

## 2(3)-STEP HECKMAN SCHÄTZER im Tobit II Modell

Tobit II Modell:

$$y_{i1}^* = x_{i1}\beta_1 + u_{i1}$$

$$y_{i2}^* = x_{i2}\beta_2 + u_{i2}$$

$$\text{mit } \begin{pmatrix} u_{i1} \\ u_{i2} \end{pmatrix} \stackrel{iid}{\sim} N \left( \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{pmatrix} \right)$$

$$y_i = \begin{cases} y_{i2}^* & y_{i1}^* > 0 \\ 0 & y_{i1}^* \leq 0 \end{cases}$$

$$E(y_i | y_i > 0) = x_{i2}\beta_2 + \sigma_{12} \lambda(-x_{i1}\beta_1)$$

$$\text{Var}(y_i | y_i > 0) = \sigma_2^2 - \sigma_{12}^2 \delta(x_{i1}\beta_1)$$

1) Schätze  $\beta_1$  durch Probit-Schätzer  $\hat{\beta}_{1, \text{PROB}}$

2) Schätze  $\beta_2$  und  $\sigma_{12}$  durch den OLS-Schätzer im Modell

$$y_i = x_{i2}\beta_2 + \sigma_{12} \lambda(-x_{i1}\hat{\beta}_{1, \text{PROB}}) + v_i \quad f. i \in I_1 := \{i: y_i > 0\}$$

3) Schätze  $\sigma_2^2 = \text{Var}(y_i | y_i > 0) + \sigma_{12}^2 \delta(x_{i1}\beta_1)$  durch

$$\hat{\sigma}_{2, \text{HECK}}^2 = \frac{1}{|I_1|} \sum_{i \in I_1} \left( \hat{v}_i^2 + \hat{\sigma}_{12, \text{HECK}}^2 \delta(x_{i1}\hat{\beta}_{1, \text{PROB}}) \right)$$

wobei  $\hat{v}_i$  die OLS-Residuen  $\hat{v}_i = y_i - x_{i2}\hat{\beta}_{2, \text{HECK}} - \hat{\sigma}_{12, \text{HECK}} \lambda(-x_{i1}\hat{\beta}_{1, \text{PROB}})$

f.  $i \in I_1$