

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

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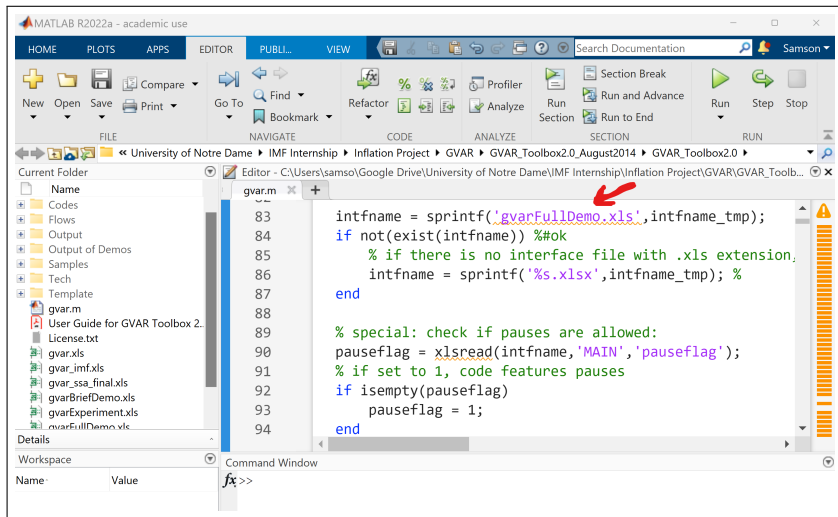
University of Notre Dame

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



The image shows the MATLAB R2022a - academic use interface. The main window is the Editor, displaying a MATLAB script named `gvar.m`. The script is located in the folder `C:\Users\sams0\Google Drive\University of Notre Dame\IMF Internship\Inflation Project\GVAR\GVAR_Toolbox2.0\GVAR_Toolbox2.0`. The code in the editor is as follows:

```
83 intfname = sprintf('gvarFullDemo.xls',intfname_tmp);
84 if not(exist(intfname)) %ok
85     % if there is no interface file with .xls extension,
86     intfname = sprintf('%s.xlsx',intfname_tmp); %
87 end
88
89 % special: check if pauses are allowed:
90 pauseflag = xlsread(intfname,'MAIN','pauseflag');
91 % if set to 1, code features pauses
92 if isempty(pauseflag)
93     pauseflag = 1;
94 end
```

A red arrow points to the string `'gvarFullDemo.xls'` in line 83. The Command Window at the bottom shows the prompt `fx>>`. The Workspace window is empty.

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, accordin
      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 performe
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
fx
```

Command Window

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

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. 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 occasions 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.

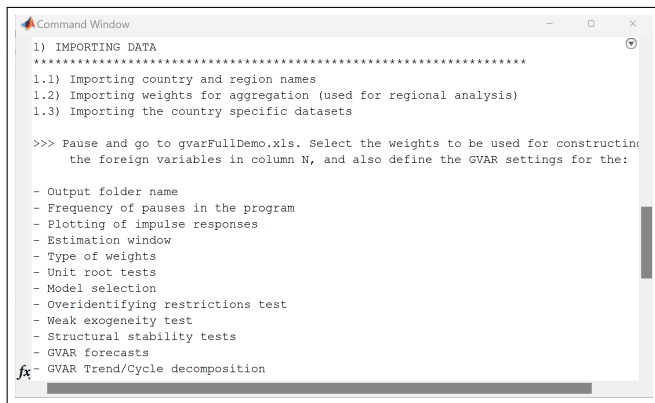
gvarFullDemo

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



```
Command Window
1) IMPORTING DATA
*****
1.1) Importing country and region names
1.2) Importing weights for aggregation (used for regional analysis)
1.3) Importing the country specific datasets

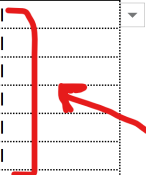
>>> Pause and go to gvarFullDemo.xls. Select the weights to be used for constructing
      the foreign variables in column N, and also define the GVAR settings for the:

