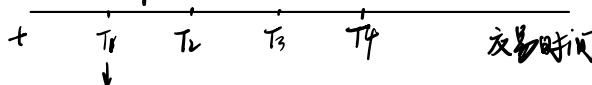


Vanilla option



$$\text{call option} = \max[0, S_{T_1} - k_1]$$

$$\text{put option} = \max[0, k_1 - S_{T_1}]$$

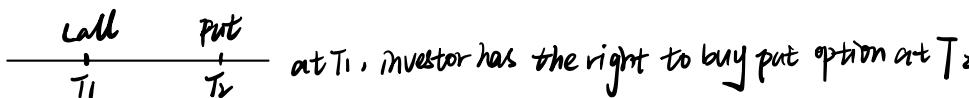
★ Compound options

① call-on-call (same underlying asset)



$$\max[0, C(T_1, S_{T_1}; T_2, k_2) - k_1]$$

② call-on-put (same underlying asset)



$$\max[0, P(T_1, S_{T_1}; T_2, k_2) - k_1]$$

③ put-on-call (same underlying asset)



$$\max[0, k_1 - C(T_1, S_{T_1}; T_2, k_2)]$$

④ put-on-put (same underlying asset)

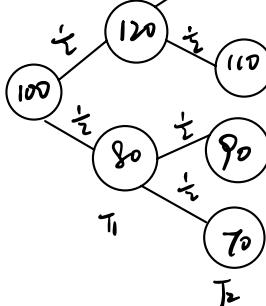


$$\max[0, k_1 - P(T_1, S_{T_1}; T_2, k_2)]$$

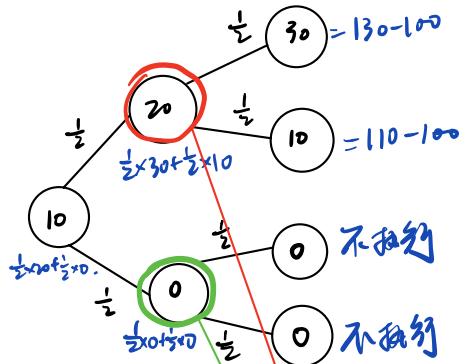
★ Chooser option 由多头选择是否执行/看涨/看跌 由空头选择出售.

$$\max[0, C(T_1, S_{T_1}; T_2, k_2) - k_1, P(T_1, S_{T_1}; T_2, k_2) - k_1']$$

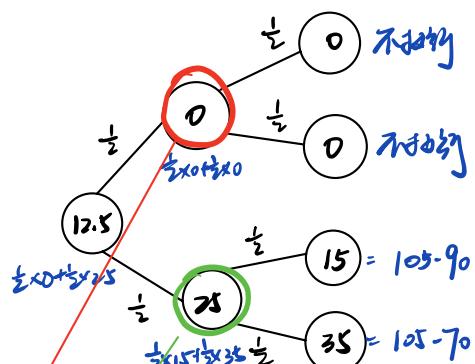
Stock price \downarrow T_2 当前价格 \downarrow k_2' 与 k_1 表示 option 执行价不一定相同。



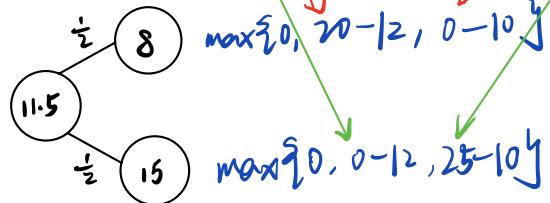
call option. $k_2 = 100$ $\max[0, S_{T_2} - k_2]$



put option $k_2 = 105$ $\max\{0, k_2 - S_T\}$

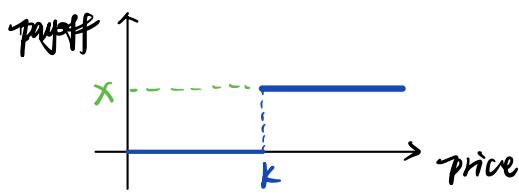


$$T_1 \text{时刻 } k_1 = 12, \quad k_1' = 10.$$



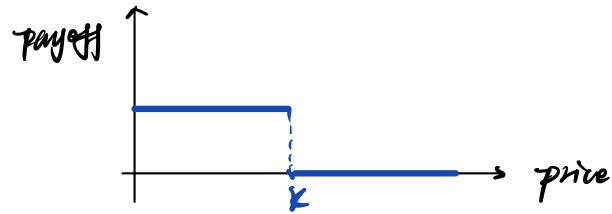
Binary option = 二元期权 & Digital option 数字期权.

