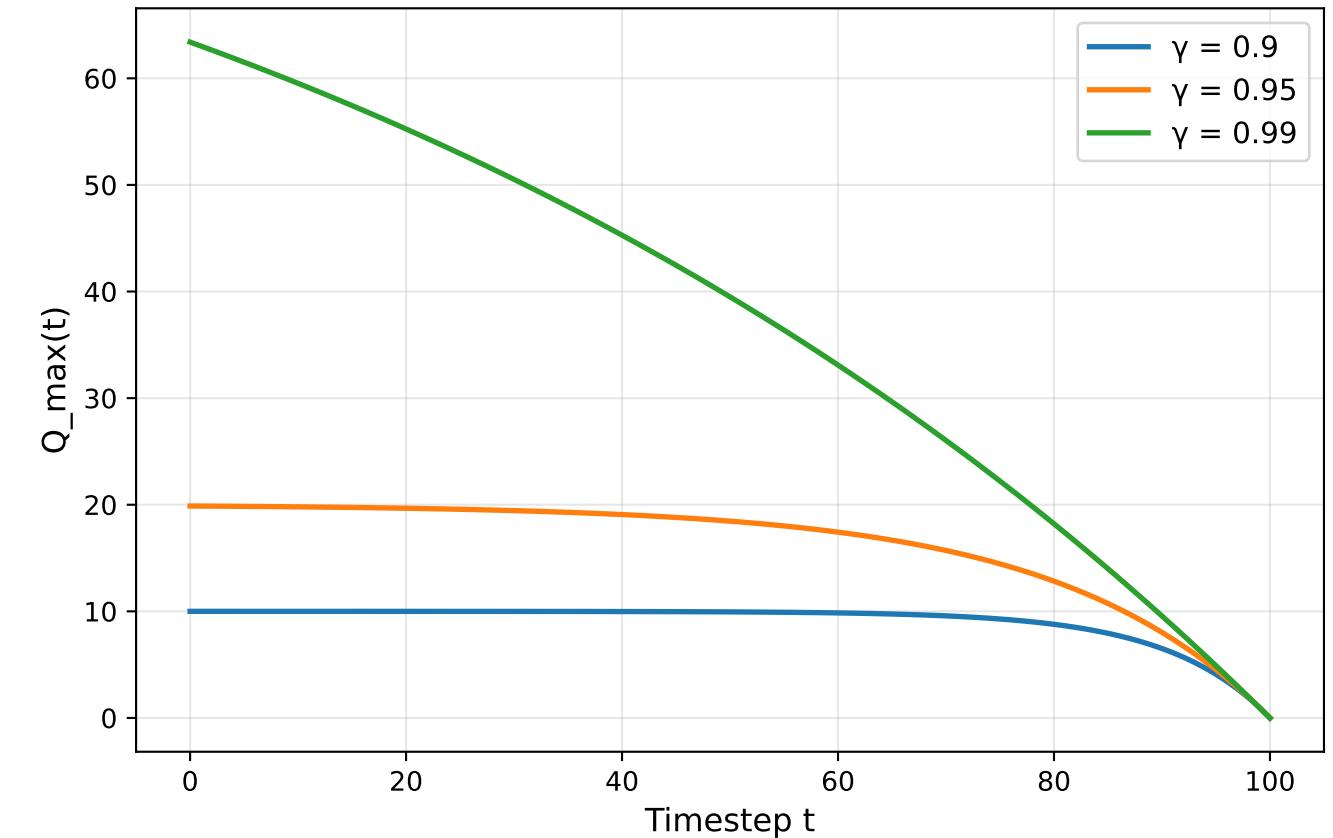
