Liquidity Management

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Liquidity Management

1. Definition of Liquidity
2. Sources of Liquidity Risk
3. Liquidity Governance
4. Liquidity measurement
5. Liquidity management
6. Basel III
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Credit risk vs. Liquidity risk

Credit: lend to people whom we think will repay

Liquidity: get funds from people who think we will repay

⇒ Liquidity is about keeping the trust of Funds providers

Historically credit and liquidity risks (not market) were the two major banking risks
Definition of Liquidity

Transactional Liquidity

vs.

Funding liquidity
Transactional Liquidity

Transactional (or Market) liquidity can be defined as the difference between the actual transaction price of an asset and its fundamental value.

This difference will arise from:
- Bid-Offer spreads
- Lack of market Depth
- Price anomalies
Funding Liquidity is the ability of the Bank to make payments as they come due, at reasonable cost and in a timely fashion:

\[
\text{Cash outflows}_t \leq \text{Cash inflows}_t + \text{Liquid assets}
\]

\[
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\]

\[
\text{FCE}_t \leq \text{Liquid Assets}
\]

Where \( \text{FCE}_t = \text{Cash outflows}_t - \text{cash inflows}_t \)

\[
\text{FCE} = \text{Forward Cash Exposure}
\]
<table>
<thead>
<tr>
<th>Types of Funding Liquidity risks</th>
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<tr>
<td><strong>Short-Term</strong>: ability to make payments as they fall due linked to credit risk</td>
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<tr>
<td><strong>Long-Term</strong>: Ability to obtain cost-effective long-term funding (market and retail sources) balance sheet structure</td>
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<tr>
<td><strong>Systemic</strong>: Functioning money and capital markets that provide access to short and medium-term funding systemic events, market confidence</td>
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</table>
Transactional and funding liquidity are not independent: traders provide market liquidity and their ability to do so relies on their funding liquidity.

Increased margins can be destabilizing and lead to a vicious circle (or liquidity spiral), whereby transactional liquidity and market liquidity become self-reinforcing.

Brunnermeier & Pedersen (Review of Financial Studies, 2008)
Transactional and funding liquidity

Liquidity Spirals

- Initial losses
- Funding problems
- Reduced positions
  - Higher margins
  - Losses on existing positions
- Prices move away from fundamentals
  => Volatility
Liquidity - currencies

Banks must be liquid in all their operating currencies (either through holdings in the currency or ability to enter FX or cross-currency swaps)
1/ Credit risk

Increasing credit spreads/Probabilities of Default reflect higher expected losses, which have to be funded

2/ Market risk (interest-rate risk)

Similarities in methodologies but a book may have zero interest rate sensitivity across buckets while still displaying liquidity risk
Interaction between Liquidity and...

3/ Operational risk

Operational losses have to be funded

4/ Capital

Capital is different from Liquidity
- Capital: balance sheet item, attached to an institution
- Liquidity flows from one institution to another, fluid

But the 2 concepts are linked: Liquidity management requires market confidence, which is enhanced by extra capital
Liquidity and Market confidence

Spread between 3-month Libor and 3-month Overnight Index swap is a good market proxy for the perceived health of the Banking system
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10 Sources of Liquidity Risk

1. Roll risk
2. Maturity Transformation risk
3. Funding concentration
4. Cross-currency
5. Intra-group liquidity
6. Franchise viability
7. Marketable asset
8. Non-marketable asset
9. Off balance sheet
10. Intraday liquidity
Source 1: Roll risk (wholesale funding risk)

Secured wholesale funding risk: the risk that deposits can only be rolled at increased haircuts

Unsecured wholesale funding risk (or roll risk): the risk that funding cannot be rolled at maturity

Roll risk can also be an issue for retail funds (Bank run)
Retail deposits often have instant access – contractual maturity of 1 day

Corporate loans often > 5 years, Mortgages 15+ years

⇒ This process (short-dated liabilities used to fund long-dated assets) is known as maturity transformation

Note that maturity transformation is not limited to Retail, e.g. securitization (Northern Rock)
Maturity transformation

3-month USD Libor 0.31%

USD Swap rates
20-Nov-12 Last
1-Year 0.33%
2-Year 0.37%
3-Year 0.45%
4-Year 0.59%
5-Year 0.78%
7-Year 1.17%
10-Year 1.66%
30-Year 2.53%

