Note: This document is a part of the lectures given during the Jan-May 2020 Semester.

Financial Markets:

We begin with the broadest possible economic classification: securities (bonds, stocks etc.) and contracts and derivatives (forwards and futures, options, swaps etc.). We discuss the basic characteristics of each type, its purpose from the point of view of an investor and its organization in different markets.

Securities:

A security is a document that confers upon its owner a financial claim.

Bonds:

Bond is a security (a document) that gives its owner the right to a fixed, predetermined payment, at a future, predetermined date, called maturity. The amount of money that a bond will pay in future is called the nominal value, face value, par value or principal. There are two sides to a bond contract:

1. The party that promises to pay the nominal value (Debtor).
2. The party that will get paid (Creditor).

We say that the debtor is a counterparty to the creditor and vice versa. The debtor issues a bond in exchange for an agreed upon amount, called the the bond price paid, by the creditor. The difference between the bond price that the creditor pays to the debtor and the nominal value is called interest. The interest as a percentage of the total value is called the interest rate. Typically (though not always), a bond with longer maturity pays a higher interest rate. Bonds are considered as risk-free security because of a guaranteed payoff at maturity.

Money can be interpreted as bond with zero interest rate and zero maturity. The debtor in this case is the government, guaranteeing the general acceptability of money as a payment instrument.

Depending on their maturity, bonds are classified as short term bonds (or bonds of maturity no greater than one year) or long term bonds (when the maturity exceeds one year).

There are bonds which involve only an initial payment (the bond price) and a final payment (the nominal value). These are called pure discount bonds, since the initial price is equal to the discounted nominal value. Most often, however (especially with long term bonds), periodic payments will be made by the debtor at predetermined percentage of nominal value of the bond and are called coupons. At maturity, the debtor will pay the last coupon and the nominal value. In this case the nominal value part is called the principal. The corresponding bonds are called coupon bonds. In fact, a coupon bond is a collection or a basket of pure discount bonds with nominal values being equal to the coupons.

If the price at which the bond is sold is exactly the same as the nominal value, we say that the bond sells at par. If the price is higher/lower than the nominal value then we say that the bond sells above/below par.

Bonds issued by a corporation for financing purpose are called debt and the creditor is called the bond-holder.

Even though we call bonds as risk free securities, they might actually involve risk as follows:

1. The debtor might fail to meet the payment obligation. This risk is typical of bonds issued by corporations and is called credit risk or default risk. Government bonds are considered free of risk, since they can always print money and are therefore unlikely to default.
2. There exists real bonds or inflation bonds, that guarantee a payment that depends on the inflation level. Because of high risk for debtor, these bonds are not common.
3. Another risk arises when the creditor needs money before maturity and tries to sell the bond. However, the price that the bond will reach before maturity depends on factors that cannot be predicted. The risk of having to sell at a given time at low prices is called liquidity risk.

Stocks:

A stock is a security that gives its owner the right to a proportion of any profit that might be distributed (rather than reinvested) by the firm that issues the stock and to the corresponding part of the firm in case it decides to close down and liquidate. The owner of the stock is called the stockholder. The profits that the company distributes to the stockholders are called dividends . These are random, unlike the nominal values of bonds which are predetermined.

Stocks "in principle" will not expire unless the company goes out of business. The stockholder can sell the stock to another person. Since the stock is a risky security, the purchase of a stock and its sale at a later date might produce a profit or loss. These are called positive or negative return respectively. Thus the return on a stock will have two components:

1. The dividends received while in ownership of the stock.

2. The difference between the selling price and the initial price called the capital gain or loss.

The relation between the dividend and the price of the stock is called the dividend yield.

Stocks while being more risky than the bonds, does not have the default risk, since there is no promise of payment to begin with. With respect to inflation uncertainty, stocks can behave better than bonds. General price increase mean that corporations are charging more for their sales leading to increased profits. This reasoning is not applicable in case of bonds. Historical data indicate that stocks pay a higher return than the interest rate paid by bonds on an average.

Short-selling the stock consists in borrowing the stock from someone who owns it and selling it. The short seller hopes that the price of the stock will drop. When that happens, she/he will buy the stock at that lower price and return it to the original owner. The investor that owes the stock has a short position in the stock. In contrast to short-selling, when a person buys a security we say that she/he goes long in the security.

Derivatives:

Derivatives are financial instruments whose payoff depends on the value of another financial variable (price of a stock, price of a bond, exchange rate etc.) called underlying. In this case, the profit of one party will be the loss of another party and is a zero-sum game.

Forwards and Futures:

Forwards and futures are contracts by which one party agrees to buy the underlying asset at a future, predetermined date at a predetermined price, while the other party agrees to deliver the underlying at the predetermined date for the agreed price. The date at which the exchange takes place is called the maturity. The price to be paid at maturity (but agreed upon today) is called the forwards price or the futures price. Today's value of the contract is zero. The regular market price at which one can buy the underlying at the present time in the market is called the spot price.

The difference between forwards and futures is the way the payments are made from one party to the other. In case of forwards, the exchange of money and assets are made only at the final date. For futures, the exchange is more complicated, occurring in stages. While forwards are traded over the counter, futures are traded on exchanges.

The side that accepts the obligation to buy the underlying takes the long position. The side that accepts the obligation to sell the underlying takes the short position. Let us denote by $F(t,T)$ the forward price agreed upon at the present time t for delivery at maturity time T. By $S(t)$ we denote the spot price of the underlying at t. The payoff for the short side of the contract is $F(t,T) - S(T)$ while the payoff for the long side of the contract is $S(T) - F(t,T)$.

Futures are marked to market. Marking to market means that both sides of the contract must keep a cash account whose balance will be updated on daily basis depending on the changes of the futures price in the market.