- Output folder name
- Frequency of pauses in the program
- Plotting of impulse responses
- Estimation window
- Type of weights
- Unit root tests
- Model selection
- Overidentifying restrictions test
- Weak exogeneity test
- Structural stability tests
- GVAR forecasts
fx - GVAR Trend/Cycle decomposition
```


Preliminary Settings

Selection of Weights

Variables		
Country-specific variables		
Name	Short name	Associated weight matrix
REAL GDP	y	wmat l
INFLATION	Dp	wmat l
REAL EQUITY PRICES	eq	wmat l
REAL EXCHANGE RATE	ep	wmat l
NOMINAL S RATE	r	wmat l
NOMINAL L RATE	lr	wmat l



Preliminary Settings

Main Settings (See Excel interface for full settings)

Settings			
Output folder	<input type="text" value="Output Full Demo"/>	Plot graphs	<input type="text"/>
Run the program with pauses	<input type="text"/>		
Estimation sample	<input type="text" value="1979Q2"/> <input type="text" value="2013Q1"/>	Initial obs	<input type="text" value="1979Q2"/> <input type="text" value="2013Q1"/>
Final obs	<input type="text"/>		
Weight Matrix			
>> Construction of weights	<input type="text" value="program-built"/>	Sample period of (trade) flows data:	
>> Type of weights	<input type="text" value="fixed"/>	Minimum year	Maximum year
		<input type="text" value="1994"/>	<input type="text" value="2021"/>
Fill the corresponding box of your choice:			
	Fixed Weights		Time-Varying Weights
>> for both estimation & solution of the GVAR	Start year	End year	>> for estimation
	<input type="text" value="2009"/>	<input type="text" value="2011"/>	Window size in years
			>> for solution
			Select a Year
			Average over the window
Unit root tests	<input type="text"/>		

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

```
Command Window

1.4) Importing critical values for maximum eigenvalue and trace statistics

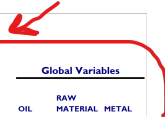
2) PREPARING DATA
*****
2.1) Creating domestic variables for each country
2.1b) Creating regions
2.2) Weight matrix
- Single weight matrix is employed
- Building the weight matrix using the flows.xls file
- Retrieving flows data
- Fixed weight matrix will be computed, as selected
- Building the weight matrix
- Updating weight matrix taking into account possible regions
- Writing to output.xls: (fixed) weight matrix

3) COUNTRY MODELS
*****
3.1) Model specification

>>> Pause and go to gvarFullDemo.xls: Define the specification of the individual models,
fx and then press enter.
```

Specification of the individual VARX* models

SPECIFICATION & ESTIMATION OF INDIVIDUAL MODELS



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

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* deterministic.

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 criterion
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

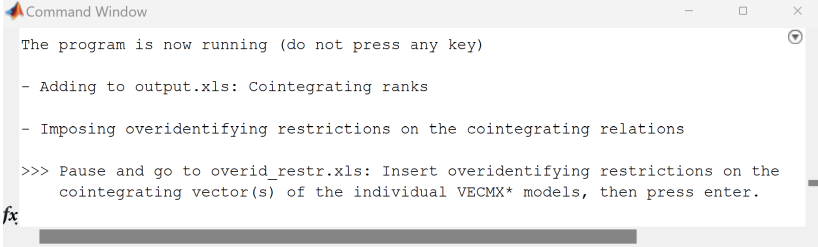
>>> Pause and go to gvarFullDemo.xls: Check the ranks found, then press enter.
```

Specification of the individual VARX* models

Lag orders for domestic variables	Lag orders for foreign variables	Treatment of deterministic 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	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
1	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.

A screenshot of a 'Command Window' window. The window title is 'Command Window'. The text inside the window reads: 'The program is now running (do not press any key)', '- Adding to output.xls: Cointegrating ranks', '- Imposing overidentifying restrictions on the cointegrating relations', and '>>> Pause and go to overid_restr.xls: Insert overidentifying restrictions on the cointegrating vector(s) of the individual VECMX* models, then press enter.' There is a small 'fx' icon on the left side of the window's border.

```
Command Window
The program is now running (do not press any key)
- Adding to output.xls: Cointegrating ranks
- Imposing overidentifying restrictions on the cointegrating relations
>>> Pause and go to overid_restr.xls: Insert overidentifying restrictions on the
    cointegrating vector(s) of the individual VECMX* models, then press enter.
```

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

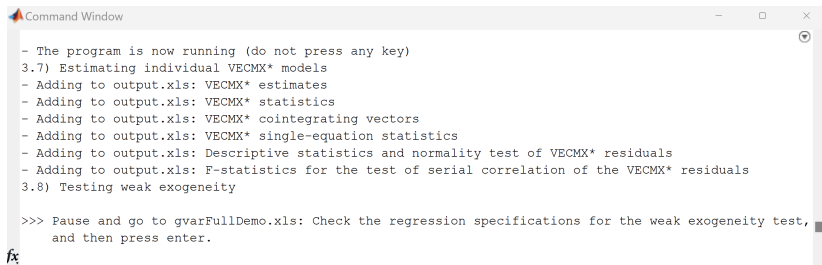
Specification of the individual VARX* models

- We are imposing overidentifying restrictions on Canada and the Euro 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	0	1	0	0	0	0	0	0	0	0
20	CV2	0	0	0	0	0	0	0	1	0	0	0	0	-1	0	0
21	CV3	0	0	0	0	0	0	-1	1	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	0	1	0	0	0	0	0	0	0	0
33	CV2	0	0	0	0	0	0	-1	1	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:															
39	INDONESIA	Trend	y	Dp	eq	ep	r	ys	Dps	eqs	rs	lrs	poil	pmat	pmetal	
40	CV1															
41	CV2															

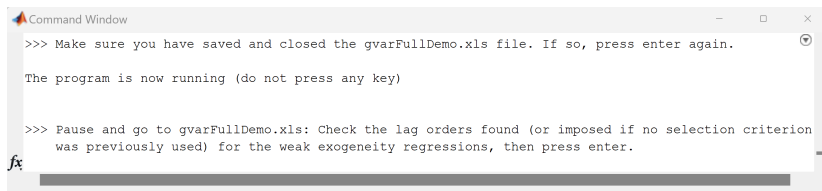
Specification of the individual VARX* models

- 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.



```
Command Window
- The program is now running (do not press any key)
3.7) Estimating individual VECMX* models
- Adding to output.xls: VECMX* estimates
- Adding to output.xls: VECMX* statistics
- Adding to output.xls: VECMX* cointegrating vectors
- Adding to output.xls: VECMX* single-equation statistics
- Adding to output.xls: Descriptive statistics and normality test of VECMX* residuals
- Adding to output.xls: F-statistics for the test of serial correlation of the VECMX* residuals
3.8) Testing weak exogeneity

>>> Pause and go to gvarFullDemo.xls: Check the regression specifications for the weak exogeneity test,
and then press enter.
```



```
Command Window
>>> 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)

>>> Pause and go to gvarFullDemo.xls: Check the lag orders found (or imposed if no selection criterion
was previously used) for the weak exogeneity regressions, then press enter.
```


