

“Testing Jointly for Structural Changes in the Error Variance and Coefficients of a Linear Regression Model”

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MATLAB Program (revised February 18, 2023)

This is a set of MATLAB program files which implement all the testing procedures discussed in the article. To replicate the empirical examples in Section 7, run script file `main.real.m` for the real interest rate example presented in Table 12. Run `main.inflation.m` for the inflation example in Table 13. The results are self explanatory.

The following function files compute the test statistics:

- `pslr0.m`: Computes the $\sup LR_T$ test statistic for m coefficient changes given no variance changes;
- `pslr1.m`: Computes the $\sup LR_{1,T}$ test statistic for n variance changes given no coefficient changes;
- `pslr2.m`: Computes the $\sup LR_{2,T}$ test statistic for n variance changes given m coefficient changes;
- `pslr3.m`: Computes the $\sup LR_{3,T}$ test statistic for m coefficient changes given n variance changes;
- `pslr4.m`: Computes the $\sup LR_{4,T}$ test statistic for m coefficient changes and n variance changes;

The UD max tests for each version can be computed by taking a maximum over a range of $1 \leq n \leq N$ for $\sup LR_{1,T}$ and $\sup LR_{2,T}$, over a range of $1 \leq m \leq M$ for $\sup LR_T$ and $\sup LR_{3,T}$, and over ranges of $1 \leq n \leq N$ and $1 \leq m \leq M$ for the $\sup LR_{4,T}$.

- `pslr9.m`: Computes the $SeqLR_{9,T}$ test statistic for m coefficient changes versus $m + 1$ coefficient changes given n variance changes;
- `pslr10.m`: Computes the $SeqLR_{10,T}$ test statistic for n variance changes versus $n + 1$ variance changes given m coefficient changes;

The following function files give the critical values:

- **getcv1.m**: Provides the critical values for $\sup LR_T$, $\sup LR_{1,T}$, $\sup LR_{2,T}$, and $\sup LR_{3,T}$ with **signif**=1, 2, 3, and 4 corresponding to the significance levels 10%, 5%, 2.5%, and 1%, respectively. **trm** is the trimming value (ϵ). The rows of the output **cv** represent the number of regressors (q for $\sup LR_T$ and $\sup LR_{3,T}$, 1 for $\sup LR_{1,T}$ and $\sup LR_{2,T}$) subject to change and the columns do the number of breaks (m for $\sup LR_T$ and $\sup LR_{3,T}$, n for $\sup LR_{1,T}$ and $\sup LR_{2,T}$).
- **getcv2.m**: Provides the critical values for $SeqLR_{9,T}$ and $SeqLR_{10,T}$ with **signif**=1, 2, 3, and 4 corresponding to the significance levels 10%, 5%, 2.5%, and 1%, respectively. **trm** is the trimming value (ϵ). The rows of the output **cv** represent the number of regressors (q for $SeqLR_{9,T}$ and 1 for $SeqLR_{10,T}$) subject to change and the columns do the number of breaks (m for $SeqLR_{9,T}$ and n for $SeqLR_{10,T}$).
- **getcv4.m**: Provides the critical values for $\sup LR_{4,T}$ with **signif**=1, 2, 3, and 4 corresponding to the significance levels 10%, 5%, 2.5%, and 1%, respectively. Input the trimming value (ϵ) **trm** and the number of regressors (q) subject to change, too. The rows of the output **cv** represent the number of coefficient breaks (m) and the columns do the number of variance breaks (n).
- **getdmax.m**: Provides the critical values for $UD \max LR_T$, $UD \max LR_{1,T}$, $UD \max LR_{2,T}$, and $UD \max LR_{3,T}$ with **signif**=1, 2, 3, and 4 corresponding to the significance levels 10%, 5%, 2.5%, and 1%, respectively. **trm** is the trimming value (ϵ). The rows of the output **cv** represent the number of regressors (q for $UD \max LR_T$ and $UD \max LR_{3,T}$, 1 for $UD \max LR_{1,T}$ and $UD \max LR_{2,T}$) subject to change. Use the first column of the output **cv** for the $UD \max$ tests. The second column is for the $WD \max$ tests discussed in Bai and Perron (1998).
- **getdmax4.m**: Provides the critical values for $UD \max LR_{4,T}$ with **signif**=1, 2, 3, and 4 corresponding to the significance levels 10%, 5%, 2.5%, and 1%, respectively. **trm** is the trimming value (ϵ). The rows of the output **cv** represent the number of regressors (q) subject to change. The four columns of the output correspond to cases of $(M, N) = (2, 2), (3, 2), (2, 3)$, and $(3, 3)$, respectively.