Testing

Non nested hypotheses

Michel Bierlaire

Introduction to choice models

The Cox test

Non nested hypotheses

Nested hypotheses

- Restricted and unrestricted models
- Linear restrictions
- H_0: restricted model is correct
- Test: likelihood ratio test

Non nested hypotheses

- Need to compare two models
- None of them is a restriction of the other
- Likelihood ratio test cannot be used

Example

Model 1

$$V_{in} = \beta_1 x_{ink} + \cdots$$
$$V_{jn} = \beta_2 x_{jnk} + \cdots$$
$$\vdots$$

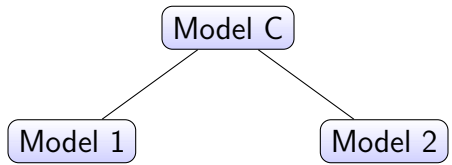
Model 2

$$V_{in} = \beta_1 \log(x_{ink}) + \cdots$$
$$V_{jn} = \beta_2 \log(x_{jnk}) + \cdots$$
$$\vdots$$

Cox test

Back to nested hypotheses

- We want to test model 1 against model 2
- We generate a composite model C such that both models 1 and 2 are restricted cases of model C.



Example

Model 1

$$V_{in} = \beta_1 x_{ink} + \cdots$$
$$V_{jn} = \beta_2 x_{jnk} + \cdots$$
$$\vdots$$

Model 2

$$V_{in} = \beta_1 \log(x_{ink}) + \cdots$$
$$V_{jn} = \beta_2 \log(x_{jnk}) + \cdots$$
$$\vdots$$

Model C

$$V_{in} = \beta_{11} x_{ink} + \beta_{12} \log(x_{ink}) + \cdots$$
$$V_{jn} = \beta_{21} x_{jnk} + \beta_{22} \log(x_{jnk}) + \cdots$$
$$\vdots$$

Cox test

Testing

- We test 1 against C using the likelihood ratio test
- We test 2 against C using the likelihood ratio test

Conclusions

C against 1	C against 2	Conclusion
1 is not rejected	2 is rejected	Prefer 1
1 is rejected	2 is not rejected	Prefer 2
1 is rejected	2 is rejected	Develop better models
1 is not rejected	2 is not rejected	Use another test