Spring 2020 4/1/2020

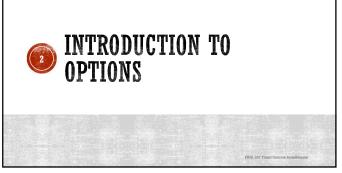
CALLABLE AND PUTABLE BONDS

- Introduction to options
 Introduction to bonds with embedded options
 Gains/losses from calling a bond
 Pricing
 Returns
 Duration and convexity





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OPTIONS

- What is an option?
- A derivative security that gives the holder the right (but not the obligation) to buy or sell the underlying instrument at a prespecified price by a pre-specified date
- The option buyer pays the option seller for the option at the time the contract is agreed upon. The price is called the option price or option premium
- Option to buy underlying security = <u>call</u> option
- Option to sell underlying security = <u>put</u> option



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OPTIONS (CONT.)

- Buy an option: pay the premium
- What can you do with an option?
- Exercise
- Allow to expire
- Trade
- Four features characterize an option
- Underlying securityExercise (or strike) price
- Expiration date
- Exercise commencement date

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PAYOFF AND PROFIT DIAGRAMS

- Payoff diagrams provide a useful way of graphing payoffs to a security (especially a derivative security) at one point in time
- These diagrams aid in replicating and valuing derivative securities
- The graph plots the payoff of one security (the derivative) as a function of the payoff of another security (the original or underlying security)
- Profit diagrams
- Profit = Payoff +/- Option's price



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PAYOFF AND PROFIT DIAGRAMS: EXAMPLES

- · Assume:
- The current price of a bond, P₀, is \$100
- We examine all payoffs at some point in time t = T $\mbox{-}$ The value of underlying security at T is $\mbox{P}_{\mbox{\scriptsize T}}$
- A call option with exercise price of \$101 at time T
 A put option with exercise price of \$101 at time T
- Both the call option and the put option currently cost \$1
- Plot the payoff diagram for buying the call, buying the put, selling the call or selling the put
- Plot the profit diagrams for the same positions



OPTION PAYOFF/PROFIT EXAMPLE

Consider a call option on bond X with an exercise price of \$112\$ that expires in 3 months. Today the option's price is \$4.

• What is your payoff if you buy the option today and in 3 months bond X is selling for \$100? What is your profit/loss?

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OPTION PAYOFF/PROFIT EXAMPLE

Consider a call option on bond X with an exercise price of \$112 that expires in 3 months. Today the option's price is \$4.

 What is your payoff if you sell the option and in 3 months bond X is selling for \$100? What is your profit/loss?

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OPTION PAYOFF/PROFIT EXAMPLE

Consider a call option on bond X with an exercise price of \$112 that expires in 3 months. Today the option's price is \$4.

• What is your payoff if you buy the option and in 3 months bond X is selling for \$120? What is your profit/loss?

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