**veclmar** — Perform LM test for residual autocorrelation after vec

### Syntax

```
veclmar [, options]
```

### Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>mlag(#)</code></td>
<td>use # for the maximum order of autocorrelation; default is <code>mlag(2)</code></td>
</tr>
<tr>
<td><code>estimates(estname)</code></td>
<td>use previously stored results <code>estname</code>; default is to use active results</td>
</tr>
<tr>
<td><code>separator(#)</code></td>
<td>draw separator line after every # rows</td>
</tr>
</tbody>
</table>

`veclmar` can be used only after vec; see [TS] vec.
You must `tsset` your data before using `veclmar`; see [TS] tsset.

### Menu

Statistics > Multivariate time series > VEC diagnostics and tests > LM test for residual autocorrelation

### Description

`veclmar` implements a Lagrange multiplier (LM) test for autocorrelation in the residuals of a VECM discussed in Johansen (1995, 21–22). The test is performed at lags \( j = 1, \ldots, \text{mlag}() \).

### Options

- `mlag(#)` specifies the maximum order of autocorrelation to be tested. The integer specified in `mlag()` must be greater than 0; the default is 2.
- `estimates(estname)` requests that `veclmar` use the previously obtained set of vec estimates stored as `estname`. By default, `veclmar` uses the active results. See [R] estimates for information on manipulating estimation results.
- `separator(#)` specifies how many rows should appear in the table between separator lines. By default, separator lines do not appear. For example, `separator(1)` would draw a line between each row, `separator(2)` between every other row, and so on.

### Remarks and examples

Estimation, inference, and postestimation analysis of VECMs is predicated on the errors’ not being autocorrelated. `veclmar` implements the LM test for autocorrelation in the residuals of a VECM discussed in Johansen (1995, 21–22). The test is performed at lags \( j = 1, \ldots, \text{mlag}() \). For each \( j \), the null hypothesis of the test is that there is no autocorrelation at lag \( j \).
Example 1

We fit a VECM using the regional income data described in [TS] `vec` and then call `veclmar` to test for autocorrelation.

```
use http://www.stata-press.com/data/r13/rdinc
vec ln_ne ln_se
(output omitted)
veclmar, mlag(4)
```

Lagrange multiplier test

```
Lag  |  chi2  |  df  |  Prob > chi2
-----|--------|------|----------------
 1   | 8.9586 | 4    | 0.06214
 2   | 4.9809 | 4    | 0.28926
 3   | 4.8519 | 4    | 0.30284
 4   | 0.3270 | 4    | 0.98801
```

H0: no autocorrelation at lag order

At the 5% level, we cannot reject the null hypothesis that there is no autocorrelation in the residuals for any of the orders tested. Thus this test finds no evidence of model misspecification.

Stored results

`veclmar` stores the following in `r()`:

Matrices

`r(lm)`  \( \chi^2 \), df, and \( p \)-values

Methods and formulas

Consider a VECM without any trend:

\[
\Delta y_t = \alpha \beta y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \epsilon_t
\]

As discussed in [TS] `vec`, as long as the parameters in the cointegrating vectors, \( \beta \), are exactly identified or overidentified, the estimates of these parameters are superconsistent. This implies that the \( r \times 1 \) vector of estimated cointegrating relations

\[
\hat{E}_t = \hat{\beta} y_t
\]

(1)
can be used as data with standard estimation and inference methods. When the parameters of the cointegrating equations are not identified, (1) does not provide consistent estimates of \( \hat{E}_t \); in these cases, `veclmar` exits with an error message.

The VECM above can be rewritten as

\[
\Delta y_t = \alpha \hat{E}_t + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \epsilon_t
\]
which is just a VAR with \( p - 1 \) lags where the endogenous variables have been first-differenced and is augmented with the exogenous variables \( \hat{E} \). \texttt{veclmar} fits this VAR and then calls \texttt{varlmar} to compute the LM test for autocorrelation.

The above discussion assumes no trend and implicitly ignores constraints on the parameters in \( \alpha \). As discussed in \texttt{vec}, the other four trend specifications considered by Johansen (1995, sec. 5.7) complicate the estimation of the free parameters in \( \beta \) but do not alter the basic result that the \( \hat{E}_t \) can be used as data in the subsequent VAR. Similarly, constraints on the parameters in \( \alpha \) imply that the subsequent VAR must be estimated with these constraints applied, but \( \hat{E}_t \) can still be used as data in the VAR.

See \texttt{[TS] varlmar} for more information on the Johansen LM test.

Reference


Also see

\texttt{[TS] vec} — Vector error-correction models
\texttt{[TS] varlmar} — Perform LM test for residual autocorrelation after \texttt{var} or \texttt{svar}
\texttt{[TS] vec intro} — Introduction to vector error-correction models