Lectural 8 Ewnometrica - I

02.04.2021

JOINT

testing of 71 linear restriction

[fer a set of linear restrictions] Hypothesis

Testing a set of linear restrictions jointly.

Yi = B, + B2 Nri + B3 X3 i+ -- + BXKi + Ui
i=1,2,-,N

Terr

811 B + 712 B2 + --- + 71 K = 71

 $Y_{21} \beta_1 + Y_{22} \beta_2 + \cdots + Y_{2k} \beta_k = Y_2$ (0:# of non-redundant

and Vol B + Vol B2 + ---+ York = Vol Wear restriction.

R.B = Y Assume: Q≤K.

Ris full ramk.

Assume: Q5K

Simplest example:

				·
Ho: RB	= Y	QEK		
&xk KXI	8×1	E(B)	W Bos)	
Bous	M	Bo	11	
RB ~	M (R	RB, RE	2 (x) 1	JR)
$R_{los}^{\hat{\beta}} - Y$		2B-Y	5-2 R(X1	$\chi)^{\prime} R^{\prime}$
Under Ho: 1	RB = Y or	RB-Y	$=\frac{O}{8\times1}$	•
RPous -Y		$\frac{1}{2}$	$R(x^1x)^{-1}$	\mathcal{R}'

Now, lets work out nono to test > 1 linear

restriction

Under Ho, we have $\frac{RB - Y}{QXI} \sim M \left(\frac{Q}{QXI}, \sigma^2 R(X'X)'R' \right)$ Aside 1: y w ~ MT (0, Zmxm) then $C = \omega' \leq \omega' \omega \sim \chi^2$ $1 \times 1 \times m \times m \times m \times 1$ natrix form of quadratic sum of standard normal r.vs. Aside2: y c, ~ Xm, independent c2~ Wm2 then $\frac{c_1/m_1}{c_2/m_z} \sim f_{m_1, m_2}$ Aside 3. 7 û û N-K } prev. lecture had scalar form:

residual N-K Zin û w X2N-K

rector for MLRM.

Aside 1
$$\Rightarrow$$

$$\begin{pmatrix} R \hat{\beta} - Y \end{pmatrix} \begin{bmatrix} \sigma^2 R (x'x)'R' \end{bmatrix} \hat{R} \hat{\beta} - Y \end{pmatrix} \sim \hat{R}$$
Aside 3 \Rightarrow

$$\hat{U}'(\sigma^2)' \hat{U} \sim \hat{V}^2 \times \hat{R}$$
Overall,
$$\begin{pmatrix} R \hat{\beta} - Y \end{pmatrix} \hat{G}^2 R (x'x)'R \end{pmatrix} \hat{R} \hat{R} - Y \end{pmatrix} \hat{G}$$

$$\hat{U}' \hat{G}^2 \hat{U} / N - K$$

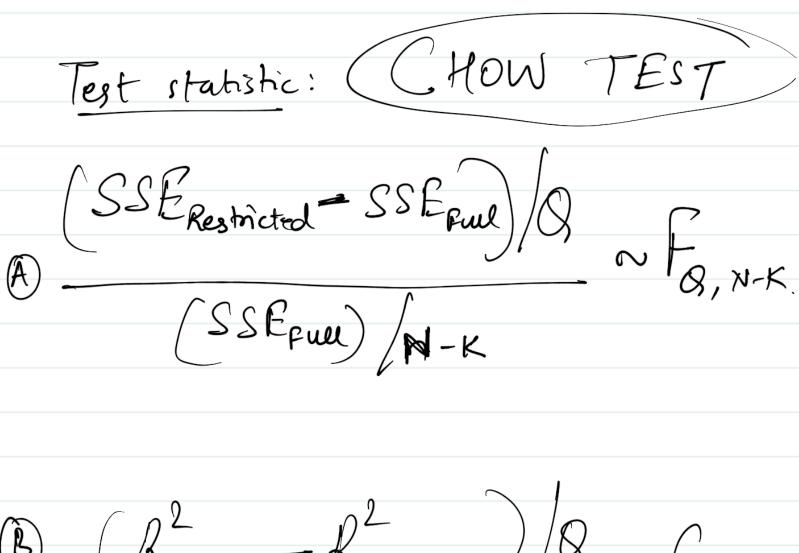
$$\hat{U}' \hat{G}^2 \hat{U} \hat{U} / N - K$$
So,
$$\begin{pmatrix} R \hat{\beta} - Y \end{pmatrix} \hat{G}^2 R (x'x)'R' \hat{J} \hat{R} \hat{G}_{00} \hat{Y} \end{pmatrix} \sim \hat{G}_{0,N} - K.$$

a restricted regression model.
Consider a full model:
y= B, + B2x2+B3x3+Byxy+U
Test: Ho: \$2 + 2 By =4 estimate: \$1, \$2, \$2, \$2, \$4

Recover a restricted model by substituting the sesmittion in the original model (1)

$$\frac{y - 4x_2}{-y} = \beta_1 + \beta_3 x_3 + \beta_4 (x_4 - 2x_2) + U$$

estimate: \$, 3, 12, + 4



B) Restricted / Restricted / N-K

(1-Rfull) / N-K

for our example: Q=/

Inference ?

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Y F-stat > Fo, N-k, a then right to reject to.

Next le dure: Maximum Likelihood Estimation