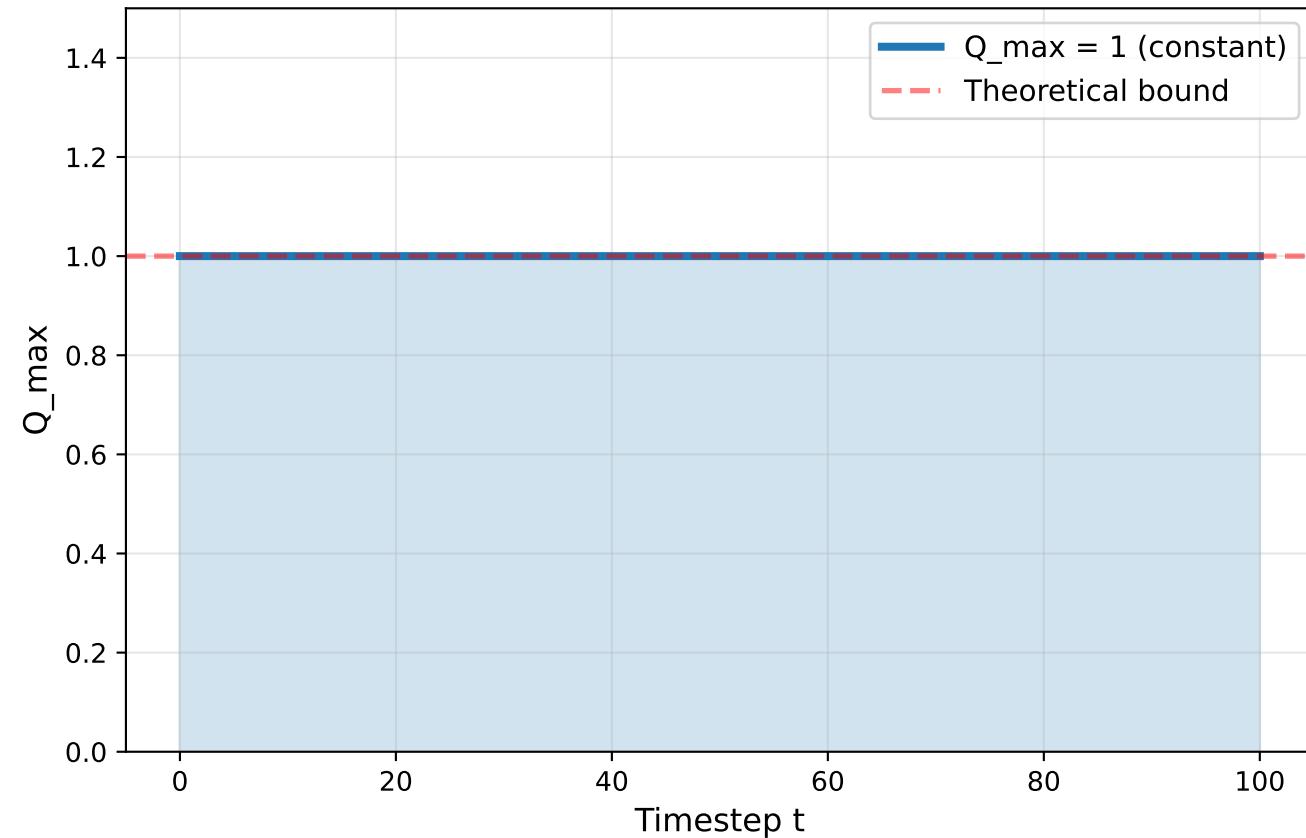


