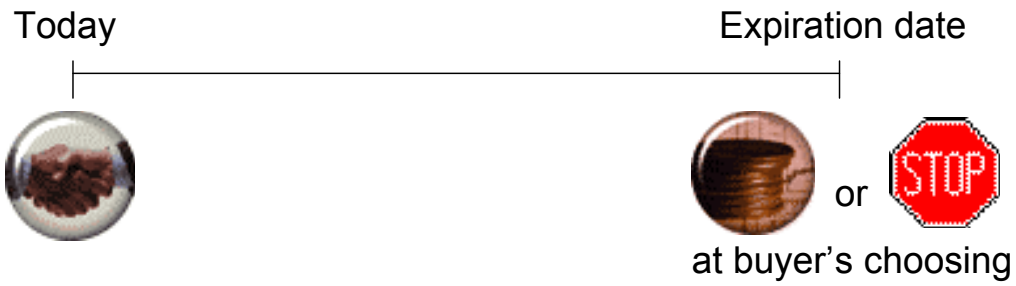
Call Options

- A non-binding agreement (right but not an obligation) to buy an asset in the future, at a price set today
- Preserves the upside potential, while at the same time eliminating the unpleasant downside (for the buyer)
- The seller of a call option is obligated to deliver if asked



Examples

- Example 2.3: S&R index
  - Today: call buyer acquires the right to pay $1,020 in six months for the index, but is not obligated to do so
  - In six months at contract expiration: if spot price is
    - $1,100, call buyer's payoff = $1,100 – $1,020 = $80
    - $900, call buyer walks away, buyer's payoff = $0
- Example 2.4: S&R index
  - Today: call seller is obligated to sell the index for $1,020 in six months, if asked to do so
  - In six months at contract expiration: if spot price is
    - $1,100, call seller's payoff = $1,020 – $1,100 = ($80)
    - $900, call buyer walks away, seller's payoff = $0
- Why would anyone agree to be on the seller side?

Definition and Terminology

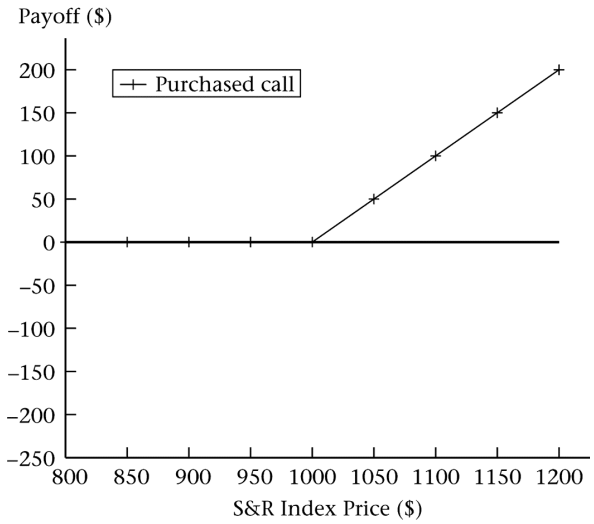
- A call option gives the owner the right but not the obligation to buy the underlying asset at a predetermined price during a predetermined time period
- Strike (or exercise) price: the amount paid by the option buyer for the asset if he/she decides to exercise
- Exercise: the act of paying the strike price to buy the asset
- Expiration: the date by which the option must be exercised or become worthless
- Exercise style: specifies when the option can be exercised
  - European-style: can be exercised only at expiration date
  - American-style: can be exercised at any time before expiration
  - Bermudan-style: Can be exercised during specified periods

