# The GVAR Toolbox: Model Specification, Estimation, and Dynamic Analysis

Samson M'boueke

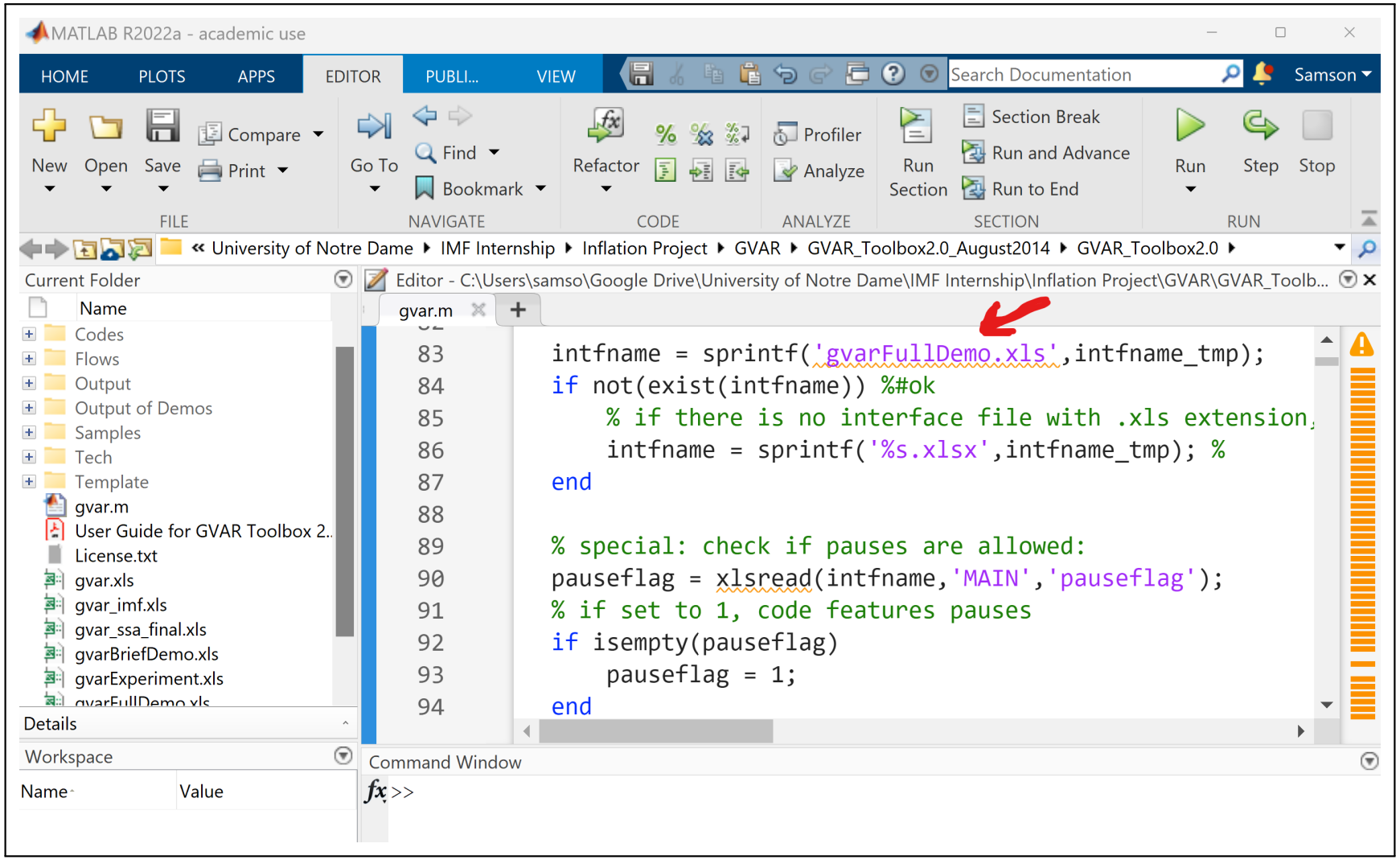
University of Notre Dame

January 9, 2024

# Getting Ready

- You do not need expert knowledge of MATLAB to perform the GVAR analysis using this toolbox. The authors have written all the necessary codes for you.
- To start, open the **gvar.m** MATLAB script and specify the interface file name as in the image below.
- If you choose not to specify the interface file name in the script, you will later need to type it in the Command Window to be able to call it
- In this demo, we will be using the **gvarFullDemo.xls** interface file. No further modifications of the script are needed.

# Getting Ready



# Getting Ready

- Run the **gvar.m** script by clicking on the "**Run all sections**" button or typing "gvar" in the Command Window
- All the instructions for performing the GVAR analysis will appear in the Command Window
- Next, type the interface file name (without the .xls extension) that you would like to use (**gvarFullDemo** in this case) and press Enter, OR simply press Enter.
- Because we specified the interface file name in the previous step, you can also just press Enter without typing the name.

# Getting Ready

Command Window

```
>> gvar
*******************************************************************************

                                GVAR Toolbox 2.0
                                  August 2014


 Alessandro Galesi, CEMFI Madrid & L.Vanessa Smith, University of York
*******************************************************************************
>>> Type the interface filename (WITHOUT the .xls extension) that you would like
    use and press enter. If you wish to use one of the demo interface files provi
    with the installation program, type gvarBriefDemo or gvarFullDemo, accordingl
    Alternatively, type the name of your own interface file.
    Note that MatLab is case sensitive.

================================================================================
Note:
1. After typing the interface filename, the program will start running and it wil
   a number of pauses, unless the "Running the program with pauses option" is dis
   (This is the case for the gvarBriefDemo, for which no pauses will be performed
2. At each pause, you will be called upon to supply settings and/or check interme
   results in the MAIN worksheet of the interface file that will open automatical
```

# Getting Ready

Command Window

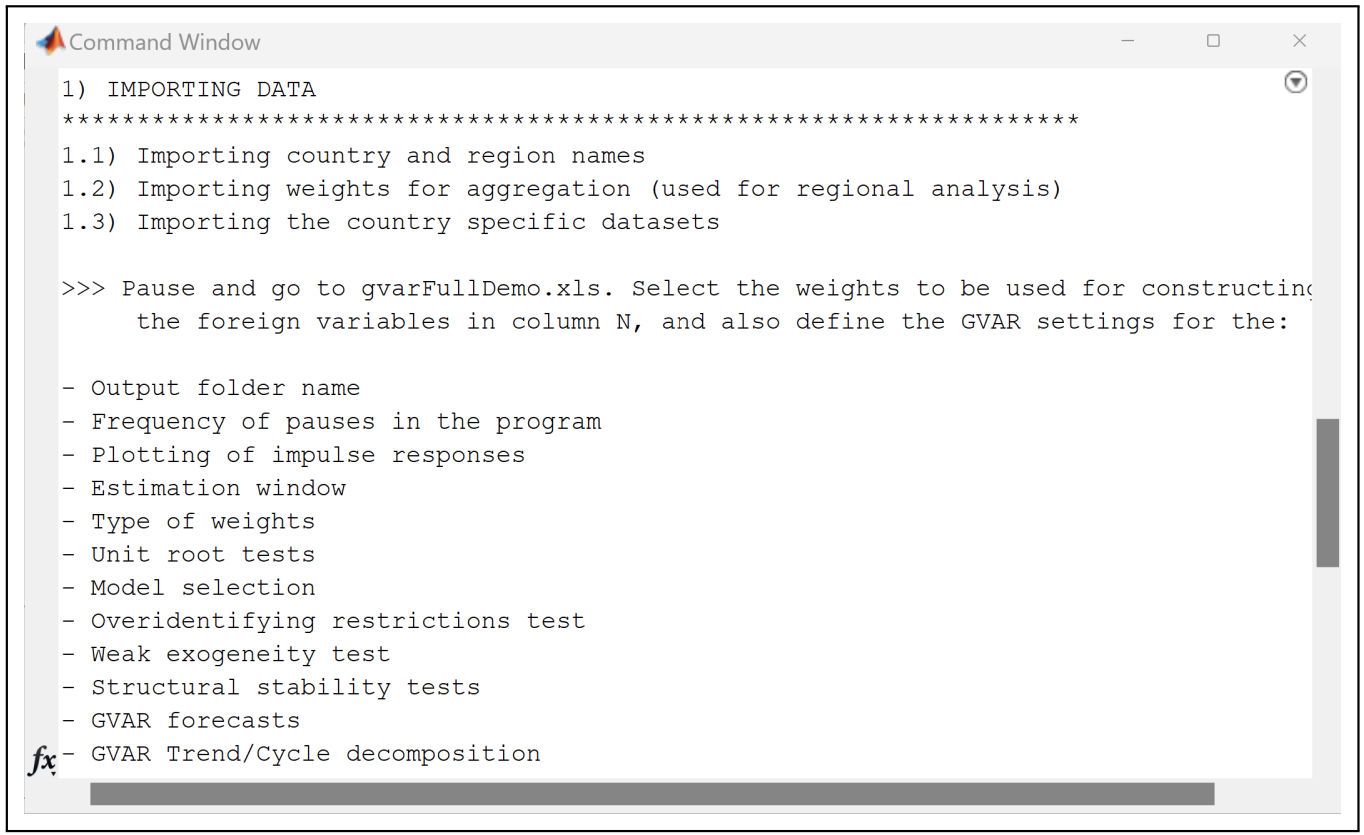
```
2. At each pause, you will be called upon to supply settings and/or check intermediat
   results in the MAIN worksheet of the interface file that will open automatically e
   time. Once this file has opened, always refer back to the MatLab command window fo
   instructions and information.
3. Additional guidance is also available by clicking on many of the headings and fiel
   names within the MAIN worksheet.

--------------------------------------------------------------------------------
  After every pause, once the required settings have been supplied and/or the inter-
  mediate results have been checked, you must save and close the interface file. In
  fact, it is recommended that you close excel completely, each time.
--------------------------------------------------------------------------------

 USING THE FULL DEMO INTERFACE FILE
If you are using the full demo interface file most of the required settings and
intermediate results are already provided. However, there are occassions where the
user is required to intervene. Once again, consult the MatLab command window for
instructions referring SPECIFICALLY to the use of the full demo interface file.
If no such instructions are given, just save and close the interface file whenever
it opens in order to proceed.
================================================================================

 gvarFullDemo
```

