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Exploring Liquidity Risk Management under the Basel III accord

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Overview – Liquidity Risk Management

Liquidity risk is a consequential risk and first seen in 2008 where it was preceded by a credit crunch. Currently (January 2013) the market is increasingly subject to uncertainty about sufficient liquidity.

LRM has just made an entrance in the Basel regulations and it came as a result of the 2008 credit crunch... Since then it is guiding almost all banking operations

What is liquidity Risk management

- Liquidity Risk is the risk of not having or being able to raise sufficient funds for the bank to meet it's payment obligations.
- Raising funds is usually achieved in 2 ways:
 - by increasing liabilities – borrowing (it's not always possible as the case in Europe at the moment) or
 - by converting assets to cash promptly and at a reasonable cost.

Overview – Liquidity Risk Management

Why is liquidity risk management important?

- If a bank is momentarily illiquid, regardless of future cash flows that will come in, it ceases business. So liquidity risk management is in part about keeping the bank in business.
- Proper Liquidity Risk Management can sometimes be costly, i.e. maintaining a large unencumbered liquid buffer can have a negative effect on the bank's profits.
- However, the more accurately a bank manages its liquidity, the more cost effectively the bank can operate:
 - with greater certainty;
 - fewer operational panics; and
 - less likelihood of having to apply to the central bank for emergency funds, which undermines confidence among customers, investors

Survival Horizon – Keeping the bank's business

- The survival horizon is a key indicator defining whether the bank can survive or not under a specific scenario,
 - Which in reality means to be able to continue its operations using current assets and liabilities.

- So how are institutions supposed to calculate their Survival Horizon??

Framework for calculating Survival Horizon

- Survival Horizon should be considered across 2 dimensions: *time* and *scenarios*.
- It is always applied on certain “*Business As Usual (BAU)*” assumptions on liquidity related risk factors.
- On top of the “BAU” scenario, the bank should stress these assumptions based on its specific activities and exposures in order to calculate the survival horizon under stressed conditions.

Valuing results across time: Case Study

- Imagine a BAU scenario of a Bank created by making assumptions for deterministic scenarios. For example the bank makes assumptions on
 - The runoff profile of deposits
 - The prepayment profile of mortgages
 - The drawdown profile of committed facilities
- These assumptions can and should be stressed under the Bank's stress testing framework.
- In addition, scenarios which stress the assumptions included in the BAU scenarios should also consider the dynamic evolution of the balance sheet across time.
- Balance sheet in reality is not static, and even as part of the BAU scenario certain products, such as repos are assumed to be rolled over.
- These rollover together with assumptions on the growth of the balance sheet are a key risk factor in liquidity stress testing.

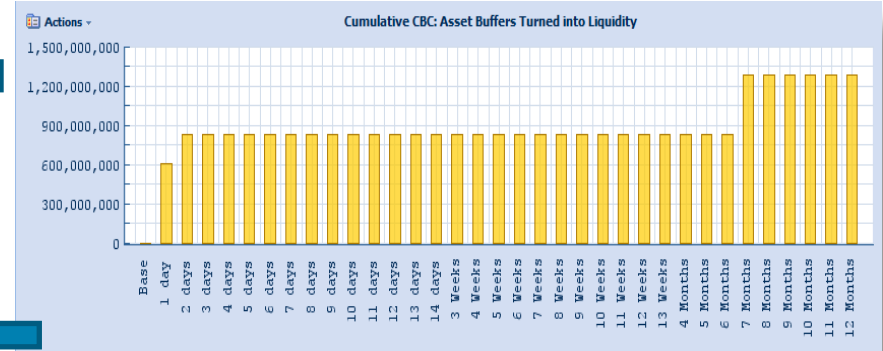
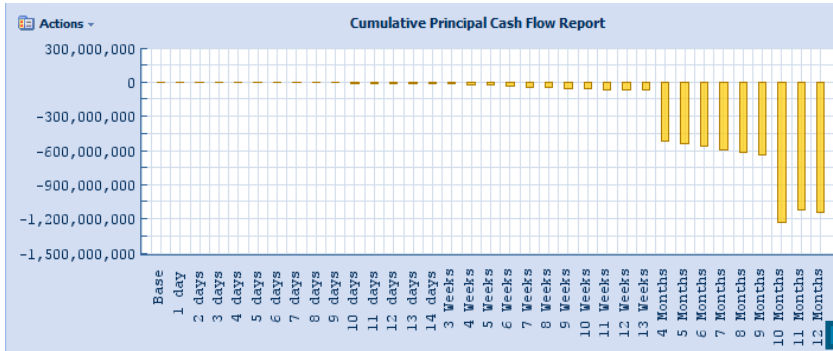
Analytics Calculated