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.
```

fx

Settings and specification of the dominant unit

DOMINANT UNIT MODEL

Model type	<input type="text"/>		
VEC model			
Lag order selection	<input type="text" value="aic"/>		
Maximum VAR order in case of aic/sbc. Actual VAR order otherwise.	<input type="text" value="2"/>	VAR order selected by aic/sbc	<input type="text"/>
Lag order for serial correlation test	<input type="text" value="4"/>		
Treatment of deterministic in VECM	<input type="text" value="Case 4"/>		
Rank order	<input type="text"/>		
Augmented VEC or univariate model			
Univariate model	<input type="text" value="levels"/>	Trend included in univariate levels	model in <input type="text" value="1"/>
Lag order selection	<input type="text" value="aic"/>		
Lag order for serial correlation test	<input type="text" value="4"/>		

> **MAIN** **DOMINANT UNIT** wmat1 wmat2 wmat3 weights_aggr | y | Dp | eq

Settings and specification of the dominant unit

Augmented VEC or univariate model

Global variables(s) included in the dominant unit model

OIL PRICE	poil
RAW MATERIAL PRICE	pmat
METAL PRICE	pmetal

Maximum lag order for global variable(s) in case of aic/sbc. Actual lag order otherwise.

Lag order selected by aic/sbc

2	
2	
2	

Settings and specification of the dominant unit

Feedback Variables

REAL GDP	INFLATI ON	REAL EQUITY PRICES	REAL EXCHAN GE RATE	NOMINA L S RATE	NOMINA L L RATE								
y_tilde	Dp_tilde	eq_tilde	ep_tilde	r_tilde	lr_tilde								
						0	0	0	0				
						0	0	0	0				
						0	0	0	0				

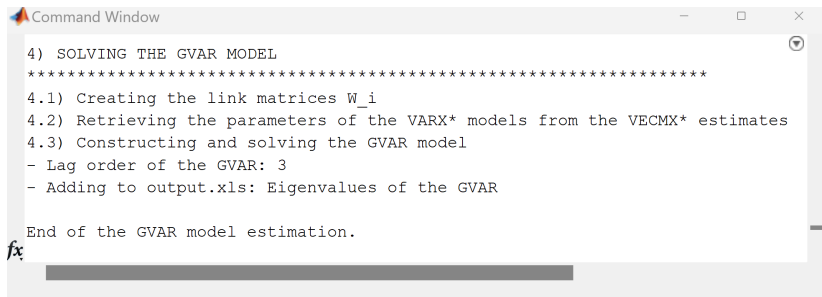
Settings and specification of the dominant unit

Fixed weights used for the construction 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.

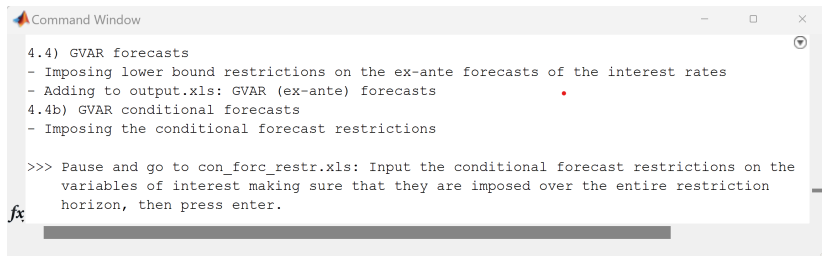


```
Command Window
4) SOLVING THE GVAR MODEL
*****
4.1) Creating the link matrices W_i
4.2) Retrieving the parameters of the VARX* models from the VECMX* estimates
4.3) Constructing and solving the GVAR model
- Lag order of the GVAR: 3
- Adding to output.xls: Eigenvalues of the GVAR

End of the GVAR model estimation.
fx
```

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.



```
Command Window
4.4) GVAR forecasts
- Imposing lower bound restrictions on the ex-ante forecasts of the interest rates
- Adding to output.xls: GVAR (ex-ante) forecasts
4.4b) GVAR conditional forecasts
- Imposing the conditional forecast restrictions