# Getting Ready

- After typing the interface file name, the program will start running and a link between MATLAB and Excel will be established through which information will be shared
- The program will typically perform numerous pauses during the process of the specification of the country-specific models, their estimation and the analysis of the GVAR model.
- During these stages, the user is called upon to supply settings and/or check intermediate results in the interface file that will open automatically each time.
- After every pause, once the required settings have been supplied and/or the intermediate results have been checked, **you must save and close the interface file**.

# Preliminary Settings

- Pause and go to **gvarFullDemo.xls**. Select the weights to be used for constructing the foreign variables, and define the GVAR settings as instructed in the Command Window



## Selection of Weights

### Variables

#### Country-specific variables

| Name | Short name | Associated weight matrix |
|---|---|---|
| REAL GDP | y | wmat1 |
| INFLATION | Dp | wmat1 |
| REAL EQUITY PRICES | eq | wmat1 |
| REAL EXCHANGE RATE | ep | wmat1 |
| NOMINAL S RATE | r | wmat1 |
| NOMINAL L RATE | lr | wmat1 |
| | | |
| | | |
| | | |
| | | |

# Preliminary Settings

## Main Settings (See Excel interface for full settings)

**Settings**

| | | | | |
|---|---|---|---|---|
| **Output folder** | Output Full Demo | | **Plot graphs** | 1 |
| **Run the program with pauses** | 1 | | | |
| **Estimation sample** | 1979Q2 | 2013Q1 | | |

| Initial obs | Final obs |
|---|---|
| 1979Q2 | 2013Q1 |

**Weight Matrix**

| | |
|---|---|
| **>> Construction of weights** | program-built |
| **>> Type of weights** | fixed |

| Sample period of (trade) flows data: | |
|---|---|
| **Minimum year** | **Maximum year** |
| 1994 | 2021 |

**Fill the corresponding box of your choice:**

| Fixed Weights | | |
|---|---|---|
| **>> for both estimation & solution of the GVAR** | **Start year** | **End year** |
| | 2009 | 2011 |

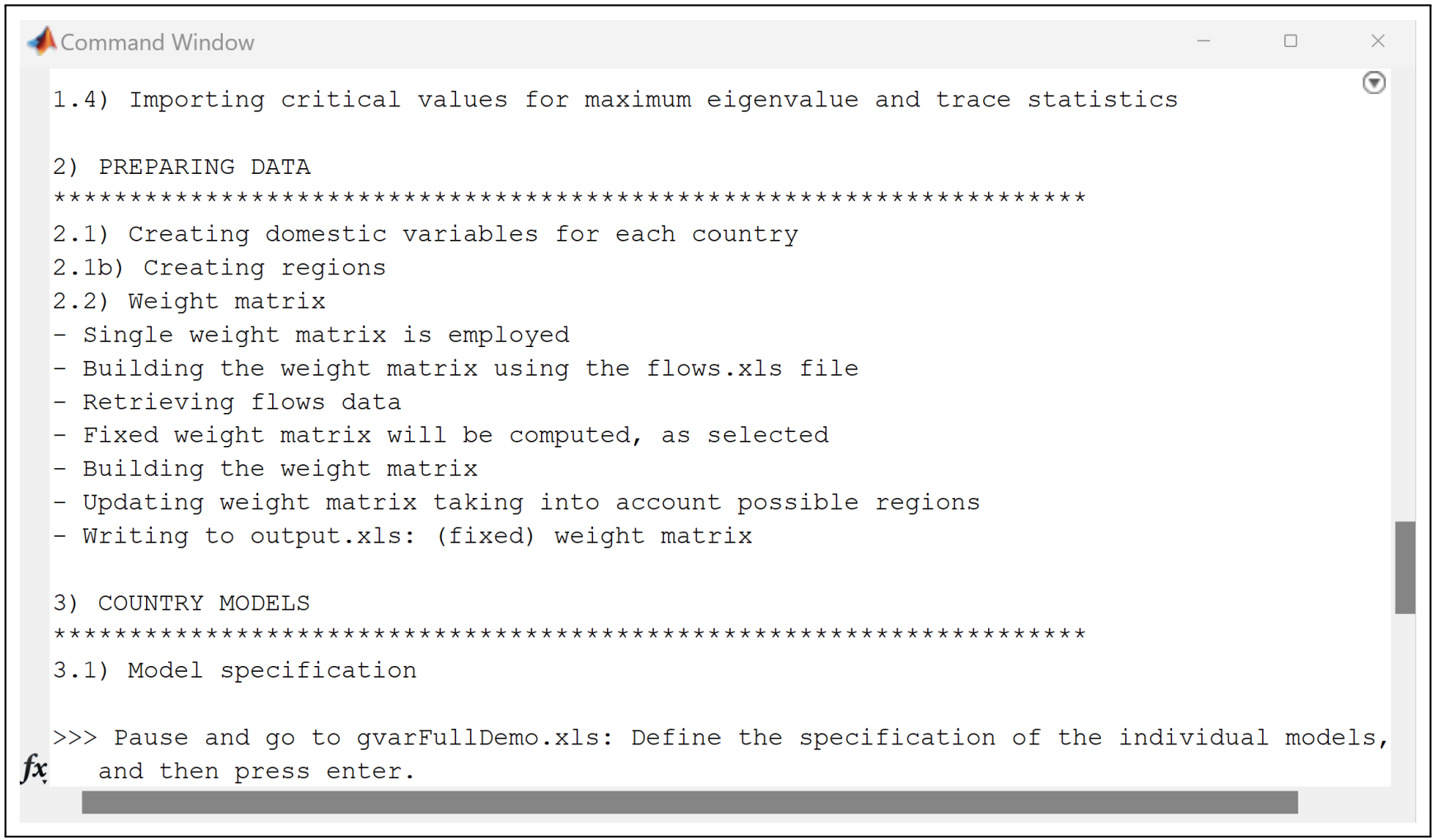
| Time-Varying Weights | | |
|---|---|---|
| **>> for estimation** | **Window size in years** | |
| **>> for solution** | **Select a Year** | |
| | **Average over the window** | |

| | |
|---|---|
| **Unit root tests** | 1 |

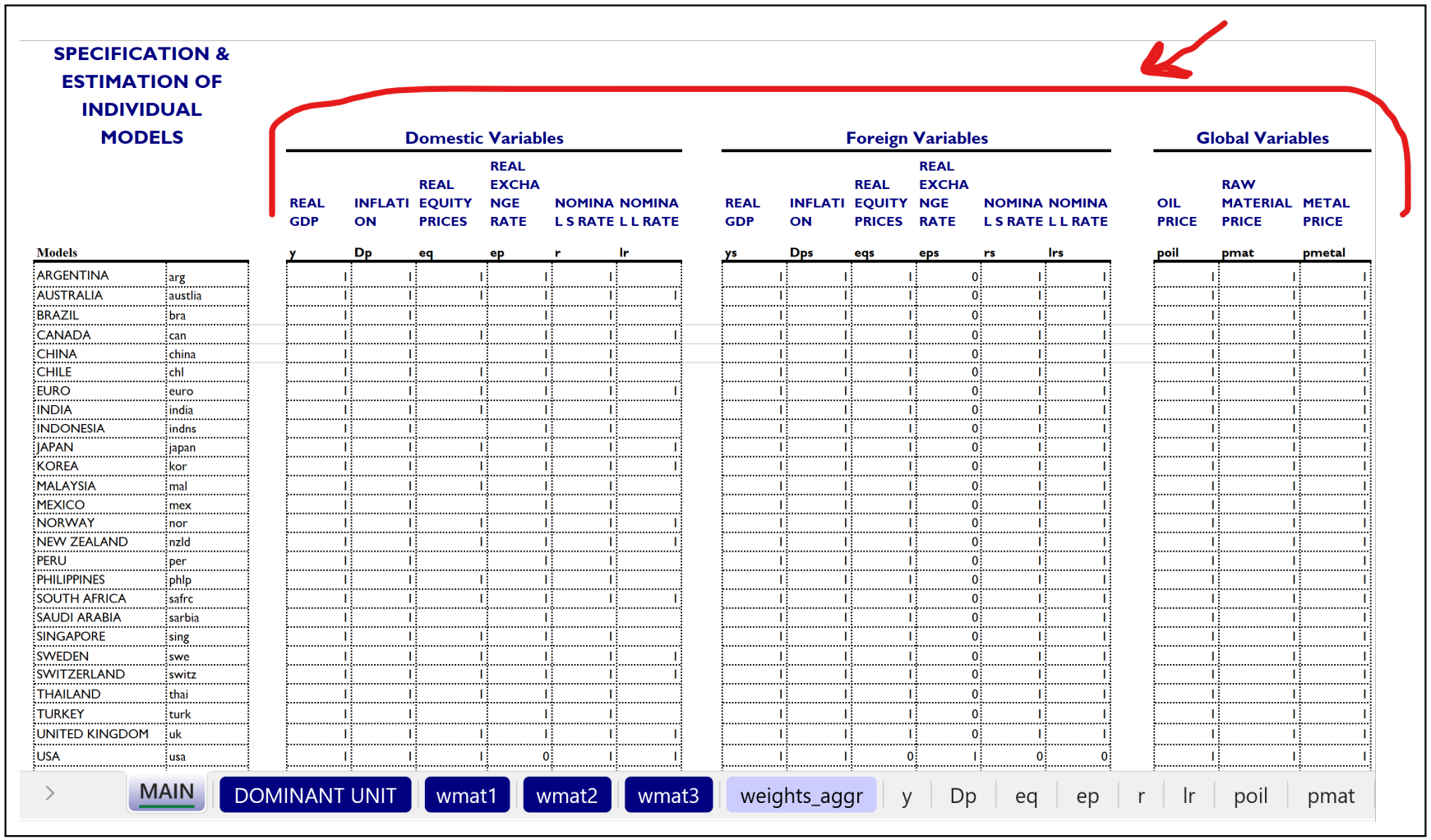
# Specification of the individual VARX* models

