FINC3012: Derivative Securities

[Week 1]

Introduction

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- A derivative is a financial instrument whose value depends on the values of other, more basic, underlying variables.
    - Very often the variables underlying derivatives are the prices of traded assets.
    - When trading an underlying asset, there is essentially immediate settlement. In contrast, derivatives will involve the exchange of an underlying asset with a delayed settlement.
- Examples of derivatives are:
    - Futures.
    - Forwards.
    - Swaps.
    - Options.
- Uses of derivatives include:
    - Hedging risks.
    - Speculating.
    - Locking in an arbitrage profit.
    - Changing the nature of a liability.
    - Changing the nature of an investment without incurring the costs of selling one portfolio and buying another.

Exchange-Traded Markets

- A derivatives exchange is a market where individuals trade standardised contracts that have been defined by the exchange.
- Traditionally derivatives exchanges have used what is known as the open outcry system. This is where traders will meet physically on a floor, shouting and using hand signals to indicate trades which they wish to carry out.
- Exchanges are increasingly replacing the open outcry system with electronic trading. This involves traders entering their desired trades at a keyboard and a computer is used to match buyers and sellers.
    - Electronic trading has led to a growth in algorithmic trading (also known as 'black-box trading', 'automated trading', 'high frequency trading', or 'robo trading'). This involves the use of computer programs to initiate trades, often without human intervention.
    - The ASX relies entirely on electronic trading.
- The Australian Securities Exchange ('ASX') is the predominant exchange in Australia.
    - It was created in 2006 with the merger of the Australian Stock Exchange and the Sydney Futures Exchange.
    - Futures contracts were originally traded solely on the Sydney Futures Exchange ('SFE') in 1960.
    - In the 1990s, the Australian Stock Exchange replicated the individual share futures contracts that were trading on the SFE.
    - This ceased with the creation of the ASX.
    - Some of the futures traded on the ASX are:
        - Gold futures.
        - 90-day bank accepted bill futures.
        - Share price index futures.
        - Contracts for difference.
        - Electricity futures contracts.

Over-the-Counter Markets

- Not all derivatives trading is done on exchanges. The over-the-counter ('OTC') market is an important alternative to exchanges.
- In terms of the volume traded, OTC is larger than the exchange-traded market.
    - The Bank for International Settlements estimates that by December 2009, the OTC derivatives market had grown to $614.7 trillion (in terms of estimated total principle amounts underlying the transactions outstanding) and the exchange market was $73.1 trillion (in terms of the estimated total value of assets underlying the contracts).
    - These two measures are not perfectly comparable. The principle underlying in an OTC transaction is not the same as its value.
    - The Bank for International Settlement estimated that the value of all OTC contracts outstanding was about $21.6 trillion as at December 2009.
- This is a telephone and computer-linked network of dealers. Trades are done over the phone and are usually between two financial institutions, or a financial institution and their client.
- Financial institutions often act as market makers for the more commonly traded instruments. This means that are always prepared to quote both a bid price (a price at which they are prepared to buy) and an offer price (a price at which they are prepared to sell).
- Telephone conversations are usually tapped to allow replay when there are disagreements about what was agreed.
- Trades in the OTC markets are typically much larger than that of exchange-traded markets.
- A key advantage of the OTC market is that the terms of a contract do not have to be those specified by an exchange. Market participants are free to negotiate and form a mutually attractive deal.
- A disadvantage is that there is usually some credit risk in an OTC trade (meaning there is a chance that the contract will not be honoured).

Forward Contracts

- Forward contracts are an agreement to buy or sell an asset at a certain time for a certain price.
    - This gives certainty to the price received or paid in the future.
- This can be contrasted with a spot contract, which is an agreement to buy or sell and asset today.
- A forward contract is traded OTC.
- One party assumes a long position in the contract and agrees to buy the underlying asset on a certain specified future date for a specified price. The other party will assume a short position and agrees to sell the asset on the same date for the same price.
- The payoffs from forward contracts are as follows:
    - For a long position, the payoff will generally be:

$$Payoff = S_T \quad K$$

where:
S_T *= spot price of the asset at maturity of the contract*
K *= delivery price*

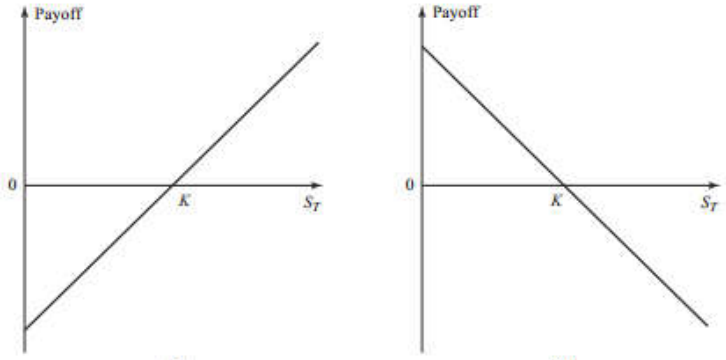
    - For a short position, the payoff will generally be:

$$Payoff = K \quad S_T$$

where:
S_T *= spot price of the asset at maturity of the contract*
K *= delivery price*

    - These can be expressed diagrammatically as:

Figure 1.2 Payoffs from forward contracts: (a) long position, (b) short position. Delivery price = K; price of asset at contract maturity = S_T.



- Thus, payoffs can be both positive and negative for both long and short positions in forwards.

- The time value of money influences the relationship between spot and forward prices. Given that money can be invested for the duration of the forward contract, prices in the future are greater than spot prices.
- In the most basic case (assuming the only cost of owning an asset is the cost of financing), the relationship between a forward price and a spot price will be expressed as:

$$F = S(1 + r)^T$$

where:
F = forward price
S = spot price
r = risk-free rate
T = time (in years)

Futures Contracts

- Future contracts are like forward contracts as they are also agreements by two parties to buy or sell an asset at a certain time in the future for a certain price.
- Unlike forward contracts, futures contracts are generally traded on an exchange.
- To make trading possible, the exchange specifies certain standardised features of the contract.
- As the two parties to the contract also do not necessarily know each other, the exchange will also provide a mechanism which allows a guarantee that the contract will be honoured.
- The standardised features and exchange mechanism promotes liquidity.
- Examples of futures exchanges are:
  - CME Group
  - NYSE Euronext
  - Eurex
  - BM&FBOVESPA
  - ASX
- Futures will be priced similarly to forwards.

Options

- There are two types of options:
  - Call options which give the holder the right, but not the obligation, to buy the underlying asset by a certain date for a certain price.
  - Put options which give the holder the right, but not the obligation, to sell the underlying asset by a certain date for a certain price.