

Economics 8117-8**Noncooperative Game Theory****February 29, 1996****Lecture 11A****Professor Andrew McLennan**

Evolutionarily Stable Strategies

I. Introduction

- A. We will first examine the ESS concept of John Maynard Smith, which is defined for symmetric two player games.
- B. Swinkels defines an extension of this concept to sets of equilibria for general normal form games.
- C. It will emerge that these concepts are very strong, since the first implies properness, while the second implies (in a certain sense) Kohlberg-Mertens stability.

II. ESS

- A. The intellectual history associated with the the concept of *evolutionarily stable strategies* (henceforth ESS) is very interesting.
 - 1. Perhaps the most successful aspect of the theory of evolution is that it provides a compelling explanation of why most organisms seem exceedingly well designed for whatever it is they do.
 - a. The political perspective known, in the U.S. , as social darwinism, argued against income redistribution to achieve greater equality, by asserting that this was contrary to the natural order of things, in which gradual improvement of the species results from rewarding the most fit.
 - i. The popularity of this view did not survive the observation that, in developed countries, fertility is negatively correlated with prosperity.
 - ii Social darwinism is easy to criticize, since its equation of success

(in reproduction) with “goodness” runs contrary to other values. A relatively uncontroversial example is the observation that few would think that long run prospects are positively associated with the future gene pool being dominated by the genes of the most fertile people alive now.

2. It is now almost dogma within biology that selection pressures act most forcefully at the level of the individual (as oppose to the herd, village, tribe, nation, ...). While selection pressures arising out of interactions between the organism and the physical world, or between the organism and members of other species, may generally tend in the direction of enhanced fitness of the species (say, relative to competitors for its ecological niche) this is emphatically not the case for selection pressures arising out of interactions between members of the same species.