

(#1)

$$S = \{ (c, t) \mid c \geq 0, t = 0, \dots, T \}$$

where c is the amount of cash in the bank at the end of the day, t is the day

$$T = \{ (c, t) \mid c \geq 0, t = T \}$$

$$N = S - T$$

$$A(c) = \{ (b, i) \mid b \geq 0, i \in [0, c + b - k \cot(\frac{\pi c}{2C})] \}$$

$$A = \bigcup_{c \geq 0} A(c)$$

$$P_R: N \times A \times \mathbb{R} \times S \rightarrow [0, 1]$$

$$P_R((c, t), (b, i), r, (c', t')) =$$

$$= \begin{cases} P(X=x)P(D=d)P(W=w), & \text{if } c+b-i \geq C, c' = -c + Rb + xi + d - w \\ & t' = t+1 \\ P(X=x)P(D=d)P(W=w), & \text{if } c+b-i < C, c' = c - Rb + xi + d - w \\ & t' = t+1 \end{cases}$$

where X is a RV representing the return of risky asset
 D is a RV representing the deposits during the day
 W is a RV representing the withdrawals during the day.

$$R_T: \mathcal{N} \times \mathcal{A} \rightarrow \mathbb{R}.$$

$$R_T((c, t), (b, i)) = \begin{cases} c - Rb + E[X]i + E[D] - E[W], \\ \text{if } c + b - i \geq c \\ \\ c - Rb + E[X]i + E[D] - E[W] \\ - k \cot\left(\frac{\pi c}{2c}\right) \\ \text{if } c + b - i < c \end{cases}$$

$$t \in [0, 1].$$