ESTIMATING FUNCTIONS AND OVER-IDENTIFIED MODELS

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ABSTRACT

Economic theory (particularly with optimizing economic agents) usually imposes a set of moment restrictions on economic data. These restrictions are known as orthogonality conditions, which correspond to a set of unbiased estimating functions with the dimension of the estimating functions often larger than the dimension of the parameters of interest. This paper provides a selected review on the efficient methods of estimating such over-identified models, using the approach of estimating functions (see Godambe, 1960, 1976; Godambe and Heyde, 1987, and Godambe and Thompson, 1974, 1989), as an organizing principle. The discussion in this paper takes place in a random sampling framework and draws heavily from Qin and Lawless (1994), who use the estimating-functions approach to combine the estimating functions in an over-identified model optimally.

1   Introduction.

Let z be a p-dimensional vector with $z \in \mathcal{Z}$ where $\mathcal{Z}$ is a compact subset of $\mathcal{R}^p$. Let θ be a k-dimensional vector with $\theta \in \mathcal{Q}$ and define the vector-valued estimating function g as $g : \mathcal{Z} \times \mathcal{Q} \to \mathcal{R}^r$, such that it is unbiased

$$E[g(z, \theta)] = 0 \tag{1}$$

for a unique element θ_0 of $\mathcal{Q}$. The function $g(z, \theta)$ is assumed to be twice continuously differentiable with respect to θ.

Equation (1) with $\dim[g] > \dim[\theta]$ often arises from economic theory with optimizing behavior on the part of economic agents. The parameter vector θ_0 is assumed to satisfy $E[g(z, \theta_0)] = 0$, where $g(z, \theta_0)$ is a given vector-valued function of moment conditions implied by economic theory - economic examples of this function in time-series context can be found in Hansen and Singleton (1982), Wirjanto (1995; 1996a, 1997), Amano and Wirjanto (1996a,b; 1997a,b,c) etc. Consequently this paper focuses on the