Essential documentation for the software used in
Long run relations in European electricity prices

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This software is Ox code (Doornik 2007), so you need either the
commercial version (OxMetrics) or the console version you may find at

1 lucas_test.ox

This is the library for computing Johansen LR test and Lucas PLR test
based on Student’s distribution and for simulating its p-values using the
bootstrap.

\texttt{johansen(mDy, mYx, mUx, avEval, amAlpha, amBeta, ...)}

Performs Gaussian ML for ECM model with cCoint cointegration relations.

\texttt{mDy (T \times K_1)} matrix of first difference of original series.

\texttt{mYx (T \times K_2 \geq K_1)} matrix of 1-lagged levels of original series and restricted
regressors.

\texttt{mUx (T \times K_3)} matrix of unrestricted regressors (delays of \texttt{mDy} and unre-
stricted dummies).

\texttt{avEval} (address) out: \((K_1 \times 1)\) vector of eigenvalues.

\texttt{amAlpha} (address) out: adjustment coefficient matrix.

\texttt{amBeta} (address) out: cointegration matrix.

optional parameters (in case cointegration rank known).

\texttt{cCoint} scalar rank of cointegration.

\texttt{amGamma} (address) out: unrestricted regressors coefficients matrix.

*Use at your own risk.
amV (address) out: covariance matrix of errors.

amErr (address) out: error series.

Returns: vector with Johansen trace statistics if computations succeeded and only standard parameters are present, log-likelihood if optional parameters are present, 0 if computational problems arose.

series_builder(mY, mX, mU, cP, amDy, amYx, amUx)

It makes the mDy and mYx series for johansen(), starting from the endogenous variables mY, the restricted regressors mX and the unrestricted regressors mU.

mY \((T \times K_1)\) matrix of endogenous variables.

mX \((T \times [K_2 - K_1])\) matrix of restricted regressors.

mU \((T \times K_3)\) matrix of unrestricted regressors.

cP (scalar) number of lags of differenced variables in the ECM.

amDy (address) out: \((T \times K_1)\) matrix of first differences of mY.

amYx (address) out: \((T \times K_2 \geq K_1)\) matrix of 1-lagged levels of original series and restricted regressors.

amUx (address) out: \((T \times [K_3 + cP * K_1])\) matrix of 1 to cP lags of differenced mY and unrestricted regressors.

Returns: 1.

tecm(mDy, mYx, mUx, dDF, cCoint, amAlpha, amBeta, amGamma, amV, amErr, avW)

Performs Student’s t ML for ECM model with cCoint cointegration relations using the EM algorithm (Lange et al. 1989, Little 1988).

mDy \((T \times K_1)\) matrix of first difference of original series.

mYx \((T \times K_2 \geq K_1)\) matrix of 1-lagged levels of original series and restricted regressors.

mUx \((T \times K_3)\) matrix of unrestricted regressors (delays of mDy and unrestricted dummies).

dDF (scalar) degree of freedom of Student’s t.

cCoint (scalar) rank of cointegration.
\texttt{amAlpha} (address) out: adjustment coefficient matrix.
\texttt{amBeta} (address) out: cointegration matrix.
\texttt{amGamma} (address) out: unrestricted regressors coefficient matrix.
\texttt{amV} (address) out: covariance matrix of errors.
\texttt{amErr} (address) out: error series.
\texttt{avW} (address) out: \((T \times 1)\) vector with weights for WLS.

Returns: log-likelihood.

\texttt{lucas.plr(mY, cLags, cDetType, dDF, ...)}
Lucas’ Pseudo LR test with Student’s t with \texttt{dDF} degrees of freedom.
\texttt{mY} \((T \times K_1)\) matrix of endogenous series.
\texttt{cLags} (scalar) number of lags of differenced \texttt{mY}.
\texttt{cDetType} (scalar) type of deterministic part: \texttt{NONE} = no deterministic, \texttt{RCONST} = restricted constant, \texttt{CONST} = unrestricted constant, \texttt{RTREND}, restricted trend, \texttt{TREND} = unrestricted linear trend (this may lead to deterministic quadratic trends).
\texttt{dDF} (series) degrees of freedom of Student’s t.

