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AUTHOR CORRECTION

Correction to: American options with liquidation penalties

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Definition 3 (page 5) and the proof of Proposition 4 (page 6) in Section 2 must be amended as follows.

Definition 3 (Backward recursion with liquidation penalties for option's holder) The cash-flow based value function for the holder of the American option with liquidation penalty rate δ is defined via the following recursion

$$\begin{aligned} V_\delta(T) &= X(T) \\ V_\delta(t) &= \max\left\{X(t), e^{-\delta\Delta t}\mathbb{E}_t^{\mathbb{Q}}\left[e^{-r\Delta t}V_\delta(t+\Delta t)\right]\right\} \quad \text{with } t = T-\Delta t,\ldots,0 \end{aligned} \tag{5}$$

Proposition 4 *The value function V_δ defined in (5) satisfies*

$$V_\delta(t) = \sup_{t\le\tau\le T}\mathbb{E}_t^{\mathbb{Q}}\left[e^{-(r+\delta)(\tau-t)}X(\tau)\right] \tag{6}$$

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Proof At T the backward recursion (5) implies that $V_\delta(T) = X(T)$. At any other $t < T$, formula (5) implies

$$\begin{aligned} V_\delta(t) &= \max\left\{X(t), e^{-\delta\Delta t}\mathbb{E}_t^{\mathbb{Q}}\left[e^{-r\Delta t}V_\delta(t+\Delta t)\right]\right\} \\ &= \max\left\{X(t), \mathbb{E}_t\left[e^{-(r+\delta)\Delta t}V_\delta(t+\Delta t)\right]\right\} \end{aligned}$$

Thus, the recursion (5) can be rewritten as

$$\begin{cases} V_\delta(T) = X(T) & t = T \\ V_\delta(t) = \max\left\{X(t), \mathbb{E}_t\left[e^{-(r+\delta)\Delta t}V(t+\Delta t)\right]\right\} & t = T-\Delta t, ..., 0 \end{cases}$$

which proves that V_δ is the Snell envelope of X discounted at the rate $r+\delta$ and with respect to the risk-neutral probability as in (6) .
ORIGINAL VERSION:

Definition 3 (Backward recursion with liquidation penalties for option's holder). The cashflow-based value function for the holder of the American option with liquidation penalty rate δ is defined via the following recursion:

$$\begin{aligned} V_\delta(T) &= X(T) \\ V_\delta(t) &= \max\left\{X(t), e^{-\delta\,\Delta t}\,V(t)\right\} \quad \text{with } t = T-\Delta t, \ldots, 0 \end{aligned} \tag{5}$$

Proposition 4 *The value function V_δ defined in (5) can be rewritten as*

$$V_\delta(t) = \sup_{t\le\tau\le T}\mathbb{E}_t\left[e^{-(r+\delta)(\tau-t)}X(\tau)\right] \tag{6}$$

Proof At T the backward recursion (5) implies that $V_\delta(T) = X(T)$. At any other $t < T$, formula (5) implies

$$\begin{aligned} V_\delta(t) &= \max\left\{X(t), e^{-\delta\Delta t}V(t)\right\} \\ &= \max\left\{X(t), e^{-\delta\Delta t}\left(\max\left(X(t), \mathbb{E}_t\left[e^{-r\Delta t}V(t+\Delta t)\right]\right)\right)\right\} \\ &= \max\left\{X(t), e^{-\delta\Delta t}\mathbb{E}_t\left[e^{-r\Delta t}V(t+\Delta t)\right]\right\} \text{ as } 1 > e^{-\delta\Delta t} \\ &= \max\left\{X(t), \mathbb{E}_t\left[e^{-(r+\delta)\Delta t}V(t+\Delta t)\right]\right\} \end{aligned}$$

Thus, the recursion (5) can be rewritten as

$$\begin{cases} V_\delta(T) = X(T) & t = T \\ V_\delta(t) = \max\left\{X(t), \mathbb{E}_t\left[e^{-(r+\delta)\Delta t} V(t+\Delta t)\right]\right\} & t = T - \Delta t, ..., 0 \end{cases}$$

which proves that V_δ is the Snell envelope of X discounted at the rate $r + \delta$ and with respect to the risk-neutral probability as in (6) .

The Original article has been corrected

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