Zero Up-Front Cost Hybrid Instruments

**Range Forward:** a.k.a. the collar, cylinder option, or fence

- for a long FC position, obtain downside protection by purchasing an out-of-the-money put option on FC for the size of the exposure
  - the option has strike price \( X_p \) and a premium with \( FV = A \)
- you then sell (write) an equivalent size out-of-the-money call put option on FC with strike price \( X_c \) and receive the premium
  - strike price \( X_c \) is chosen so this call premium has \( FV = B = A \)

\[ S(\$/FC) \]

\[ \begin{align*}
  \text{Underlying Firm Exposure} \\
  \text{Premium received, } A, \text{ is equal to premium paid, } B \\
  \text{Write call option on FC with strike price } X_C \\
  \text{Purchase put option on FC with strike price } X_P
\end{align*} \]
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**Range Forward**

- the net effect with the exposure is a payoff that is flat both at the bottom and top
- maximum loss on position of \(-Z\) and maximum gain on position of \(+Y\), and the underlying exposure within the "range"

![Diagram showing Range Forward and its payoff](attachment:range_forward_diagram.png)

**Special Case of Range Forwards**

- **Range forward = forward contract when strike price = F**
  - being long (buying) a put option and short (selling) a call option on FC, both with strike price at the forward price \(F\), create a synthetic forward sale of FC
  - the two options together have the same payoff as a forward sale
  - since a forward contract has zero upfront cost, by arbitrage the cost of these two options must be zero so we know that the premium of these options are the same
  - it is a special case of a range forward

![Diagram showing Special Case of Range Forwards](attachment:special_case_diagram.png)
Participating Forward

- Full downside protection with partial upside participation
  - combination of a put and a call with zero upfront cost
    - downside protection financed by selling part of upside participation
  - for a long FC position:
    - 1. buy a full size FC put option on the exposure at strike price X
    - 2. for Z% upside participation in the exposure sell a fraction call option (1-Z%) of the size of the put option at the same strike price X

- Two options with zero net upfront cost
  - payoff on the two options is line with slight kink at strike price X
  - net exposure with the firm (combination of firm exposure and participating forward) is like a call option on FC with a floor on downside (downside protection at max loss) and partial upside participation everywhere above X
    - less upside participation than the full exposure