# **Interest Rate Caps, Floors, and Collars**

Both Caps and Floors are a series of Interest Rate Options contracts.

Reference Rate – the interest rate a loan is based on – such as LIBOR.

Interest Rate Cap – one party agrees to compensate another party if a reference rate is higher than a predetermined level (strike rate).

Interest Rate Floor – one party agrees to compensate another party if a reference rate is lower than a predetermined level (strike rate).

Generally, the compensation involves paying the difference between the reference rate and the predetermined level multiplied by a notional principal.

In both cases, this potential compensation comes at the price of an upfront premium.

Example: A buys an interest rate cap from B so that if 3-month LIBOR exceeds 6% at the end of any three-month period for the next four years, B will pay A an amount equal to the difference based on a notional principal of $20 million.

Suppose exactly one year from the date of the agreement (one of the three-month dates), 3-month LIBOR is 8%.

B must pay A: $20 million \* ((8% - 6%)/4) = $100,000

An interest rate floor works the same way if the reference rate falls below the strike rate.

Interest Rate Caps and Floors are equivalent to a series of interest rate options contracts at different time periods (in our example, 16 contracts – one every three months for four years).

Buying a cap is equivalent to buying a series of puts on a fixed-income instrument (like the T-bond interest rate futures contracts we looked at). This is because the owner of the cap will profit if rates rise (causing a bond’s value to fall).

Buying a floor is equivalent to buying a series of calls on a fixed income instrument. This is because the owner of the floor will profit if rates drop (causing a bond’s value to rise).

With a cap (put), you profit if interest rates go up

With a floor (call), you profit if interest rates go down

As with all options, the premium is paid up front. It is the most that the purchaser of the option can lose and the most that the writer of the option can make.

As with other options, Caps and Floors can be in-the-money or out-of-the-money.

Buying an interest rate cap with the same reference rate as you have for a pre-existing floating-rate loan (where you are the debtor) with a notional principal equal to the face value of that loan effectively assures you that the interest you pay on that loan won’t exceed the strike rate on your cap (your interest rate is capped).

Buying an interest rate floor with the same reference rate as you have for a pre-existing floating-rate loan (where you are the creditor) with a notional principal equal to the face value of that loan effectively assures you that the interest you receive on that loan won’t be less than the strike rate on your floor.

Premiums are determined based on some option-pricing model.

Note that if you use Black-Scholes, adjustments must be made because although stock prices can take any value, fixed-income securities cannot exceed the sum of the promised cash flows unless we have negative interest rates.

Additionally, Black-Scholes assumes a constant variance over the life of the option, but fixed-income securities have reduced variance as they move closer to maturity (remember that there is more intersest rate risk with a bond that has a higher maturity).

Interest Rate Collars

An interest rate collar is just a combination of a floor and a cap.

If an individual has a floating-rate loan and wants to be assured that the interest rate will always be between 4% and 6%, he can buy a cap with a strike rate of 6% and sell a floor with a strike rate of 4%.

If interest rates go above 6%, he is compensated through his ownership of the cap as we showed earlier.

If interest rates go below 4%, he must pay (to the one who bought the floor from him) the difference between the 4% rate and where rates actually are – effectively giving him a rate of 4%.

If the probabilities of rates going above 6% are equal to the probabilities of rates going below 4%, the premium he pays for the cap should be approximately equal to the premium he receives when he sells the 4% floor, so that converting the floating-rate loan to a collar is costless.