Optional arguments:
[0] restricted regressors.
[1] unrestricted regressors (if only restricted regressors needed, pass <> as first optional argument).

Returns: vector of PLR statistics.

\texttt{sim.ecm(mEps, mYstart, cCoint, cP, mX, mU, mAlpha, mBeta, mGamma, amY)}
It simulates from an ECM(\texttt{cP}) model with cointegration rank \texttt{cCoint} using \texttt{mYstart} as initial values, \texttt{mEps} as shocks, \texttt{mX} as restricted regressors, \texttt{mUx} as unrestricted regressors, parameters \texttt{mAlpha}, \texttt{mBeta} and \texttt{mGamma} the simulated time series is written in the address \texttt{amY} (for formats see \texttt{series.builder()}).
Notice: \texttt{mYstart} must be of rows \texttt{cP+1}.
It bootstraps Lucas’ Pseudo LR test with Student’s t with \( dDF \) degrees of freedom with the method of Swensen (2006).

\( mY \) \( (T \times K_1) \) endogenous series.

\( cLags \) (scalar) number of lags of differenced \( mY \).

\( cDetType \) (scalar) type of deterministic part: \texttt{NONE} = no deterministic, \texttt{RCONST} = restricted constant, \texttt{CONST} = unrestricted constant, \texttt{RTREND} = restricted trend, \texttt{TREND} = unrestricted linear trend (may lead to deterministic quadratic trends).

\( dDF \) (scalar) degrees of freedom of Student’s t.

Optional arguments:

[0] restricted regressors.

[1] unrestricted regressors (if only restricted regressors needed, pass \(< >\) as first optional argument).

The function returns no output, but prints the PLR tests with p-values.

### 2 NewKPSS.ox

This is the library for computing KPSS and IKPSS tests. It needs the library \texttt{rq.ox} by Roger Koenker (http://www.econ.uiuc.edu/ roger/).

The two functions for the end-user are

\begin{align*}
\texttt{kpss} & (vY, bTrend, cTrunc) \\
\texttt{ikpss} & (vY, bTrend, cTrunc)
\end{align*}

They compute the KPSS and IKPSS statistics.

\( vY \) \( (T \times 1) \) time series to test for stationarity.

\( bTrend \) (boolean) \( 0 \) = de-mean (resp. de-median), \( 1 \) = OLS de-trending (resp. LAD de-trending).

\( cTrunc \) (scalar) set the bandwidth (or truncation) parameter. If set to -1 the function computes it automatically (see below)

These functions use three global variables that may be changed any time before the function call:

\begin{itemize}
  \item \texttt{M\_KERNEL} may be assign equal to the values \texttt{QUADRATIC} or \texttt{BARTLETT}.
  \item \texttt{M\_BANDWIDTH} may be assigned to the values \texttt{ANDREWS} or \texttt{NEWEYWEST}.
  \item \texttt{M\_VERB} \( 0 \) = textual output off, \( 1 \) = textual output on.
\end{itemize}
3 nh.ox

This is the library for computing the original and the robust versions of Nyblom and Harvey’s (2000) cointegration test. It needs the library rq.ox by Roger Koenker (http://www.econ.uiuc.edu/ roger/).

nhstat(mX, cTrend, cBandWidth) inhstat(mX, cTrend, cBandWidth)

They perform the multivariate generalization of KPSS test by Nyblom and Harvey (2000) and the robust version thereof based on signs.

mX ($T \times N$) data matrix.

cTrend (scalar) $0 =$ nothing, $1 =$ de-mean/median, $2 =$ de-trend (linear trend).

cBandWidth (scalar) negative = automatic bandwidth, integer = bandwidth of Bartlett window.

Return: the vector of NH/INH statistics.

4 fmlad.ox

This library contains functions for computing the FM-LAD regression by Phillips (1995). The only relevant function for the end user is the following. It needs the library rq.ox by Roger Koenker (http://www.econ.uiuc.edu/ roger/).

fmlad(vY, mX, iBandWidth)

vY ($T \times 1$) vector of dependent variable.

mX ($T \times N$) matrix of regressors (a constant is automatically included).

iBandWidth (scalar) bandwidth parameter. If negative automatic bandwidth selection ($4(T/100)^{2/9}$).

References


