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Sincere and sophisticated players in an equal-income market

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Abstract

We study the simultaneous direct revelation mechanism associated with each equal-income competitive social choice function in the allocation of objects and money among sincere and strategic agents. Strategic agents take advantage of sincere agents. They non-cooperatively coordinate on the equal-income competitive allocations for the true preferences that are Pareto undominated for them within the set of equal-income competitive allocations. Sincere agents are protected to some extent, however. Their welfare is usually above their maximin payoff.

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1. Introduction

We consider the problem of allocating a set of n objects and an amount of money among n agents with unit demands and quasi-linear preferences. Examples are the dissolution of a partnership [1] and the allocation of rooms and contributions to rent among roommates [2]. An equal-income competitive (eic) allocation is an allocation that can be sustained as a competitive equilibrium when each agent has an equal share of the aggregate income. An eic social choice function (eic-scf), our main object of study, selects an eic allocation for each possible preference profile. We characterize the non-cooperative equilibrium outcomes of the simultaneous direct revelation game associated with each eic-scf under the assumption that an exogenously determined set of agents are sincere, i.e., unconditionally report their true preferences, and this is common knowledge among the other agents, who are strategic. This allows us to make a normative assessment of these mechanisms. In some situations, it may be plausible that agents differ in their level of sophistication.[2] A policy maker may be interested in protecting the welfare of both the less sophisticated and those who blindly follow her instructions.[3] Several relevant questions arise. What are the outcomes of the manipulation of these scfs under our behavioral assumptions? How do these outcomes compare to those when all agents are strategic? Are efficiency and equity obtained in some form? Do strategic agents take advantage of sincere agents? If so, to what extent? Could we differentiate eic-scfs in terms of the way they treat sincere agents?

Our main result, Theorem 1, allows us to answer all these questions. It states that, in a complete information setting, the limit Nash equilibrium outcomes [7,8] of the direct revelation game associated with an eic-scf at some preference profile is the set of eic allocations, for true preferences, that are Pareto undominated *for the strategic agents* within the eic set—we discuss our choice of limit Nash equilibrium as the prediction for these games below. Eic allocations are Pareto efficient and envy-free, i.e., no agent prefers the allotment of any other agent to her own [9].[4] Thus, non-cooperative behavior in the manipulation of an eic-scf with sincere and strategic agents does not compromise these two properties. Since eic allocations are Pareto efficient, our theorem implies that when all agents are strategic, the set of non-cooperative outcomes of the manipulation of each eic-scf is exactly the eic set. Moreover, when some agents are sincere, these outcomes shrink to the "faces" of the eic set that are most favorable to strategic agents (see Section 2). In this sense, strategic agents take advantage of sincere agents.[5] Eic-scfs provide a safety net for sincere agents, however. They guarantee them, at least, the minimum welfare among all eic allocations for the true preferences. This lower bound is usually above the agent's

[2] In the related problem of school choice, where parents report preferences on public schools, Pathak and Sönmez [3] argue that parents' sophistication is not homogeneous. Some parents may participate in extensive discussion of the best strategies given the mechanism adopted by a school district. Some other may report their true preferences without further thought. One can envision a similar situation in our environment. In experimental settings, recent studies have documented the propensity of some subjects to provide truthful reports in strategic communication games [4,5].

[3] Pathak and Sönmez [6] argue that this has been the case in school districts in England and Chicago.

[4] Eic allocations and envy-free allocations coincide in our model [9].

[5] This is in stark contrast to environments with indivisible goods without money. In marriage markets, even though there is a women-optimal stable matching, each stable matching is an equilibrium, for women, of the direct revelation game associated with the men-optimal stable scf when men truthfully report their preferences [10]. Some equilibrium refinements obtain the women-optimal stable allocation as the unique outcome when the men-optimal stable scf is operated [11]. By contrast, our results do not depend on any equilibrium refinement. In school choice problems the outcomes from the manipulation of the "Boston mechanism" when some parents are sincere and the other strategic, contains outcomes that are Pareto dominated for the strategic parents by another equilibrium outcome [3].