1.2 Financial Engineering

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# 1.2.1 Trading Positions and Attitudes

* Long and short positions:. In the financial parlance, when an investor owns a security it is said that she is long in that security, and when she owes the value of a security she is short in that security.

[Being long in any security implies to have a profit if the price increases, and a lost if the price decreases; whereas being short carries a profit if the price of the security decreases, and a lost if it increases.]

* A portfolio insurance strategy: Suppose an investor is long on stocks from XYZ. Then to cover himself from possible losses, in the event that the price of the stock goes down, he can simultaneously enter into a long position on a put option (i.e. a long put) for similar amount of XYZ shares.
* Hedgers, speculators and arbitrageurs:Hull (2009, §1.5) identifies three types of traders: hedgers, speculators and arbitrageurs. Hedgers trade so as to reduce or eliminate the risk in taking a position on a security; their main goal is to protect the portfolio from loosing value at the expense of lowering the possible benefits. This attitude (or trading strategy) is called hedging.
* Bulls and bears:When the market trend is upward, as reflected by the main index or the majority of its composite stocks, it is said to be bullish, or that the bulls are in charge
* Market timing or buy-and-hold:As for possible trading strategies, at one end of the wide range of possibilities is the passive attitude, followed by the majority of investors, consisting on buying various securities and maintaining them in the portfolio for a long time. What sustains this static strategy is the observed tendency of almost all securities to increase their value if sufficient time is given to them to mature.

# 1.2.2 On Price and Value of Stocks. The Discounted Cash Flow

[The price of a stock is determined by the forces of supply and demand from investors]

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for t to infinity:

$s\_0=\sum\_{t=1}^\infity d\_t/(1+r)^t$

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for d has g growth ratio:

$s\_0=\sum\_{t=1}^\infinity\frac{d\_1(1+g)^{t-1}}{(1+r)^t}=\frac{d\_1}{r-g},for r>g$

# 1.2.3 Arbitrage and Risk-Neutral Valuation Principle

* Principle of No Arbitrage: there are no arbitrage opportunities.

Definition 1.1 (Extended no arbitrage) The extended no arbitrage is the following list of assumptions about the market of securities: • Arbitrage is not possible. • There are no transaction costs, no taxes, and no restrictions on short selling. • It is possible to borrow and lend at equal risk-free interest rates. • All securities are perfectly divisible

Theorem 1.1 (Pricing a forward contract) At any time t the forward price of a forward contract to buy an asset which has a price at time , with delivery price , maturity date , and considering a constant interest rate through the life of the contract is either: (1) , if the asset pays no dividends and has no costs. (2) , if the asset pays dividends or has some costs whose discounted total value is . (3) , if the asset pays interests at a continuous rate of .

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* Risk-neutral valuation. Another way to value an option can be derived from the assumption that investors are indifferent about risk. This is a strong hypothesis but make for doing pretty valuation.

# 1.2.4 The Efficient Market Hypothesis and Computational Complexity

* Weak: only the price history of the securities constitutes the available information.
* Semi–strong: all public information known up to the present time is available.
* Strong: all public and private information (i.e., all possible information) known up to the present time is available.