Liquidity Risk Management powered by SAP HANA
Challenges in Liquidity Risk Management
Banking Credit Spread Widening since Financial Crisis

- Before 2007 access to liquidity was not seen to be risky.
- Increased Credit Spreads
  - European banks
  - American banks
- Spread widening means higher liquidity costs reducing liquidity buffers
- Banks need to manage liquidity and collateral much faster and at the same time more careful and more detailed
Nowadays most derivatives are collateralised

\[
\text{Funding Spread} = \text{Funding Liquidity Spread} + \text{Credit Spread Add-On}
\]

\[
\text{Funding Liquidity Spread} = \text{LIBOR} - \text{OIS}
\]

For funding the collateral the bank pays LIBOR plus a Credit Spread Add-On and gets OIS rate.

* LIBOR = London Interbank Offered Rate, OIS = Overnight Index Swap
iTraxx Financials widening since Financial Crisis

- Tiny funding costs before 2007
- Solvency issues and vanishing investor confidence led rising refinancing
- After limited contraction of funding spreads the EU debt crisis has widened spreads to highest levels ever

- Funding Liquidity Risk can be defined as potential inability to meet current and future cash flows.

* Source: Bloomberg, markit Group
Funding Liquidity Risk
Internal Risk Management

- Risk that the firm will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs*

- A first step of a funding liquidity risk calculation consists in calculating the Forward Liquidity Exposure in terms of the Legal Cash Flow Gap.

- In a second step hypothetical cash flows should be taken into account as well. These simulations should be driven by market development, customer behaviour and bank strategy to generate a more realistic Economic Cash Flow Gap.

- If liquidity gaps are detected when analysing the economic cash flow gap, a third step consists in calculating the Counterbalancing Capacity. All assets like bonds or committed lines are used to resolve potential liquidity bottlenecks.

* Basel Committee on Banking Supervision – BCBS 144 Principles for Sound Liquidity Risk Management and Supervision
Funding Liquidity Risk to be based on cash flows being the least common denominator

- Funding Liquidity Risk Management needs to be done comprehensively, all on- and off-balance sheet positions have to be taken into account.

- Cash flow view supports New Product Procedure in terms of flexibility.

- Relevant reporting and steering could be done on Cash Flows.

- Cash Flow roll out for complex instruments to be done by dedicated systems.
  
  ✓ Consistency with other risk categories crucial (e.g. different risk types based on the same curves).
  ✓ Actual market data needed, due to illiquidity traders’ expertise sometimes required
  ✓ Complex pricing algorithms needed, difficult to replicate
  ✓ Banks often do not want to disclose pricing algorithms
Reporting Funding Liquidity Risk via Funding Matrix

Economic Cashflow Gap + Counterbalancing Capacity = Liquidity (Net) Position
Risk view on Funding Liquidity Risk

- **Credit Risk**
- **Market Risk**
- **Operational Risk**

**General Market Risk**
- Volatility within general market: equities, currencies, curves, ...

**Specific Market Risk**
- Volatility of specific market against general market

**Funding Liquidity Risk**
- Residual Risk: e.g. spread risk interest rate curve against rating curve
- Event Risk: e.g. crashes, mergers, rating changes
- Incremental Default Risk: e.g. default within structured credit

**Cash Flows**
- Market depth

**Market Liquidity Risk**
Asset Liability/Treasury view on Funding Liquidity Risk

Assets:
- Cash
- Loans
- Derivatives
- Securities
- ...

Liabilities:
- Deposits
- Issues
- Derivatives
- Other
- ...

Money Market

Gap Profile

Funding

Collateral

Collateral

Funding
BCBS 188: Basel III
Intern. framework for liquidity risk measurement, standards and monitoring

Level 1: Cash, Sovereign and Central Bank Debt (usually 0 % Risk Weight*), ...

Level 2: Sovereign and Central Bank Debt (usually 20 % Risk Weight*), AA- or higher rated bonds, ...

Cash Outflows: Retail deposits, Unsecured Wholesale Funding, Repos, CCLs, Derivative Outflow

Cash Inflows: Reverse Repos, Obtained Credit Lines, Other Inflows

Available Stable Funding (Sources)

Required Stable Funding (Uses)

Regulatory Capital

(Less) Stable Deposits, Wholesale Funding

All other Liabilities

Cash, Securities, Debt, Off-balance Sheet Exposures

Bonds, Equities, Gold, Specific Loans

All other Assets

* Risk Weights could be retrieved from SAP Basel II Credit Risk Solution
Challenges in Liquidity Risk along different dimensions

**BASEL III requirements**
- New Liquidity Rules under Basel III
- Moving Target as full Basel III Implementation runs to 2018

**Market situation**
- Mortgage crisis, European debt crisis, what’s next?
- Increasing costs for refinancing and liquidity procurement

**Organisation & processes**
- Strong collaboration between different LoBs required
- Change in liquidity management processes possible

**High data volumes**
- Cash flow orientation causes huge data volumes
- How to handle these volumes for ad hoc steering purposes?

