**Intro**

European and local regulators require financial institutions to assess the strength of their capital position by evaluating how their capital measures (RWA, ECL and EL) would change in stressed economic conditions. This is referred to as “stress testing”. Stress testing is performed as follows. **First,** a number of plausible economic scenarios (neutral, severe, very severe) are defined, whereby each of the scenarios must be given a plausible narrative. **Then**, we assess how capital measures would be impacted under these economic circumstances. The objective is to determine if the bank will become insolvent at any point within the stress testing horizon; usually set to 3 years. **Additional to stress testing**, regulators require financial institutions to perform so called “reverse stress tests”. The steps taken in reverse stress testing are in reverse order as compared to stress testing. First, we must determine under which economic scenarios the bank would become insolvent. Then, we must find a plausible narrative to these scenarios.

**Problem statement**

At NIBC reverse stress testing is performed as follows. First, we simulate a large number of potential future economic scenarios. Then, we determine how our capital measures would be impacted under each of these scenarios. Finally, we evaluate the scenarios in which the bank becomes insolvent. For the first step, we simulate quarterly changes in GDP, HPI, WTI crude oil price, SMX index and AScX index. The changes are simulated by means of a multivariate Ornstein-Uhlenbeck stochastic process that accounts for the correlation across variables. To date we have not assessed other possibilities to simulate the changes in these variables within a 3-year timespan. In our current set-up we assess the plausibility of simulated 3-year changes by comparing the quantiles of simulated changes against the quantiles of historically observed changes. From this comparison, we can observe that, for some variables, the distributions of simulated and historical 3-year changes differ significantly. This is something we would like to investigate further. Can the fit to historical distributions be improved by implementing a different model? How do we measure the fit? These answers would help our team defend or rethink our approach to reverse stress testing.

**Guidance**

For the research project we would like students to assess other possibilities to simulate the changes in these variables within a 3-year timespan. Other approaches should be proposed and benchmarked against our current method. Therefore, the student should address the following questions:

* What models can be implemented to simulated successive quarterly changes in GDP, HPI, WTI crude oil price, SMX index and AScX index within a 3-year timespan?
* Since we are looking for scenarios, which models can be implemented to simulate the risk drivers simultaneously and take into account their correlations?
* How should we determine the performance of the model? Is the new approach better than the current approach?

For the research project NIBC will provide the time series of GDP, HPI, WTI crude oil price, SMX index and AScX index values. We would also prepare a more in-depth presentation to introduce the challenge at hand.

My colleague Felix Farias will be the main contact person for this exercise. Looking forward to get help from the young talent in your programs.

Kind regards / Met vriendelijke groet,