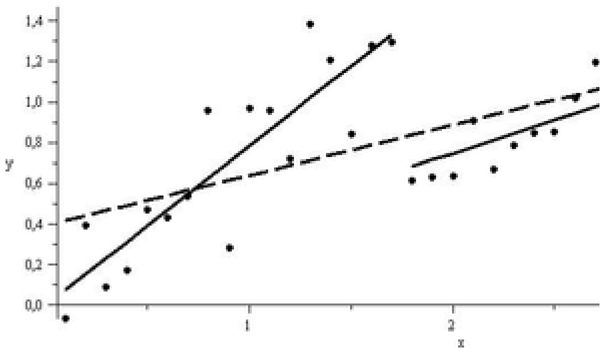
Chow test

From Wikipedia, the free encyclopedia

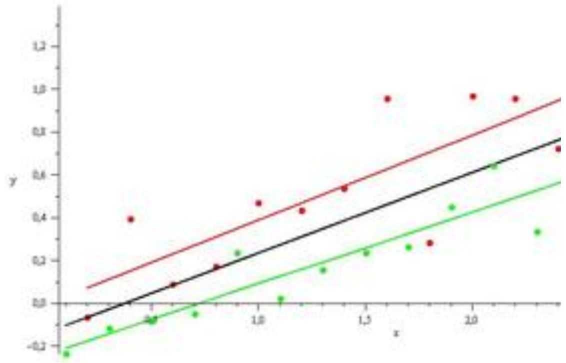
The **Chow test** is a statistical and econometric test of whether the coefficients in two linear regressions on different data sets are equal. The Chow test was invented by economist Gregory Chow. In econometrics, the Chow test is most commonly used in time series analysis to test for the presence of a structural break. In program evaluation, the Chow test is often used to determine whether the independent variables have different impacts on different subgroups of the population.

structural break



At $x = 1.7$ there is a structural break, regression on the subintervals $[0,1.7]$ and $[1.7,4]$ delivers a better modelling than the combined regression(dashed) over the whole interval.

program evaluation



Comparison of 2 different programs (red, green) existing in a common data set, separate regressions for both programs deliver a better modelling than a combined regression (black).

Suppose that we model our data as

$$y_t = a + bx_{1t} + cx_{2t} + \varepsilon.$$

If we split our data into two groups, then we have

$$y_t = a_1 + b_1x_{1t} + c_1x_{2t} + \varepsilon.$$

and

$$y_t = a_2 + b_2x_{1t} + c_2x_{2t} + \varepsilon.$$

The null hypothesis of the Chow test asserts that $a_1 = a_2$, $b_1 = b_2$, and $c_1 = c_2$.

Let S_C be the sum of squared residuals from the combined data, S_1 be the sum of squared residuals from the first group, and S_2 be the sum of squared residuals from the second group.

N_1 and N_2 are the number of observations in each group and k is the total number of parameters (in this case, 3). Then the Chow test statistic is

$$\frac{(S_C - (S_1 + S_2))/(k)}{(S_1 + S_2)/(N_1 + N_2 - 2k)}.$$

The test statistic follows the F distribution with k and $N_1 + N_2 - 2k$ degrees of freedom.

[edit] References

- Howard E. Doran: *Applied Regression Analysis in Econometrics*. CRC Press 1989, ISBN 0824780493, p. 146 (restricted online version (Google Books))
- Christopher Dougherty: *Introduction to Econometrics*. Oxford University Press 2007, ISBN 0199280967, p. 194 (restricted online version (Google Books))
- Gregory C. Chow (1960). "Tests of Equality Between Sets of Coefficients in Two Linear Regressions". *Econometrica* **28** (3): 591–605. doi:10.2307/1910133. JSTOR 1910133.
- [1] [2] [3] Series of explanations from the Stata Corporation