Sequential characteristics of Wooldridge´s estimators of a dynamical random effects probit model

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In a balanced panel of observations of N individuals through T equispaced times $t_1<t_2<\ldots t_T$ with respect to a binary response variable Y and a set of p exogenous variables X_1 , X_2 ,…X_p , a conditional dynamic probit model with random effects $e_{it} = a_i+u_{it}$ may be expressed for individual i at time t as $P(Y_{it}=1)= \Phi (X_{it}\beta+\gamma\ Y_{i(t-1)} +a_i)$ for i=1,….N; $t=t_1,t_2,\ldots t_T$, with $\Phi(u)$ denoting the standard Normal distribution function at u. In this context, with the additional hypotheses of i) independence of the sequence $u_{i1},\ldots u_{it}$, given a_i, ii) a Normal distribution for a_i and iii) a specific assumption relative to the initial state Y_{i0}, a marginal likelihood may be written and maximum marginal likelihood estimates can be computed, by numerical maximization. The complexity of this issue, leads to different approaches to its solution, as one from Stewart (2006), proposing the use of maximum simulated likelihood , and that from Wooldridge (2005) who points out a simple solution to this task. In a prospective study, it may be useful to plan interim analysis of the observations at K specified time points $(t_{mj})_{j=1..K}$ with $t_{m1}<t_{m2}< ..t_{mK}=T$. At each of these time points, parameters estimates of the model may be obtained using standard statistical software for a static random effects probit model, after an appropriate manipulation of the data. In this paper, after having developed a code in R software for fitting a static random effects probit model, and making use of it for fitting a dynamic probit model following Wooldridge´s approach, we examine the KxK empirical covariance matrix of the estimators of one specific regression coefficient, obtained in the K interim analysis. This sudy is pursued through bootstrap methods, following the same steps as Bole, Rebeck (2004). The objective is to test if the respective theoretical covariance matrix has a structure of independent increments, in order to be possible to apply the group sequential methodology as in Spiessens et al (2002).

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