APPLICATIONS OF LIKELIHOOD RATIO ORDERINGS IN ECONOMICS

By Ian Jewitt

University of Bristol

The likelihood ratio ordering has recently been used in economic theory. This paper examines some of its applications in portfolio theory, auction theory, and agency theory.

0. Introduction. A variety of familiar stochastic orderings are induced by classes of real valued functions: the random variable X_2 is said to stochastically dominate the random variable X_1 with respect to the class of functions C if

$$Eu(X_2) \geq Eu(X_1) \text{ for all } u \in C. \tag{0.1}$$

In what follows we shall be concerned with sufficient conditions expressed in terms of densities, so letting X_1 and X_2 have densities f_1 and f_2 respectively, (0.1) becomes

$$\int u(x) f_2(x) dx \geq \int u(x) f_1(x) dx \text{ for all } u \in C. \tag{0.2}$$

It is possible to consider inequality (0.2) a property of a linear transformation from the function space containing C to functions of the form $Tu : \{1, 2\} \to \mathbb{R}$. It is required that Tu be increasing, where

$$Tu(i) = \int u(x) f_i(x) dx \qquad i = 1, 2.$$

Widening the enquiry somewhat, it is often of interest to know when a transformation T maps some known class of functions C into some other known class C'. So, we want conditions on f such that $TC \subset C'$ where

$$Tu(y) = \int u(x) f(x \mid y) dx.$$