is the Standard & Poor's 500-stock index (S&P), made up of 500 stocks. A beta for a given asset is then estimated by using the S&P in replace of M, and then collecting past data for both rates of return. For example consider an asset A for which we wish to estimate its beta. These estimates are computed using sample means, variances and covariances as follows: We choose N time points such as the end of each of the last 10 years k = 1, 2, . . . ,N. r Ak and r_S & P_k denote the kth such sample values for rate of return yielding estimates

$$\hat{\bar{r}}_A = \frac{1}{N}\sum_{k=1}^{N} r_{Ak}$$

$$\hat{\bar{r}}_{S\&P} = \frac{1}{N}\sum_{k=1}^{N} r_{S\&Pk}.$$

The variance $\sigma^2_{S\&P}$ is then estimated by

$$Y = \frac{1}{N-1}\sum_{k=1}^{N}(r_{S\&Pk} - \hat{\bar{r}}_{S\&P})^2,$$

and the covariance $\sigma_{S\&P,A}$ is estimated by

$$X = \frac{1}{N-1}\sum_{k=1}^{N}(r_{S\&Pk} - \hat{\bar{r}}_{S\&P})(r_{S\&Pk} - \hat{\bar{r}}_A).$$

The beta value is then estimated by taking the ratio X/Y.

More on systematic risk

With the CAPM formula in mind, for a given asset i let us express ri as

$$r_i = r_f + \beta_i(r_M - r_f) + \epsilon_i, \tag{6}$$

where

$$\epsilon_i = r_i - r_f - \beta_i(r_M - r_f), \tag{7}$$

a random variable, is the error term. Note how we replaced deterministic rM with random rM in the CAPM to do this. Our objective is to determine some properties of the error term.

It is immediate from the CAPM formula that E(εi) = 0. Moreover Cov(εi, rM) = 0 as is seen by direct computation and the definition of βi:

$$\begin{aligned}
cov(\epsilon_i, r_M) &= cov(r_i - r_f - \beta_i(r_M - r_f), r_M) \\
&= cov(r_i - \beta_i(r_M - r_f), r_M) \\
&= cov(r_i, r_M) - \beta_i cov(r_M - r_f, r_M) \\
&= cov(r_i, r_M) - \beta_i cov(r_M, r_M) \\
&= \sigma_{M,i} - \frac{\sigma_{M,i}}{\sigma_M^2}\sigma_M^2 \\
&= \sigma_{M,i} - \sigma_{M,i} \\
&= 0.
\end{aligned}$$

So the error term has mean 0 and is uncorrelated with the market portfolio. It then follows by taking the variance of both sides of (6) that

$$\sigma_i^2 = \beta_i^2\sigma_M^2 + var(\epsilon_i). \tag{8}$$

We conclude that the variance of asset i can be broken into two orthogonal components. The first, $\beta_i^2\sigma_M^2$, is called the *systematic* risk and represents that part of the risk (of investing in asset i) associated with the market as a whole. The other part, $var(\epsilon_i)$, is called the *nonsystematic* risk. The nonsystematic risk can be reduced (essentially eliminated) by diversification, but the systematic risk, when $\beta_i^2 > 0$, can not be diversified away.

Solving for σ in terms of $\overline{r}$ in the capital market line yields the inverse line for efficient portfolios

$$\sigma = \frac{\overline{r} - r_f}{\overline{r}_M - r_f}\sigma_M.$$

Using the CAPM formula $\overline{r}_p - r_f = \beta_p(\overline{r}_M - r_f)$ and plugging into this inverse line formula, we conclude that for any efficient portfolio p, $\sigma_p = \beta_p\sigma_M$; there is only systematic risk for efficient portfolios, no nonsystematic risk. This makes perfect sense: Clearly M has only systematic risk since $\beta_M = 1$. We know that all efficient portfolios are a mixture of M and the risk-free asset (e.g., they all have points on the capital market line). Since the risk-free asset is deterministic it does not contribute to either the variance or the beta of the portfolio, only M does; so all of the risk is contained in M which we just pointed out is pure systematic risk.

Pricing assets

Consider an asset with price $P = X_0$ at time $t = 0$, payoff (random) $Q = X_1$ and expected payoff $\overline{Q} = E(X_1)$ at time $t = 1$. Then by definition $\overline{r} = (E(X_1) - X_0)/X_0 = (\overline{Q} - P)/P$. Solving for P yields

$$P = \overline{Q}/(1 + \overline{r}),$$

which expresses the price as the discounted payoff (present value) if using $\overline{r}$ as the discount rate. But since $\overline{r} = r_f + \beta(\overline{r}_M - r_f)$ from the CAPM formula, we conclude that

$$P = \frac{\overline{Q}}{1 + r_f + \beta(\overline{r}_M - r_f)} \qquad \textit{(Pricing version of CAPM formula)} \qquad (9)$$

Examples

Chicago Corp stock will pay a dividend of \$1.32 next year. Its current price is \$24.625 per share. The beta for the stock is 1.35 and the expected return on the market is 13.5%. If the riskless rate is 8.2%, what is the expected growth rate of Chicago?