>>> Pause and go to con_forc_restr.xls: Input the conditional forecast restrictions on the
variables of interest making sure that they are imposed over the entire restriction
horizon, then press enter.
```

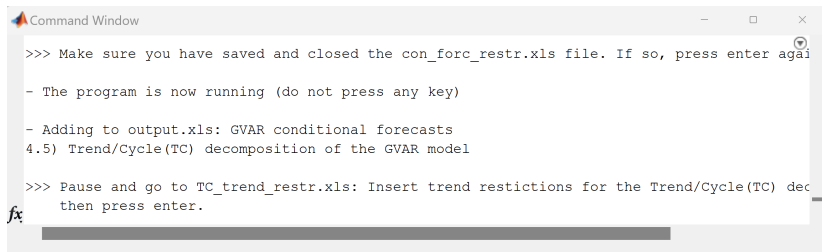
Additional Features: GVAR Forecasts

- 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									

Trend/Cycle decomposition

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



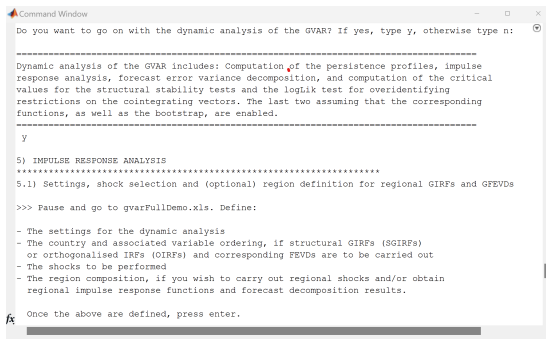
```
Command Window
>>> Make sure you have saved and closed the con_forc_restr.xls file. If so, press enter again
- The program is now running (do not press any key)
- Adding to output.xls: GVAR conditional forecasts
4.5) Trend/Cycle(TC) decomposition of the GVAR model
>>> Pause and go to TC_trend_restr.xls: Insert trend restrictions for the Trend/Cycle(TC) dec
fx
```

Trend/Cycle decomposition

	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	ARGENTINA	y									
5	ARGENTINA	Dp	1								
6	ARGENTINA	eq									
7	ARGENTINA	ep									
8	ARGENTINA	r	1								
9	AUSTRALIA	y									
10	AUSTRALIA	Dp	1								
11	AUSTRALIA	eq									
12	AUSTRALIA	ep									
13	AUSTRALIA	r	1								
14	AUSTRALIA	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								

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.



```
Command Window
Do you want to go on with the dynamic analysis of the GVAR? If yes, type y, otherwise type n:

-----
Dynamic analysis of the GVAR includes: Computation of the persistence profiles, impulse
response analysis, forecast error variance decomposition, and computation of the critical
values for the structural stability tests and the logLik test for overidentifying
restrictions on the cointegrating vectors. The last two assuming that the corresponding
functions, as well as the bootstrap, are enabled.
-----

y

5) IMPULSE RESPONSE ANALYSIS
*****
5.1) Settings, shock selection and (optional) region definition for regional GIRFs and GFEVDs

>>> Pause and go to gvarFullDemo.xls. Define:

- The settings for the dynamic analysis
- The country and associated variable ordering, if structural GIRFs (SGIRFs)
  or orthogonalised IRFs (OIRFs) and corresponding FEVDs are to be carried out
- The shocks to be performed
- The region composition, if you wish to carry out regional shocks and/or obtain
  regional impulse response functions and forecast decomposition results.