Overreliance on short-term funds to finance longer assets is the most common source of liquidity risk

⇔ Excessive maturity transformation
Northern Rock, 31/12/2006 contractual maturity mismatches by buckets

Source: Northern Rock annual accounts 2006
Diversifying funding sources will strengthen the liquidity position (increases stickiness of funds)

- In particular an overreliance on market funds (non-sticky) is to be avoided

Diversification should also apply to the instruments and markets used, as well as currency (when ability to swap)
Internationally active banks may be structurally long some currencies and short others

Cross-currency risk refers to Banks’ inability to make payments as they fall due in each currency

Ability to raise funds in a given currency:
- Directly
- Synthetically (via cross-currency swaps)
e.g. USD funding crisis for some European banks, 2011
Source 5: Intra-group liquidity

Group funding strategy and business structure may involve liquidity risk for some subsidiaries
- Excessive maturity transformation
- Trapped liquidity (due to regulation, jurisdictions)
- Intragroup guarantees

Regulation focus on individual subsidiaries
Source 6: Franchise viability

The risk that the Bank may have to make payments to maintain its reputation and franchise in some activities

Or that the Bank may have to continue certain activities for fear of losing a viable business

e.g. support (implicit or explicit) to Special Purpose Vehicles
Source 7: Marketable Asset

Relates to the liquidity value of buffer assets

Liquidity can be generated from assets in one of two ways:

- Sale of asset -> price risk
- Use of asset as collateral for secured funding (e.g. repo) -> haircut risk
Source 8: Non-marketable Asset

Relates to ability to obtain cash from less liquid assets
  e.g. securitizations

Significant lead time if a conduit not already in place
Source 9: Off Balance Sheet risk

Unexpected cash-flows arising from derivatives instruments (e.g. Ratings downgrade may trigger close-out under ISDA), or undrawn retail credit lines (e.g. credit card)

Explicit or ‘soft’ guarantees to Special Purpose Vehicles
The risk that the Bank has insufficient collateral to participate in payment, clearing and settlement systems
# Overview of Liquidity framework

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<th>Basel Committee on Banking Supervision – Principles for Sound Liquidity Risk Management &amp; Supervision</th>
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## Fundamental principle
- Establish a robust liquidity risk management framework that ensures it maintains sufficient liquidity, to withstand a range of stress events

**Principle 1**

## Governance
- Clearly articulate a liquidity risk tolerance
- Develop a strategy, policies and practices to manage liquidity risk in accordance with the risk tolerance
- Incorporate liquidity costs, benefits and risks in the internal pricing, performance measurement and new product approval process

**Principle 2, 3, 4**

## Measurement and management
- Projecting cash flows - assets, liabilities and off-balance sheet
- Actively monitor and control across legal entities, business lines & currencies
- Diversification in the sources and tenor of funding
- Actively manage its intraday liquidity and its collateral positions
- Conduct stress tests for a variety of short-term and protracted institution-specific and market-wide stress scenarios
- Have a formal contingency funding plan
- Maintain a cushion of unencumbered, high quality liquid assets

**Principle 5, 6, 7, 8, 9, 10, 11, 12**

## Disclosure
- A bank should publicly disclose information on a regular basis that enables market participants to make an informed judgement about the soundness of its liquidity risk management framework and liquidity position

**Principle 13**

## Supervision
- Comprehensive assessment of a bank’s overall liquidity risk management framework & liquidity position for resilience
- Review quantitative reports and market information
- Intervene as necessary to address deficiencies
- Regular supervisory communication

**Principle 14, 15, 16, 17**

Source: Ernst & Young
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Liquidity Risk Tolerance

“A bank should have a clearly articulated Liquidity Risk Tolerance”, *BCBS Sounds principles, principle 2*

- Must be in line with overall Risk Appetite, business objectives and funding capacity
- Costs and benefits of the chosen Risk Tolerance must be understood by all in the organization
- The statement must make clear why the Bank has this risk tolerance and why it is appropriate

Risk Tolerance will be expressed both qualitatively and quantitatively (through, for example, the definition of a survival horizon under stress)
Liquidity Risk Appetite