- Total Cash flows = Principal Cash flows + Interest Rate Cash flows
- Forward Liquidity Exposure (FLE) = Cumulative Liquidity Gap
- Liquidity Gap = Total Cash Flow Assets – Total Cash Flow Liabilities
- Counterbalancing Capacity (CBC) = Cash + Central Bank Reserves + Balance Sheet Liquidity
- Balance Sheet Liquidity = liquidation of assets either by selling or repo
- Survival Horizon = first time t that $\text{Cumulative CBC}(t) + \text{FLE}(t) = 0$

Survival Horizon – For how long can a bank sustain a crisis under BaU?

Forward Liquidity Exposure:

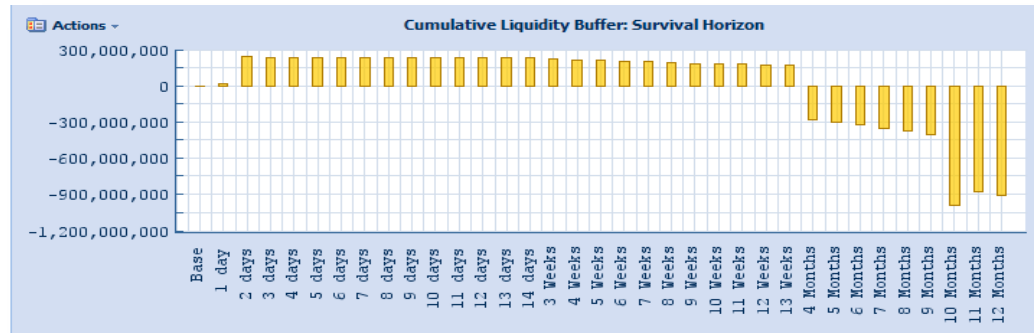
CounterBalancing Capacity (CBC):



First the bank needs to consider cash flows, both current and future in order to acknowledge the cash flow obligations that need to be funded within a specific time frame.

Secondly, the bank needs to consider the amount of funds that can be raised under a stress scenario from existing liquid assets.

Under a BAU scenario banks are usually less conservative, but under a stress scenario they can choose not to include growth assumptions in order to evaluate the sustainability of their balance sheet by using only what they currently have.



By adding the two, the financial institution can obtain the Survival Horizon and then determine how long it can survive.

Case study

time 0	CBC	FLE	SH	LCR	NSFR
BAU	4,000,000	2,000,000	13 weeks	102%	105%
Idiosyncratic	2,700,000	3,000,000	4 weeks	85%	90%
Market Wide	3,200,000	2,500,000	10 weeks	91%	101%

- Under the Business As Usual scenario, the bank seems to have a 13 weeks survival horizon with both LCR and NSFR over 100% which satisfy the regulator's requirement.
- Under the Idiosyncratic scenario, the survival horizon decreases to 4 weeks since the assumptions taken in BAU are stressed to consider worst case scenarios. In this case both the LCR and the NSFR are below the regulator's limit and therefore the Bank will face liquidity issues under the specific scenario.
- Under the market wide scenario the bank is in a better condition than in the idiosyncratic with a 10 weeks SH and NSFR above the 100% threshold and LCR almost over it.

Background– Liquidity Risk Management

Business

So far we have seen a number of cases of wrongly made or even non-existent at all Liquidity Risk Management.

Approx. 800 banks have gone bankrupt/taken over/bailed out since 2008.

Some more than once. Two or three times.

Therefore regulators had no option other than focusing on Liquidity Risk Management and principles for best practices around liquidity.

There is an extensive list of new regulations published in the last 5-6 years around new regulations and best practices for liquidity risk management from both international and local regulators.