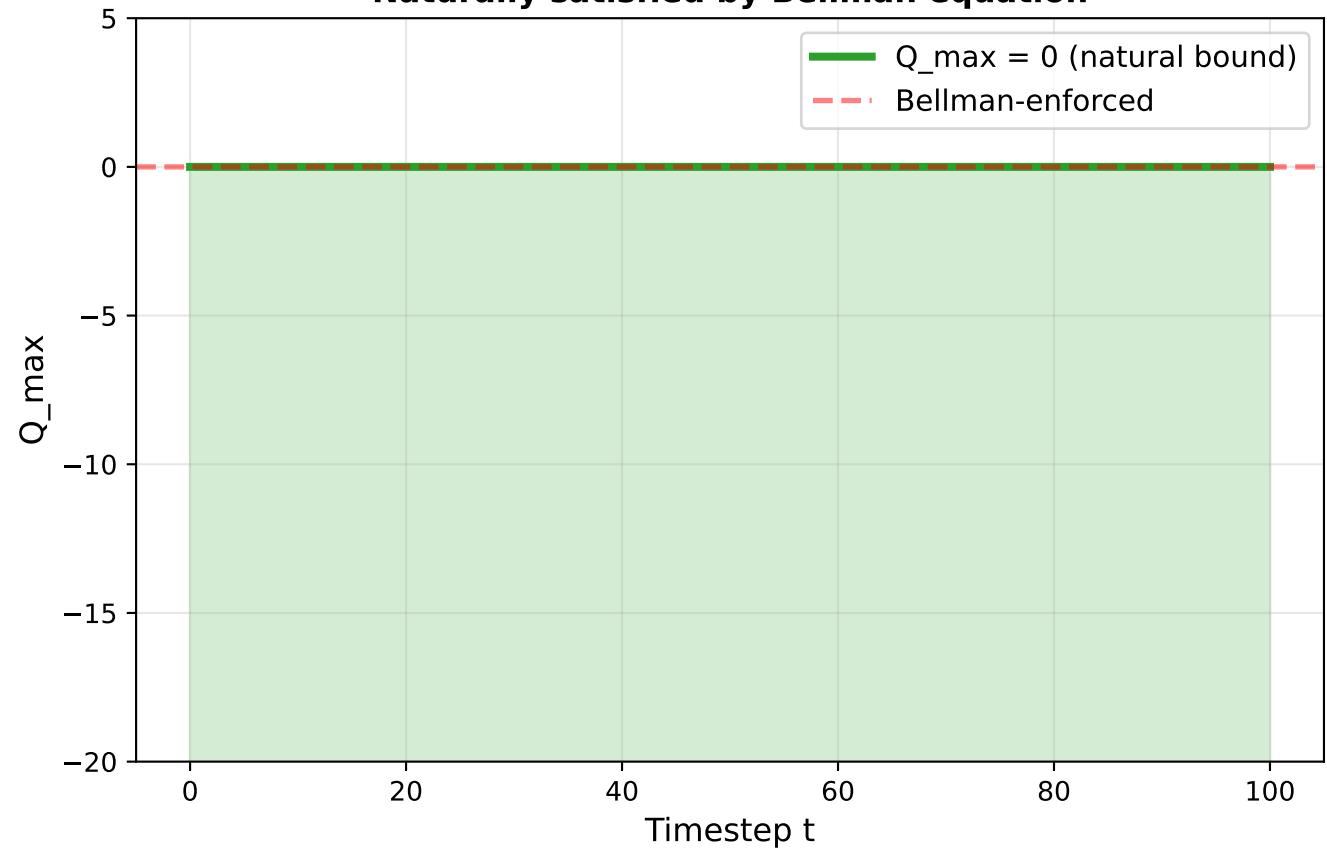
Dense Positive: $Q_{\max}(t) = (1-\gamma^{(H-t)})/(1-\gamma)$
Decreases with time (remaining potential)



Sparse Terminal: $Q_{\max} = 1$ (constant)
No time dependence



Dense Negative: $Q_{\max} = 0$ (constant)
Naturally satisfied by Bellman equation



Summary: Reward Structure Determines QBound Effectiveness

Reward Type	Q_{\max} Behavior	Overestimation Risk	QBound Helps?
Sparse Terminal	Constant (1.0)	Low (20%)	No (~0%)
Dense Positive	Decreases over time	HIGH (85%)	YES (+12-34%)
Dense Negative	Constant (0.0)	Minimal (5%)	NO (-3 to -47%)