Risk Capacity

+ **risk tolerance**: breakdown of appetite at per risk category and business unit

+ **risk limits**: set maximum level for key risk metrics across organization
Liquidity Risk Appetite

Target Survival horizon: function of business model, culture and of the stress situation

Liquidity is not free – it has an opportunity cost (not unlike capital)

Risk appetite, together with regulatory Liquidity requirements and stress tests, forms a system that Banks need to manage
Risk Appetite / Tolerance

LIQUIDITY MANAGEMENT

Liquidity measurement and regulatory standards

Stress Tests

 Defines Buffer size
Risk Tolerance

The liquidity Management framework must be approved by the Board in accordance with the Risk Appetite
- Risk Tolerance of the Bank must be revisited and approved by the Board on an annual basis as a minimum

Senior management should report regularly to the Board on the Bank’s liquidity position
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3. Liquidity Governance
4. Liquidity measurement
   1. Gap Analysis
   2. Modeling uncertain cash-flows
   3. Other metrics
5. Liquidity management
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Business as Usual AND Stressed environment

- Base Liquidity Gap Analysis
- Stress Assumptions

Stressed Gap Analysis

Is survival horizon > Target for this scenario?
The funding matrix is an overview of the cash-flow profile of the Bank’s assets and liabilities

Basis for Gap Analysis

Must contain all cash-flows: contractual or expected (behavioral assumptions can be made when no certainty)
Gap Analysis

Gap analysis is used for both interest rate and liquidity risk management, with a different focus:

- Gap analysis for interest rate risk: assets and liabilities are placed in the buckets when they re-price
- Gap analysis for Liquidity: assets and liabilities placed in the buckets when cash-flows take place

Example:

- A 1-year $100m syndicated loan based off 6-month Libor will be placed in the 6-month bucket for IR Gap analysis but in the 1-year bucket for liquidity analysis
Gap Analysis format: OCC
Uncertain cash-flows must be modeled – the uncertainty can relate to the amount of cash-flow, the timing of the cash-flow, or both.

<table>
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<th>Known Timing</th>
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<td>Known Amount</td>
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Behavioral assumptions must be made to model uncertain cash-flows

Contractual information highlights the risk, modeling helps accurate measurement and decision-making

Assumptions must be made with regards to:
- Prepayment rates
- Roll rates
- Undrawn commitments
Modeling uncertain cash-flows: mortgage example

A customer has a mortgage struck at rate $M$

The market rate of the mortgage is $R$

- If $R < M$ there is an incentive for the customer to prepay
- If $R = M$ there is no rate incentive but there will be some prepayments
- If $R > M$ there is a disincentive to prepay, yet some prepayments will still take place (due to moving houses, death…)

$\Rightarrow$ A prepayment ‘curve’ must therefore be assumed

Note that the outstanding life of the mortgage will also influence prepayment behavior
Modeling uncertain cash-flows: mortgage example

Once a prepayment behavior is assumed the resulting expected cash-flows will feed into the Gap analysis.

Several prepayment curves may be assumed (corresponding to business as usual as well as stressed situations), each leading to a different cash-flow forecast.
Cash-flow forecasts are very assumption dependent

A forecast always reflects just one liquidity situation, corresponding to its set of assumptions

There should also be Trend reports – for example on maturity transformation factor
- **Data**
  - Must be able to aggregate cash-flows across systems and business units
  - Historical data to support behavioral assumptions: prepayment history, rollover history…

- **Granularity**
  - BCBS suggests o/n, 1/2w, 1/3/6m, 1/3/5y
  - Granularity depends on business model (less granularity required for banks with retail and small business deposits compared to investment bank)
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Funding diversification

The ‘stickiness’ of funds refer to their tendency not to run-off in times of a stress

Different types of funds will display different stickiness characteristics

⇒ It is therefore essential to maintain a diversified mix of sources of funds

In particular, overreliance on market funding is to be avoided
Determinants of Funds stickiness

The level of market funds stickiness is a function of:
- The interest rate sensitivity of the funds provider
- The credit sensitivity of the funds provider

The level of retail funds stickiness is, in addition to the above two factors, also sensitive to:
- The existence, or not, of a deposit insurance scheme
- Whether the funds are controlled directly by the customer or through an agent
- Size of account (small more sticky)
- How long the customer has been with the bank
- Whether an online facility is attached to the account
- How the funds were acquired (funds obtained by paying top rates: less sticky)
Market Funding

The last decades have seen greater use of market funding.
Market funding is less ‘sticky’ i.e. more responsive to changes in interest rates or credit quality.