Background– Liquidity Risk Management

International Regulation

- BCBS: International Convergence of Capital Measurement and Capital Standards, June 2004;
- BCBS: Principles for Sound Liquidity Risk Management and Supervision, September 2008;
- CEBS: Technical Advice on Liquidity Risk Management”, September 2008;
- CEBS: Guidelines on Liquidity Buffers and Survival Periods”, December 2009;
- European Parliament: Directive 2009/111/CE du Parlement Européen et du Conseil (CRD II), September 2009
- BCBS: International Framework for Liquidity Risk Measurement, Standards and Monitoring, December 2010.
- European Commission: CRD IV proposal, July 2011;
- BCBS: Monitoring indicators for intraday liquidity management, July 2012
- BCBS /GHOS Extending LCR phase in to 1st January 2019 and relaxing slightly the reqs for HQLA

Turkish Regulations

- Banking Act #5411 (November 2005)
- Regulation on Measurement and Evaluation of Liquidity Adequacy of Banks (November 2006, June 2007, January 2009)
- Regulation on the Internal Systems of Banks (November 2006, June 2007, November 2008)
- Regulation on Measurement and Evaluation of Capital Adequacy of Banks (November 2006, October 2007, March 2008)

Latest on Basel III

- Currently implementing the so-called Basel III Quantitative Impact Study (QIS)
- The QIS is used as a proposed guideline to the various Basel III measures for all risks, liquidity, capital, credit etc.
- Still has not been finalised...in February 2013, 5th version of the QIS has been issued by the Committee and made available for further comments and suggestions.
- Through the QIS, banks are required to calculate Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR).

LCR – Short Term Survival Horizon

- Defining a 30-days survival horizon by allowing to include only inflows and outflows occurring on the first 30 days.

$$LCR = \frac{\text{Stock of High – Quality Liquid Assets}}{\text{Total Net Cash Outflows over the next 30 calendar days}} \geq 100\%$$

where

$$\begin{aligned} \text{Total net cash outflows over the next 30 calendar days} \\ = \text{outflows} - \min\{\text{inflows}, 75\% \text{ of outflows}\} \end{aligned}$$

- The definition of the LCR is no different than the definition of the survival horizon.
- It is considering the stock of high-quality liquid assets, which is a kind of Counterbalancing capacity.
- And the Net Cash Outflows, which represent the Forward Liquidity Exposure
- Aims to ensure that a bank has an adequate stock of unencumbered high quality liquid assets (HQLA) – that is cash or assets that can be converted into cash at little or no loss of value – in order to meet its liquidity needs

LCR – Too strict to be sustained

- Originally LCR was to be applied at 100% by 2015...January 2013 Basel Committee has agreed a phase-in period for the 100% standard through a 5-year period

2015	2016	2017	2018	2019
60%	70%	80%	90%	100%

- Allowance for a larger set of assets to be defined as High-Quality Liquid Assets **BUT** up to the local regulator discretion.
- Level 2B Assets
 - Corporate debt securities rated A+ to BBB– with a **50% haircut**
 - Certain unencumbered equities subject to a **50% haircut**
 - Certain residential mortgage-backed securities rated AA or higher with a **25% haircut**
- Weights applied on inflows and outflows increasing and decreasing respectively to lessen restriction.
- Before it was almost impossible to maintain the 100% required.

NSFR – Long term Survival horizon

- NSFR is representing a long-term survival horizon by considering inflows and outflows occurring for the next year.

$$NSFR = \frac{\textit{Available Amount of Stable Funding}}{\textit{Required Amount of Stable Funding}} > 100\%$$

- Through the NSFR, the Basel committee is trying to ensure that long term assets (1-year term) are funded with at least a minimum amount of stable liabilities in relation to their liquidity risk profiles.
- NSFR was from its original definition bound to be introduced as a minimum measure from 1st January 2018, which still remains to be the case.

Basel III - Monitoring tools

- In addition to the two liquidity ratios outlined above, the Basel Committee has introduced a list of other metrics which capture information related to a bank's cash flows, balance sheet structure, available unencumbered collateral and certain market indicators.
- These metrics are:
 - ✓ ***Contractual maturity mismatch***: provides insight into the extent to which the bank relies on maturity transformation under its current contracts
 - ✓ ***Concentration of funding***: monitors both the absolute percentage of the funding exposure and any significant increases in concentrations.
 - ✓ ***Available unencumbered assets***: reports available unencumbered assets that are marketable as collateral in secondary markets and/or eligible for central banks' standing facilities.
 - ✓ ***LCR by significant currency***: monitors the LCR in significant currencies in order to capture potential currency mismatches.
 - ✓ ***Mark-related monitoring tools***: monitors potential liquidity difficulties through market data such as market-wide information, information on the financial sector and bank-specific information.