(1) cash-or-nothing call



标的资产价格低于执行价格K时，
期权无价值；标的资产价格高于
执行价格时，获得固定价格收益。

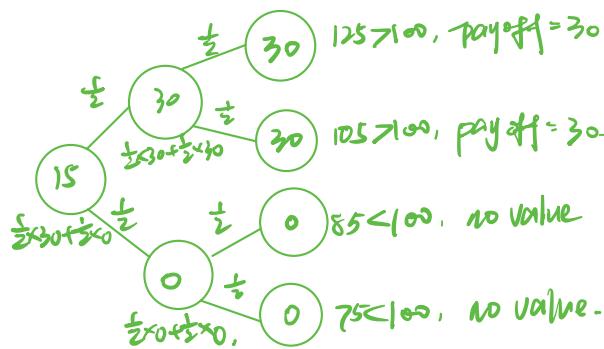
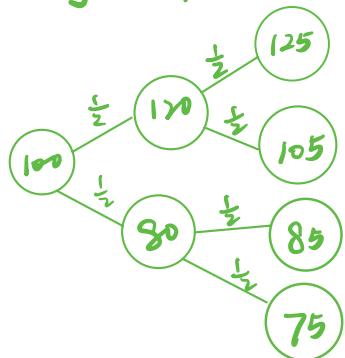
(2) cash-or-nothing put



标的资产价格低于执行价格时，
获得固定价格收益；标的资产价格
高于执行价格时，期权无价值

Example

Binary call option $K = 100$ $X = 30$



Compound option 复合期权.

(1) call-on-call option



复合期权到期日 标的资产到期日.

T_1 时刻支付后，来购买标的资产的看涨期权

在下时刻以后，来购买标的资产.

(2) call-on-put option



复合期权到期日 标的资产到期日.

T_1 时刻支付后，来购买标的资产的看涨期权

在下时刻以后，来出售标的资产.

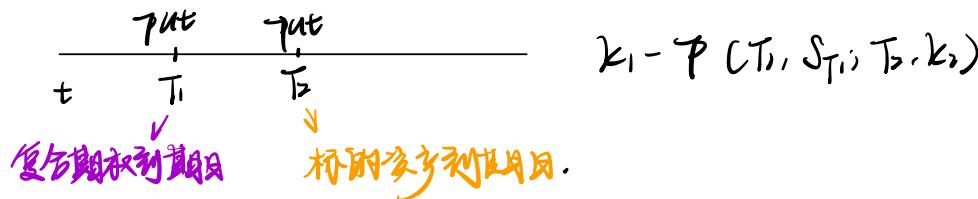
(3) put-on-call option.



T_1 时刻卖出标的资产的看涨期权获得 k_1 ,

在下时刻以 k_2 买入标的资产

(4) put-on-put option.



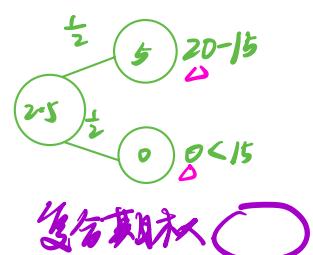
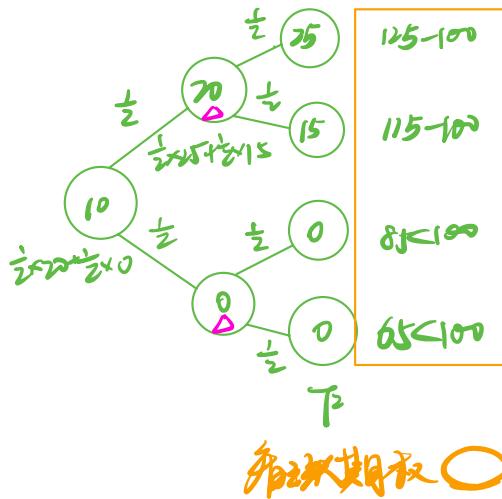
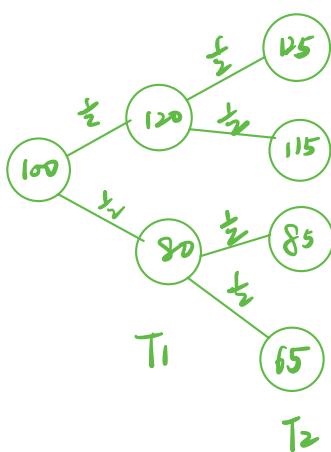
T_1 时刻卖出标的资产的看跌期权获得 k_1 ,

在下时刻以 k_2 价格买入标的资产.