- Once the preliminary settings are defined, press Enter. Make sure you have saved and closed the Excel interface and press Enter one more time.
- At the **Model Specification** stage, the program will pause and ask you to define the specification of the individual models.
- This should be done in the section "**SPECIFICATION & ESTIMATION OF INDIVIDUAL MODELS**" of the **MAIN** worksheet in the Excel interface.
- Follow the instructions in the Command Window to select the domestic and foreign variables to include in each country model, as well the relevant global variables.

# Specification of the individual VARX* models



# Specification of the individual VARX* models



**SPECIFICATION & ESTIMATION OF INDIVIDUAL MODELS**

| | | Domestic Variables | | | | | | Foreign Variables | | | | | | Global Variables | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | REAL GDP | INFLATION | REAL EQUITY PRICES | REAL EXCHANGE RATE | NOMINAL S RATE | NOMINAL L RATE | REAL GDP | INFLATION | REAL EQUITY PRICES | REAL EXCHANGE RATE | NOMINAL S RATE | NOMINAL L RATE | OIL PRICE | RAW MATERIAL PRICE | METAL PRICE |
| Models | | y | Dp | eq | ep | r | lr | ys | Dps | eqs | eps | rs | lrs | poil | pmat | pmetal |
| ARGENTINA | arg | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| AUSTRALIA | austlia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| BRAZIL | bra | 1 | 1 | | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| CANADA | can | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| CHINA | china | 1 | 1 | | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| CHILE | chl | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| EURO | euro | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| INDIA | india | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| INDONESIA | indns | 1 | 1 | | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| JAPAN | japan | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| KOREA | kor | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| MALAYSIA | mal | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| MEXICO | mex | 1 | 1 | | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| NORWAY | nor | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| NEW ZEALAND | nzld | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| PERU | per | 1 | 1 | | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| PHILIPPINES | phlp | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| SOUTH AFRICA | safrc | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| SAUDI ARABIA | sarbia | 1 | 1 | | 1 | | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| SINGAPORE | sing | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| SWEDEN | swe | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| SWITZERLAND | switz | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| THAILAND | thai | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| TURKEY | turk | 1 | 1 | | 1 | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| UNITED KINGDOM | uk | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| USA | usa | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |

MAIN | DOMINANT UNIT | wmat1 | wmat2 | wmat3 | weights_aggr | y | Dp | eq | ep | r | lr | poil | pmat

# Specification of the individual VARX* models

- Save and close the Excel interface, go to the MATLAB Command Window prompt and press Enter twice to proceed (*Do this after each modification of the Excel interface*).
- Note: At each pause, you could open the **output.xls** file in the **Output Full Demo** subfolder of the **Output** folder to see the outputs you have gotten so far. But make sure you close it before proceeding.
- The next 3 pauses are for checking the lag orders, the treatment of the deterministic components in the VECMX* models, and checking the rank orders, in that order.
- If you are not satisfied with the values the program found for the lag and rank orders, you can change them before proceeding. Make sure you also choose the appropriate option for the VECMX* deterministics.

# Specification of the individual VARX* models

Command Window

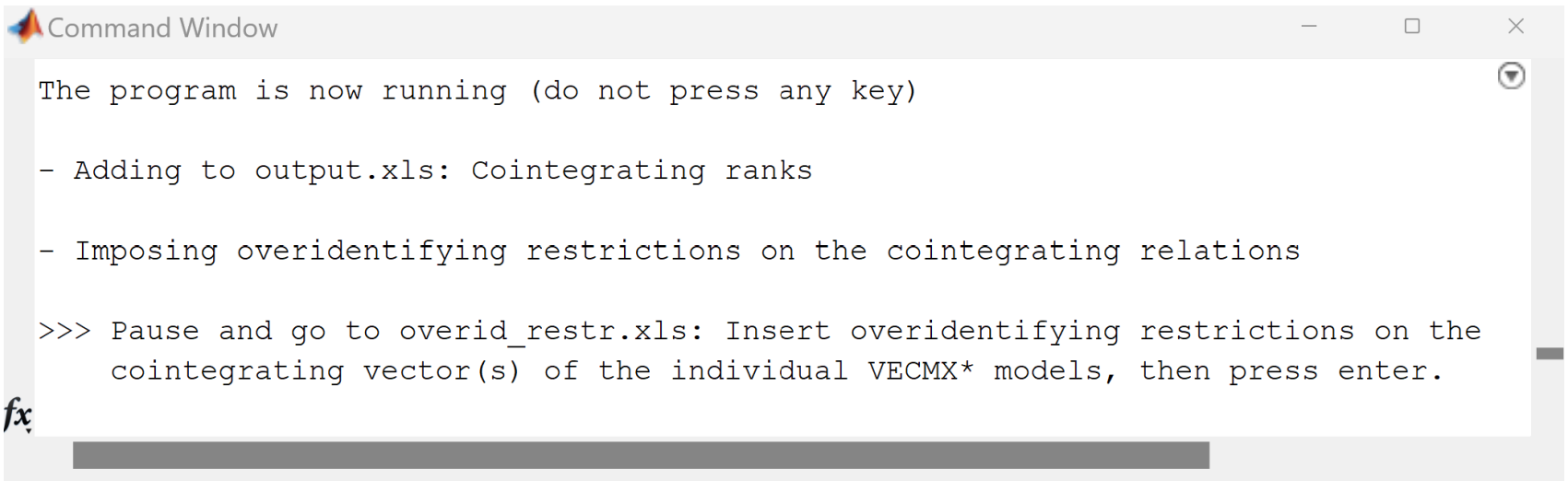
```
3.5) Determining the lag orders of each country model

>>> Pause and go to gvarFullDemo.xls: Check the lag orders found (or inputted if no selection criter
    was previously used), then press enter.

>>> Make sure you have saved and closed the gvarFullDemo.xls file. If so, press enter again.

The program is now running (do not press any key)

- Adding to output.xls: VARX* order selection results and residual serial correlation test results
- Adding to output.xls: VARX* lag orders
3.6) Determining the number of cointegrating relations for each country

>>> Pause and go to gvarFullDemo.xls: Select between case II (restricted intercept),
     case III (unrestricted intercept) and case IV (unrestricted intercept, restricted trend)
     for VECMX* estimation, then press enter.

>>> Make sure you have saved and closed the gvarFullDemo.xls file. If so, press enter again.

The program is now running (do not press any key)

>>> Warning: Full rank found for model of PERU
- Adding to output.xls: Cointegration test statistics

>>> Pause and go to gvarFullDemo.xls: Check the ranks found, then press enter.
```

# Specification of the individual VARX* models

| Lag orders for domestic variables | Lag orders for foreign variables | Treatment of deterministics in VECMX* | Rank orders |
|---|---|---|---|
| 2 | 1 | 4 | 2 |
| 1 | 1 | 4 | 5 |
| 2 | 1 | 4 | 2 |
| 2 | 1 | 4 | 3 |
| 1 | 1 | 4 | 2 |
| 2 | 1 | 4 | 2 |
| 2 | 1 | 4 | 2 |
| 2 | 1 | 4 | 2 |
| 2 | 1 | 4 | 3 |
| 2 | 1 | 4 | 2 |
| 2 | 1 | 4 | 4 |
| 1 | 1 | 4 | 2 |
| 1 | 1 | 4 | 3 |
| 2 | 1 | 4 | 3 |
| 2 | 1 | 4 | 2 |
| 2 | 1 | 4 | 4 |
| 2 | 1 | 4 | 2 |
| 2 | 1 | 4 | 3 |
| 2 | 1 | 4 | 2 |
| 2 | 1 | 4 | 2 |
| 2 | 1 | 4 | 2 |
| 1 | 1 | 4 | 3 |
| 2 | 1 | 4 | 3 |
| 2 | 1 | 4 | 1 |
| 1 | 1 | 4 | 3 |
| 2 | 1 | 4 | 2 |

# Specification of the individual VARX* models

- If you have chosen to impose and test for overidentifying restrictions on the coefficients of the cointegrating relations, the next pause will ask you to do so in the **overid_restr.xls** worksheet that opens automatically.