Basel III – Monitoring tools

Monitoring Tools	Objective
Contractual Maturity Mismatch	<ul style="list-style-type: none">➤ Identifies the gaps between the contractual inflows and outflows of liquidity for defined time bands➤ These maturity gaps indicate how much liquidity a bank would potentially need to raise in each of these time buckets in the worst possible scenario (i.e. all outflows occurred at the earliest possible date).
Concentration of funding	<ul style="list-style-type: none">➤ Identifies wholesale funding sources whose withdrawal could trigger significant liquidity problems.
Available unencumbered assets	<ul style="list-style-type: none">➤ Provides information on the quantity and key characteristics of banks' available unencumbered assets, which can potentially be used as collateral to raise additional secured funding and hence increase liquidity sources for a bank.
LCR by significant currency	<ul style="list-style-type: none">➤ Allows the bank and the supervisor to track potential currency mismatch issues that could arise.
Market-related monitoring tools	<ul style="list-style-type: none">➤ High frequency market data can be used as early warning indicators when monitoring potential liquidity difficulties at banks.

Liquidity Risk under BDDK (Banking Regulation and Supervision Agency)

- New regulations under Basel III have not yet been officially published for liquidity.
- However, the 2006 Regulation on Measurement and Evaluation of Liquidity Adequacy of Banks is defining certain ratios similar to the LCR and NSFR.
- These ratios are reported through 2 terms
 - First term: 0 – 7 days
 - Second term: 0 – 31 days

Liquidity Risk under BDDK in Turkey

- Total Liquidity Adequacy Ratio

$$\frac{\text{Liquid Assets} + \text{Cash Inflow Within 1 Week (Month)Maturity}}{\text{Cash Outflows 1 Week (Month)Maturity}} \geq 100\%$$

- Similar, to the LCR which considers the ratio between the bank's liquid assets and the net cash outflows.
- Foreign Currency Liquidity Adequacy Ratio

$$\frac{\text{FX Liquid Assets} + \text{FX Cash Inflows Within 1 Week (Month)Maturity}}{\text{FX Cash Flows Within 1 Week (Month)Maturity}} \geq 80\%$$

- Similar, to the Basel III LCR by currency monitoring tool that is required.

Liquidity Risk under BDDK in Turkey

- Assets and liabilities calculated over their stock values and hundred percent consideration ratio – Stock liquidity adequacy ratio

$$\frac{\textit{Stock Values of Liquid Assets Regardless of Maturity}}{\textit{Stock Values of Certain Liabilities Regardless of Maturity}} \geq 7\%$$

- This can be considered as a less conservative version of the NSFR where assets, i.e. required funding must be greater than the liabilities, i.e. the available funding.
- In reality, local banks which comply with the 3 existing liquidity adequacy ratios should be capable to comply with the Basel III liquidity ratios as well

Liquidity Risk – Drivers (Regulatory Compliance)

Stress testing Basel III: LCR – 30 days stress test NFR – 1 year stress test

Analyse liquidity across 9 risk drivers

Insufficient funding, correlations of products, no rollovers and stickiness depending on types of funding. All exit clauses exercised. Access to funds from “Central Bank”

Behavioural patterns, loss of consumer confidence, stickiness and product mix, unused overdrafts, credit cards max

Time delays in the disposal of the asset

Too high concentration of funding (credit rating, type of lender etc.)

Wholesale funding

Intra-group liquidity

Retail funding

Cross-currency liquidity

Off-balance sheet liquidity

Marketable assets

Non-marketable assets

Funding diversification

Restrictions on transferability. Each legal unit must be self sufficient if no approval obtained