Example

call-on-call option $k_1 = 15$ $k_2 = 100$ 标的资产的价格.

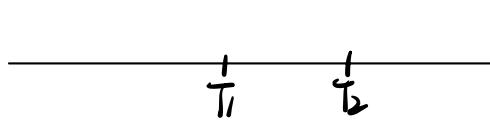
underlying asset price 看涨期权的价格 $\max(S_T, k_2, 0)$



Chooser option 选择期权

购买期权后，可以选择执行/看跌。

可以不同执行价与刻期日。

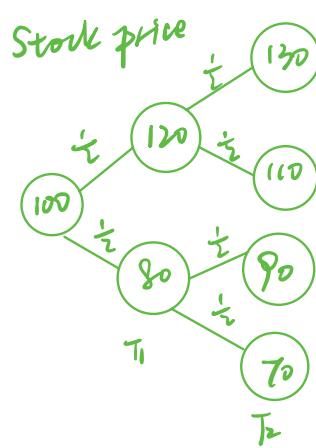


选择看涨/看
跌期权的时间

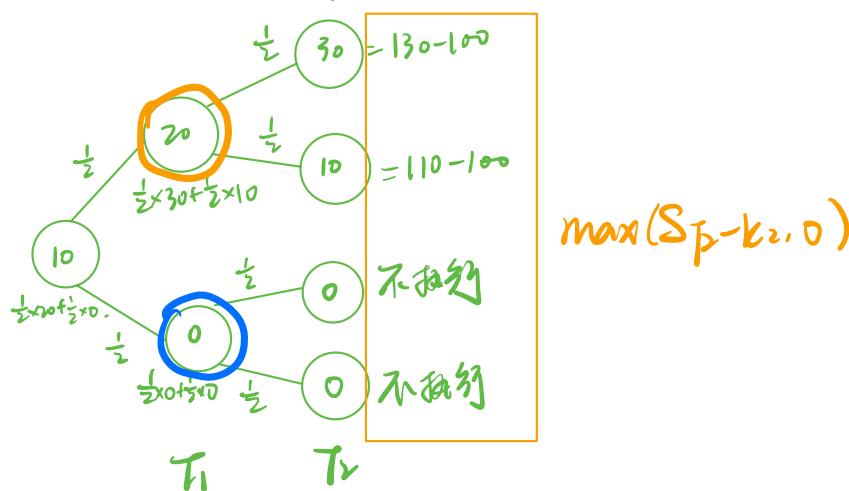
$$\max(0, C(T_1, S_{T_1}; T_2, k_2) - k_1, P(T_1, S_{T_1}; T_2, k_2') - k_1')$$

↓
选择是否执行期权标的
的资产的时间。

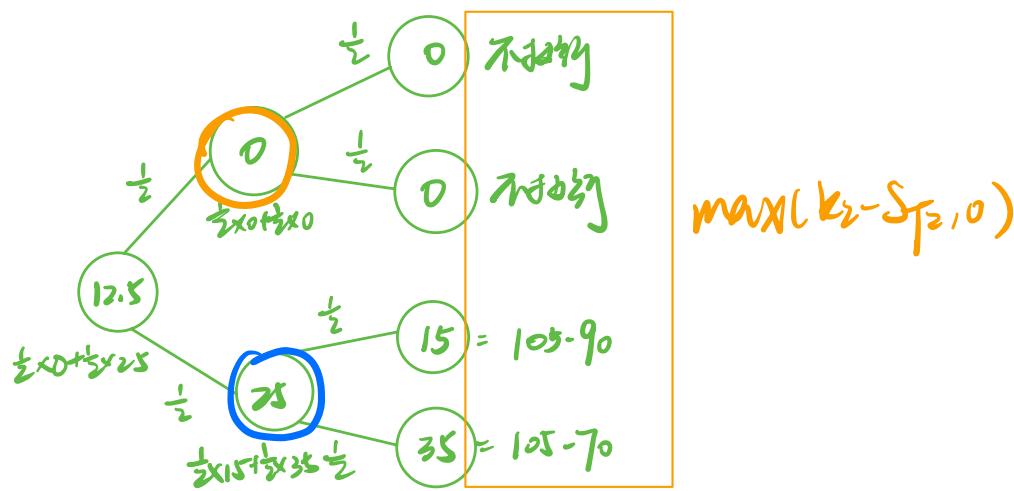
Example.



