LIQUIDITY STRESS TESTING TOOLKIT
A key steering tool for liquidity measurement and management
AGENDA

1. Toolkit
2. Process overview
3. Areas of focus
4. Integration
Leveraging on its experience and in line with market practices, Avantage Reply has developed a Liquidity Stress Testing model.

Flexible and easy to use, it provides financial institutions with a toolkit which allows them to easily perform internal stress tests and integrate outcomes into decision-making processes.

Appropriate liquidity stress test modeling is a prerequisite for simulating and understanding the liquidity position and to assess liquidity adequacy.

The LST toolkit has many features, as summarised on the right:

- **Multi-scenarios**: Allows calibration of up to 5 scenarios
- **2 Propagation speeds**: Gradual vs fast Scenario
- **Sensitivity analysis**: Ability to understand the sensitivity of key material risk factors
- **2 Parallel simulations**: Allows the ability to stress two different data sets in parallel
- **2 Approaches**: Normative and Economic
- **3 Metrics**: LCR : Liquidity Coverage Ratio NSFR : Net Stable Funding Ratio NLP : Net Liquidity Position
Appropriate liquidity modeling is a prerequisite for simulating and interpreting the impact of different scenarios on an institution’s liquidity adequacy (e.g. minimum requirement of HQLA assets, stressed LCR/NSFR, stressed NLP, survival horizon).

The liquidity stress test model has the following features:

- Relies on regulatory, ALM and budget forecasts data;
- Shows the impact on the internal and regulatory metrics through different types of scenarios and propagation speeds;
- Is flexible and able to be reused and integrated into liquidity management and risk monitoring;
- Is built in VBA/Excel, but could eventually be replaced by a more robust long-term solution.

1. Model Inputs
   - Liquidity balance sheet and budget forecasts
   - Maturity ladder/ Liquidity gap
   - Market Data (Sensitivity data on credit rates and interest rates)
   - Scenario assumptions

2. Model Calculation
   - Deposit run off/Withdrawal of payment facilities
   - Cash available from HQLA and stock/loan activities
   - Evolution of the market value of the investment portfolio
   - Derivative exposures and derivatives valuation

3. Model Output
   - Stressed LCR/NSFR
   - Stressed liquidity gap / Net liquidity position
   - Survival Horizon
   - Stressed internal liquidity buffer
   - Stressed cash flows over 7 days, 1 month….
   - Model Output

4. Decision-making process integration
   - Metrics, tolerance thresholds and limits definition
   - Integration into liquidity management
   - Metrics risk monitoring.
LIQUIDITY STRESS TESTING TOOLKIT

Area of focus - Risk factor mapping & Risk factor analysis

The liquidity stress test model is implemented on defined stress scenarios aiming to transform contractual or behavioural assumptions to balance sheet cash-flows.

Shocks reflected on risk drivers are applied by product type (deposits, loans, etc.) and per time bucket on key internal and regulatory metrics.

The risk driver mapping is a key preliminary step within the LST process. It consists of identifying the key liquidity risk drivers to which the institution is exposed and that could impact the liquidity balance sheet.

The main objective is to identify key liquidity vulnerabilities before conducting the risk driver analysis.

The analysis of risk drivers can be carried out by an empirical analysis and in particular by sensitivity analysis that aims to describe how fast the NLP goes negative based on the individual sensitivity of each risk driver. It should allow the impact of key material risk factors to be assessed in order to identify the areas of focus that should be considered in the scenario design and calibration stage.
Liquidity stress testing objectives are to evaluate whether institutions maintain adequate liquidity under stressed scenarios and to provide information at a time of liquidity crisis to allow management to act in a timely manner. Ideally, scenarios should be framed as follows:

1. **Narratives to scenarios**: The set of scenarios provide information that allows the evaluation of a wide range of events that can be either directly linked to the institution, to the market,....

2. **Scenario types**:
   - Scenarios that evaluate idiosyncratic stress features;
   - Scenarios that evaluate market wide stress features;
   - Scenarios that evaluate a combination of idiosyncratic stress and market wide stress features;
   - Scenarios that evaluate reputational stress features;
   - Pre-determined scenarios that the institution wants to survive for a pre-determined amount of time;
   - Reverse stress features.

3. **Fast versus gradually developing stress**: Such distinction is especially relevant to understand and evaluate the impact of the relevant management actions within each scenario. For example, a rapidly developing stress event would not benefit from actions which take a longer time to initiate or that require relatively low levels of stress to initiate.
LIQUIDITY STRESS TESTING TOOLKIT
Area of focus - Calculation Process

Step 1  Model inputs
Step 2  Model calculation
Step 3  Model outputs
Step 4  Decision-making process integration

Risk drivers:
- Deposit or wholesale funding rollovers;
- Drawings on off B/S facilities;
- Investment portfolio haircuts;
- …

Scenarios:
- Narratives to scenarios:
- Scenario types:
- Fast versus gradually developing stress:

Calculation:
1. The shocks defined by risk driver are applied to each component of the internal or regulatory metrics.
2. Stressed metrics are then calculated as below:

Projected LCR:
- The stress testing methodology is based on the projection of 30 days cash flows for 3 years broken by month.

\[
LCR = \frac{\text{Liquid Assets}}{\text{Net Cash Flows (30Days)}}
\]

Projected NSFR:
- The stress testing methodology is based on the budget projection for 3 years broken by month.

\[
NSFR = \frac{\text{Available Stable Funding (ASF)}}{\text{Required Stable Funding (RSF)}}
\]

Internal Metrics
- The stress testing methodology determines two output metrics:
  1) NET LIQUIDITY POSITION (NLP)
  2) TIME-TO-SURVIVE (TTS)
- The NLP is calculated using the Liquid Assets and the inflows and outflows resulting from the stress test scenario, which is then broken down into pre-determined time buckets (1 day, 2 days, etc):

\[
NLP = \text{Liquid Assets} + \text{Inflows} - \text{Outflows} - \text{Off-balance} +/- \text{Secured Transactions}
\]

In practice, the NLP calculation is built like a cumulated static gap.

NB: Other bank-specific metrics could be integrated.

Stressed LCR/NSFR under various scenarios and propagation speed…

Stressed NLP and Survival horizon under various scenarios and propagation speed…

Stressed NLP and Survival horizon under various scenarios and propagation speed…

Regulatory Metrics
- Stressed LCR/NSFR under various scenarios and propagation speed…

Stressed NLP and Survival horizon under various scenarios and propagation speed…

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LIQUIDITY STRESS TESTING TOOLKIT
Area of focus - Analysis and management actions

Once scenarios have been defined and shocks calibrated by risk driver, the liquidity stress testing tool allows an institution to directly view the impacts with flexibility to vary the scenario to be applied, the speed of propagation or even the input data on the LCR, NSFR and NLP.

The 3 indicators can be analysed separately but the strength of the toolkit is to allow cross analysis to determine the right management actions to apply. As the tool allows two data sets to be run in parallel, results can be generated both with and without management actions taken into consideration.

Note that Net Liquidity Position and Time-to-survive are complementary indicators of the LCR and NSFR. In fact, it could reveal some bank’s vulnerabilities that the LCR and NSFR can’t highlight due to their definition/calculation.

One of the useful outcomes of the stress tests could be to ensure a better link between management and risk monitoring. The results could be used to set early warning indicators and limits.
The Funding & Liquidity management framework could be defined through 3 lenses:

1. Viability
2. Sustainability
3. Regulatory

To ensure proper integration of Liquidity stress tests, the institution’s viability and regulatory indicators should be stressed under different scenario and propagation speeds.

**Funding and Liquidity adequacy**

**Viability**
- The bank’s counter-balancing capacity should be sufficient in adverse and stressed market circumstances
- The time-to-survive in a liquidity stress scenario must be sufficient

**Sustainability**
- Funding of long-term assets and investments must be done by stable and longer-term liabilities
- Funding of short-term assets should not lead to too much dependency on short term wholesale markets
- Funding diversification should be in place, across funding providers, instrument types, geographic markets, tenors and currencies
- Geographical dependencies with respect to intra-group funding should be limited
- The bank should be able to meet payment and settlement obligations in a timely manner

**Regulatory**
- Compliance with regulatory funding and liquidity requirements under normal and stressed scenarios
**AVANTAGE REPLY FRANCE**  
*Our service offering*

**Expert and methodological support in ALM, Finance and Risk around strategic risk management and management processes, governance of Finance and Risk functions, risk modeling and scarce resources (capital, liquidity) and stress tests**

- **ALM**
- **Finance**
- **Risk**

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**Strategy and governance**
- Business model assessment
- Capital management governance
- Solvency stress testing governance

**Steering**
- ICAAP
- Capital allocation policy
- TLAC/MREL

**Modeling**
- P&L Modeling and Stress tests
- Business / Capital modeling
- Resolution modeling
- Pillar 1 Risk models design and validation
- Model risk testing and scoring
- Pillar 2 models and risk stress tests

**Regulatory (transversal offer)**
- Regulatory watch
- Regulatory strategy
- Remediation
- Project management

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**Finance**
- Risk governance
- Model risk management
- Regulatory strategy

**Risk**
- Material risk assessment
- Risk appetite
- Recovery plan

**ALM**
- ALM governance
- ALM strategy (including hedging)
- Fund transfer pricing

**Trading Activities**
- Desk strategy
- Desk hedging strategy
- Market risk policy
- Limit framework

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1. Our teams support CROs and CFOs from the design of target systems to operational implementation at Group or entity level.
2. Our missions last from 1 month to 1 year. On average, they last 6 months.

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**Key services**
- Strategic diagnosis, gap analysis and benchmarking
- Definition and design of steering processes and dashboard
- Organizational and governance redesign
- Deployment and operational implementation
- Modeling and Quantitative studies
- Subject matter expert support
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