Regional barriers for funding of net outflow in a currency

Committed lines: Securitisation
Undrawn loans & guarantees
Hedging

Increase in haircuts in collateral used as security, margin calls

Intra day Liquidity risk

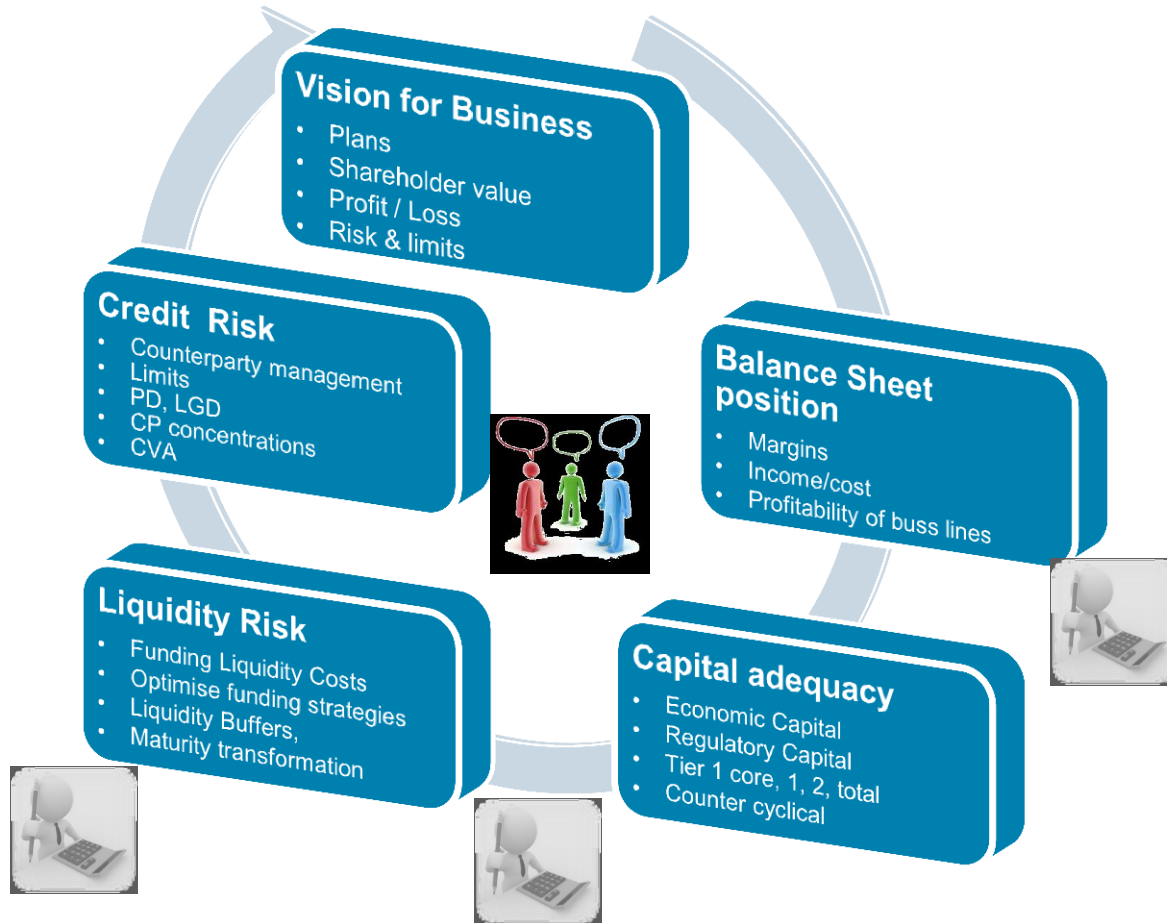
Requires that banks calibrate their liquid asset buffers considering their need for liquidity intraday, both in normal and stressed circumstances

Stress testing should incorporate what-if elements to increase the transparency of the results and identify liquidity bottlenecks

