EXTENDED OPTIMA AND EQUILIBRIA
FOR CONTINUOUS GAMES.
I. GENERAL RESULTS

D. J. GATES AND M. WESTCOTT

Abstract

In this, the first of three papers, we examine conditions, derived previously, which specify the equilibrium solutions of an adjustment process for N players engaged in a game with continuous (in fact, continuously differentiable) payoff functions, where each player's strategy is to choose a single real number. It is equivalent to the basic form of quantity-variation competition between N firms. The conditions are related to a new optimum which takes account of the ability of firms, or coalitions of firms, to discipline another firm that tries to increase its own profit. Closely related optima are also introduced and analysed. The new optima occupy N-dimensional regions in the strategy space, and contain the optima of Cournot, Pareto, von-Neumann and Morgenstern, and Nash as special cases.

1. Introduction

An adjustment process for many firms in competition, with no knowledge of the payoff structure of the market, was studied by Gates, Rickard and Wilson [3] (see also [2], [8], [4], [5] and [11]). It was found numerically, for the case of 2 firms, that the adjustment process converges for all sensible initial conditions. In general, with N firms, all equilibrium states of this process were proved to satisfy the new condition: there exists a non-zero, positive-semi-definite (psd) matrix A_{ij} $(i, j = 1, 2, \ldots, N)$ such that

$$\sum_{j=1}^{N} A_{ij} J_{ij} = 0 \quad \text{for } i = 1, 2, \ldots, N, \tag{1.1}$$

where $J_i(\sigma)$ is the payoff (or profit) to firm i when firms 1 to N produce

[Optima And Equilibria](#)

Parkash Chander

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corpus obeys its own logic like that of literature music or art In all these domains an aesthetic satisfaction is at once the objective of the creative activity and a signal which enables one to recognise successful works Likewise in all these domains fashionable phenomena reflecting social consensus are used to develop aesthetic criteria *Calculation of Optima and Equilibria in Dynamic Resource Extraction Problems* Rajani Singh,2018 **Foundations Of The Theory Of General Equilibrium (Second Edition)** Yves Balasko,2016-05-11 The economic theory of general equilibrium underpins the most important models used in economic theory in general and in its more specialized areas such as macroeconomics international trade environmental economics growth theory and developmental economics In Foundations of the Theory of General Equilibrium leading academic scholar Yves Balasko offers a good introduction to the economic theory of general equilibrium and makes use of various mathematical tools as intuitive and easy as possible The second half of the book addresses properties of the general equilibrium model that are still at the frontier of current research These properties deal with the characterization of economies with a unique equilibrium and more generally with the relationships between the number of equilibria and the fundamentals of an economy **A Recursive Formulation of Traffic Optima and Equilibria** Richard Steinberg,Peter Streufert,2000 **The Equilibrium Manifold** Yves Balasko,2009-04-17 A leading scholar in the field presents post 1970s developments in the theory of general equilibrium unified by the concept of equilibrium manifold In The Equilibrium Manifold noted economic scholar and major contributor to the theory of general equilibrium Yves Balasko argues that contrary to what many textbooks want readers to believe the study of the general equilibrium model did not end with the existence and welfare theorems of the 1950s These developments which characterize the modern phase of the theory of general equilibrium led to what Balasko calls the postmodern phase marked by the reintroduction of differentiability assumptions and the application of the methods of differential topology to the study of the equilibrium equation Balasko s rigorous study demonstrates the central role played by the equilibrium manifold in understanding the properties of the Arrow Debreu model and its extensions Balasko argues that the tools of differential topology articulated around the concept of equilibrium manifold offer powerful methods for studying economically important issues from existence and uniqueness to business cycles and economic fluctuations After an examination of the theory of general equilibrium s evolution in the hundred years between Walras and Arrow Debreu Balasko discusses the properties of the equilibrium manifold and the natural projection He highlights the important role of the set of no trade equilibria the structure of which is applied to the global structure of the equilibrium manifold He also develops a geometric approach to the study of the equilibrium manifold Applications include stability issues of adjustment dynamics for out of equilibrium prices the introduction of price dependent preferences and aspects of time and uncertainty in extensions of the general equilibrium model that account for various forms of market frictions and imperfections Special effort has been made at reducing the mathematical technicalities without compromising rigor The Equilibrium Manifold makes clear the ways in which the postmodern developments of the Arrow