**Analytics**
- Simulations, predictive analytics, scenario analysis required
- A solution needs to cover compliance, analytics and steering

Multidimensionality impacts the entire banking and liquidity arena
What is SAP HANA?
BANKS FACE AN INFORMATION AVAILABILITY PROBLEM

Data volume is exploding

Calculation speed is stagnating

Requirements on information availability are increasing

Traditional approach of OLTP and OLAP fails
The elements of In-Memory computing are not new. However, dramatically improved hardware economics and technology innovations in software has now made it possible for SAP to deliver on its vision of the Real-Time Enterprise with In-Memory business applications.

**HW Technology Innovations**
- Multi-Core Architecture (8 x 8 core CPU in one server)
- Massive parallel scaling with many blades
- One blade ~$50,000 = 1 Enterprise Class Server
- 64bit address space max at 2TB in current servers
- 100GB/s data throughput
- Dramatic decline in price/performance

**SAP SW Technology Innovations**
- Row and Column Store
- Compression
- Partitioning
- No Aggregate Tables
LRM@HANA overview
SAP LRM@HANA meets the challenges

- SAP LRM@HANA content supports Basel III compliance
- Intuitive User Interfaces
- Collaborative processes support holistic handling of liquidity risk
- Predict liquidity needs on basis of scenarios, simulations and stress testing in real-time
- HANA technology allows for intraday processing of large data volumes
- ... in atomic granularity

- Stress testing, scenario analysis and simulations
- Seamless drill-down from group-level results to individual cash-flows
LRM@HANA – enabling real time Liquidity Risk Management

**Extensive performance**
- aggregation of 200+ Mio. cash flows in 1 second
- real time load and analysis

**Open platform for specific models**
- extensible architecture for modeling of customer specific logic
- extensive configuration capabilities for complex filtering, aggregation and calculation rules

**Ad-hoc simulation and drill down**
- what-if analysis on behavioural and market parameters
- single contract level including full drill down
SAP Liquidity Risk Management Test Results

290M Cash Flows

>60 minutes

4000x faster

Aggregated & Selected

<1 seconds

Standard System

In-Memory System
Product Scope LRM 1.0

- SAP LRM@HANA, enables banks to perform real time, high-speed liquidity reporting and risk management on large volumes of individual cash flows

- The application allows for pooling all types of cash flows, including operative, simulated, and stressed data from various SAP and non-SAP source systems

- Framework to calculate risk key figures including regulatory requirements like Basel III ratios

- Users can apply basic stress factors to the data, for example to gauge the effect of varying haircut and run-off rates, or the re-classification of certain assets

- Intuitive UIs enable business users to analyse and compare scenarios
SAP Liquidity Risk Management 1.0 Architecture

- **Comprehensive Liquidity Risk Reporting**
- **High Performance Cash Flow Aggregation and Key Figure Calculations**
- **Upload of Stressed / Unstressed Cash Flows for Current and Simulated Business**
SAP Liquidity Risk Management 1.0: solution architecture

Monitoring

LRM platform

Native analytic UI

Mobile

BI

Non-SAP

Key date(s)/matband/currency/scenario(s)/portfolio/filter

Calculation hierarchy

run off

max

min

roll over

f(x,y)

h(x,y)

Generated SQL

Select from special artifacts

Star schema around flat cash flow object

SQL script or extra joins for special logic, such as simulation

Scenario

- Market Data, e.g. Haircuts, FX rates
- Behavioural data
- ... on flexibly defined portfolios

What if?

- Market Data, e.g. Haircuts, FX rates
- Behavioural data
- ... on flexibly defined portfolios
SAP Liquidity Risk Management 1.0: Visualisation of LRM data and results

Direct connect to views on HANA DB also supported via standard protocols

Remarks:
* need BI query to access the ODP
** can not send parameters, i.e. ODP needs dedicated shell for each report
**FINSAPP** is a SAP Systems Integrator and SAP Partner, specialising in SAP HANA, Business Intelligence, Analytics, Predictive Modelling, Reporting, Database & Technology (Real-time data platform) and Mobile technologies.

We embrace BI trends and help our clients grow and prosper by unleashing the value of Big Data when utilised with the HANA database in order to anticipate future opportunities and risks.

Together we can;

- Discover the areas in your business in which HANA can deliver additional benefits and value
- Develop a target architecture for your business processes and the supporting applications, including HANA
- Derive the best transformation path to integrate HANA into your business
- Execute a business case for using HANA

We pride ourselves on our entrepreneurial vision, innovative thinking and creative ideas and continue to deliver projects to time, to budget, at lowest TCO and highest ROI (REAL VALUE), time and time again.
CONTACT

Stuart Holman
Managing Director

Mobile: +44 (0) 7974 773117

Email: stuart.holman@finsapp.com

Web: www.finsapp.com