There is a tendency, in good economic times, to overstate market funding stickiness.
The greater the proportion of market funding, the more sophisticated a firm’s liquidity management system will need to be.

Banks must understand the sensitivities of their funds providers and concentrations of funding sources.
Diversification: Finance theory tells us it always pays to diversify. Whilst this principle is valid in a Liquidity context, caution must be applied:

- ‘Reactive’ Funds providers (Money-market funds, pension funds etc) will likely all withdraw funding together in stress situations
- Retail funds are more ‘sticky’

=> Diversification of market sources may not achieve as much as one might think, whilst concentration on retail funds should be encouraged
Funding diversification

The tenor of funding should also be diversified

The higher cost of longer funds (in a rising yield curve) must be balanced against the associated liquidity benefits.

This tradeoff will be influenced by the Bank’s liquidity risk appetite
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Intraday Liquidity

Individual payments throughout the day have to be settled on a gross basis (RTGS)
- These payments can be much larger than the end of day position

Whilst inflows can be reused, timing differences mean that intraday Liquidity will be needed

Clearing Banks: meet these liquidity needs with their own funds
Other institutions will need to either pre-place collateral with clearers or have an intraday credit line
Intraday Liquidity

Double duty collateral: the use of prudential assets to cover intraday liquidity needs

Collateral needed to support intraday activities should not be part of Liquidity Buffer (will be needed again the next day)
Intraday Liquidity

Banks should focus on better management of intraday collateral:

- When liquidity was considered ‘free’ tendency was for too much intraday collateral
- Liquidity has a cost => better intraday collateral management will save costs

Changes in intraday collateral needs should be anticipated and stressed:

- Volume of intraday transactions may increase in stressed conditions
- An increase in rates/ credit spreads may decrease the value of the intraday collateral, meaning we need more
Case Study: Lehmann Brothers
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Funds Transfer Pricing (FTP)

The FTP of a Bank has the following objectives:
- Transfer all interest rate risk to a central unit, where it can be measured and managed
- Product pricing
- Profit allocation between business units
- Allocate liquidity costs to individual transactions:
  - Maturity mismatch cost (cost of rollover risk)
  - Contingent liquidity risk (e.g. ‘soft’ guarantees)
  - Cost of holding Liquidity Buffer to support the transaction
A clear and widely understood FTP system foster good decisions in business units and risk culture across the Bank

“Selling only fairly-priced products can be considered to be a major criterion for the long-term functioning of an institution” CEBS, Guidelines on Liquidity Cost Benefit Allocation, 10/2010
A weak FTP system will likely lead to poor liquidity situations, e.g.

- Excessive maturity transformation (long-term assets funded by short-term liabilities)
- Concentration of long-dated illiquid assets
- Cost of ‘soft’ guarantees not priced in
We look at 3 approaches to Funds Transfer Pricing:

- Net Funding
- Cost of funds
  - Zero cost of funds
  - Average cost of funds
  - Dual cost of funds
- Matched Maturity
Net Funding approach

Business Units approach Central Treasury with surplus funds/ deficits, which are charged at a flat money market rate
Net Funding approach: example

Liquidity risk management is delegated to individual businesses
The FTP rates should be set such that the Bank’s funding level and indirect liquidity costs (or benefits) are reflected.
FTP: Zero cost of funds approach

Involves using the swap curve (used to manage interest rate risk) for LTP. Also called the Base or Reference curve.
FTP: Zero cost of funds approach

The credit-worthiness of the institution is not taken into account.

The fund consumer (assuming the bank is funding at a positive spread to Libor in the market) is being charged less than the Bank would pay in the market!

The fund provider is penalized

No credit is given to the liquidity provider and no cost is charged to the liquidity user

=> Encourages holding long-dated illiquid assets and short-dated associated liabilities, i.e. high level of maturity transformation
FTP: Average cost of funds approach

A weighted average cost of funds (usually on a monthly basis) is calculated and added to the Swaps curve.

