Formule za drugi kolokvijum iz predmeta **Kvantitativni metodi u ekonomiji – Ekonometrija**

Ocenjivanje i testiranje ekonometrijskih modela

$$\begin{bmatrix}\hat{b}_1\\ \hat{b}_2\end{bmatrix}=\begin{bmatrix} n & \sum X_{2t}\\ \sum X_{2t} & \sum X_{2t}^2\end{bmatrix}^{-1}\begin{bmatrix}\sum Y_t\\ \sum Y_t X_{2t}\end{bmatrix}$$

$$\begin{bmatrix}\hat{b}_1\\ \hat{b}_2\\ \hat{b}_3\end{bmatrix}=\begin{bmatrix} n & \sum X_{2t} & \sum X_{3t}\\ \sum X_{2t} & \sum X_{2t}^2 & \sum X_{2t}X_{3t}\\ \sum X_{3t} & \sum X_{2t}X_{3t} & \sum X_{3t}^2\end{bmatrix}^{-1}\begin{bmatrix}\sum Y_t\\ \sum Y_t X_{2t}\\ \sum Y_t X_{3t}\end{bmatrix}$$

$$\sum e_t^2=\sum Y_t^2-\left(\hat{b}_1\sum Y_t+\hat{b}_2\sum Y_t X_{2t}\right)$$

$$\sum e_t^2=\sum Y_t^2-\left(\hat{b}_1\sum Y_t+\hat{b}_2\sum Y_t X_{2t}+\hat{b}_3\sum Y_t X_{3t}\right)$$

$$\hat{\sigma}^2=\frac{\sum e_t^2}{n-k}\quad S_j=\sqrt{a_{jj}\cdot\hat{\sigma}^2}\quad t_j^*=\frac{\hat{b}_j}{S_j}$$

$$R^2=1-\frac{\sum e_t^2}{\sum y_t^2}\quad \sum y_t^2=\sum Y_t^2-n\cdot\overline{Y}^2\quad F^*=\frac{R^2}{\frac{1-R^2}{n-k}}$$

$$\overline{R}^2=1-\frac{n-1}{n-k}\cdot(1-R^2)$$

$$b_j\in\left\{\hat{b}_j-t\cdot S_j;\hat{b}_j+t\cdot S_j\right\}$$

$$l=-\frac{n}{2}\left(\ln\left(\frac{\sum e_i^2}{n}\cdot 2\pi\right)+1\right)\qquad AIC=-\frac{2l}{n}+\frac{2k}{n}\qquad SIC=-\frac{2l}{n}+\frac{k\ln n}{n}$$

$$S_{ip}=\sqrt{\hat{\sigma}^2\left(1+\frac{1}{n}+\frac{\left(X_{i2}-\overline{X}_2\right)^2}{\sum x_{i2}^2}\right)}\qquad S_{ip}=\hat{\sigma}\cdot\sqrt{\underline{X}_s^T\cdot\left(\underline{X}^T\cdot\underline{X}\right)^{-1}\cdot\underline{X}_s}$$

$$t_p^*=\frac{Y_i-Y_{ip}}{S_{ip}}\qquad t_p^*=\frac{Y_i-Y_{ip}}{\hat{\sigma}\cdot\sqrt{1+\underline{X}_s^T\cdot\left(\underline{X}^T\cdot\underline{X}\right)^{-1}\cdot\underline{X}_s}}$$

$$r_{YX_j}=\frac{\sum y_i x_{ij}}{\sqrt{\sum y_i^2\cdot\sum x_{ij}^2}}\qquad \sum y_i x_{ij}=\sum Y_i X_{ij}-n\cdot\overline{Y}\cdot\overline{X}_j$$

Autokorelacija

$$d=\frac{\sum_{t=2}^{n}\left(e_t-e_{t-1}\right)^2}{\sum_{t=1}^{n}e_t^2}=\frac{\sum e_t^2+\sum e_{t-1}^2-2\sum e_t e_{t-1}}{\sum e_t^2}$$

$$\hat{e}_t=\hat{\rho}\cdot e_{t-1}\qquad \hat{\rho}=\frac{\sum e_t\cdot e_{t-1}}{\sum e_{t-1}^2}\qquad \rho=\frac{n}{n-(k-1)}\cdot\hat{\rho}$$

$$Y_t-\rho\cdot Y_{t-1}=b_1\cdot(1-\rho)+b_2\cdot\left(X_t-\rho\cdot X_{t-1}\right)+u_t-\rho\cdot u_{t-1}$$

Heteroskedastičnost

$$d_{ij}=\rho\left(X_{ij}\right)-\rho\left(\left|e_i\right|\right),\quad\forall ij$$

$$r_j=1-6\cdot\frac{\sum_{i=1}^{n} d_{ij}^2}{n\left(n^2-1\right)} \qquad Z_j^*=r_j\sqrt{n-1}$$

$$\frac{Y_i}{Z_i}=b_1\frac{1}{Z_i}+b_2\frac{X_{i2}}{Z_i}+\ldots+b_k\frac{X_{ij}}{Z_i}+\frac{u_i}{Z_i} \qquad \ln Y_i=b_1+b_2\ln X_{i2}+\ldots+b_k\ln X_{ik}+v_i$$

Multikolinearnost

$$r_{Y\cdot X_2X_3}=\sqrt{R^2} \quad r_{YX_2\cdot X_3}=\frac{r_{YX_2}-r_{YX_3}\cdot r_{X_2X_3}}{\sqrt{\left(1-r_{YX_3}^2\right)\cdot\left(1-r_{X_2X_3}^2\right)}} \qquad r_{YX_3\cdot X_2}=\frac{r_{YX_3}-r_{YX_2}\cdot r_{X_2X_3}}{\sqrt{\left(1-r_{YX_2}^2\right)\cdot\left(1-r_{X_2X_3}^2\right)}}$$

$$\chi_0^2=-\left(n-1-\frac{1}{6}(2k'+5)\right)\ln\left|\underline{R}\right| \qquad F^*=\frac{\dfrac{r_{X_2X_3}^2}{k'-1}}{\dfrac{1-r_{X_2X_3}^2}{n-k'}}$$

Veštačke promenljive

$$Y_i=a_1+(a_2-a_1)\cdot V_i+b\cdot X_i+u_i \qquad V_i=\begin{cases}0 & \text{za prvu grupu}\\ 1 & \text{za drugu grupu}\end{cases}$$

$$Y_i=a+b_1X_i+(b_2-b_1)V_{i2}+u_i \qquad V_{i2}=\begin{cases}0 & \text{za 1. grupu}\\ X_{i_2} & \text{za 2. grupu}\end{cases}$$

$$F^*=\frac{\dfrac{\sum_{i=1}^{n} e_i^2-\left(\sum_{i=1}^{n_1} e_i^2+\sum_{i=n_1+1}^{n} e_i^2\right)}{k}}{\dfrac{\sum_{i=1}^{n_1} e_i^2+\sum_{i=n_1+1}^{n} e_i^2}{n-2k}}$$

Dinamički modeli

$$Y_t=a+cX_{t+1}^*+u_t$$

$$b_\tau=b,\ \forall\tau \qquad X_{t+1}^*=b\sum_{\tau=0}^{T} X_{t-\tau}$$

$$b_\tau=(T+1-\tau)b,\ 0\le\tau\le T \qquad X_{t+1}^*=b\sum_{\tau=0}^{T}(T+1-\tau)X_{t-\tau}$$

$$b_\tau=\begin{cases}(1+\tau)b & \text{za} \quad 0\le\tau<T/2\\ (T+1-\tau)b & \text{za} \quad T/2\le\tau\le T\end{cases} \qquad X_{t+1}^*=b\left[\sum_{\tau=0}^{\frac{T}{2}}(1+\tau)X_{t-\tau}+\sum_{\tau=\frac{T}{2}+1}^{T}(T+1-\tau)X_{t-\tau}\right]$$

$$b_\tau=d_0+d_1\tau+d_2\tau^2+\ldots+d_q\tau^q=\sum_{p=0}^{q} d_p\tau^p,\quad q<T \qquad X_{t+1}^*=\sum_{\tau=0}^{T}\sum_{p=0}^{q} d_p\tau^pX_{t-\tau}$$

$$b_\tau=b\cdot\beta^\tau,\quad 0<\beta<1,\quad \tau=0,1,\ldots \qquad X_{t+1}^*=bX_t+b\cdot\beta\cdot X_{t-1}+b\cdot\beta^2\cdot X_{t-2}+\ldots=b\cdot\sum_{\tau=0}^{\infty}\beta^\tau\cdot X_{t-\tau}$$

$$MSE=\frac{1}{S}\cdot\sum_{s=1}^{S}\left(Y_{T+s}-P_{T,s}\right)^2 \qquad MAE=\frac{1}{S}\cdot\sum_{s=1}^{S}\left|Y_{t+s}-P_{t,s}\right| \qquad MAPE=\frac{1}{S}\cdot\sum_{s=1}^{S}\left|\frac{Y_{t+s}-P_{t,s}}{Y_{t+s}}\right|\cdot 100\%$$