

## INTRODUCTION

Dynamic games, introduced to economics by Roos (1925, 1927), and neglected until the early 1970s, have become a standard tool of economic analysis. Indeed, one of the emerging trends in the expanding relationship between game theory and economics is the application of dynamic/stochastic games in a variety of settings. Dynamic games include differential games (set in continuous time), difference games (set in discrete time), and timing games.

While early economic articles using dynamic games mostly appeared in highly technical journals or volumes, nowadays one easily comes across papers using dynamic games in mainstream general journals such as the *American Economic Review*, *Journal of Political Economy*, *Economic Journal*, *Canadian Journal of Economics*, *European Economic Review*, *Oxford Economic Papers*, *Economica*, *Scandinavian Journal of Economics*, *Japanese Economic Review*, and in field journals such as *Journal of Public Economics*, *International Journal of Industrial Organization*, *Journal of International Economics*, *Journal of Public Economic Theory*, *Review of International Economics*, *Journal of Development Economics*, *Journal of Environmental Economics and Management*, *Resource and Energy Economics*, *Environmental Modelling and Assessment*, and many others.

The purpose of this volume is to present a survey of the development of dynamic games in economics, with special emphasis on applications. An excellent survey was provided by Clemhout and Wan (1994). Since then, there have been many economic articles with further applications of differential games. This fact alone is sufficient to justify my enterprise. I must stress that this volume is not meant to be a comprehensive treatment of differential games. Readers interested in precise definitions and fine points are referred to books on dynamic games (e.g., Başar and Olders, 1995; Dockner *et al.* 2000). The latter also contains many applications in economics and management science. I will assume that the reader has some working knowledge of optimal control theory and dynamic programming, for which there are several good books (e.g., Léonard and Long, 1992; Kamien and Schwartz, 1991).

Economists have used dynamic games to analyze a variety of problems in various fields. In this volume, I survey dynamic games in environmental economics (Chap. 2), natural resources economics (Chap. 3), international economics and development economics (Chap. 4), industrial organization (Chap. 5), public economics (Chap. 6), and macroeconomics (Chap. 7). Naturally, there are overlaps and omissions, for which I apologize.

My wish is that this book will stimulate the reader's interests in the use of dynamic games to analyze new problems or old problems from a new perspective. The next step would be to equip yourself with a pencil, a piece of paper, and a good textbook on differential game. Bon voyage!