

# Game Theory via Revealed Preferences<sup>1</sup>

Indrajit Ray

*Department of Economics, University of York, Heslington, York YO10 5DD,  
United Kingdom*  
E-mail: [ir2@york.ac.uk](mailto:ir2@york.ac.uk)

and

Lin Zhou

*Department of Economics, Duke University, Durham, NC 27708, and  
Department of Economics and Finance, City University of Hong Kong,  
Tat Chee Avenue, Kowloon, Hong Kong*  
E-mail: [linzhou@econ.duke.edu](mailto:linzhou@econ.duke.edu); [EFZHOU@cityu.edu.hk](mailto:EFZHOU@cityu.edu.hk)

Received February 17, 1999

We investigate equilibrium notions in game theory from the revealed preference approach. For extensive game forms with complete information, we derive a set of independent necessary and sufficient conditions for the observed outcomes to be rationalized by subgame-perfect Nash equilibrium. *Journal of Economic Literature* Classification Numbers: C72, C92. © 2001 Academic Press

## 1. INTRODUCTION

In the past two decades we have witnessed a rapid development in non-cooperative game theory. Many new solution concepts, particularly refinements of Nash equilibrium, have been introduced and successfully applied to many fields in economics as well as other social sciences. Though game theory has been applied to many fields, one important issue has not yet received much attention in the literature. To model any situation as a game, we first specify individuals' preferences, then apply certain solution concept

<sup>1</sup> We thank the seminar and conference participants at Brunel, CORE, Duke-UNC, Essex, Montreal, Warwick, Washington, and York for valuable discussions and particularly an anonymous referee and an associate editor for their careful readings and extremely helpful suggestions.



to predict the outcome. But what if the theoretical prediction differs from the actual outcome? There could be two possible explanations: either individuals do not play according to the theory, or individuals' preferences are not correctly specified. In fact, even when the theoretical prediction coincides with the actual outcome, we should not rule out the possibility that individuals do not play according to the theory if we are not sure about the specification of individuals' preferences. The question is, therefore: can we, by any means, test whether individuals play according to the game theoretic prediction, solely on the basis of the observations of individuals' actual moves? If we could not find such a mean of testing, then the empirical content of game theory would be virtually void. Surprisingly, the existing literature contains hardly anything on this issue. Thus purpose of this paper is to take a first step in addressing this issue.

Instead of criticizing the predictive power of the solution concepts, in this paper we try to rationalize the actual outcomes. We ask what are the *necessary and sufficient* conditions for the observed outcomes to be rationalized by the equilibrium solution concept. In a sense, our approach is similar to the classical revealed preference theory initiated by Samuelson (1938).

The general problem under consideration here takes the following form. Let  $\Gamma$  be a collection of related game forms that several individuals play. Suppose that we can observe an outcome  $O(G)$  for every game form  $G$  in  $\Gamma$ . What conditions must the observed outcomes satisfy so that  $O(G)$  is the equilibrium outcome of a game associated with  $G$ , for every  $G$ ? Moreover, what are the necessary and sufficient conditions to allow the observed outcomes to be rationalized by the equilibrium solution concept?

Notice that in our framework only outcomes are observed, not the preferences of individuals. This is the important distinction between our work and studies in experimental game theory. In the experimental studies, players' preferences are assumed known to the researchers, and hence the theoretical equilibrium outcome is known as well. Then the individuals' actual plays are compared with the theoretical equilibrium outcome. In our model, as in any other model of revealed preference, only outcomes are observed. From these observations, we have to construct preferences of individuals so that the observed outcomes can be rationalized by the equilibrium notion with these constructed preferences. Also, note that we are imposing no restriction on the preferences (except that they must be orderings). In many contexts, it is natural to assume some a priori restrictions—for example, monotonicity in payoffs when the outcomes are monetary payoffs to the individuals. Any such restriction would indeed imply further conditions for rationalizability of solutions.

Since in strategic situations players can move simultaneously or sequentially, and in each case there are a variety of theoretical equilibrium concepts, we have a rich class of models to investigate. Clearly, different

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات