



## Econometrics 2, Class 1

Problem Set #10  
November 21, 2005



## 10.1 Exam-like question

We will go through this on the blackboard.

## 10.2 Dynamic Regression Models and Cointegration



- We look at the analysis given in "Mona – a quarterly model of the Danish economy" from the Danish central bank.
- MONA – MOdel NATionalbank.
- The model is used primarily for internal forecasting.
- It consists of 336 equations:
  - 42 estimated behavioural relations
  - 294 non-estimated identities.
- The dataset is quarterly and starts in 1971.
- Chapter II presents the most important of the 42 estimated relations.
- These are estimated with OLS or IV using the cointegration method.

### (1) Example: Industrial exports, price



The long-term price relation is written as:

$$\log\left(\frac{\text{export price}}{\text{market price}}\right) = b \cdot \log\left(\frac{\text{costs}}{\text{market price}}\right) + \text{trend}$$

i.e. the more costs deviate from the market price, the more Denmark's export price deviates from the market price.



(2) The estimated export-price relation

EXPORT PRICE			Table II.1.3
Variable	Name	Coefficient	t value
Change in export price	$\Delta \log(pxden/efkrks)$		
Change in market price	$\Delta \log(pxudl/efkrks)$	0.3074	3.1
Change in effective krone rate	$\Delta \log(efkrks)$	0.1429	1.2
Change in cost	$\Delta \log(mulc)$	0.3677	3.4
Export price	$\log(pxden_{-1}/efkrks_{-1})$	-0.3073	4.3
Market price	$\log(pxudl_{-1}/efkrks_{-1})$	0.1207	5.1
Cost	$\log(mulc_{-1})$	0.1866	3.7
Trend	0.001·trend	-3.1369	3.5
Constant		5.4876	3.5

T = 1975:2 – 1997:4    DW = 2.028    AR(1) = 0.512    Se = 0.0082  
R<sup>2</sup> = 0.6511    JB = 2.839    AR(4) = 1.280

Note: The relation is estimated by OLS. The applied homogeneity restriction is easily accepted with a test statistic of 4.2, which is F(1.83) distributed.



Interpret the estimation

- (a) The model is formulated as an ECM.
- (b) The proposed long-term cointegrating relation is between Export price, Market price and Cost.
- (c) The test for no-cointegration should be based on the coefficient to Export price = -0.3073.
  - We wish to test whether it is significantly different from 0.
  - To do this we use the t-value = -4.3 and the PcGive test. We need the 5% critical value with a constant and a trend and 3 variables = -3.93.
  - We thus reject the null – there is cointegration.
- (d) We are told that there is no major autocorrelation and there is normality in the residuals.

(B) PcGive test for no-cointegration

Number of variables in $X_t (p)$	Constant in (25)			Constant and trend in (25)		
	1%	5%	10%	1%	5%	10%
2	-3.79	-3.21	-2.91	-4.25	-3.69	-3.39
3	-4.09	-3.51	-3.19	-4.50	-3.93	-3.62
4	-4.36	-3.76	-3.44	-4.72	-4.14	-3.83
5	-4.59	-3.99	-3.66	-4.93	-4.34	-4.03



### (3) Prepare a presentation

- You have half an hour to look at one cointegrating relation and analyze it as I have done.
- You should then give a short presentation to class!