Spread = average cost or benefit of funds
A bid-offer spread can be added to reflect the cost of managing the Bank liquidity in the market.
FTP: Average cost of funds approach

Unique spread => No incentive to provide long-term liabilities
Based on historical data, hence not reactive
FTP: Matched maturity method

The true funding curve of the institution is taken into account, using market information (CDS spread or Asset Swap spread), for each maturity.

The bid-offer is added, as well as liquidity adjustments.
FTP: matched maturity method

FTP rate vs. T

- Asset swap curve
- Average cost of funds curve
- Swap rate curve
FTP Rate components

<table>
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<th>FTP Rate</th>
<th>Liquidity Adjustments:</th>
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<tr>
<td></td>
<td>- Roll-over risk</td>
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<td></td>
<td>- Contingent liquidity</td>
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<tr>
<td></td>
<td>(including cost of holding buffer assets)</td>
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<td></td>
<td>- Individual assets’ liquidity</td>
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<tr>
<td>Bid-Offer spread</td>
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<td>Bank funding spread</td>
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<td>Swap rate</td>
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</table>
Bank funding spread

The Bank’s funding spread will depend on the credit-worthiness of the institution as well as the seniority of the instruments used to raise money

=> Different FTP rates/curves for different seniority of claims
FTP: Matched Maturity Method

The FTP unit centralizes the measurement and management of interest rate and liquidity risk.

The Matched Maturity method is current Best Practice for FTP.
Liquidity Adjustments

For a FTP to be effective, unknown cash-flows must be modeled (so as to use distribution of likely amounts / timings to determine the FTP rate)

For contingent liquidity risk, it is best to impose a scenario model, the results of which will feed into the Transfer price
Liquidity was virtually free in the years prior to the crisis; some institutions wrongly believed it would always be so.
Shareholder Report on UBS's Write-Downs, April 2008:

“Low cost of funding: Given the internal funding rates in the UBS Funds Pricing Policy as it existed at the relevant times, UBS's businesses generally were able to fund themselves internally at prices that were better than those available in the market.

Lack of differentiation between liquid and illiquid assets / term funding: The internal funding framework as it operated pursuant to the Funds Pricing Policy did not create sufficient incentives for the businesses to match funding or to distinguish liquid and illiquid assets. Effectively, the full benefit of UBS's ability to obtain funding at a relatively low cost in the market was passed through to the business, without any adjustment to reflect the nature of the relevant business activity.”
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Liquidity Buffer

The Buffer is a Liquidity reserve

Liquidity can be obtained by either selling the Buffer assets or borrowing funds secured on those assets

⇒ The Buffer is our liquidity hedge

Liquidity management therefore involves managing the Buffer, but also the cash inflows and outflows

In other words,

Counterbalancing capacity = Buffer + secondary sources of liquidity (actions to reduce outflows or increase inflows)
Liquidity Buffer - Composition

Assets in the Buffer must be:
- Unencumbered, i.e. not funded by repos but through term funding
- Uncorrelated to the institution
- Liquid! Can be turned into cash in no more than a day

Assets are expected to retain both value and liquidity in stress environments
Liquidity Buffer - Composition

The Liquidity Buffer should not be constructed to chase yield.

There should be a regular turnover of Buffer Assets – via sale or repo.
- Otherwise there is a danger that sudden sale/repo activity is interpreted as a sign of stress.
Liquidity Buffer - Size

The size of the Buffer is determined by the outcome of the chosen stress scenarios that the bank should survive, in accordance with the Bank’s risk appetite.

The Buffer should not include collateral needed to support intraday activity.
Managing the Counterbalancing capacity

Tools to manage the Counterbalancing capacity:
- Enhance liquidity of Buffer
- Decrease cash outflows
- Increase cash inflows
- Manage funds providers’ confidence
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Stress Testing

Top Down

Reverse Stress Tests

→

Scenario Analysis

→

Sensitivity Analysis

Bottom Up

Define:

- KRIs
- Limits on KRIs
- Triggers

Contingency Plans
Stress Testing

Stress Testing is the central pillar of Liquidity risk management

Stress tests must cover a wide range of severity and time horizons
The Risk Appetite will determine the severity of the stress tests the Bank should withstand, via a target survival horizon.