- Follow the instructions in the Command Window to define the overidentifying restrictions.

# Specification of the individual VARX* models

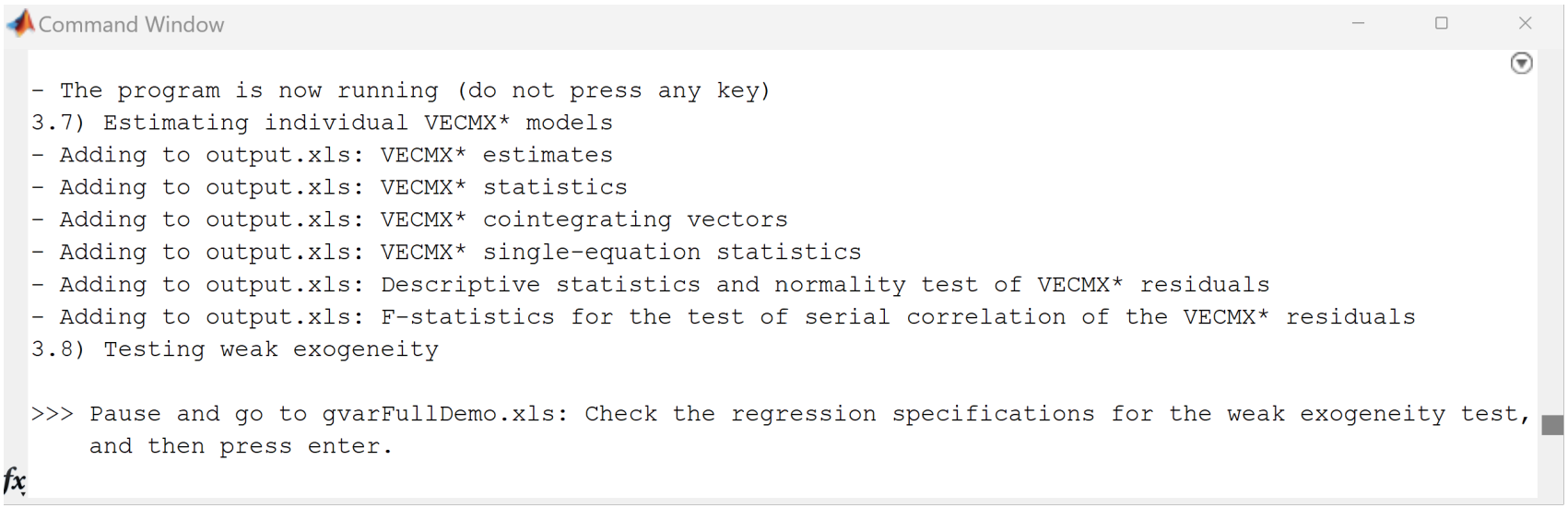
- We are imposing overidentifying restrictions on Canada and the Eruo area only in this demo.

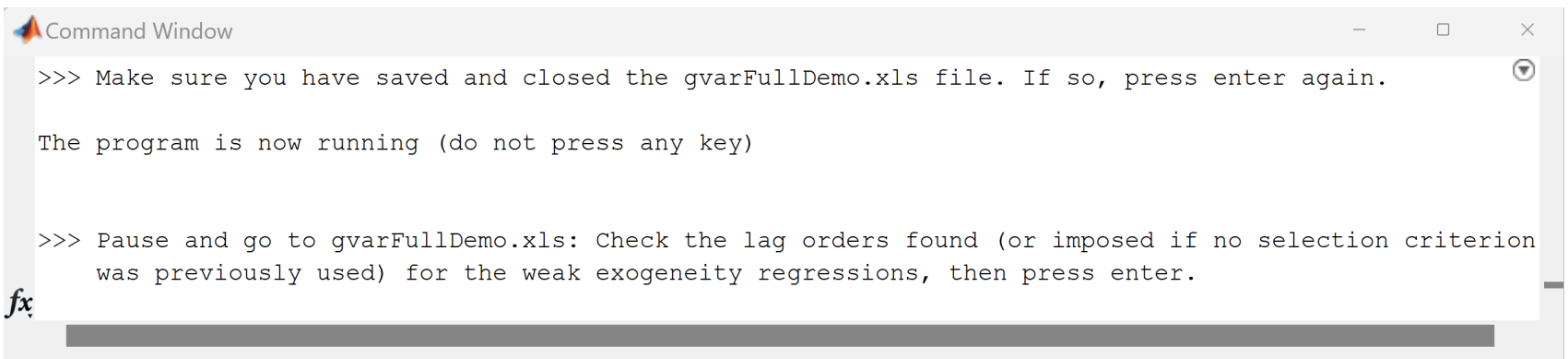
| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | CV1 | | | | | | | | | | | | | | | |
| 16 | CV2 | | | | | | | | | | | | | | | |
| 17 | # unrestricted: | | | | | | | | | | | | | | | |
| 18 | CANADA | Trend | y | Dp | eq | ep | r | lr | ys | Dps | eqs | rs | lrs | poil | pmat | pmetal |
| 19 | CV1 | 0 | 0 | -1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | CV2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | -1 | 0 | 0 | 0 |
| 21 | CV3 | 0 | 0 | 0 | 0 | 0 | -1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | # unrestricted: | | | | | | | | | | | | | | | |
| 23 | CHINA | Trend | y | Dp | ep | r | ys | Dps | eqs | rs | lrs | poil | pmat | pmetal | | |
| 24 | CV1 | | | | | | | | | | | | | | | |
| 25 | CV2 | | | | | | | | | | | | | | | |
| 26 | # unrestricted: | | | | | | | | | | | | | | | |
| 27 | CHILE | Trend | y | Dp | eq | ep | r | ys | Dps | eqs | rs | lrs | poil | pmat | pmetal | |
| 28 | CV1 | | | | | | | | | | | | | | | |
| 29 | CV2 | | | | | | | | | | | | | | | |
| 30 | # unrestricted: | | | | | | | | | | | | | | | |
| 31 | EURO | Trend | y | Dp | eq | ep | r | lr | ys | Dps | eqs | rs | lrs | poil | pmat | pmetal |
| 32 | CV1 | 0 | 0 | -1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 33 | CV2 | 0 | 0 | 0 | 0 | 0 | -1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 34 | # unrestricted: | | | | | | | | | | | | | | | |
| 35 | INDIA | Trend | y | Dp | eq | ep | r | ys | Dps | eqs | rs | lrs | poil | pmat | pmetal | |
| 36 | CV1 | | | | | | | | | | | | | | | |
| 37 | CV2 | | | | | | | | | | | | | | | |
| 38 | # unrestricted: | | | | | | | | | | | | | | | |

Sheet1 | overid_restr

# Specification of the individual VARX* models

- At the next 2 pauses, you will check the regression specifications for the weak exogeneity test and the lag orders for the weak exogeneity regressions, in that order.



# Specification of the individual VARX* models

- In this demo, we will include the foreign variable **eps** i all country models

**Weak exogeneity test: Foreign and global variable specification**

| REAL GDP | INFLATION | REAL EQUITY PRICES | REAL EXCHANGE RATE | NOMINAL S RATE | NOMINAL L RATE | OIL PRICE | RAW MATERIAL PRICE | METAL PRICE |
|---|---|---|---|---|---|---|---|---|
| ys | Dps | eqs | eps | rs | lrs | poil | pmat | pmetal |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | |

# Settings and specification of the dominant unit

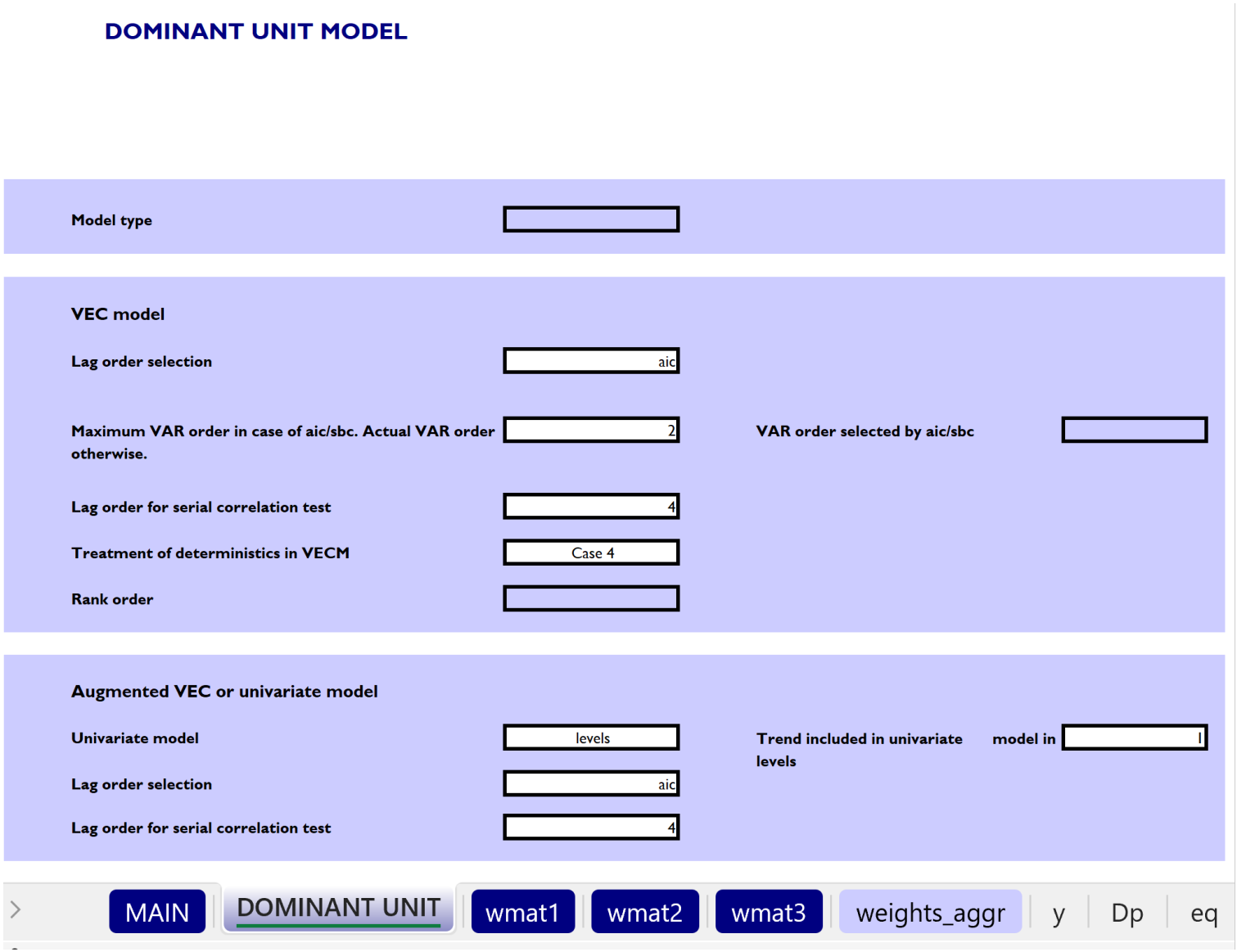
- If the dominant unit function has been enabled, the next pause will ask you to define the settings and specification of the dominant unit model in the **DOMINANT UNIT** worksheet of the Excel interface.
- Follow the instructions in the Command Window to define the settings for this demo.
- After defining the settings, there will be a few other pauses where you will check the values that the program found for the lag and rank orders of the dominant unit VEC model, as well as the lag orders of the augmented VEC or univariate model

# Settings and specification of the dominant unit

Command Window

```
- Adding to output.xls: Lag order selection results for the weak exogeneity regressions
  and residual serial correlation test results
- Adding to output.xls: Weak exogeneity test results
3.9) Contemporaneous effects of foreign variables on their domestic counterparts
- Adding to output.xls: Contemporaneous coefficients
3.10) Average pairwise cross-section correlations: Variables and residuals
- Adding to output.xls: Average pairwise cross-section correlations
3.11) Structural stability tests
- Adding to output.xls: Structural stability test statistics
3.12) Specification and estimation of the dominant unit model

>>> Pause and go to gvarFullDemo.xls: Define the settings and the specification of the
    dominant unit model. This includes information required in the columns adjacent to
    the settings (if applicable), in particular:
   - the maximum/actual lag order for the global variables
   - the specification of the feedback variables
   - the maximum/actual lag order for the feedback variables
   - the weights to construct the feedback variables
   - specifying which weights from the drop down lists (column AH)
     to be used for computing the feedback variables that will be
     included in the dominant unit model,
   then press enter.
```

# Settings and specification of the dominant unit



# Settings and specification of the dominant unit

**Augmented VEC or univariate model**

| Global variables(s) included in the dominant unit model | | Maximum lag order for global variable(s) in case of aic/sbc. Actual lag order otherwise. | Lag order selected by aic/sbc |
|---|---|---|---|
| OIL PRICE | poil | 2 | |
| RAW MATERIAL PRICE | pmat | 2 | |
| METAL PRICE | pmetal | 2 | |

# Settings and specification of the dominant unit

**Feedback Variables**

| REAL GDP | INFLATION | REAL EQUITY PRICES | REAL EXCHANGE RATE | NOMINAL S RATE | NOMINAL L RATE |
|---|---|---|---|---|---|
| y_tilde | Dp_tilde | eq_tilde | ep_tilde | r_tilde | lr_tilde |
| 1 | 1 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 |

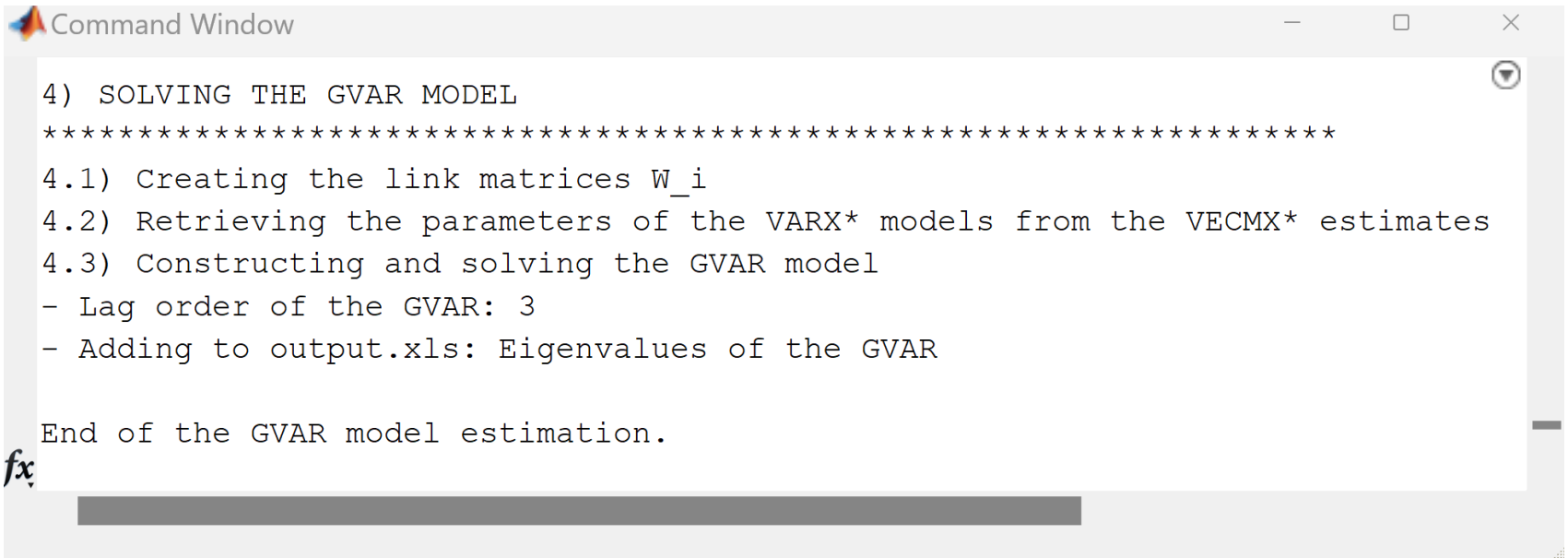
# Settings and specification of the dominant unit

**Fixed weights used for the contruction of the feedback variables**

| Countries | wmat1 | wmat2 | | |
|---|---|---|---|---|
| ARGENTINA | 0.01 | 0.04 | | |
| AUSTRALIA | 0.02 | 0.04 | | |
| BRAZIL | 0.04 | 0.04 | | |
| CANADA | 0.02 | 0.04 | | |
| CHINA | 0.17 | 0.04 | | |
| CHILE | 0.01 | 0.04 | | |
| EURO | 0.17 | 0.04 | | |
| INDIA | 0.07 | 0.04 | | |
| INDONESIA | 0.02 | 0.04 | | |
| JAPAN | 0.07 | 0.04 | | |
| KOREA | 0.02 | 0.04 | | |
| MALAYSIA | 0.01 | 0.04 | | |
| MEXICO | 0.03 | 0.04 | | |
| NORWAY | 0.00 | 0.04 | | |
| NEW ZEALAND | 0.00 | 0.04 | | |
| PERU | 0.00 | 0.04 | | |
| PHILIPPINES | 0.01 | 0.04 | | |
| SOUTH AFRICA | 0.01 | 0.04 | | |
| SAUDI ARABIA | 0.01 | 0.04 | | |
| SINGAPORE | 0.00 | 0.04 | | |
| SWEDEN | 0.01 | 0.04 | | |
| SWITZERLAND | 0.01 | 0.04 | | |
| THAILAND | 0.01 | 0.04 | | |
| TURKEY | 0.02 | 0.04 | | |
| UNITED KINGDOM | 0.04 | 0.04 | | |
| USA | 0.24 | 0.04 | | |
| | | | | |
| | | | | |

