

Goal: Maximize expected revenue starting at time $t=0$ by setting prices P_0, \dots, P_2 if have until time $T-1=3$ to sell it

$$V_0 = \underbrace{d(P_0)}_{\text{Prob sell item at time 0}} P_0 + \underbrace{(1-d(P_0))}_{\text{Prob. don't sell item at time 0}} \left[\underbrace{0}_{\text{Revenue at } t=0} + \underbrace{d(P_1)}_{\text{Prob sell item at } t=1} P_1 + \underbrace{d(P_1)}_{\text{Revenue if sell at } t=1} \right]$$

$$(1-d(P_2)) \left[d(P_2) P_2 + \right]$$

$$(1-d(P_2)) \left[d(P_3) P + \underbrace{(1-d(P_3)) 0}_{\text{don't sell at time } t=T-1=3} \right] = V_3$$

$$V_2 = V_1$$

don't sell at time $t=T-1=3$

Then: with $T-1=3$ as last day to sell item

$$V_{T-1} = V_3 = d(P_3)P_3 + \cancel{(1-d(P_3))} 0$$

$$V_2 = d(P_2)P_2 + (1-d(P_2)) V_3$$

$$V_1 = d(P_1)P_1 + (1-d(P_1)) V_2$$

$$V_0 = d(P_0)P_0 + (1-d(P_0)) V_1$$

General equation:

$$V_T = 0$$

For $t=0 \dots T-1$: $V_t = d(P_t)P_t + (1-d(P_t)) V_{t+1}$

To maximize V_0 : Need to set $P_0 \dots P_{T-1}$

↳ Given $P_1 \dots P_{T-1}$: Need to set $P_1 \dots P_{T-1}$

↳ Given P_{T-1} , function of just P_{T-2} : Need to set P_{T-2}, P_{T-1}

↳ Single-time revenue maximization to set P_{T-1}

