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International Business Research and Game Theory: Looking beyond the Prisoner's Dilemma

Ursula F. Ott *

School of Business and Economics, Loughborough University, Ashby Road, Loughborough LE11 3TU, United Kingdom

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ABSTRACT

This article outlines the un-mined potential of Game Theory for International Business (IB) research. Game Theory has been only rarely used in International Business – particularly, in comparison to transaction cost economics and the resource based view. Although its applications to International Business problems do exist, there is considerably more potential for its refinements to be related to topics of uncertainty and dynamics in strategic interactions in International Business. There is more to Game Theory than the Prisoner's Dilemma.

1. Introduction

For a long time International Business (IB) topics of absolute, relative and competitive advantage have triggered political scientists, economists and social scientists to explore theories to understand the what, how and why questions of international trade, multinational enterprises and globalization. The field of International Business has always combined theoretical concepts from many disciplines. Phenomena and problems in International Business ask for tools to explain and solve them. Within the tension between different legal, political, cultural, organizational, economic and managerial systems, decision-making between individuals, groups, companies and countries plays a crucial role in International Business. This means that in a complex decision-making scenario, International Business research needs to draw upon tools which explain, analyze and solve these strategic interactions. In this article, we make the case for such a theoretical tool to analyze cooperation and conflict in International Business – Game Theory.

Game Theory cannot simply be viewed as a matter of abstract mathematics, but as fundamentally concerning the real world (Rubinstein, 1991).

Rubinstein's statement indicates that Game Theory is an abstract inquiry into the function and logic of social institutions and patterns of behavior. Game Theory offers a strategic tool to look forwards by reasoning backwards which can be very useful for decision-makers in multi-person decision-making situations like those in International Business. Schelling (1960) showed as much in the *Strategy of Conflict* a rational analysis of international political conflict – as did Axelrod (1984) in the *Evolution of Co-operation*, which showed how cooperation can emerge in a world of self-interested egoists (superpowers,

* Tel.: +44 1509 223648.
E-mail address: U.F.Ott@lboro.ac.uk.

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businesses and individuals) without central authority to police action. Both conflict and co-operation are crucial parts of Game Theory and the strategic treatment of decision-making situations has contributed to a better understanding of behavior in social, political and economic settings. Though Game Theory is mostly equated to the Prisoner's Dilemma, this paper shows the potential of the solution concepts to analyze dynamics and uncertainty as well. The analysis of International Business problems and challenges, such as multinational enterprises (MNEs) in emerging markets, can usefully import knowledge from other disciplines and then export the new insights gained from the applications to IB problems.

This paper shows the strength of Game Theory for considering International Business problems. It starts with the chronology, explanations, notations and reasoning of Game Theory and reviews the applications of Game Theory to International Business. To understand the use of Game Theory for International Business, strength and weaknesses are presented in the framework of analysis to deal with the criticism often put forward against Game Theory. The contribution of this paper is that it connects the future IB research agenda suggested by IB scholars with the strength of a game theoretical approach as a mode of analysis. In the mathematical Appendix A the reader will find a formal example to support the argument for IB and Game Theory.

2. Game Theory and International Business

2.1. Game Theory – chronology, explanations and notations

This section introduces the works of Game Theory and the basic notation and rules of the games as well as the solution concepts offered. The starting point for the development of Game Theory was the publication of John von Neumann and Oscar Morgenstern's seminal work 'The Theory of Games and Economic Behavior' in 1944. Subsequently, Economics and Political Science have been the main fields in which Game Theory has been applied and developed. Game Theorists became Nobel Laureates for Economics in 1994 (John Nash, Reinhard Selten and John Harsanyi), 1996 (James Mirrlees, William Vickrey), 2001 (George Akerlof, Michael Spence, Joseph Stiglitz), 2005 (Robert Aumann, Thomas Schelling), and 2007 (Leonid Hurwicz, Eric Maskin, Roger Myerson). By contrast, Game Theory has not been widely used in the field of Business. Camerer (1991) argued that the field of Strategic Management was considerably impaired by the way in which Game Theory had been marginalized within that field. In this paper, we take Camerer's (1991) general approach, develop it, and apply it to the specific field of International Business.

2.1.1. Games – notation

Game Theory can be divided into co-operative and non-cooperative Game Theory. The former is important in the context of coalitions and political science of voting. The latter has been necessary to examine static and dynamic games and games played with complete or incomplete information – chess or poker, for instance. Table 1 shows the relevant solution concepts in this context in a 2×2 table formed by the dimensions of time and information.

Game Theory has been widely defined as the study of mathematical models of cooperation and conflict (Myerson, 1991). A game, Γ, in game theoretical terms, is any social situation of two or more individuals who are called players (N). These players are assumed to be rational and intelligent. A decision-maker is rational when she makes decisions consistently in pursuit of her own objectives. The players choose strategies, C_i, and their choice of strategies yields payoffs to each player (possibly random). In Game Theory, 'strategy' means the actions of the players. The term, 'strategy', should not be confused with the use of it in strategic management. Each player's objective is to maximize the expected value of her own payoff, which is measured in utility scale u_i. The basic model of a game is, therefore, $\Gamma = (N, (C_i)_{i \in N}, (u_i)_{i \in N})$.

Camerer's (1991) explication of the utility of Game Theory for Strategic Management Research distinguishes between games, game theoretic reasoning and equilibrium points which are determined by game-theoretic reasoning. He used Cournot quantity-setting and the centipede game as examples and dispelled a common myth that players who do not reason game theoretically will never converge to an equilibrium and another myth that players must think they are rational ad infinitum. When he suggested that Game Theory provides a taxonomy of interactive situations, it becomes clear that not only strategy research, but also International Business can benefit from using strategic formulation situations. He suggested the benefits of becoming familiar with the terms of Game Theory such as equilibrium, pooling and separating, rationalizability, reputation, folk theorem, coordination games, trigger strategies, learning curve, strategic groups, entry barriers and scope and scale economies (see Glossary). A lot of these terms and concepts are used in International Business as well and merging them seems a useful way forward.

2.1.2. Game theoretic reasoning

We use Camerer's (1991) approach to look into game theoretic reasoning. Game theoretic reasoning is expressed in the decision rule or algorithm which selects the equilibrium strategy. Camerer used the Cournot–Nash equilibrium to show the quantity setting process of reasoning and the centipede game to show the moves of the players and the algorithm which starts at the last possible move and works forward. This is seen as looking forwards and reasoning backwards – *backward induction*. Camerer mainly focused on Cournot and centipede games, but there are many more equilibrium concepts, such as Bertrand Nash equilibrium (price setting equilibrium), Stackelberg equilibrium (leader-follower situation), Sub-Game Perfect equilibrium (sequential moves), Bayesian Nash equilibrium (uncertainty and simultaneous moves), Perfect Bayesian Equilibrium (uncertainty and dynamic updating of beliefs).