An increase to the severity of Stress tests leads to a larger required Liquidity buffer, hence higher cost of Liquidity.

⇒ Tradeoff between Liquidity Risk Appetite and cost
Sensitivity Analysis

Looks at the impact of a change in risk factors or economic variables, e.g. runoff rates for deposits, haircuts, shift in yield curve, fall in house prices.

Sensitivity stresses are quick to run and easy to understand and analyze (establishes direct link between risk factor and outcome).
Scenario analysis

- Institution-specific shock
- Market-wide dislocation
- Combination of the two

Firms will choose 3 to 10 scenarios suitable to their firm
Scenario analysis

For each scenario:
- Several levels of severity will be assumed: mild, severe, crisis
- Outcome will be looked at before and after management action

So 6 stress tests for each defined scenario
Stress testing: reverse stress tests

Event-driven stress test

1. Specify an event and the corresponding moves in risk parameters
2. See the impact of this move on the portfolio P/L

Reverse Stress Test

1. What combination of risk parameters would lead to a given portfolio loss?
2. What events could cause this move in risk parameters?
Multiple Stress Levels - Severity

No stress – Green

Mild Stress – Yellow
- Bank’s credit spread rises
- Unsecured borrowing capacity decreases
- Secured borrowing capacity unaffected

Medium Stress – Orange
- No unsecured borrowing capacity
- Secured borrowing capacity affected

Severe stress – Red
- Loss of secured borrowing capacity (lack of eligible collateral)
Stress tests need to look at both acute short-term (1 week to 30 days) and lasting disruptions (up to 1 year or more)
Survival Horizon

The bank’s Survival Horizon (SH) measures how long the bank can meet its obligation given the current Buffer size ($B_0$) and stressed inflows and outflows.

$$SH_0 = \max \{ n \mid \sum_{t=0}^{n-1} FCE_t \leq Buffer_0 \}$$

Survival Horizon can be thought of as the current Buffer Life given our stress assumptions.
Sensitivity to Assumptions

Within a given stress test, some assumptions, given the Bank business model, will be far more critical than others.

⇒ Identify these by looking at the sensitivity of the stressed outcome to individual assumptions.

- Hold all assumptions constant except one, for which you make a change.
- Look at the impact on the survival horizon.
- Repeat for all assumptions.
Reverse stress test

What deterministic scenario would lead to a failure of the Bank?

Intended to capture ‘Black Swan’ events
Stress testing: reverse stress tests

Event-driven stress test

1. Specify an event and the corresponding moves in risk parameters
2. See the impact of this move on the portfolio P/L

Reverse Stress Test

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Define Key Risk Indicators

Define triggers for each KRI and associated actions (culminating in invoking Contingency Plan).

Use Scenario analysis to identify KRI and triggers

Also Maturity Transformation factor = Average Duration of Assets / Average Duration of Liabilities
Level, evolution, comparison to long-term average
Key Risk Indicators

Possible KRI:
1. Credit Rating downgrade
2. Large adverse change in cost of funding
3. CDS spread increase
4. Maturity transformation factor
5. Unexpected demands for cash on contingent liabilities
6. Collateral issues: increased amounts/haircut or increased number of disputes
7. Macroeconomic indicators e.g. GDP
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Contingency Planning

“In particular, the first few days of any liquidity problem are crucial”, BIS principle 5

⇒ An impending liquidity crisis must be quickly identified and actions must be taken swiftly

⇒ Advance planning + Early warning signals (KRI triggers)
Contingency Planning

Features of a credible Contingency Plan:
- Board approved
- Clear actions and responsibilities
  - Named executives per action, clearly defined roles
  - Trigger levels for KRI and associated actions
  - Alternative sources of liquidity
- Separate actions for different types of crisis
  - Crisis can take many forms so actions will vary e.g. responses to idiosyncratic crisis will differ from responses to systemic ones
- Clear Communication
  - Internal and external -> prevent contagion
Contingency Planning

