

Optimal Queue Design

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Abstract

We study the optimal method for rationing scarce resources through a queue system. The designer controls agents' entry into a queue and their exit, their service priority—or queueing discipline—as well as their information about queue priorities, while providing them with the incentive to join the queue and, importantly, to stay in the queue, when recommended by the designer. Under a mild condition, the optimal mechanism induces agents to enter up to a certain queue length and never removes any agents from the queue; serves them according to a first-come-first-served (FCFS) rule; and provides them with no information throughout the process beyond the recommendations they receive. FCFS is also necessary for optimality in a rich domain. We identify a novel role for queueing disciplines in regulating agents' beliefs and their dynamic incentives and uncover a hitherto unrecognized virtue of FCFS in this regard.