# Solving the GVAR model

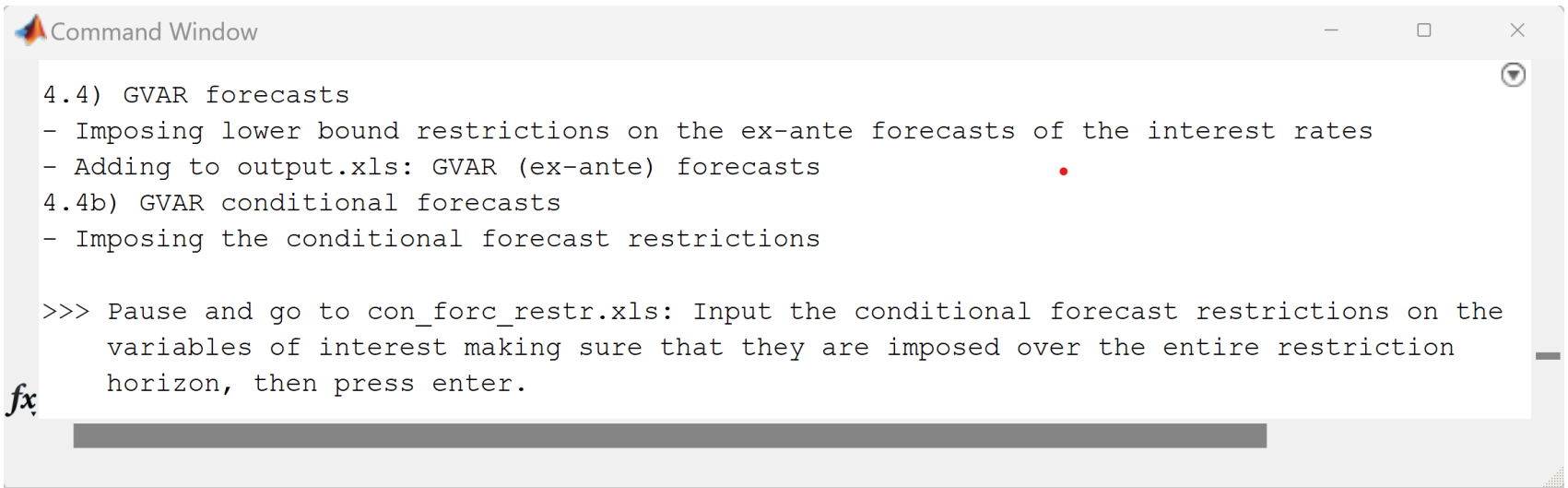
- When you are done specifying the dominant unit model, the program will be ready to solve your GVAR model.



# Additional Features: GVAR Forecasts

- If you have chosen to generate ex-ante forecasts of the GVAR model, the program will then compute these over the specified horizon

- Follow the instructions in the Command Window to define the settings for this demo.



# Additional Features: GVAR Forecasts

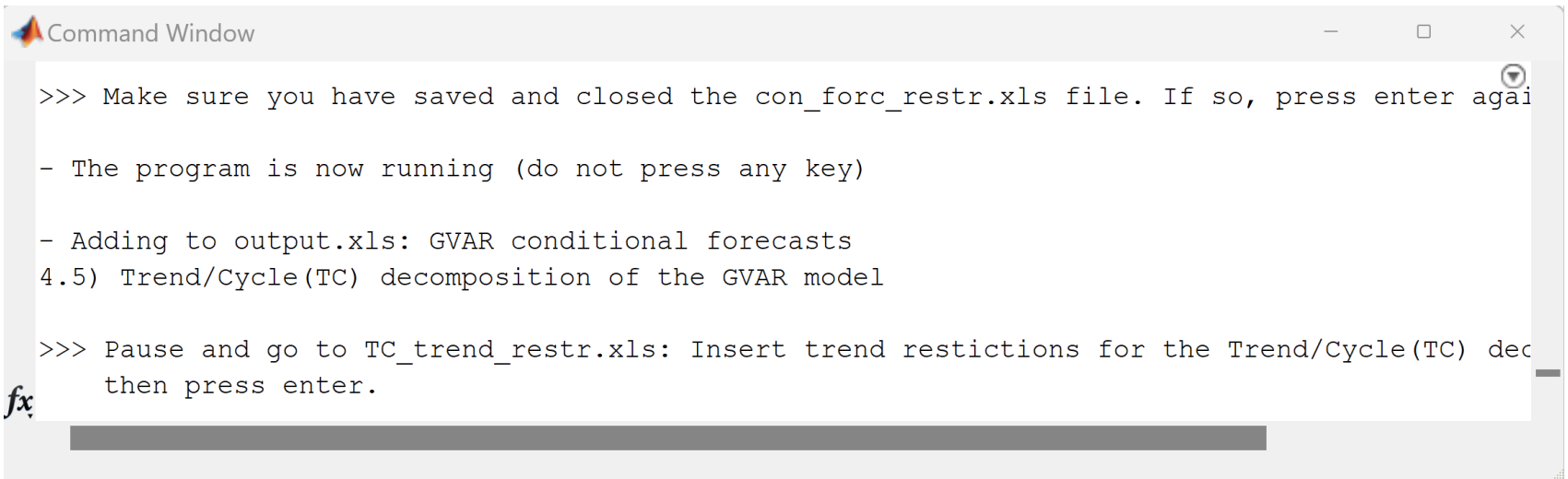
- Here we will be imposing restrictions on the conditional forecasts of the short and long-term interest rates of the US over the period 2013Q2-2014Q1.

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Country | Variable | 2013Q2 | 2013Q3 | 2013Q4 | 2014Q1 | | | |
| 117 | thai | eq | | | | | | | |
| 118 | thai | ep | | | | | | | |
| 119 | thai | r | | | | | | | |
| 120 | turk | y | | | | | | | |
| 121 | turk | Dp | | | | | | | |
| 122 | turk | ep | | | | | | | |
| 123 | turk | r | | | | | | | |
| 124 | uk | y | | | | | | | |
| 125 | uk | Dp | | | | | | | |
| 126 | uk | eq | | | | | | | |
| 127 | uk | ep | | | | | | | |
| 128 | uk | r | | | | | | | |
| 129 | uk | lr | | | | | | | |
| 130 | usa | y | | | | | | | |
| 131 | usa | Dp | | | | | | | |
| 132 | usa | eq | | | | | | | |
| 133 | usa | r | 0.01 | 0.01 | 0.01 | 0.01 | | | |
| 134 | usa | lr | 0.02 | 0.02 | 0.02 | 0.02 | | | |
| 135 | du_model | poil | | | | | | | |
| 136 | du_model | pmat | | | | | | | |
| 137 | du_model | pmetal | | | | | | | |
| 138 | | | | | | | | | |
| 139 | | | | | | | | | |

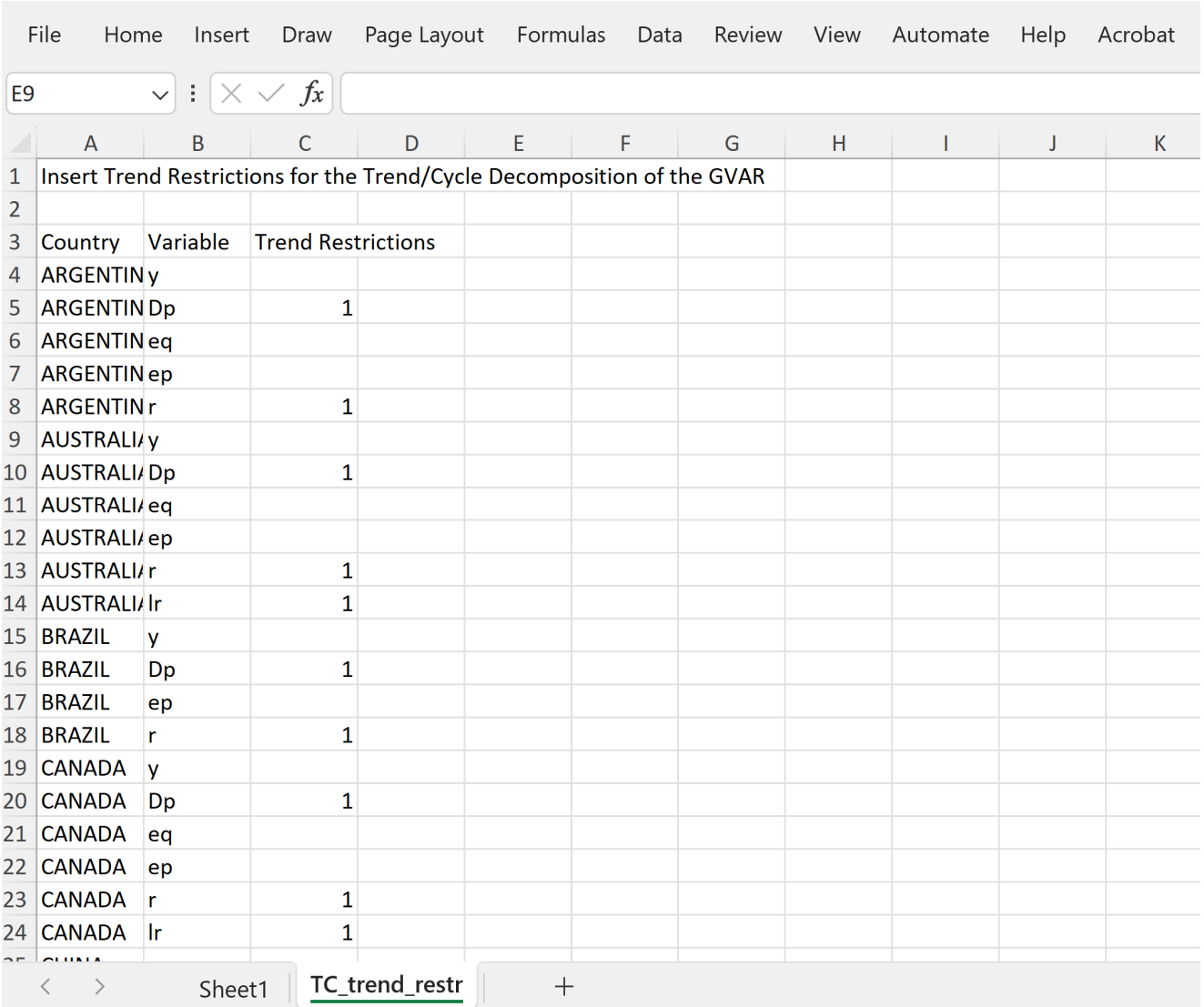
Sheet1 restrictions +

# Trend/Cycle decomposition

- If you have also choosen to perform the Trend/Cycle decomposition of the GVAR model, the next pause will ask you to define the corresponding trend restrictions