Debreu model improve our understanding of modern market economies **Equilibrium Theory with an Infinite Dimensional Commodity Space** Truman F. Bewley,1970 **Numerical Versus Analytic Calculation of Optima and Equilibria in Fish Wars Model with Finite Time Horizon** Agnieszka Wiszniewska-Matyszkiel,2016 In the research presented in this paper we analyse a model of Fish Wars first introduced by Levhari and Mirman restricted to finite time horizon We study it both by analytic and numerical methods and compare results Our study suggests possibility of using numerical methods for dynamic games with singularities in payoffs **Game Theory and Climate Change** Parkash Chander,2018-04-03 Despite the growing consensus on the need for action to counteract climate change complex economic and political forces have so far prevented international actors from making much headway toward resolving the problem Most approaches to climate change are based in economics and environmental science in this book Parkash Chander argues that we can make further progress on the climate change impasse by considering a third approach game theory Chander shows that a game theoretic approach which offers insight into the nature of interactions between sovereign countries behaving strategically and the kinds of outcomes such interactions produce can illuminate how best to achieve international agreements in support of climate change mitigation strategies Game Theory and Climate Change develops a conceptual framework with which to analyze climate change as a strategic or dynamic game bringing together cooperative and noncooperative game theory and providing practical analyses of international negotiations Chander offers economic and game theoretic interpretations of both the Kyoto Protocol and the Paris Agreement and argues that the Paris Agreement may succeed where the Kyoto Protocol failed Finally Chander discusses the policy recommendations his framework generates including a global agreement to support development of cleaner technologies on a global scale **Nonlinear Dynamics in Equilibrium Models** John Stachurski,Alain Venditti,Makoto Yano,2012-01-25 Optimal growth theory studies the problem of efficient resource allocation over time a fundamental concern of economic research Since the 1970s the techniques of nonlinear dynamical systems have become a vital tool in optimal growth theory illuminating dynamics and demonstrating the possibility of endogenous economic fluctuations Kazuo Nishimura s seminal contributions on business cycles chaotic equilibria and indeterminacy have been central to this development transforming our understanding of economic growth cycles and the relationship between them The subjects of Kazuo s analysis remain of fundamental importance to modern economic theory This book collects his major contributions in a single volume Kazuo Nishimura has been recognized for his contributions to economic theory on many occasions being elected fellow of the Econometric Society and serving as an editor of several major journals Chapter Introduction is available open access under a Creative Commons Attribution NonCommercial NoDerivatives 4 0 International License via link springer com **The American Economist** ,1974 **Optima and Competitive Equilibria with Adverse Selection and Moral Hazard** Edward C. Prescott,Robert M. Townsend,1981 **SIAM Journal on Control and Optimization** Society for Industrial and Applied Mathematics,1984

On Pareto Optima and Competitive Equilibria: Relationships among equilibria and optima James C. Moore,1970

Behavior, Culture, and Conflict in World Politics William Zimmerman,Harold Karan Jacobson,1993 For almost a half century the Cold War its presumed origins and its anticipated consequences blinded most scholars to the global problems underlying the conflict With the sudden demise of the Cold War it is clear that new thinking about conflict in world politics is essential Assembling research from a variety of disciplines and cultural perspectives Behavior Culture and Conflict in World Politics indicates that conflict between states is not substantially different from conflict within families or societies Based on this fundamental assertion the contributors take the first steps toward articulating a general theory of conflict *The Internet as a Large-scale Complex System* Kihong Park,Walter Willinger,2005 This volume contains a snapshot of some features of the Internet that may be fruitfully approached using a complex systems perspective meaning using interdisciplinary tools and methods to tackle the subject area *Professor Debreu's "market Equilibrium" Theorem* James C. Moore,1973 *Journal of Economic Theory* ,1972 General Equilibrium Theory Gerard Debreu,1996 General Equilibrium Theory has been one of the major intellectual developments in economics during the past half century The theory of general equilibrium is centred on an inquiry about human societies which has several of the characteristics of a fundamental scientific question In an economy a multitude of agents produce exchange and consume a large number of commodities Their decisions are independent of each other and dictated by self interest Attempting to answer the question Why is social chaos not the result has required an intensive research effort by several generations of leading economists This important three volume set gathers together many of the articles that have played an influential role in the history of ideas in the general equilibrium area in the contemporary period

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