

Cancelable Swap Explained

Cancelable Swap

- ◆ A cancelable swap gives the holder the right but not the obligation to cancel the swap at predetermined dates prior to maturity.
- ◆ Cancelable swap consists of a vanilla swap and a Bermudan option to cancel the remaining swap.
- ◆ The price of a cancelable swap is the difference of the values of the swap and the option given by

$$PV_{\text{CancellablePayerSwap}} = PV_{\text{PayerSwap}} - PV_{\text{ReceiverBermudanSwaption}}$$
$$PV_{\text{CancellableReceiverSwap}} = PV_{\text{ReceiverSwap}} - PV_{\text{PayerBermudanSwaption}}$$

- ◆ A Bermudan swaption gives the holder the right but not the obligation to enter an interest rate swap at predefined dates.

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- ◆ At the maturity T , the payoff of a Bermudan swaption is given by

$$Payoff(T) = \max(0, V_{swap}(T))$$

where $V_{swap}(T)$ is the value of the underlying swap at T .

- ◆ At any exercise date T_i , the payoff of the Bermudan swaption is given by

$$Payoff(T_i) = \max(V_{swap}(T_i), I(T_i))$$

where $V_{swap}(T_i)$ is the exercise value of the Bermudan swap and $I(T_i)$ is the intrinsic value.

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- ◆ Unlike pricing a European swaption, an interest rate term structure model is needed to evaluate a Bermudan swap.
- ◆ A short rate model or a market rate model is used. One key step is to calibrate the model to the market quotes.
- ◆ The running swap rate follows the following process:

$$\ln S_{i,T}(t_i) = \ln S_{i,T}(0) - \frac{\sigma_{i,T}^2 t_i}{2} + \sigma_{i,T} \sqrt{t_i} Z,$$

- ◆ It can be further written as

$$S_t = \bar{S}(t) \exp\left[-\frac{1}{2}\sigma(t)^2 t + \sigma(t) W_t\right],$$

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- ◆ The exercise value is calculated at a possible early exercised time as $\max\{\beta(S_{i,n}(t_i) - K_i), 0\}$
- ◆ One assumption of this model is that the term structure is deterministic.
- ◆ The research shows this approach can be considered as approximately arbitrage-free if we believe drift adjustments are relatively small.



Thanks!



You can find more details at

<https://finpricing.com/lib/EqRainbow.html>

