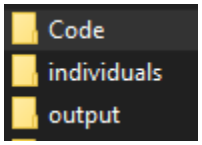
CEMLA Growth at Risk Project (C-GARP)

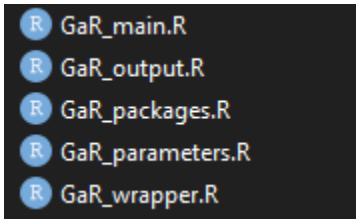
GROWTH-AT-RISK CODE v1.0

These notes are intended to be a quick reference of the code **GaR_main.R** to obtain the financial conditions indices of a given set of countries. For a more in-depth information of the methodology, please refer to the technical notes at the CEMLA Growth-at-Risk website.

The code is provided in zip file that contains the following folders:



The operative code is based on the following files contained in the folder **Code**:



Required Data

1. Panel data is stored in an Excel file on a dedicated sheet. No information should be stored outside the table. The table must contain the columns **Date**, **Country** and **N_Country**. It also must contain the columns with the variables that will be included in the analysis.

   For instance, consider the table below with the variables **g_GDP** (GDP annual growth in %), **FCI** (financial conditions index), and **VIX**:

Date	Country	N_Country	g_GDP	FCI	VIX
01/03/1992	BRAZIL	1	-3.15	#N/D	17.56
01/06/1992	BRAZIL	1	-2.12	#N/D	15.62
01/09/1992	BRAZIL	1	-0.90	#N/D	13.90
01/12/1992	BRAZIL	1	4.23	#N/D	14.76

Code execution

1. Open file **GaR_main.R**

2. Modify variable **workingDirectory** to include the absolute path of the folder that contains the GaR code. The path should be in R format, i.e., with slashes instead of backslashes (as in Windows).

   For instance, the following location in Windows C:\GaR\Code should be entered as **workingDirectory <- "C:/GaR/Code"**

3. Open the file **GaR_parameters.R**

4. Modify the following parameters according to your requirements:
   1. **source_file**: The path and name of the file with the panel data.
   2. **sheet**: The name of the sheet of the source file where the data is located.
   3. **dependent_variable**: The name of the dependent of the quantile regression.
   4. **independent_variables**: Vector with the names of independent variables that will be introduced in the model.
   5. **orth_var_dep** and **orth_var_ind**: These parameters allow for the introduction of residuals (orthogonalization) of the variable in orth_var_dep with respect to the variable in orth_var_ind. The new variable name is given by "Dependent variable_Independent Variable_res". For instance, consider the following instance:

      ```
      orth_var_dep <- c("FCI")
      orth_var_ind <- c("VIX")
      ```

      That means that the model will include the residues of the linear regression given by the model FCI ~ VIX, and the resulting variable will be FCI_VIX_res.
   6. **h**: Horizon in months.
   7. **n_tau**: number of regular partitions of the [0,1] interval for the quantiles. For instance, n_tau=3 would create the quantiles {0.25, 0.5, 0.75}; n_tau=19, {0.05, 0.1, 0.15, …, 0.9, 0.95}, and so on.
   8. **interaction_term**: Optional vector of strings that allows to include interaction terms in the model. The syntax of the entries should be "Var1:Var2". For instance, **interaction_term <- c("Fin_Dev:VIX")** would incorporate the interaction between Fin_Dev and VIX, whenever Fin_Dev and VIX are defined variables in the panel.

9. **selected_date_v**: It is the date that will be considered for the model estimation. The model will have information up to this date. It will not consider data beyond this date.
10. **selected_date_next_v**: It is the forecasted date.
11. **GaR_level**: Numeric value in the interval (0,1) for the GaR estimation. Default set at 0.05.
12. **probability**: Numeric value in the interval (0,1) for the level of the Expected Shortfall and Expected Longrise. Default set at 0.05.
13. **alpha_CI**: Numeric value in the interval (0,1) for the confidence level of the coefficient estimation. Read 1-alpha_CI as the confidence level. Default set at 0.05, i.e., confidence intervals for the estimated coefficients of 95% of confidence.
14. **outputPath**: Write the path where the output file will be saved. The file name has the structure GaR + time stamp + fileTag (next parameter).
15. **fileTag**: String that is appended to the file name.

Results

1. The results are stored in an Excel file in the path and file set in the **GaR_parameters.R** file. The name of the file is GaR*_DATE_TIME_fileTag*.xlsx.
2. It has the following sheets:
    1. **Data**: contains a table with the panel data and its transformations used to estimate the quantile model.
    2. **Quantile coefficients**: contains a table with the information of the coefficient estimation.
    3. **Plots**: contains a set of plots of the coefficients and the model.
    4. **Distribution results**: displays a table with results based on the estimated distribution.
    5. **Parameters**: stores the parameters defined in **GaR_parameters.R** as reference.
3. The zip file already contains a ready to run example. Adjust **workingDirectory** accordingly and execute the code. The output would be located in the folder "\CGARP v1.0\output" and should match the file "\CGARP v1.0\output\GaR_test.xlsx".

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The code is provided “as is”, without any warranty.

In case of needing more detailed information, please consult the technical notes.

When using the code please cite: Ossandon Busch et al. (2022), Growth at Risk: methodology and applications in an open-source platform. Latin American Journal of Central Banking, Elsevier, forthcoming.

Do not hesitate to contact us to let us know your doubt, comments, suggestions, or if you want to report any bug at cgarp@cemla.org

Please remind that this code comes “as is”, and it is provided with NO WARRANTY. CEMLA does not bear any responsibility for its use.