

ID6

ARMAX

Identification



6.8 EXAMPLE 6.2

Using (6.7.7) we will now compute the covariances of the IV estimates performed in Example 6.1. The approximation of the remote noise $w(t)$ with the residuals of the order 6 auxiliary AR model allows computing, on 500 samples, the variance

$$\sigma_w^2 = 0.0379,$$

i.e. a value near to the true one, given by 0.0381. Making reference to the first estimate, obtained using as instruments delayed inputs, it is then necessary to filter the input sequence with $r(z)$ in order to construct Z^* (6.7.5) and, eventually, covariance matrix (6.7.7), which is given by

$$\text{cov } \theta_{500}^o = 10^{-3} \begin{bmatrix} 1.390 & -3.132 & 1.803 & 0.198 \\ -3.132 & 8.013 & -5.443 & -0.004 \\ 1.803 & -5.443 & 4.487 & -0.552 \\ 0.198 & -0.004 & -0.552 & 0.433 \end{bmatrix}.$$

The corresponding standard deviations of the parameters are

$$\begin{aligned} \text{std } \alpha_1 &= 0.037 \text{ (0.0371)} & \text{std } \beta_1 &= 0.067 \text{ (0.0689)} \\ \text{std } \alpha_2 &= 0.090 \text{ (0.1002)} & \text{std } \beta_2 &= 0.021 \text{ (0.0019)}; \end{aligned}$$

it can be noted that the obtained deviations (in parentheses) agree very well with expected ones assuming a Gaussian distribution. Considering now the estimate obtained using instruments generated with a model of the process, it is necessary to filter these variables and the inputs with $r(z^{-1})$ in order to construct the corresponding matrix Z^* and (6.7.7); we obtain

$$\text{cov } \theta_{500}^o = 10^{-3} \begin{bmatrix} 0.565 & -1.648 & 0.905 & 0.228 \\ -1.648 & 6.247 & -4.544 & -0.118 \\ 0.905 & -4.544 & 4.103 & -0.499 \\ 0.228 & -0.118 & -0.499 & 0.459 \end{bmatrix}.$$

The corresponding standard deviations of the parameters are

$$\begin{array}{ll} \text{std } \alpha_1 = 0.024 \text{ (0.0176)} & \text{std } \beta_1 = 0.064 \text{ (0.0515)} \\ \text{std } \alpha_2 = 0.079 \text{ (0.0625)} & \text{std } \beta_2 = 0.021 \text{ (0.0029);} \end{array}$$

also in this case the observed deviations agree very well with expected ones. A comparison of the covariances of these estimates shows that those obtained using instruments generated by means of a model are superior to the estimates obtained using as instruments past inputs.

SECTIONS	MODULES	QUESTIONS	HOME PAGE
PREV. MODULE	FAQ	TUTOR	NEXT MODULE