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## READ ME file corresponding to "Covid-19, Credit
## Risk Management Modeling, and Government Support"
##
## by Sean Telg, Anna Dubinova & Andre Lucas
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## CODE
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To run the model in the article, make use of the following R scripts:
(1) export_results.R
(2) forecasting_exercise.R
As a background, we also provide the files used to pre-process the data.
We advise not to run them, but to inspect them only.
(3) preprocess_creditdata.R [not runnable due to data license issues]
(4) preprocess_macrodata.R
(5) simulate_credit_data.R [for constructing a simulated ratings transition file]

We provide a simulated data set for credit rating transitions due to licensing issues.
Read further below, where we give the precise scripts, download instructions, and data
construction if one has WRDS/Compustat/S&P access to the credit data.

The following R scripts are provided as part of the main routines:
- gasfilter.R
- get_parameters.R
- MLE.R

Short description of the main R scripts:
(1) Should be directly runnable.
    Input: choose your desired settings at the start of the file, model, etc. Illustration works
    for model 4.
    Function: allows for estimating the various model considered in the article on the pre-
    covid and full sample.
    Output: csv file with model estimation results.
    Dependencies: makes use of gasfilter.R, get_parameters.R and MLE.R and gasfilter.R.
(2) Should be directly runnable.
    IMPORTANT NOTE: however that (a) you must first run export_results.R and NOT restart
    R, such that all libraries etc are present, and (b) you define your own input directory
    time/name for the inputs of the simulation in a real analysis (in the distributed code, we
    have set it to the map holding the test run results for "`output Wed Aug 31
    11.47.47 2022`").

Input: makes use of .Rdat files generated by export_results.R
Function: performing the simulation based forecasts and stress tests as in article.
Output: graphs of forecasts (including bands).

Short description of the background R scripts:
(3) Input: csv file with the raw credit data from WRDS.
Function: pre-processing data where the user can select, among others, sample size
(time frame considered), the granular structure of the rating classes and
the type of companies to consider.
Output: csv file with a count matrix of rating transitions.
(4) Input: the raw macro data file macrodataJBF_raw.xlsx.
Function: constructs the data measures used in the article (by transforming them
and seasonally adjusting them, if required).
Output: csv file with pre-processed macro data.

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DATA
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Two types of data are used in the article: credit ratings data and macroeconomic data.

[1] CREDIT RATINGS DATA (not provided: not freely available)
- code we used to preprocess the raw credit data pull from WRDS/Compustat/S&P can be
found in "preprocess_creditdata.R". NOTE: the credit rating transition data provided to run
the present code is SIMULATED data due to licensing issues (read below).
- Standard and Poor's credit rating data are obtained from Wharton Research Data Services
(WRDS) via Compustat and span the period Jan 1998 - Sep 2021.
- Items downloaded are
  "entity_id"   "ratingdate"   "orgdebttypecode"
  "ratingtypecode"   "currentratingsymbol"
  "ratingsymbol"   "ratingtypename"   "ratingtypeid"
  "entname"   "sectorcode"
  "sectordescription" "region"   "countrycode"
- We use long term entity ratings (ratingtypecode=STDLONG), use the rating dates (rather
than the creditwatch dates) and concentrate on U.S. (region=USA) corporate ratings
(sectorcode=CORPS).
- We regroup the original 21 rating scale into 3 rating classes: IG (AAA to BBB-), NP (BB+ to
C) and D (Default and Strategic Default), where IG = Investment Grade, NP = Non-Prime, D =
Default.
- We condition on firms being rated at the start and the end of a month. Firms that moved
into the non-rated class (NR) over a month are omitted in that specific month, but still
accounted for in all previous months.

[2] MACROECONOMIC DATA (provided: freely available)
- code we used to preprocess the raw macro data can be found in "preprocess_macrodata.R"
- Economic growth and government subsidy measures are obtained from the Federal Reserve Economic
  Data (FRED) data base.
- The corresponding codes to find the measures on the FRED website:
  * Industrial Production Index (GVIPT50002S)
  * Subsidies (B096RC1Q027SBEA)
  * Stock of corporate bonds issued by commercial banking under TARP (FGCBGSQ027S)
  * TARP AIG support (WAIG)
  * Federal government budget (MTSDS133FMS)