Using the capital asset pricing model (CAPM),

$$E(R_i) = r + \beta_i\,[E(R_m) - r] \qquad (4.7)$$

We first find the expected rate of return as

$$E(R_i) = 0.082 + 1.35\,[0.135 - 0.082] = 0.15355 = R$$

The expected rate of return $E(R_i)$, for a security is also its required rate of return R by the investors. Using the growth model for a stock, equation (3.6),

$$P_0 = \frac{D_1}{R - g}$$

we get, $\qquad R - g = D_1/P_0, \qquad$ or $\qquad g = R - D_1/P_0,$

which gives $g = 0.15355 - 1.32/24.625 = 0.1$. Thus the growth rate is 10%. ♥

Eastern Oil stock currently sells at $120 a share. The stockholders expect to get a dividend of $6 next year, and they expect that the dividend will grow at the rate of 5% per annum. The expected return on the market is 12% and the riskless rate is 6%. This morning Eastern announced that it has won the multimillion dollar navy contract, and in response to the news, the stock jumped to $125 a share. Find the beta of the stock before and after the announcement.

Using Gordon's growth model, $P_0 = \frac{D_1}{R-g}$, we get $R = D_1/P_0 + g$, which is also the expected return on the stock, E(R). But by CAPM,

$$E(R_i) = r + \beta_i\,[E(R_m) - r]$$

we get
$$\beta = \frac{E(R_i) - r}{E(R_m) - r}$$

Thus
$$\beta = \frac{D_1/P_0 + g - r}{E(R_m) - r} = \frac{6/120 + 0.05 - 0.06}{0.12 - 0.06} = 0.667, \text{ before. } ♥$$

And
$$\beta = \frac{6/125 + 0.05 - 0.06}{0.12 - 0.06} = 0.633, \text{ after. } ♥$$

Armstrong Corporation $6 preferred stock sells for $50 a share. The beta of this stock is 1.25. The current riskless rate is 8%. Just yesterday, Louis Armstrong, the founder and CEO, died and the stock dropped to $47 a share in response to the news. Find the new beta of Armstrong preferred.

A preferred stock has fixed dividends, that is, there is no expectation of growth. This means $g = 0$ in Gordon's growth model, $P0 = D1/(R - g)$, which becomes $P0 = D1/R$. Rewrite it as $R = D1/P0$. This implies that the current return of the stock is 6/50 = .12.

This is quite reasonable. If you buy a stock for $50 a share and it pays a dividend of $6 annually, without any growth opportunity, the return is indeed 12%.

Using CAPM,

$$.12 = .08 + 1.25[E(R_m) - .08]$$

Solve this equation to get $E(R_m) = (.12 - .08)/1.25 + .08 = .112$

This is quite reasonable, because the stock, with its $\beta_1 = 1.25$, has a return of .12; and the market with its $\beta = 1$, should have a lower expected return, perhaps around 11%.

Let $\beta_1 = 1.25$, beta of the stock before Armstrong's death and β_2 = beta of the stock after his death. Now assume that Armstrong is just an insignificant player in the stock market, and the market will ignore his demise. The expected return on the market will remain at .112 and the risk-free rate at .08. The new return on the stock is 6/47. The CAPM gives us

$$6/47 = .08 + \beta_2[.112 - .08]$$

This gives $\beta_2 = (6/47 - .08)/(.112 - .08) = 1.49$ ♥

The answer is quite reasonable, because Louis Armstrong was a very important individual at Armstrong Company. His departure has introduced a substantial measure of uncertainty, or risk, in the company, thereby increasing its β from 1.25 to 1.49.

