

Non-Quasi-Linear Agents in Quasi-Linear Mechanisms

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Abstract

Mechanisms with money are commonly designed under the assumption that agents are quasi-linear, meaning they have linear disutility for spending money. We study the implications when agents with non-linear (specifically, convex) disutility for payments participate in mechanisms designed for quasi-linear agents. We first show that any mechanism that is truthful for quasi-linear buyers has a simple best response function for buyers with non-linear disutility from payments, in which each bidder simply scales down her value for each potential outcome by a fixed factor, equal to her target return on investment (ROI). We call such a strategy ROI-optimal. We prove the existence of a Nash equilibrium in which agents use ROI-optimal strategies for a general class of allocation problems. Motivated by online marketplaces, we then focus on simultaneous second-price auctions for additive bidders and show that all ROI-optimal equilibria in this setting achieve constant-factor approximations to suitable welfare and revenue benchmarks.

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