# Trend/Cycle decomposition



File Home Insert Draw Page Layout Formulas Data Review View Automate Help Acrobat

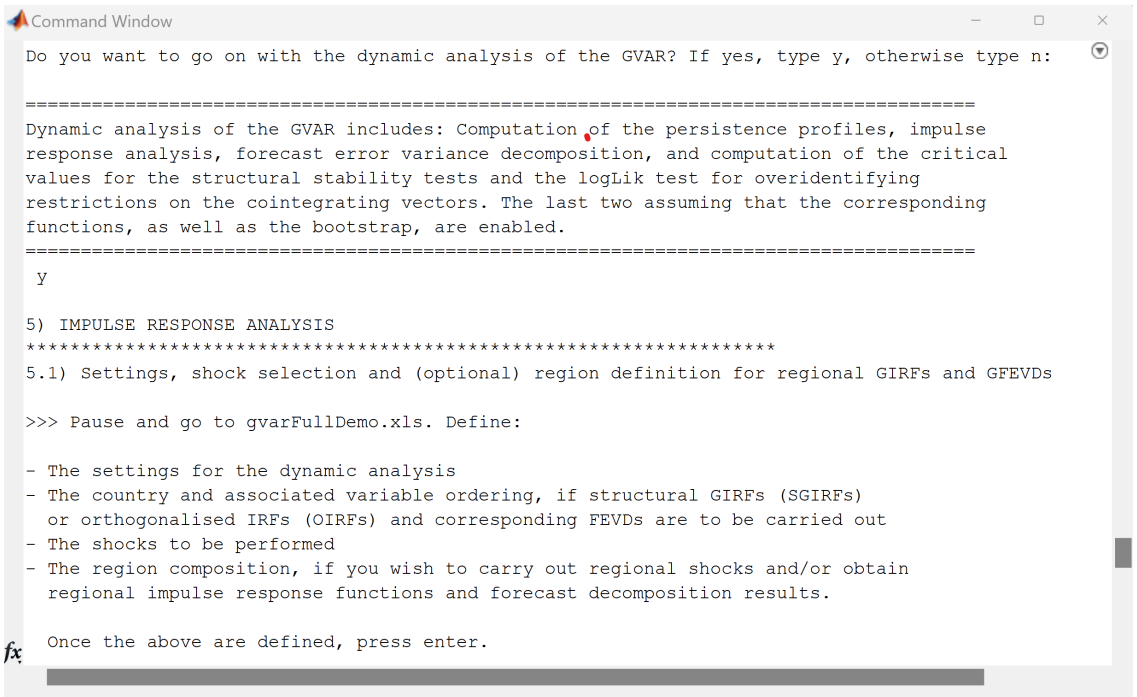
E9

| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Insert Trend Restrictions for the Trend/Cycle Decomposition of the GVAR | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | Country | Variable | Trend Restrictions | | | | | | | | |
| 4 | ARGENTIN | y | | | | | | | | | |
| 5 | ARGENTIN | Dp | 1 | | | | | | | | |
| 6 | ARGENTIN | eq | | | | | | | | | |
| 7 | ARGENTIN | ep | | | | | | | | | |
| 8 | ARGENTIN | r | 1 | | | | | | | | |
| 9 | AUSTRALI | y | | | | | | | | | |
| 10 | AUSTRALI | Dp | 1 | | | | | | | | |
| 11 | AUSTRALI | eq | | | | | | | | | |
| 12 | AUSTRALI | ep | | | | | | | | | |
| 13 | AUSTRALI | r | 1 | | | | | | | | |
| 14 | AUSTRALI | lr | 1 | | | | | | | | |
| 15 | BRAZIL | y | | | | | | | | | |
| 16 | BRAZIL | Dp | 1 | | | | | | | | |
| 17 | BRAZIL | ep | | | | | | | | | |
| 18 | BRAZIL | r | 1 | | | | | | | | |
| 19 | CANADA | y | | | | | | | | | |
| 20 | CANADA | Dp | 1 | | | | | | | | |
| 21 | CANADA | eq | | | | | | | | | |
| 22 | CANADA | ep | | | | | | | | | |
| 23 | CANADA | r | 1 | | | | | | | | |
| 24 | CANADA | lr | 1 | | | | | | | | |

Sheet1 TC_trend_restr +

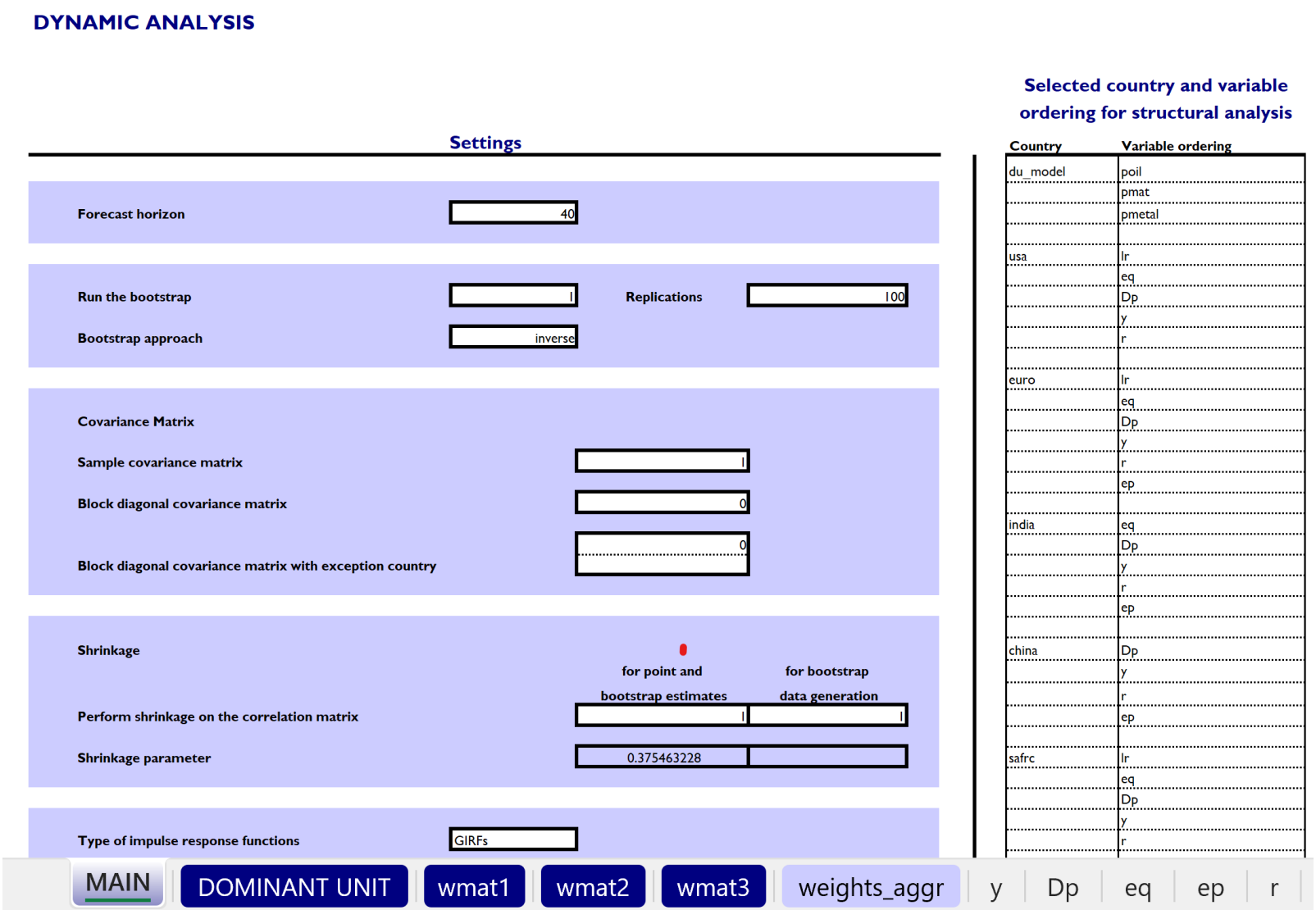
# Dynamic Analysis

- When you are done estimating the model, the program will ask you whether you want to perform dynamic analysis. Type **"y"** for Yes or **"n"** for No. This is the final step of the GVAR program.




