

# STRATEGIC COMPLEMENTARITY: a revealed preference analysis

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**Extended Abstract:** The most familiar setting for revealed preference analysis is that of consumer demand. In that context, Afriat's Theorem (1967) gives necessary and sufficient conditions on a collection of observations, with each observation consisting of a price vector and a demand bundle, to be consistent with the maximization of a monotone utility function. That theorem is the starting point of a considerable body of empirical work investigating the rationality of agent behavior and it has also been extended in various ways, for example, to test for stronger restrictions on the utility function such as expected utility or weak separability.

This paper is part of a more recent strand in the revealed preference literature, which moves away from the context of single-agent choice behavior and instead considers multi-agent environments, such as exchange economies (see, for example, Brown and Matzkin (1996)) or simultaneous and extensive form games (see Sprumont (2000), Ray and Zhou (2001), and Carvajal, Deb, Fenske, and Quah (2013)). The objective is to find conditions on a data set that are *necessary and sufficient* for it to be consistent with a particular economic model, under certain assumptions on the data generating process. The ideal would be to find a set of conditions that are intuitively appealing and also allow for easy empirical implementation.

In this paper, we consider a class of games where each player's pure strategies are completely ordered (for example, a subset of the real line). We assume that the observer has access to a data set where an observation consists of each player's chosen action, the strategy sets from which actions are chosen, and parameters which may affect payoffs. The variation in the data arises from changes to parameters and/or changes to the strategy sets. We show that an intuitive and easy-to-check property on the data set we call the *strong axiom of revealed complementarity* (SARC) is necessary and sufficient for it to be consistent with the hypothesis that the observations are pure strategy Nash equilibria from a family of games with strategic complementarity. We also explicitly construct a set of preferences, one for each player, that agrees with the data and is consistent with strategic complementarity (in the sense that each agent's preference obeys the single crossing differences property). Lastly, we explain how we can identify the set of possible Nash equilibria in a game outside the set of observations. We show that the set of possible Nash equilibria is very well-behaved; for example, it effectively has a largest and a smallest element and these can be calculated with some version of a best-response dynamic.

**Note:** All our main results are in place and a working paper should be complete in a few months. If you would like me to alert you when it is ready, please inform me.

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