We can re-express this formula by using $r = (Q - P)/P = (Q/P) - 1$, then computing

$$\begin{aligned} Cov(r, r_M) &= Cov((Q/P) - 1, r_M) \\ &= Cov((Q/P), r_M) \\ &= \frac{1}{P} Cov(Q, r_M); \end{aligned}$$

obtaining

$$\beta = \frac{1}{P}(Cov(Q, r_M)/\sigma_M^2).$$

Plugging into the pricing version of CAPM formula yields

$$P = \frac{\overline{Q}}{1 + r_f + \frac{1}{P}(Cov(Q, r_M)/\sigma_M^2)(\overline{r}_M - r_f)}.$$

Solving for P yields

$$P = \frac{\overline{Q} - \frac{Cov(Q, r_M)(\overline{r}_M - r_f)}{\sigma_M^2}}{1 + r_f}. \tag{10}$$

This equation is interesting since it expresses the price as the present value of an "adjusted" expected payoff. If the asset is uncorrelated with the market, then the price is exactly $\overline{Q}/(1+r_f)$, the present value of the expected payoff. The adjustment

$$-\frac{Cov(Q, r_M)(\overline{r}_M - r_f)}{\sigma_M^2}$$

yields a lower price if the asset is positively correlated with the market, and a higher price if the asset is negatively correlated with the market.

Beta

The risk of an investment or a project is difficult to measure or quantify. This difficulty arises from the fact that different persons have different perceptions of risk. What may be quite a risky project to one investor may appear to be fairly safe to another person. After all, how can you quantify courage, or patience, or risk, or beauty? In the section on portfolio theory, we used σ as a measure of risk, which is really the standard deviation of returns. Another useful measure of risk is the β of an investment. Like σ, β is also a statistical measure of risk. We infer it from the observations of the past performance of a stock. For example, we may want to find the risk of buying and holding the stock of a particular corporation, such as IBM, and we are interested in finding the β of IBM. We can start by looking at the historical value of three variables:

1. *The returns of IBM stock*, R_j. We define the return on a stock by the relation

$$R_j = \frac{P_1 - P_0 + D_1}{P_0} \tag{4.1}$$

In the above equation, $P0$ is the purchase price of the stock, $P1$ its price at the end of the holding period, and $D1$ is the dividend paid, if any, at the end. The quantity $P1 - P0$ is the price appreciation of the stock, and along with the dividend, is the total change in the value of the investment. The return is equal to be the change in the value of the investment divided by the original investment. For example to find the monthly rate of return on the IBM stock, we may want to know the price of the stock at the beginning of each month, the price at the end of the month, and the dividends paid during that particular month. We have to develop a series of numbers representing the return for each month for the last 24 months, say.

2. *The returns of the market*, *Rm*. A *market index* provides an overall measure of the performance of the market. The oldest and the most popular market index is the Dow Jones Industrial Average. The problem with this index is that it uses only 30 stocks in its valuation. For a broader market index, we may have to look at S&P100, or S&P500 index. There is even an index for over-the-counter stocks called the NASDAQ Composite Index. The value of these indexes is available daily.

Let us track the market for the last 24 months. If we know the value of the index at the start and finish of each month, we can find the return of the market for that month. The dividend yield for the market is around 1.71% annually at present. Therefore, we define the overall return on the market as

$$R_m = \frac{M_1 - M_0}{M_0} + d_1 \tag{4.2}$$

where $M0$ is the beginning value and $M1$ the ending value of the market index, and $d1$ is the dividend yield as a percent for that period. With some effort, we may be able to develop a set of market returns for each of the last 24 months.

3. *The riskless rate of interest*, *r*. The securities issued by the Federal government, such as the Treasury bills, bonds, and notes, are, by definition, riskless. They are the safest investments

available, backed by the full faith and taxing power of the government. Their rate of return depends on their time to maturity, and for longer maturity, the return is generally higher. The Treasury yield curve is available on the Internet.

After some research, we may also get a series of riskless rates for each of the past 24 months.

Then we define two variables x and y as:

$$y = R_j - r$$
$$x = R_m - r$$

where R_j = return on the stock j each month for the last 24 months,
R_m = corresponding monthly returns on the market for the same period,
and r = riskless rate of interest per month, for the last 24 months.

By subtracting the riskless rate of interest, we are able to see the return due to the risk inherent in the given stock, and the return from the risk in the market. Thus, we are comparing the returns exclusively due to the risk in the investments.

A regression line drawn between the various observed values of x and y will show a certain linear relationship between x and y. The slope of the line will give the rate of change of y with respect to x. In other words, the slope will signify how much the return on the stock will change corresponding to a given change in the return on the market. In this diagram let us say that the slope of the line is β, and the y-intercept is α. The quantity □ is practically zero, and it is statistically insignificant. The quantity β, on the other hand, represents an important concept.

This responsiveness of the stock return to the changing market conditions is called the "beta" of the stock. Stocks with low betas will show very little movement due to the fluctuations in the stock market. High beta stocks will tend to be jumpy showing a large variation in response to small changes in the market.