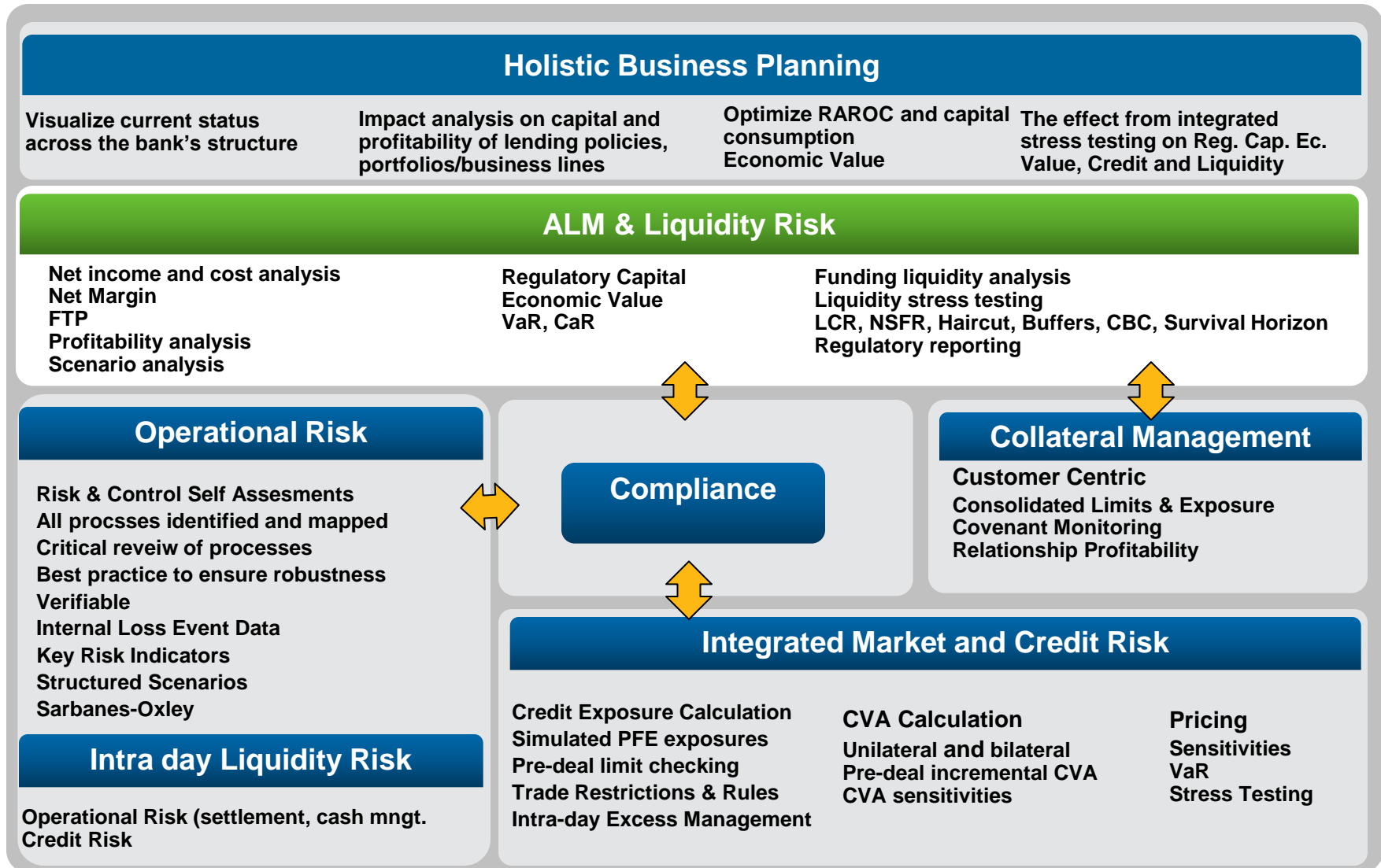
Liquidity Risk – Drivers (Business)



