

¹ Non-quasi-linear Agents ² in Quasi-linear Mechanisms

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¹⁸ — Abstract —

¹⁹ Mechanisms with money are commonly designed under the assumption that agents are quasi-linear,
²⁰ meaning they have linear disutility for spending money. We study the implications when agents
²¹ with non-linear (specifically, convex) disutility for payments participate in mechanisms designed
²² for quasi-linear agents. We first show that any mechanism that is truthful for quasi-linear buyers
²³ has a simple best response function for buyers with non-linear disutility from payments, in which
²⁴ each bidder simply scales down her value for each potential outcome by a fixed factor, equal to her
²⁵ target return on investment (ROI). We call such a strategy ROI-optimal. We prove the existence
²⁶ of a Nash equilibrium in which agents use ROI-optimal strategies for a general class of allocation
²⁷ problems. Motivated by online marketplaces, we then focus on simultaneous second-price auctions
²⁸ for additive bidders and show that all ROI-optimal equilibria in this setting achieve constant-factor
²⁹ approximations to suitable welfare and revenue benchmarks.

³⁰ **2012 ACM Subject Classification** Theory of computation → Quality of equilibria

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³² taneous Second-Price Auctions

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³⁵ **Related Version** A full version of the paper is available on the arXiv.

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