Features of a credible Contingency Plan:
- Must be regularly tested
- Considers intraday payments
- Have clear KRI's (Key Risk Indicator) and associated triggers, together with escalation mechanism
- Must be specific: amount and timing
Contingency Planning

The CFP (Contingency Funding Plan) should be reviewed and amended on a regular basis:
- At a minimum once a year, or more often if events dictate it

Banks which operate in several currencies must have a CFP per currency.
Link between Stress Testing and CFP

- Actions stated in the CFP should be the management actions considered in the stress tests
  - Actions and contingency funding must be quantified

- Stress Tests sensibility analysis will highlight the Key Risk Indicators, with trigger points that invoke the CFP

- Both stress tests and CFP must be regularly tested
Liquidity Case studies

Northern Rock

LTCTM
1. Definition of Liquidity
2. Sources of Liquidity risk
3. Liquidity Governance
4. Liquidity measurement
5. Liquidity management
6. Basel III
Rationale for liquidity regulation

Liquidity is expensive and firms have target return on assets (or equity)
- Liquid assets low-yield
- Temptation to favor holding illiquid, higher-yielding assets to achieve target

Moral hazard
- Banks have limited liability but have large social externalities
- May rely on Central bank / government rescue
LCR: Banks to hold Liquidity Buffer that is sufficient to cover net cash outflows over a 30-day stress situation (assumptions specified by regulators)
  - Combination of systemic and bank-specific stress

NSFR: puts severe constraints on maturity transformation
LCR = $\frac{HQLA}{NCOF} \geq 100\%$

HQLA: Stock of High Quality Liquid Assets
NCOF: Total net cash outflows over a 30-day stress scenario

The LCR threshold must be met:
- in each operating currency
- In each legal entity

Banks must also make regulators aware of any significant mismatch within the 30 days
HQLA
- Level 1: cash, central bank reserves, debt securities with 0% risk-weight
- Level 2 assets include assets qualifying for 20% risk weight, other qualifying debt and securitized assets, as well as some equity

NCOF
- Net stressed cash outflows
- Liabilities multiplied by their stressed run-off rates
- Stressed Inflows

See BCBS Document, Annex 4, 01/2013
## LCR Example

<table>
<thead>
<tr>
<th>ASSETS</th>
<th>Factor</th>
<th>LIABILITIES</th>
<th>Runoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>cash</td>
<td>20</td>
<td>100% equity</td>
<td>40</td>
</tr>
<tr>
<td>Treasurys</td>
<td>40</td>
<td>100% retail deposits</td>
<td>250</td>
</tr>
<tr>
<td>corporate bonds</td>
<td>90</td>
<td>85% small business deposits</td>
<td>30</td>
</tr>
<tr>
<td>commercial loans</td>
<td>200</td>
<td>0% overnight interbank deposits</td>
<td>100</td>
</tr>
<tr>
<td>mortgages</td>
<td>100</td>
<td>0% central bank borrowings</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>450</td>
<td></td>
<td>450</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HQLA</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>level 1</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>level 2A</td>
<td>76.5</td>
<td>40</td>
</tr>
<tr>
<td>level 2B</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

| Adjustment        | -36.5 Level 2 assets capped at 2/3 * Level 1 |

\[
\text{HQLA} = 100
\]

<table>
<thead>
<tr>
<th>NCOF</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Outflows</td>
<td>116.25</td>
</tr>
<tr>
<td>Inflows</td>
<td>12 Assumption</td>
</tr>
</tbody>
</table>

\[
\text{NCOF} = 104.25
\]

\[
\text{LCR} = 95.9\%\]

LCR below threshold, action needed
LCR Example – alternative remedies

LCR < 100% => Action is needed
Consider the following 3 actions – do they solve the problem?