fx Once the above are defined, press enter.
```

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

Dynamic Analysis

DYNAMIC ANALYSIS

Settings

Forecast horizon	<input type="text" value="40"/>		
Run the bootstrap	<input type="text" value="1"/>	Replications	<input type="text" value="100"/>
Bootstrap approach	<input type="text" value="inverse"/>		
Covariance Matrix			
Sample covariance matrix	<input type="text" value="1"/>		
Block diagonal covariance matrix	<input type="text" value="0"/>		
Block diagonal covariance matrix with exception country	<input type="text" value="0"/>		
Shrinkage			
	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
	for point and bootstrap estimates	for bootstrap data generation	
Perform shrinkage on the correlation matrix	<input type="text" value=""/>	<input type="text" value="1"/>	
Shrinkage parameter	<input type="text" value="0.375463228"/>	<input type="text" value=""/>	
Type of impulse response functions	<input type="text" value="GIRFs"/>		

Selected country and variable ordering for structural analysis

Country	Variable ordering
du_model	pol 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
safr	lr eq Dp y r

MAIN

DOMINANT UNIT

wmat1

wmat2

wmat3

weights_aggr

y

Dp

eq

ep

r

Dynamic Analysis

Select shocks

Selected country and variable ordering for structural analysis

Country	Variable ordering	Model	REAL GDP	INFLATI ON	REAL EQUITY PRICES	REAL EXCHAN GE RATE	NOMINA LS RATE	NOMINA LL RATE	OIL PRICE	RAW MATERIAL PRICE	METAL PRICE
			y	Dp	eq	ep	r	lr	poil	pmat	gmetal
du model	pol	ARGENTINA	arg	0	0	0	0	0			
	prest	AUSTRALIA	aus	0	0	-1	0	0			
	gmetall	BRAZIL	bra	0	0	0	0	0			
		CANADA	can	0	0	0	0	0			
usa	r	CHINA	chn	0	0	0	0	0			
	rs	CHILE	chl	0	0	0	0	0			
	Dp	EURO	euro	0	0	0	0	0			
	r	INDIA	ind	0	0	0	0	0			
	r	INDONESIA	indn	0	0	0	0	0			
	r	JAPAN	jpn	0	0	0	0	0			
euro	r	KOREA	kor	-1	0	0	0	0			
	rs	MALAYSIA	mal	0	0	0	0	0			
	Dp	MEXICO	mex	0	0	0	0	0			
	r	NORWAY	nor	0	0	0	0	0			
	r	NEW ZEALAND	nzd	0	0	0	0	0			
	ep	PERU	per	0	0	0	0	0			
	rs	PHILIPPINES	phl	0	0	0	0	0			
nda	rs	SOUTH AFRICA	safrc	0	0	0	0	0			
	Dp	SAUDI ARABIA	sarba	0	0	0	0	0			
	r	SINGAPORE	sing	0	0	0	0	0			
	r	SWEDEN	sw	0	0	0	0	0			
	Dp	SWITZERLAND	swt	0	0	0	0	0			
	rs	THAILAND	tha	0	0	0	0	0			
china	Dp	TURKEY	turk	0	0	0	0	0			
	r	UNITED KINGDOM	uk	0	0	0	0	0			
	r	USA	usa	0	0	0	0	1	0		
	ep	DOMINANT UNIT MODEL	du model						1	0	0
usfc	r										
rs	Dp										
	r										
	r										

Regions

Name	Short name	Countries included
CHINA	chn	chn
EUROAREA	euro	euro
JAPAN	jpn	jpn
LATIN AMERICA	la	arg bra chl col ecu per
OTHER DEVELOPED COUNTRIES	odc	aus can nzd
REST OF ASIA	restasia	ind kor mal phl sng tha
REST OF THE WORLD	restworld	ind safrc sarba turk
REST OF WESTERN EUROPE	restwurope	nor sw swt
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 structural stability tests, provided this function was previously enabled

```
Command Window
creating graphs_bs OIL PRICE.xls
creating graphs_bs RAW MATERIAL PRICE.xls
creating graphs_bs METAL PRICE.xls
- Creating the output file fevds_bs.xls
- Creating the output file rirfs_bs.xls
creating rgraphs_bs REAL GDP.xls
creating rgraphs_bs INFLATION.xls
creating rgraphs_bs REAL EQUITY PRICES.xls
creating rgraphs_bs REAL EXCHANGE RATE.xls
creating rgraphs_bs NOMINAL S RATE.xls
creating rgraphs_bs NOMINAL L RATE.xls
- Creating the output file rfevds_bs.xls
--- End of the dynamic analysis ---

5.6) Bootstrap critical values for structural stability tests

>>> Pause and go to gvarFullDemo.xls: Select the required bootstrap approach, the covariance
matrix to be used for generating the bootstrap data and whether to perform shrinkage on
the corresponding correlation matrix, and then press enter.

(If these are already defined and you do not wish to change them, simply close
the interface file and press enter).
```

fx

Next session:

Understanding and Interpreting Results
from GVAR Models