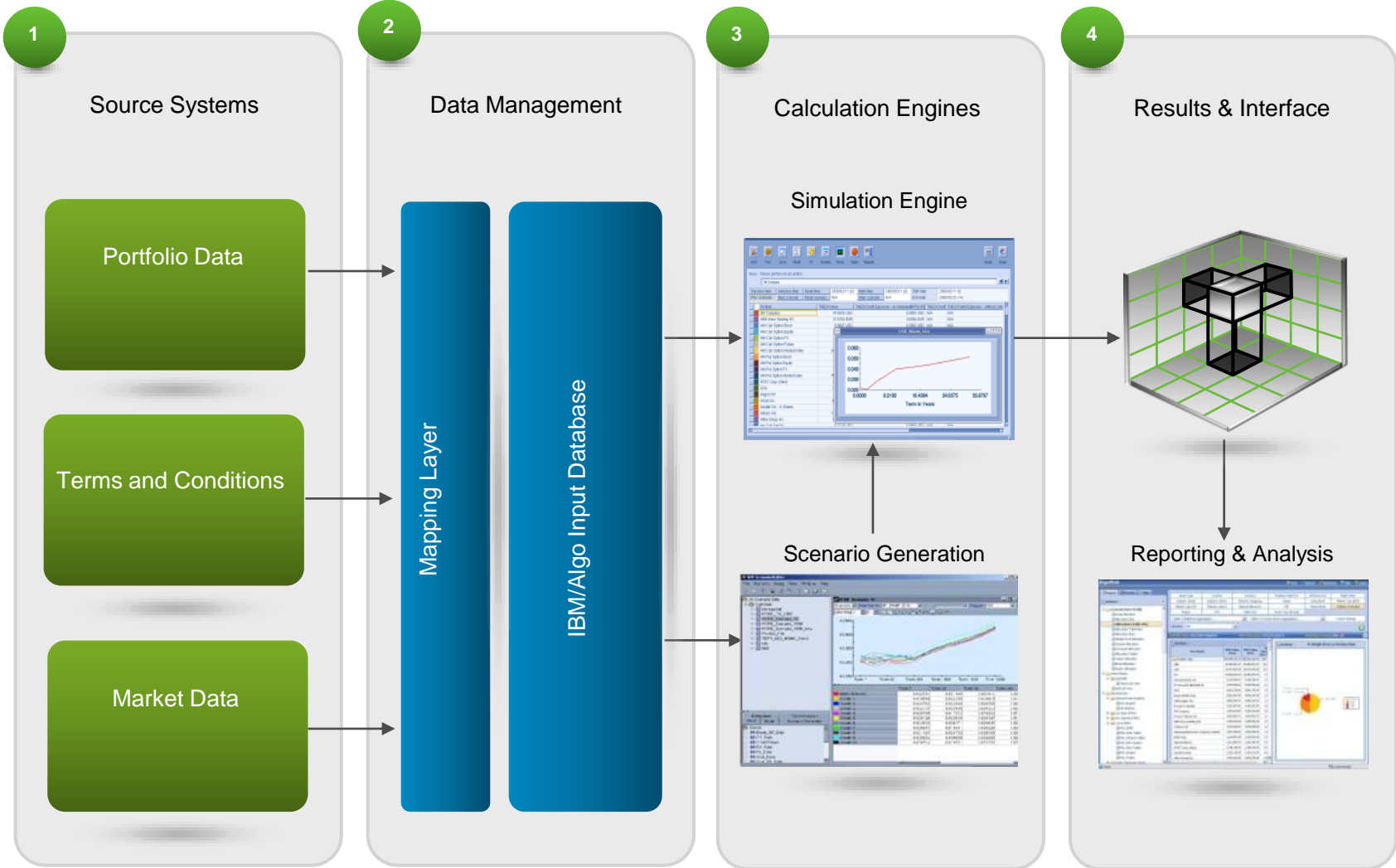
Iterative process



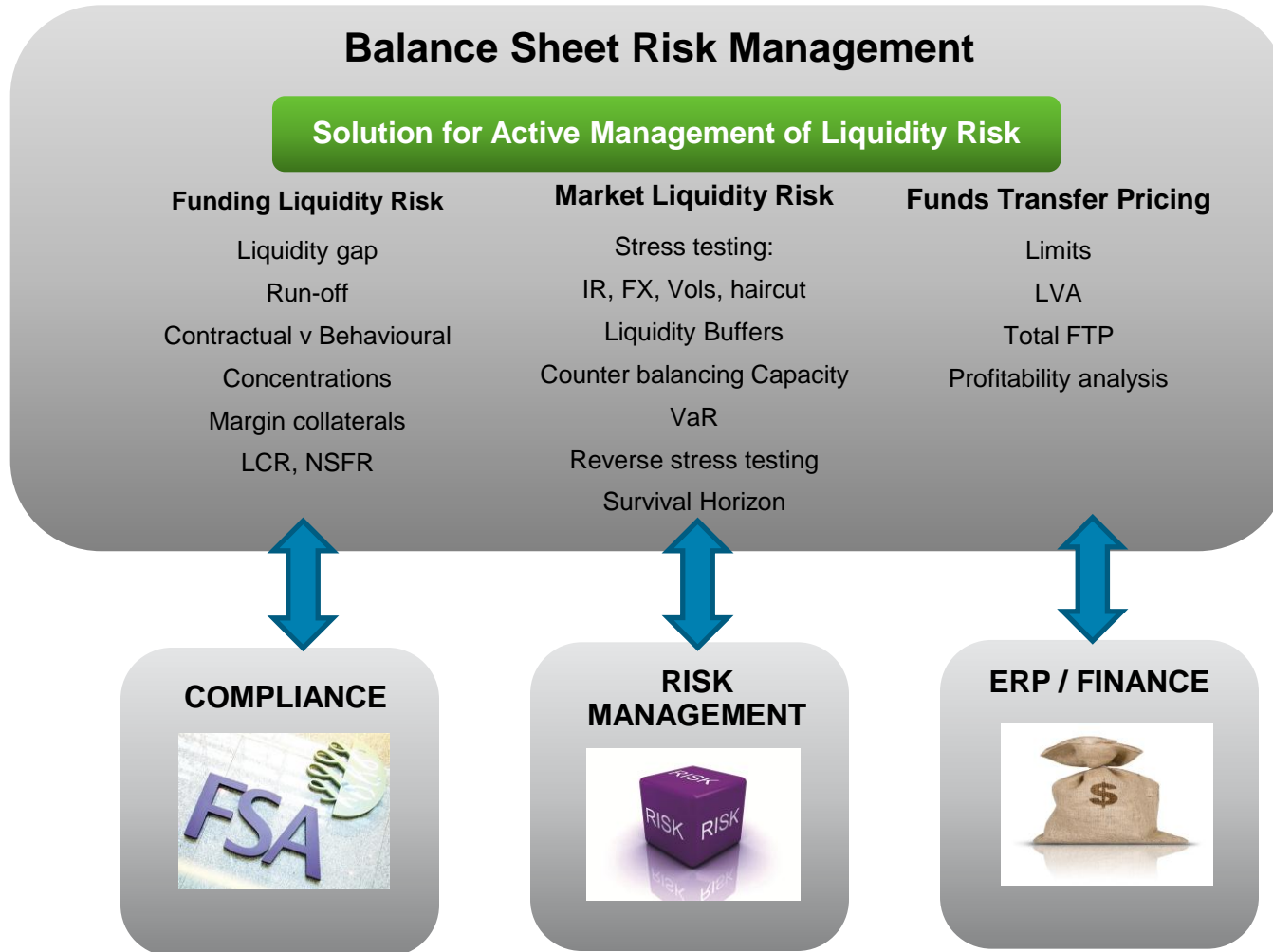
Liquidity risk: Part of Enterprise Risk Management



