Forecasting Using Econometric and Atheoretical Time Series Models

Consider estimating and then forecasting out-of-sample the annual consumption of chicken in the United States. The data (1951-1997) are:

Y = per capita chicken consumption (in pounds)
PC = the price of chicken (in cents per pound)
PB = the price of beef (in cents per pound)
YD = U. S. per capita disposable income (in hundreds of dollars).

You can find the data (chick6.wf1) at:

http://occawlonline.pearsoned.com/bookbind/pubbooks/studenmund_awl/chapter1/deluxe.html

We wish to compare out-of-sample forecasts of the demand for chicken using econometric models and using methods that do not use any economic structure, only statistical treatments.

1. OLS

a. unconditional forecasts: $\hat{Y}_{t+1} = X_t \hat{b}$
b. conditional forecasts: $\hat{Y}_{t+1} = \widehat{X_t} \hat{b}$

2. GLS

With an AR(1) error ($e_t = r e_{t-1} + u_t$) and using a simple regression model ($Y_t = b_0 + b_1 X_t + e_t$) the gls forecast is:

$$\hat{Y}_{t+1} = \hat{r} Y_t + \hat{b}_0 (1 - \hat{r}) + \hat{b}_1 (\widehat{X}_{t+1} - \hat{r} X_t)$$

3. Forecasting confidence intervals

A 95% confidence interval is approximately

$$[\hat{Y}_{t+1} \pm 2s_F]$$

4. Forecasting with simultaneous systems

Typically uses simulation methods.

5. Forecasting with ARIMA(p,d,q) models

$$Y_t = b_0 + q_1 Y_{t-1} + \ldots + q_p Y_{t-p} + e_t + f_1 e_{t-1} + \ldots + f_q e_{t-q}$$

The first part is the AR process, the second the MA process and the original series is differenced d times to achieve stationarity (detrend).