

Disconnectedness, Brouwer's Fixed Point Theorem and Terrorism Risk

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Abstract

Acts of Terrorism across the world have some degree of commonality amongst them. They have involved violence against civilians, many a time with the objective of secession from the current central authority. This paper generalizes the idea of secession from a geopolitical region to a set of points in an economics framework that is structured for Walrasian equilibrium. The notion of “secession” is equated to “disconnected” spaces. To make “disconnectedness” tractable the paper employs the mathematical property of connectedness of spaces while defining disconnectedness. Thereafter, it is proven that Brouwer’s fixed point theorem leads to the existence of the objective to “disconnect” a space. The result leads to predictability about the nature of points in any space that terrorist acts shall target, namely those that tend to connect. Existence of such an objective can help explain bombings of Jakarta and Bombay stock markets that serve as points where assets of economic value exchange hands; and (depending upon how the set of points is defined) the train bombings in London and Madrid.

Introduction

Ever since September 11, 2001 researchers have analyzed different aspects of terrorism. These aspects include, but are not limited to, definitional issues (Gibbs(1989);Player *et al* (2002), Seto(2002)); efficiency and equity issues of targeted screening (Viscusi and Zeckhauser (2003)); role of government and effect on insurance markets (Levmore and Logue (2003); Gron and Sykes (2003); Brown *et al* (2002)); determinants of terrorism and its economic consequences (Abadie (2004); Krueger and Maleckova (2003); Blomberg *et al* (2004); Frey and Luechinger (2003);Berrebi and Klor (2005)); rationality of terrorists’ behavior (Manning (2002)); and mathematical models of terrorism (Woo (2003)). It has been suggested in various fora that a more concerted study of terrorism risk is required which takes into account a holistic view.² While this study does not attempt to integrate different directions of study into one, it does attempt to shed some light on the research question, what are terrorists trying to do?

A short answer to the question above is: “They are trying to disconnect”. Evidence from several parts of the world suggests that political terrorism also aims at

² Comment of the moderator at the Risk Theory Society Proceedings, 2003.

dismembering a nation-state. Movements by Irish Republican Army (IRA) and Liberation Tigers of Tamil Eelam (LTTE) are testimony to this objective. While the former date the beginnings of the movement for an Irish republic to 1916, the latter have claimed separate land since the birth of the nation-state of Sri Lanka in 1948. Several other terrorist movements can be cited that potentially have this objective. While this paper does not deal with these contentious political issues,³ it attempts to make the notion of “dis-membering” a set mathematically precise. The paper proceeds to prove the existence of such an objective via the application of Brouwer’s fixed point theorem. The study also discusses the economic implication of this result.

The organization of the paper is as follows. In section I, the Walrasian framework is reviewed briefly. In particular the importance of Brouwer’s fixed point theorem is emphasized for the existence of Walras equilibrium. In section II, using definition of connectedness the meaning of “disconnectedness” is made mathematically precise. Section III establishes a link between the Brouwer’s fixed point theorem and disconnectedness. Section IV discusses the economic implications of the existence result. Section V concludes.

³ In particular, debates like “One man’s terrorist is another’s freedom fighter” are not the subject of this study.

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