Building Liquidity Risk Management



Liquidity Risk – focus areas



Case Study – Belgian Bank

- Large Belgian Bank in early 2008
- June 2008 facing severe liquidity issues
- Sep 2008 bank nationalised, and parts are sold off
- Approximately €40bill injected/converted in the bank by Belgium, Luxembourg and Holland
- 2 notch down grade by credit bureaus
- Bank pays out dividend again for 2010 in Spring 2011
- Oct 2011 bank technically bankrupt again other parts are sold off
- Belgium guarantees €55bill
- Twice collapsed, three(3) bailed out in 3 years , (credit squeeze first, then no liquidity)

Case Study – Nordic Bank

- Bank imposed an internal stress test as the ESB based stress test was deemed to be inadequate.
- Assumptions:
 - Haircut on certain sovereign (Greece, Spain, Portugal and Italy) between 20% and 80 %
 - Credit defaults on losses on SME was 6%
 - Rollover of 50% of wholesale funding + 50 bpts
 - 2 Notch credit down grade - ISDA agreements re-negotiated
 - Profit of 14% on turnover was turned into a loss of 8% ie. Tier I capital disappeared
- Result: bank increased LCR to ~200% and Tier 1 to ~12%. Effect on profit: a decrease of more than 35% in profit.
- Long term consequences: decrease in cost and availability of funding. Leads to increase in profit.

Approx sanitised data

Liquidity Risk for Basel III - What to watch out for

Data Volumes

- It is widely acknowledged that compared to ALM, Liquidity Risk require less aggregated financial information in order not to lose information. This and the requirement for many more time buckets (daily as opposed to monthly) put some demand on a system ability to handle much higher data volumes.. Data pools in excess of 1 million are not uncommon.

Response Times

- Under Basel 3, there is a huge need for granular data processing.
 - Product categorization under LCR and NSFR is extremely detailed and hence requiring very flexible ETL processes.
- The ability to turn around analysis and reporting requirements quickly. Both periodic and ad-hoc

Stress testing is Risk based

- Combination of Stresses when testing is the most important aspect of Liquidity Risk Analysis. They must be able to accurately reflect the cashflow results of all parts of the balance sheet including complex instruments, behavioural analysis of product in a flexible and easy to use manner.

Consistency

- Consistency of results in particular between:
 - Finance and Risk
 - Capital and Liquidity

Transparency

- Transparency of results i.e. drill down to source data and assumptions

