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STRESS TESTING FRAMEWORK FOR BANK'S MARKET RISKS

The individuality of banks' risky portfolios makes it impossible to design a unified stress testing technology and requires the development of ad-hoc stress tests. This problem can be effectively solved by applying various methods of stress testing and combinations of them considering the advantages and disadvantages of different approaches.

Historical stress tests not always allow to determine the worst-case scenario of risk escalation because they do not take into account the feasibility of more extreme shocks in the sense of scale and duration than those observed in the past; feasibility of shocks that differ from historical one; and peculiarities of the current risk portfolio structure. Therefore, it is reasonable to supplement historical stress tests by the hypothetical scenarios.

Scenarios can be considered separately (discrete stress tests), or be integrated into a stochastic model of risk assessment by weighting the results obtained from different scenarios with probability, which is calculated with the use of quantitative or qualitative methods (Breuer's, Berkowitz's, Dowd-Blake's, Aragones-Blanco-Dowd's, Kwiatkowski-Rebonato's and other methods of generalized scenarios). Integration of stress testing in the stochastic model provides a multidimensional distribution of risk factors return (distributional stress tests) but not a single assessment of the negative effects of extreme events (spot stress tests).

Stress testing can be done in the form of both single-factor and multifactor analysis of the risk factors shocks impact on a single open position (stress tests of individual risk) or risk portfolio as a whole (portfolio stress tests).

In the case of multifactor stress testing (scenario analysis) the revaluation of positions/portfolios can occur as a subject to the combined impact of adverse changes in all relevant risk factors (comprehensive stress tests), or by taking into account just the main risk factors (defined, for example, by using principal components analysis) without any attention to the dynamic of peripheral factors.

Scenario analysis can be implemented either without taking into consideration the interdependence between changes in individual risk factors (non-systemic stress testing), and by taking into account

the effects of correlation between risk factors, financial markets' cointegration and contagion (systemic stress testing). Thus, scenario analysis involves the choice of risks aggregating method, the most common of which are: simple risks summing, constant diversification method, variance-covariance approach, using copulas, method of complete simulation.

Stress testing can be based on modified stochastic analysis models like VaR-I (intra-horizon VaR), stressed VaR.

A more sophisticated approach to risk modeling during market shocks requires the use of extreme value theory, which allows to determine the frequency and magnitude of extreme returns. The most common methods for selecting extreme returns are so called block maxima or minima and peaks-over-threshold.

During stress testing, it is necessary to determine the bank's ability to withstand a one-day shock (static stress tests) and a long period of losses (dynamic stress tests). The latter can be realized with the use of deviation and drawdown risk measures.

In addition to the assessment of potential consequences of different scenarios (direct stress testing) it is also reasonable to identify scenarios that can cause critical and catastrophic losses (reverse stress tests) and thereby uncover hidden risks and interactions among risks.