Payoff/Profit of a Purchased Call

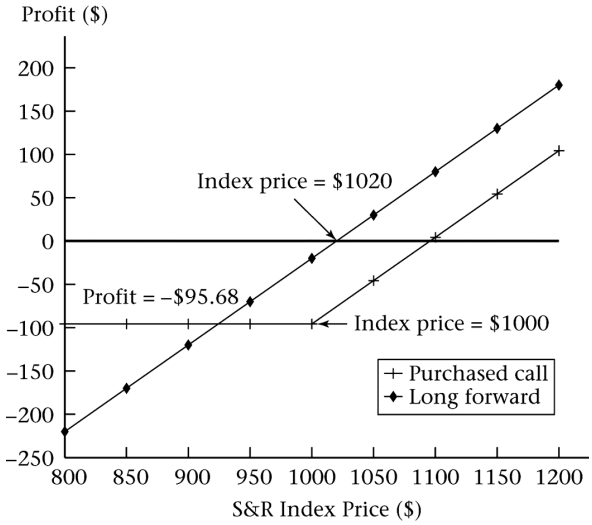
- Payoff = Max [0, spot price at expiration – strike price]
- Profit = Payoff – future value of option premium
- Examples 2.5 & 2.6:
  - S&R Index 6-month Call Option
    - Strike price = $1,000, Premium = $93.81, 6-month risk-free rate = 2%
  - If index value in six months = $1100
    - Payoff = max [0, $1,100 – $1,000] = $100
    - Profit = $100 – ($93.81 x 1.02) = $4.32
  - If index value in six months = $900
    - Payoff = max [0, $900 – $1,000] = $0
    - Profit = $0 – ($93.81 x 1.02) = – $95.68

Diagrams for Purchased Call (Hockey-stick Function)

- Payoff at expiration



- Profit at expiration



Payoff/Profit of a Written Call

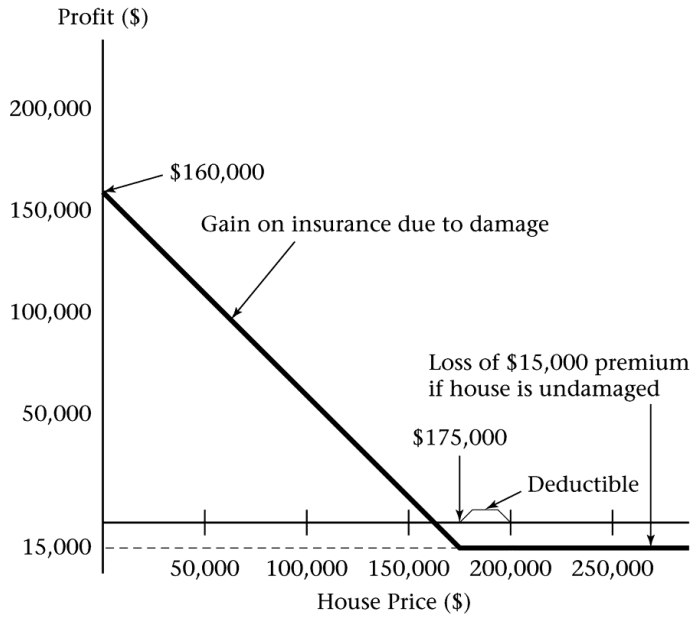
- Payoff = – max [0, spot price at expiration – strike price]
- Profit = Payoff + future value of option premium
- Example 2.7
  - S&R Index 6-month Call Option
    - Strike price = $1,000, Premium = $93.81, 6-month risk-free rate = 2%
  - If index value in six months = $1100
    - Payoff = – max [0, $1,100 – $1,000] = – $100
    - Profit = – $100 + ($93.81 x 1.02) = – $4.32
  - If index value in six months = $900
    - Payoff = – max [0, $900 – $1,000] = $0
    - Profit = $0 + ($93.81 x 1.02) = $95.68

Put Options

- A put option gives the owner the right but not the obligation to sell the underlying asset at a predetermined price during a predetermined time period
- The seller of a put option is obligated to buy if asked
- Payoff/profit of a purchased (i.e., long) put
  - Payoff = max [0, strike price – spot price at expiration]
  - Profit = Payoff – future value of option premium
- Payoff/profit of a written (i.e., short) put
  - Payoff = – max [0, strike price – spot price at expiration]
  - Profit = Payoff + future value of option premium

Options and Insurance

- Homeowner's insurance as a put option



A Few Items to Note

- A call option becomes more profitable when the underlying asset appreciates in value
- A put option becomes more profitable when the underlying asset depreciates in value
- Moneyness
  - In-the-money option: positive payoff if exercised immediately
  - At-the-money option: zero payoff if exercised immediately
  - Out-of-the money option: negative payoff if exercised immediately