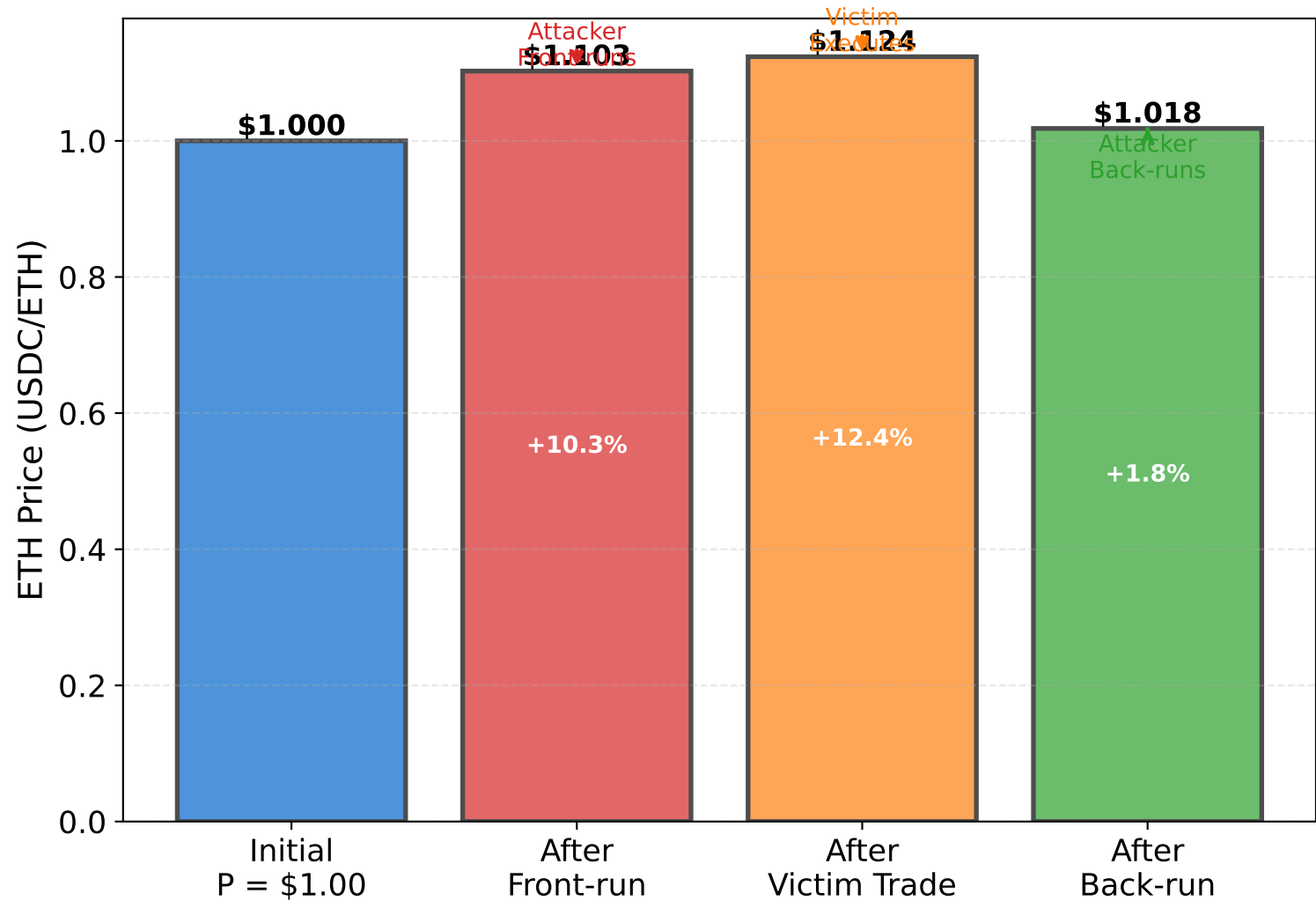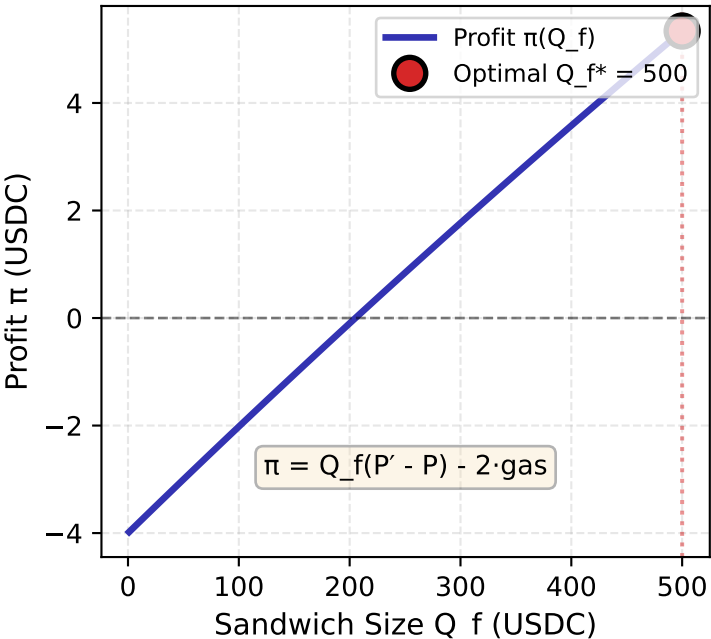# MEV Sandwich Attack: Optimal Extraction Strategy
Daian et al. (2020): Victim Trade = 100 USDC, Optimal Front-run = 500 USDC

Price Dynamics During Sandwich Attack

ETH Price (USDC/ETH)

- Initial P = $1.00: **$1.000**
- After Front-run: **$1.103** — Attacker Front-runs — +10.3%
- After Victim Trade: **$1.124** — Victim Trades — +12.4%
- After Back-run: **$1.018** — Attacker Back-runs — +1.8%

Profit Optimization

Profit π (USDC)

- Profit $\pi(Q_f)$
- Optimal $Q_f^* = 500$

$$\pi = Q_f(P' - P) - 2 \cdot gas$$

Sandwich Size Q_f (USDC)

Welfare Distribution

Value (USDC)

- Attacker Profit: **$5.34**
- Victim Loss: **$10.30**
- Gas Burned: **$4.00**

Net: $-8.96 (zero-sum minus gas)