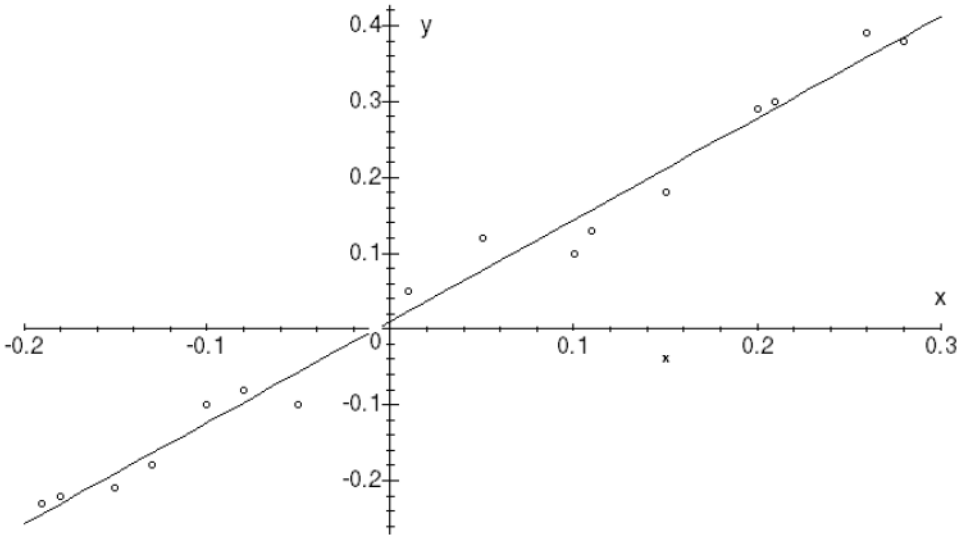


Fig. 4.1: A regression line between y and x.

High β stocks, due to their large volatility, will be more unpredictable, and therefore, more risky. Low beta stocks show relatively small volatility, and they are more predictable and safe.

Beta is a statistical quantity, and it is a measure of the systematic risk, or the market related risk of a stock. These results can also be expressed as a statistical formula,

$$\beta_j = \frac{\text{cov}(R_j, R_m)}{\text{var}(R_m)} = \frac{r_{jm}\sigma_m\sigma_j}{\sigma_m^2} = \frac{r_{jm}\sigma_j}{\sigma_m} \tag{4.3}$$

where $\text{cov}(R_j, R_m)$ is the covariance between the returns on the stock j and the market, and $\text{var}(R_m)$ is the variance of the returns on the market. If we have collected sufficient statistical data, we may find β by using

$$\beta = \frac{n\Sigma(xy) - (\Sigma x)(\Sigma y)}{n\Sigma x^2 - (\Sigma x)^2} \tag{4.4}$$

$$\alpha = \frac{\Sigma y - \beta\Sigma x}{n} \tag{4.5}$$

where n is the number of x and y values.

One can apply the concept of beta to a portfolio. The beta of a portfolio is simply the weighted average of the betas of the securities in the portfolio,

Beta of a portfolio, $$\beta_p = w_1\beta_1 + w_2\beta_2 + w_3\beta_3 + \ldots = \sum_{i=1}^{n} w_i\beta_i \tag{4.6}$$

The advantage of using β as a measure of risk is that it can combine linearly for different securities in a portfolio, but the disadvantage is that it can measure only the market related risk of a security. On the other hand, σ can measure the risk independent of the market

conditions, but its disadvantage is that it is non-linear in character and difficult to apply in practice. Both β and σ are incomplete measures of risk; they change with time, and are difficult to measure accurately.

By definition, the beta of a riskless investment is zero. Further, the beta of the market is 1. This is seen by setting $j = m$ in (4.3) and noting that the covariance of a random variable with itself is just its variance.

A security that has a high beta should show a large rise in price when there is an upward movement in the market, and has a large drop in price in case of a downward movement. These large price fluctuations can cause a considerable amount of uncertainty about the return of this security, and greater risk associated with it. Therefore, a high beta security is also a high-risk security. Thus, beta is frequently used as a measure of the risk of a security. A low beta security is a defensive security and a high beta of a stock means a more aggressive management stance.

The numerical value of β for different stocks is available from sources on the Internet, such as www.etrade.com, and www.yahoo.com.

References:

1. http://www.columbia.edu/~ks20/FE-Notes/4700-07-Notes-CAPM.pdf
2. https://www.scranton.edu/faculty/hussain/teaching/fin586_/GPT104.pdf
3. https://people.bath.ac.uk/mnsak/Research/Asset_pricing.pdf
4.