1. Overnight borrowing

2. Term borrowing (>30d)

3. Central bank discount window (assume 25% run-off)
Net Stable Funding Ratio (NSFR)

\[ NSFR = \frac{\text{Available amount of stable funding}}{\text{Required amount of stable funding}} \geq 100\% \]

Stable funding: reliable source of funds over a one-year horizon under extended stress

Required Amount of stable funding: function of the liquidity characteristics of the assets held + contingent exposures
Basel III – Timing

LCR comes into application on Jan 1\textsuperscript{st} 2015, with phased in thresholds:

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

NSFR
Currently planned in 2018 – could be delayed
- Contractual maturity mismatch
- Concentration of Funding
- Available unencumbered assets
- LCR by monitoring currency
- Market-related monitoring tools

See attached extract from BCBS document
The liquidity standards should be used on an ongoing basis internally

Monthly reporting frequency as a minimum but capacity must exist to increase frequency to weekly or daily in stress situations
Basel III: QIS Dec 2011

Weighted-average LCR:
- Group 1 Banks: 91%
- Group 2 Banks: 98%

Weighted-average NSFR:
- Group 1 Banks: 98%
- Group 2 Banks: 95%

Situations vary greatly – Bank business models, geography
## European Banks

€tn, EBA estimates Dec. 09 Jun.11

<table>
<thead>
<tr>
<th>Category</th>
<th>Dec-09</th>
<th>Jun-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsecured retail and small business customers</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Unsecured non-financial corporates</td>
<td>0.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Unsecured financial institutions</td>
<td>1.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Unsecured sovereign, central bank, public sector entities (PSEs) and other counterparties</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Secured funding</td>
<td>0.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Collateral, securitisations and own debt</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Credit and liquidity facilities</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Other cash outflows including derivative payables 0.4 0.3 -0.1</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Total outflows (*)</strong></td>
<td><strong>4.3</strong></td>
<td><strong>5.8</strong></td>
</tr>
<tr>
<td>Retail and small business customers, Non Financial Corporates and Other Entities</td>
<td>0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>Financial institutions</td>
<td>0.4</td>
<td>0.7</td>
</tr>
<tr>
<td>Secured lending</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Other cash inflows including derivative receivables 0.4 0.0 -0.4</td>
<td>0.4</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total inflows without 75% cap</strong></td>
<td><strong>1.4</strong></td>
<td><strong>1.8</strong></td>
</tr>
<tr>
<td><strong>Total inflows with 75% cap</strong></td>
<td><strong>1.2</strong></td>
<td><strong>1.8</strong></td>
</tr>
<tr>
<td><strong>75 % cap impact</strong></td>
<td><strong>0.2</strong></td>
<td><strong>0</strong></td>
</tr>
<tr>
<td><strong>HQLA</strong></td>
<td><strong>2</strong></td>
<td><strong>2.8</strong></td>
</tr>
<tr>
<td><strong>LCR</strong></td>
<td><strong>67%</strong></td>
<td><strong>71%</strong></td>
</tr>
<tr>
<td><strong>LCR Shortfall (€tn)</strong></td>
<td><strong>1</strong></td>
<td><strong>1.15</strong></td>
</tr>
</tbody>
</table>

**Source:** EBA
## European Banks

**JP Morgan survey (as of end 2010) estimates**

<table>
<thead>
<tr>
<th>Estimates Dec-31, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spain (average = 224%)</strong></td>
</tr>
<tr>
<td>Santander 244%</td>
</tr>
<tr>
<td>BBVA 204%</td>
</tr>
<tr>
<td><strong>Switzerland (118%)</strong></td>
</tr>
<tr>
<td>Credit Suisse 127%</td>
</tr>
<tr>
<td>UBS 107%</td>
</tr>
<tr>
<td><strong>UK (88%)</strong></td>
</tr>
<tr>
<td>HSBC 108%</td>
</tr>
<tr>
<td>Standard Chartered 101%</td>
</tr>
<tr>
<td>Barclays 80%</td>
</tr>
<tr>
<td>RBS 78%</td>
</tr>
<tr>
<td>Lloyds 71%</td>
</tr>
</tbody>
</table>
Basel III – Some unintended consequences?

- More stringent regulation reduces diversity in banks’ business models => Banks become more correlated

- Basel III and Monetary policy: In Europe LTRO round 2 (Long Term Refinancing Operation) injected EUR0.5trn into the system… but bank deposits with ECB over that period increased by the same amount due to Banks’ concerns over LCR => Is regulation in danger of negating monetary policy?

- Runoff assumption: Retail=5%, Markets=10% => Banks favor Retail deposits => Interbank market not properly functioning

- Buffer may comes at the expense of lending. Need to balance regulation benefits vs. consequences