

Stress test methodology

1. Objective of stress tests

Running stress tests by KELER CCP has a double objective:

- on the one hand to check that the default fund (KGA) is of appropriate size at all times, and
- to check compliance with the requirements on the other financial resources of KELER CCP on the other hand.

2. Historical scenarios

KELER CCP determined several historical scenarios with two approaches:

- In some historical scenarios the price changes of the underlying products were examined, and the same parameters are applied for the different maturities within the groups of products.
- In some historical scenarios the different price changes of the futures products different maturities are taken into consideration, not just the price changes of the underlying products.

We developed a historical database on the prices of products we clear and from January 1998 we identified the periods when the greatest volatility was experienced. In line with the Technical Standards we considered the holding period as 2 days.

Groups of products were defined, for each of them one parameter was determined

- In the case of equities (including indices due to their attributes) the decrease of price is seen as the main risk, although the price increase may have inherent risks as well. However, based on our experience to date, the sudden upward price change generally follows a price movement of the opposite direction and great extent, thus the risk of positive correction is far less than the risk of a sudden fall of price in a normal period.
- In the case of interest rate products the change of the valid reference yields expressed in percentage points was examined.
- We examined the change of foreign currencies against the HUF, at the mid-rate of the NBH, as the increase of foreign exchange rates results in a weakening Forint.
- In the case of cross currency rates (change in the closing buy-sell average published by Reuters, calculated at the NBH fixings) we examined the absolute value of rate changes in looking for the maximums, as in this case a move in any direction represents risk.
- In the case of commodities, due to the lack of available spot market closing prices, we developed a timeline with the smoothed futures prices so that from among the actual open futures prices the price of the closest expiry was considered. This explains for most commodities the significant price change (old crop vs. new crop). We examined changes of both directions as both the increase and the decrease of grain prices represent significant risks.

Based on their volatilities we separated stress periods for the product groups.

For all periods we checked the exact price changes of all product groups, this how we determined the parameter sets of our five historical scenarios.

Determining historical stress test scenarios for different maturities Keler CCP considered the parameters of the Russian crisis in 1998, global crisis in 2008 based on the fact that the most significant price changes were in these times.

Keler CCP determined the following maturity categories for the groups of products in the two historical scenarios:

- 0-30 days to maturity
- 31-60 days to maturity
- 61-90 days to maturity
- 91-180 days to maturity
- 181-360 days to maturity
- more than 361 days to maturity

3. Hypothetical scenarios

In our view a shock impacting the entire market can happen in two ways: either a crisis started abroad reaches Hungary or the shock impacts the Hungarian capital market only. There are several examples of the first case in the historical scenarios; therefore in the development of the hypothetical scenarios we assumed the collapse of the Hungarian market only.

In line with the assumed scenario the downgrading of Hungary would be followed by a sudden rise in CDS prices, consequently Hungary would get close to bankruptcy. Should bankruptcy occur, based on the correlation among the prices of our product groups, we can conclude that equities prices would fall, government bonds would suffer a major loss of value due to the rise of yields, currencies would strengthen due to the weakening of the HUF, the Hungarian crisis would not affect cross currency rates, however, commodity prices, particularly the price of grains would grow, assuming that capital would flee into grains.

Beyond these assumptions Keler CCP conducts stress tests based on a pure currency and cross currency stress situation in line with experience of recent years.

4. Concluding stress tests

We complete stress testing daily, at the level of the clearing entity (own, omnibus client, individually segregated non-clearing member / client) for all scenarios. The results are consolidated at clearing member and group level without netting, i.e. only the open risks are added up. In the derivative market the net open interest is taken into account during stress testing.

After the results of the scenarios are determined for the derivative market, we select the first or the second and the third if their sum is larger exposure(s) with uncovered risk in BSE derivative market, the worst value(s) are compared to the default fund (KGA) of the BSE derivative market concerned and the financial resources of Keler CCP to check compliance.