An Optimal Budget-Constrained Mechanism with Multiple Liquidity-Constrained Agents

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Abstract

We study a mechanism design problem when a mechanism designer (the seller) is facing agents (buyers) who are budget constrained. The budget constraint is a hard constraint and represents the maximum amount of payment that the buyer can afford to pay, i.e. there is no financial market for financing. Both valuation and budgets are private information and in order to make the analysis tractable, we restrict our attention to a 2×2 discrete type space. We characterize an optimal budget-constrained mechanism in this environment, i.e. a mechanism that generates the highest expected revenue.

We first study a single agent environment in Che and Gale (1999, 2000) and develop a more general approach to analyze this problem. Next, we extend this approach to a multiple agents environment. We show that full participation might be an optimal mechanism even though the budget level is extremely low. The condition of no exclusion at optimum is irrelevant to the level of budget. If we focus on the case with full participation, when the budget level is sufficiently low then the seller is more willing to sell the object to the type with low valuation but high budget. We also show it is never optimal to exclude all low budget types, since exclusion of low budget types is not beneficial for the seller to extract more surplus from the types with high valuation.