LIML

LIML (FULLER=*scalar*, INST=(*list of instruments*), SILENT, TERSE)
dependent variable *list of endogenous and exogenous variables* ;

Function:

LIML computes the limited information maximum likelihood estimator for a single equation linear structural model. To estimate a single equation **nonlinear** model via LIML, use FIML with unrestricted reduced-form equations for the included endogenous variables (those which appear on the right hand side of the primary equation).

Usage:

LIML's form is identical to the 2SLS/INST/IV/TSLS command -- specify a list of instruments and the variables in the equation. LIML determines the list of endogenous variables, included exogenous variables, and excluded exogenous variables by comparing the instrument list with the variables in the equation. If there are no endogenous variables, OLSQ is used and a warning is printed. If the right hand side equation is exactly identified (number of endogenous variables equals number of excluded exogenous variables), LIML is equivalent to 2SLS, so 2SLS is used, and a warning is printed. If the equation is underidentified, an error message is printed (just like 2SLS).

Options:

FULLER= value used to weight eigenvalue towards zero. The formula used is K = LAMBDA - FULLER/(T-NZ), where K is the K-class constant, LAMBDA is the LIML eigenvalue, T is the number of observations, and NZ is the number of instruments. FULLER=0 (default) is the standard LIML estimator, which is median-unbiased. FULLER=1 yields a mean-unbiased estimator. FULLER values between 0 and 8-16/(T-NZ-2) dominate LIML in small-sigma efficiency. The LIML estimator modified in this way has smaller tails than the standard LIML estimator, which gives it good small-sample properties (see the references for details).

INST= *(list of instruments)*. This list should include all the exogenous variables in the equation being estimated as well as the other exogenous variables in the model. Do not forget to include a constant if there is one in the model. Weights are not supported at present.

SILENT/**NOSILENT** suppresses all printed output.

TERSE/**NOTERSE** provides only minimal output (number of observations and table of coefficients, SEs, and ts.)

Examples:

LIML

This example estimates the consumption function for the illustrative model in the TSP User's Manual, using the constant, trend, government expenditures (G), and the log of the money supply (LM) as instruments:

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LIML (INST=(C,G,TIME,LM)) CONS C GNP ;
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Output:

The output of LIML begins with an equation title, the name of the dependent variable and the lists of endogenous, included exogenous and excluded exogenous variables. The LIML eigenvalue and an F-test of the overidentifying restrictions are printed. If FULLER is used, the FULLER constant and the computed K-class value are also printed. The log of the LIML eigenvalue plus a constant is equal to the log of the likelihood function.

This is followed by various statistics on goodness-of-fit: the sum of squared residuals, the standard error of the regression, the R-squared, and the Durbin-Watson statistic for autocorrelation of the residuals.

Following this is a table of right hand side variable names, estimated coefficients, standard errors and associated t-statistics. If the variance- covariance matrix has been unsuppressed (see the SUPRES command), it is printed after this table. Finally, if the RESID and PLOTS options are on, a table and plot of the actual and fitted values of the dependent variable and the residuals is printed.

LIML also stores most of these results in data storage for later use. The table below lists the results available after a LIML command. The fitted values and residuals will only be stored if the RESID option is on (the default).

Name	**Type**	**Length**	**Variable Description**
@LHV	list	1	Name of the dependent variable.
@SSR	scalar	1	Sum of squared residuals.
@S	scalar	1	Standard error of the regression.
@S2	scalar	1	Standard error squared.
@YMEAN	scalar	1	Mean of the dependent variable.
@SDEV	scalar	1	Standard deviation of the dependent variable.
@NOB	scalar	1	Number of observations.
@DW	scalar	1	Durbin-Watson statistic.
@RSQ	scalar	1	R-squared.
@ARSQ	scalar	1	Adjusted R-squared.
@FOVERID	scalar	1	F-test of overidentifying restrictions.
@LAMBDA	scalar	1	LIML eigenvalue.
@RNMS	list	#vars	Names of right hand side variables.
@COEF	vector	#vars	Coefficient estimates.
@SES	vector	#vars	Standard Errors.
@T	vector	#vars	T-statistics.
@VCOV	matrix	#vars*#vars	Variance-covariance of estimated coefficients.
@RES	series	#obs	Residuals.
@FIT	series	#obs	Fitted values of the dependent variable.

If the regression includes PDL or Shiller lag variables, the following will also be stored:

@SLAG	scalar	1	Sum of the lag coeffecients.
@MLAG	scalar	1	Mean lag coeffecient.
@LAGF	vector	#lags	Estimated lag coeffecients, after "unscrambling".

Method:

The LIML eigenvalue is the minimum eigenvalue of the matrix $H^{-1}H_1$. H^{-1} is the inverse of the residual covariance matrix of the endogenous and dependent variables regressed on all of the instruments. H_1 is the residual covariance matrix of the same variables regressed on just the included instruments. This eigenvalue is calculated by CACM algorithm 384. The FULLER constant term (if non-zero) is subtracted from this eigenvalue to yield K, which is then used in the standard K-class formula to compute the coefficients. The standard errors are computed from the K-class inverse matrix times the sum of squared residuals divided by (number of observations minus number of estimated coefficients).

References

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