- Follow the instructions for defining the settings and selecting the shocks as in the images below

# Dynamic Analysis



**DYNAMIC ANALYSIS**

**Settings**

| | | | |
|---|---|---|---|
| Forecast horizon | 40 | | |
| Run the bootstrap | 1 | Replications | 100 |
| Bootstrap approach | inverse | | |
| **Covariance Matrix** | | | |
| Sample covariance matrix | 1 | | |
| Block diagonal covariance matrix | 0 | | |
| Block diagonal covariance matrix with exception country | 0 | | |
| **Shrinkage** | | for point and bootstrap estimates | for bootstrap data generation |
| Perform shrinkage on the correlation matrix | | 1 | 1 |
| Shrinkage parameter | | 0.375463228 | |
| Type of impulse response functions | GIRFs | | |

**Selected country and variable ordering for structural analysis**

| Country | Variable ordering |
|---|---|
| du_model | poil |
| | pmat |
| | pmetal |
| | |
| usa | lr |
| | eq |
| | Dp |
| | y |
| | r |
| | |
| euro | lr |
| | eq |
| | Dp |
| | y |
| | r |
| | ep |
| | |
| india | eq |
| | Dp |
| | y |
| | r |
| | ep |
| | |
| china | Dp |
| | y |
| | r |
| | ep |
| | |
| safrc | lr |
| | eq |
| | Dp |
| | y |
| | r |

MAIN | DOMINANT UNIT | wmat1 | wmat2 | wmat3 | weights_aggr | y | Dp | eq | ep | r

# Dynamic Analysis

**Selected country and variable ordering for structural analysis**

| Country | Variable ordering |
|---|---|
| du_model | poil |
| | pmat |
| | pmetal |
| | |
| usa | lr |
| | eq |
| | Dp |
| | y |
| | r |
| | |
| euro | lr |
| | eq |
| | Dp |
| | y |
| | r |
| | ep |
| | |
| india | eq |
| | Dp |
| | y |
| | r |
| | ep |
| | |
| china | Dp |
| | y |
| | r |
| | ep |
| | |
| safrc | lr |
| | eq |
| | Dp |
| | y |
| | r |

| Models | |
|---|---|
| ARGENTINA | arg |
| AUSTRALIA | austlia |
| BRAZIL | bra |
| CANADA | can |
| CHINA | china |
| CHILE | chl |
| EURO | euro |
| INDIA | india |
| INDONESIA | indns |
| JAPAN | japan |
| KOREA | kor |
| MALAYSIA | mal |
| MEXICO | mex |
| NORWAY | nor |
| NEW ZEALAND | nzld |
| PERU | per |
| PHILIPPINES | phlp |
| SOUTH AFRICA | safrc |
| SAUDI ARABIA | sarbia |
| SINGAPORE | sing |
| SWEDEN | swe |
| SWITZERLAND | switz |
| THAILAND | thai |
| TURKEY | turk |
| UNITED KINGDOM | uk |
| USA | usa |
| DOMINANT UNIT MOD | du_model |

**Select shocks**

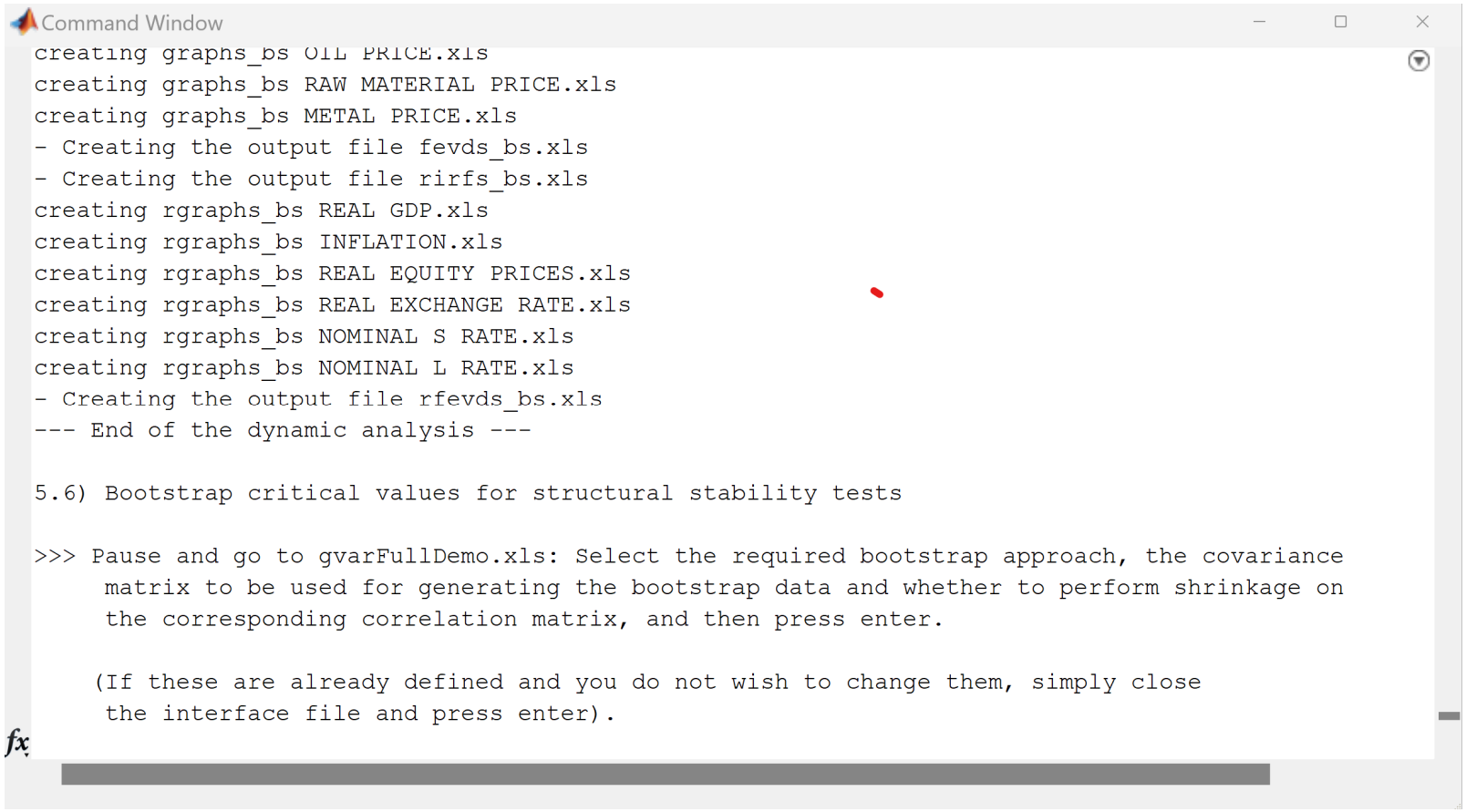
| REAL GDP | INFLATION | REAL EQUITY PRICES | REAL EXCHANGE RATE | NOMINAL S RATE | NOMINAL L RATE | OIL PRICE | RAW MATERIAL PRICE | METAL PRICE |
|---|---|---|---|---|---|---|---|---|
| y | Dp | eq | ep | r | lr | poil | pmat | pmetal |
| 0 | 0 | 0 | 0 | 0 | | | | |
| 0 | 0 | -3 | 0 | 0 | 0 | | | |
| 0 | 0 | | 0 | 0 | | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 0 | 0 | | 0 | 0 | | | | |
| 0 | 0 | 0 | 0 | 0 | | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 0 | 0 | 0 | 0 | 0 | | | | |
| 0 | 0 | | 0 | 0 | | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 2 | 0 | 0 | 0 | 0 | 0 | | | |
| 0 | 0 | 0 | 0 | 0 | | | | |
| 0 | 0 | | 0 | 0 | | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 0 | 0 | | 0 | 0 | | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 0 | 0 | | 0 | | | | | |
| 0 | 0 | 0 | 0 | 0 | | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 0 | 0 | 0 | 0 | 0 | | | | |
| 0 | 0 | | 0 | 0 | | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 0 | 0 | 0 | | 1 | 0 | | | |
| | | | | | | 1 | 0 | 0 |

**Regions**

| Name | Short name | Countries included |
|---|---|---|
| CHINA | china | china |
| EUROAREA | euro | euro |
| JAPAN | japan | japan |
| LATIN AMERICA | la | arg |
| | | bra |
| | | chl |
| | | mex |
| | | per |
| OTHER DEVELOPED COUNTRIES | odc | austlia |
| | | can |
| | | nzld |
| REST OF ASIA | restasia | indns |
| | | kor |
| | | mal |
| | | phlp |
| | | sing |
| | | thai |
| REST OF THE WORLD | restworld | india |
| | | safrc |
| | | sarbia |
| | | turk |
| REST OF WESTERN EUROPE | restweurope | nor |
| | | swe |
| | | switz |
| UNITED KINGDOM | uk | uk |

# Bootstrapping the Structural Stability Tests

- The final set of pauses refers to selecting the covariance matrix for computing the bootstrap critical values of the structrual stability tests, provided this function was previously enabled



Next session:

Understanding and Interpreting Results from GVAR Models