Fixed Income

Steven Wang

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1 Section 1

$$P_{swap} = P_{floater} - P_{fixed}$$
$$P_{swap} = Cap - Floor$$

$$B(t,T) = e^{-\int_t^T r_u du + \int_t^T \gamma(u,T) dW_u^*}$$
$$dB(t,T) = B(t,T)(r_t dt + \gamma(t,T) dW_t^*)$$

$$\begin{aligned} d(log(B(t,T))) &= \frac{1}{B(t,T)} d(B(t,T)) - \frac{1}{2B(t,T)^2} d < B(t,T) > \\ &= r_t dt + \gamma(t,T) dW_t^* - \frac{1}{2}(\gamma(t,T)^2 dt) \\ &= r_t dt - \frac{1}{2}\gamma^2(t,T) dt + \gamma(t,T) dW_t^* \end{aligned}$$

$$log(B(t,T)) = \int_0^t r_u du - \frac{1}{2}\int_0^t \gamma^2(u,T) du + \int_0^t \gamma(u,T) dW_t^* + logB(0,T)$$
$$B(t,T) = B(0,T) \cdot e^{\int_0^t r_u du - \frac{1}{2}\int_0^t \gamma^2(u,T) du + \int_0^t \gamma(u,T) dW_t^*}$$
$$\frac{B(t,T)}{B(0,T)} = S_t^0 \cdot \underbrace{e^{-\frac{1}{2}\int_0^t ||\gamma(u,T)||^2 du + \int_0^t \gamma(t,T) dW_t^*}}_{M(t,T)}$$