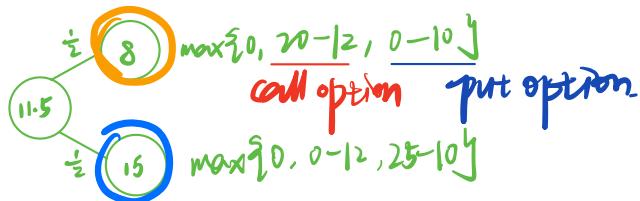
如果下时刻选择 call option $k_2=100$.



如果下时刻选择 put option $k_2=105$

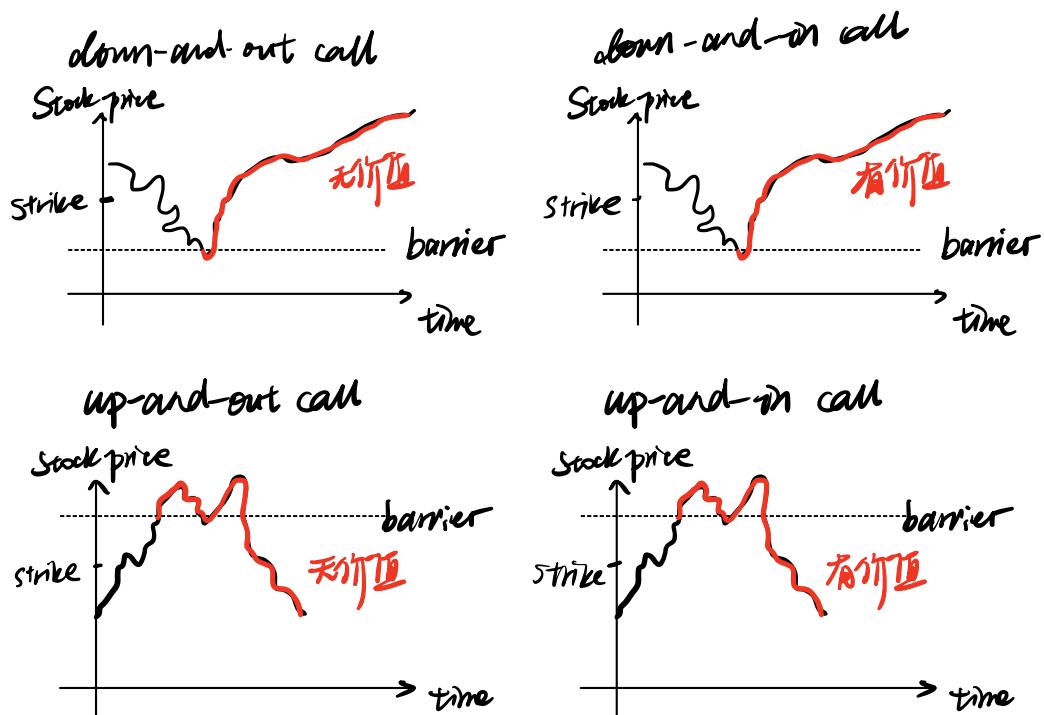


T1时刻 $K_1=12$, $K_1'=10$.



Barrier option 障碍期权 ($B = \text{某值}$)

- ① down-and-out option. 该价格如果下降至 B , 其期权无价值
- ② down-and-in option. 该价格如果下降至 B , 其期权开始生效
- ③ up-and-out option 该价格如果上升至 B , 其期权无价值
- ④ up-and-in option. 该价格如果上升至 B , 其期权开始生效



example 向下降至97后期权无价值.

down-and-out call $K=95$ $B=97$

Stock price:

