Lecture

Regulatory Challenges in Financial Markets: from Banking and Insurance to Blockchain

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Spring Term 2023, Session 03

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Universität Zürich[UZH]

Aims

- The course aims to:
  - introduce the fundamental facts on the Basel regulatory regime
  - and on SST (Swiss Solvency Test)
  - and to analyse the impact of new technologies like blockchain on the existing regulatory frameworks for banks and insurers.

Content

- Three big chapters
- Chapter 1:
  an introduction to the on the Basel regulatory regime for banks
- Chapter 2:
  an introduction to the Swiss Solvency Test for insurers
- Chapter 3:
  regulation aspects on blockchain and new technologies
- one session dedicated to preparation for the exam

Chapter 1.3: Banking

Invited Guest Lecturer:
Dr. Martin Bardenhewer

- ZKB
  - (designated) CFO
  - (currently) Head Institutional Clients & Multinationals
- Former Co-chair of the National Working Group for CHF LIBOR transition

Chapter 1.3: Banking
Invited lecture
Dr. Martin Bardenhewer

Regulation

Zürcher Kantonalbank

Capital, Liquidity and Too-big-to-fail

Martin M. Bardenhewer, 8 March 2022

Welcome

Martin M. Bardenhewer

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CV

May 2022	ZKB, designated Group CFO
2017 – 2022	ZKB, Head Institutional Clients & Multinationals and deputy member of ExCo for Asset Management, Trading, Capital Markets, International Business and Research
2014 – 2022	Co-chair of National Working Group for CHF LIBOR transition
2007 – 2016	ZKB, Head Treasury and Deputy CFO
2004 – 2006	ZKB, Head Market Risk Management
2001 – 2004	ZKB, Head Modelling
1999 – 2001	KPMG Audit and Risk Consultant
1999	PhD in Finance, University of Mannheim
1994	Master of Economics, University of Bonn
since 2004	Visiting lecturer at Universities of Cologne and Zurich

Freedom and regulation

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No regulation in a neo-classical world

"Capitalism and freedom" by Milton Freedman - the bible of neo-classical libertinism:

In chapter II, Friedman discusses the government as rule-maker and umpire,

only helping people to enforce their claim in freely negotiated contracts (principle of subsidiary)

… but …

"Humans, more than Econs, also need protection from others who deliberately exploit their weaknesses. Econs will read and understand the fine print of a contract before signing it, but Humans usually do not"

"Freedom is not a contested value; all the participants of the debate are in favour of it. For adherents of the rational investor, freedom is free of charge. For a behavioural economist, freedom has a cost. [Freedom and regulation] are a dilemma for behavioural economists."

Kahneman, D. (2010), Thinking fast and slow, p. 412ff.

Key issues of regulation

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Clear objectives

There are precisely three objectives against which regulation should be assessed

1. Financial market stability
2. Prevention of financial market abuse
3. Customer protection

Conflicts of macro economic interests

Trustworthiness as Swiss USP calls for tight regulation.
Competitiveness requires a regulation aligned to international standards.

Key question

How shall a regulatory regime be designed such that its utility outweigh its costs and who shall carry these costs?

A bunch of regulation

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What	Minimum requirements	Driver	Swiss law	EU law
Capital	Capital and leverage ratio (quantitative)	BCBS	BankG, ERV	CRD IV
Liquidity	LCR and NSFR (quantitative), further metrics and qualitative requirements	BCBS	BankG, LiqV	CRD IV
Systemically important banks (SIB)	Additional quantitative requirements living wills	FSB	BankG, BankV	BRRD
Deposit insurance	Design of mutual liability scheme for banks	-	BankG	- (only national)
Derivatives market infrastructure	Clearing obligation, trade repository	IOSCO	FinfraG, FinfraV	EMIR
Benchmarks	Qualitative requirements for use in products	IOSCO	-	BMR
Consumer protection	Rules of conduct, organisation, registration, client segmentation, sales documentation, trade execution	EU	FidleG, FidleV	MIFID
	Greenwashing	EU	self regulation	SFDR
Anti Money Laundering	Qualitative minimum requirements (esp. KYC)	Wolfsberg	GWG	AMLD V
Data & processes	Qualitative requirements on operational stability, cyber security, outsourcing, data protection, …	-	FINMA circulars, DSG	misc. GDPR

… and other

Why ‘Basel’?

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The Basel Committee of Supervision (BCBS)

- … is a regulator
- … has been set up in 1974
- … consists of members of local regulatory authorities of 28 nations
- … does not possess any formal supervisory authority
- … sets standards in close coordination with banks
- … the Committee's Secretariat is located at the BIS in Basel

Source: commons.wikimedia.org

Regulation - capital

Capital and risk

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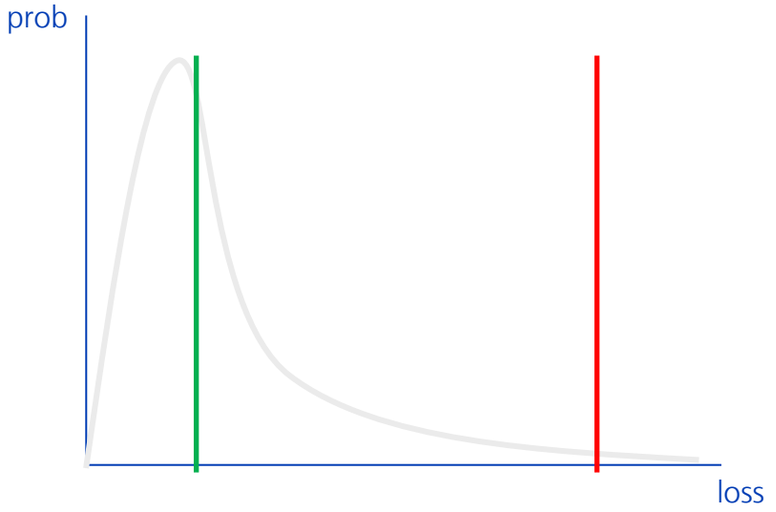
Expected and unexpected loss



The **expected loss** is covered by the price

The **unexpected loss** is covered by capital

Capital absorbs losses, it's a risk buffer. Available capital limits the capacity to take risks.

Cost of capital

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Cost of debt can directly be observed, cost of equity capital can’t.

Debt capital

→ given by contract specification

Equity capital

→ investors' expectations of rate of return

Cost of (equity) capital have to be extracted from stock price time series by using specific models (e.g. CAPM)

How expensive is capital ?

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Equity is more expensive than debt

- Debt is less risky than equity

  → cost of equity capital > cost of debt capital

- Cost of equity capital depends on the business risk

  → a diversified business mix has ceteris paribus lower equity capital costs than a specialised business

- Typically, cost of equity capital is between 5% and 15%

Pricing of products – cost of capital

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How cost of capital is factored in the calculation of a loan

Case study

5 year fixed rate loan: at which coupon should it be priced ?

6% of loan is funded with equity, 94% with debt,

5 year funding rate is 0%, 1% gross margin on loan

Loss given Default (LGD) = 10%, Probability of Default (PD) = 1%

Cost of capital for retail business is 5% over funding

funding	0%	
+ expected loss	0.1%	10% LGD × 1% PD
+ unexpected loss	**0.3%**	6% funded with equity × 5% cost of capital above funding
+ operating costs	0.2%	
= costing	0.6%	⇒ 0.4% net margin if the loan is priced at 1%

30 years of banking regulation

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1975	**Concordat**	Principles for sharing responsibility for international banking
1988	**Basel I**	Quantitative **minimum capital requirements** for credit risk and market risk
1999	**Basel II**	Revised framework: - three-pillar-concept - Internal models for credit risk - Operational risk as new risk class
2009		Quick fixes to Basel II, mainly in market risk (informally labelled **Basel II.5**)
2010	**Basel III**	Tightening of every y capital component (risk weights, capital quality, minimum levels) Introduction of buffer concept, leverage ratio and **minimum liquidity requirements**
2013	**Basel III final**	Overhaul of Basel III models for credit RWA calculation (informally labelled **Basel IV**) Overhaul of Basel II.5 models for market RWA calculation (Fundamental Review of the Trading Book) Strengthening of standard approaches
2025		Going Live of Basel III final

The three pillars of the Basel framework

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Quantitative requirements

What
Definition and quality layers of capital

Levels
Minimum requirements

Models
- Credit risk
- Market risk
- Operational risk

Metrics
- Capital ratio
- Leverage ratio

Supervisory review

Principle-based qualitative requirements

- Bank's internal capital adequacy assessment process (ICAAP)
- Supervisory review process
- Expectation of operating steadily above pillar 1 requirements
- Stress testing
- Governance and compensation
- Risk categories not addressed in pillar 1 (e.g. interest rate risk in the banking book)

Market discipline

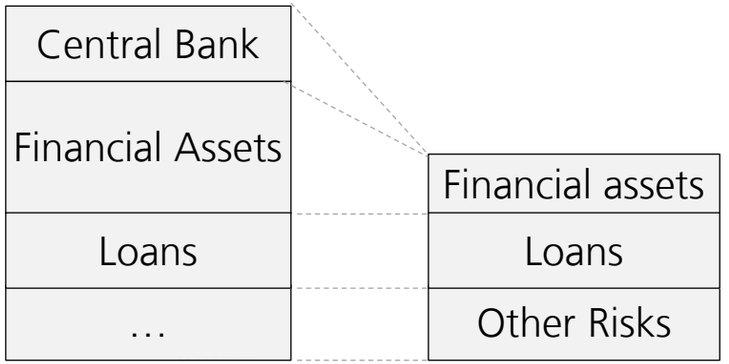
Guiding principles for disclosure

- Clarity
- Comprehensiveness
- Meaningfulness / usefulness
- Consistency over time
- Comparability

Pillar 1: Capital ratio and leverage ratio

leverage ratio has been intrududec after the crisis Only one of the two is binfing.

Risk weighted **Capital Ratio**



all business lines are weighted according to the risk

- x% of risk weighted assets (RWA) have to be financed with capital
- Risk weights are put onto risky business (credit risk, market risk, operational risk)
- Different models to calculate risk weights

Unweighted **«Leverage Ratio»**

Total Exposure
(Total Assets + net off balance sheet)

- y% of exposure has to be buffered by capital
- Baseline: notional, no risk weighting
- Either capital ratio or leverage ratio is binding, depending on RWA calculation models

Basic formulas for Risk Weighted Assets (RWA)

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The calculation of RWA among risk classes

- Market risk and credit risk in the trading book
  - Standard approach: sensitivity-based method
  - Model approach: Value-at-Risk--based method
- Credit risk in the banking book
  - Risk weights × exposure
  - Standard model or internal rating-based model (fundamental/advanced) for calculation of risk weights
- Operational risk
  (losses, incurred for inadequate or failed internal processes, people and systems, or from external events (including legal risk)
  - Standard approach based upon business model or model-based approaches based upon historical losses

Summing up (assumption of perfect correlation)

we compute differently the three risk

Basel III: Lessons learned from the financial crisis

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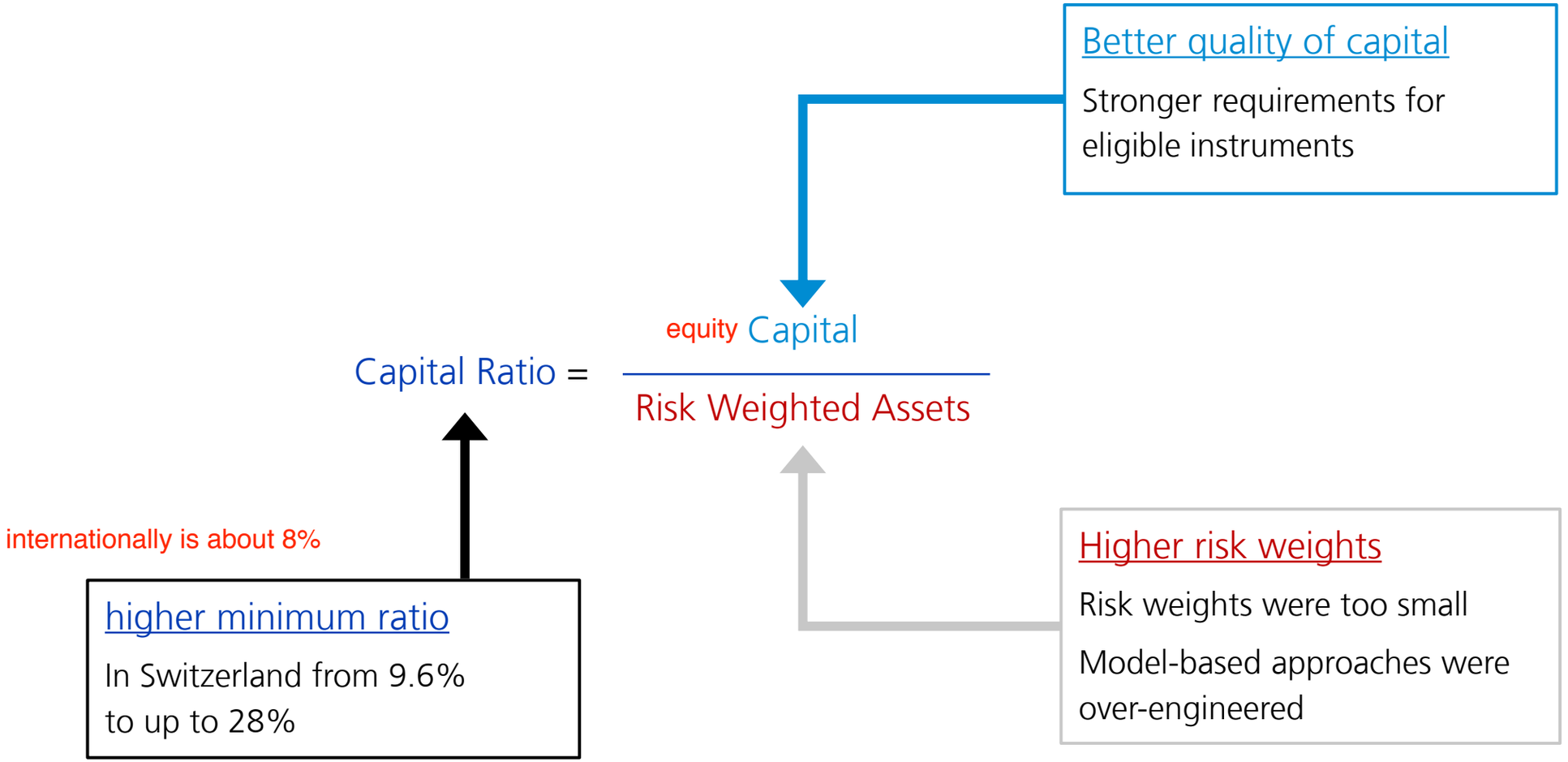

30 years of banking regulation

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Basel III final: Market and credit risk in the trading book

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Fundamental review of the trading book (FRTB)

FRTB strengthens the standard approach and replaces Value-at-Risk (99%, 10d) by Expected-Shortfall (97.5%, [•]days)

Standard approach

Capital requirement = sensitivity based method + default risk charge + residual risk add-on

Sensitivity based method captures delta, vega and curvature risk for seven risk classed on which each position is mapped

Model approach

to compute a very remarkable loss

Capital requirement = multiplicator × expected-shortfall-based-capital-measure + default risk charge

The expected shortfall has to be calculated and reported both for each single trading desk and for the whole trading book

A trading desk which is not approved for the model approach is treated under the standard approach

Basel III final: Credit risk in the banking book

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Standard approach

Tabulated risk weights for different products and ratings, e.g.:

- Risk weight mortgages with loan-to-value ≤ 2/3 is 35% or 75% for >2/3
- Risks weight for a loan to a A-rated corporate is 50%
- Risk weight for government bonds with rating of AA- or better is 0%!

Model approach (internal ratings-based, IRB)

Risk weights are calculated based upon modelled Probability of Default (PD), Exposure at Default (EAD) and, in the advanced IRB, Loss Given Defaults (LGD) and effective maturity

Link between the approaches

Strengthening the standard approach:
Risk weights calculated in a model approach are floored to 72.5% of risk weights calculated in the standard approach

Basel III final: Operational risk and overall effect

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Standard approach for operational risk

Only standard approach, no model approaches anymore

Capital requirement = Business Indicator Component × Internal Loss Multiplier

Business Indicator Components are fixed multipliers for gross income in seven business lines
Internal Loss Multiplier is based upon internal loss history and reflects bank specific historic vulnerability to operational losses

And what's the impact of all this?

Basel III final is expected to increase capital requirements by 25% for large banks (European Banking Association)

Key driver is the floor for model based approach in credit risk, followed by FRTB and standard approach for operational risk
Higher capital = less risk and less return on invested capital = less expected return by shareholders

Regulation - liquidity

Funding risk and liquidity risk

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Funding

Financing an asset

Any asset has to be fully funded by equity and/or debt.

Funding risk if
Maturity of funding is shorter that maturity of asset

Mitigation
Good old golden rule of balance sheet

Liquidity

Having enough cash

An asset is liquid if it can be converted into cash at low cost in short time

Liquidity risk if
No cash at hand when needed

Mitigation
Holding a liquidity buffer for unforeseen events

The two ratios, one for funding and one for liqudity

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Liquidity Coverage Ratio (LCR):

$$\frac{\text{high-quality liquid financial assets}}{\text{net cash outflows over 30 days}} > 100\%$$

- Buffer to cover liquidity gap in a severe stress scenario
- Cash flow perspective
- Horizon: 30 days

Net Stable Funding Ratio (NSFR):

$$\frac{\text{available stable funding}}{\text{required stable funding}} > 100\%$$

- Required funding in a long lasting stress scenario
- Balance sheet structure perspective
- Horizon: 1 year

Regulation of funding: Net Stable Funding Ratio (NSFR)

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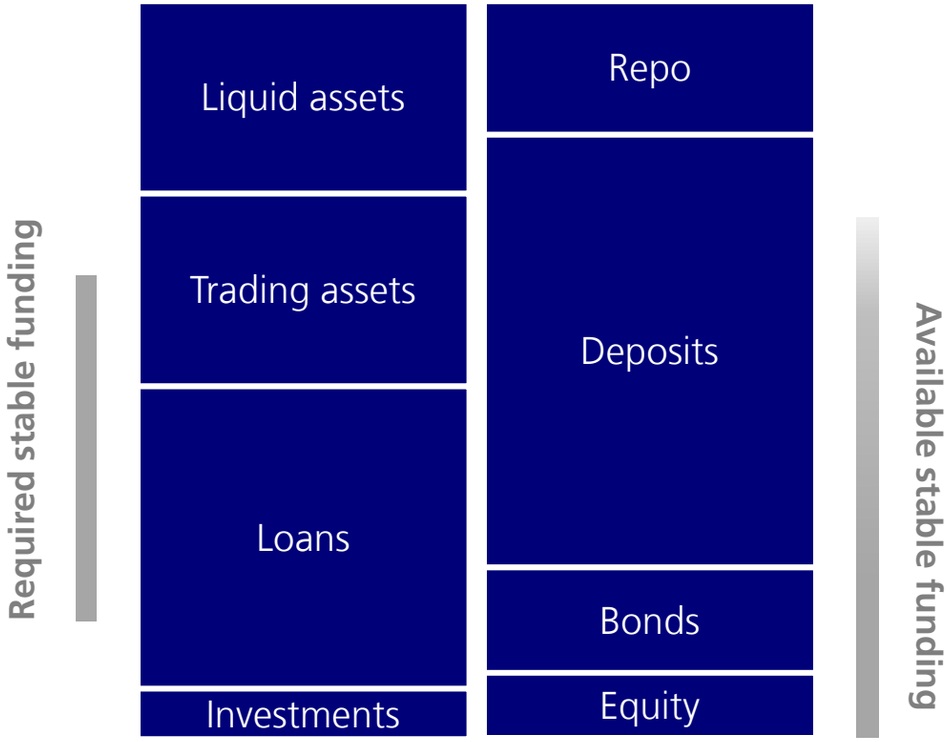
NSFR: stable funding of long term assets to avoid a funding stress



- Available stable funding:
  term to maturity **> 1y**, assumptions for client deposits
- Required stable funding:
  term to maturity **> 1y**, assumptions for credit lines
- Minimum:
  NSFR > 100%, higher for systemically relevant banks
- tough for investment banks,
  easy for saving institutions

Regulation of liquidity: Liquidity Coverage Ratio (LCR)

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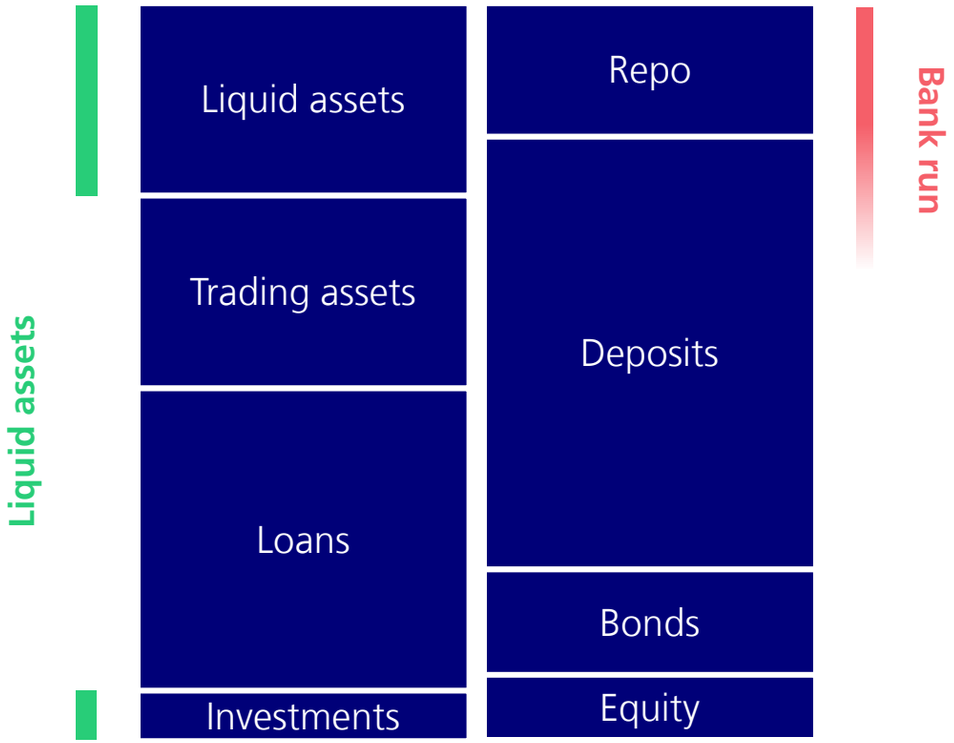
LCR: buffer of liquid assets to survive a funding stress



- Buffer of high quality liquid assets (HQLA):
  deposit at central bank, bonds with high credit rating
- Bank run scenario:
  massive outflow assumptions over a **30 days period**
- Minimum:
  LCR > 100%, higher for systemically relevant banks
- tough for most banks,
  significant macroeconomic effects

LCR: HQLA

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Two Levels of HQLA: level 1 without haircut, level 2 with 15% haircut

HQLA have to be of very **high** credit **quality** and have to be **liquid assets** even in a crisis.
Bonds from financial institutions are not eligible.

Level 1 Assets with a 0% risk weight in the standard approach for credit risk.
Level 1 assets are cash and sovereign bonds with a AA- or higher.

Level 2 Assets with a 20% risk weight in the standard approach for credit risk
Level 2 assets are sovereign and other public bonds with a A- or higher,
corporate bonds with AA- or higher and certain covered bonds

The amount of level 2 HQLA is capped at 40% of total HQLA.

LCR: some in- and outflow parameters

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How many cents per $ have to be put in HQLA?

0%	any funding with term > 30 Any central bank funding	very stable funding
5%	Saving deposits covered by deposit insurance Operational accounts covered by deposit insurance Committed credit lines to SME	
10%	Saving deposits not covered by deposit insurance	stable funding
20%	Saving deposits > 1.5m CHF (Swiss finish)	
25%	Other operational accounts	
40%	Non-operational accounts from corporates	less or non-stable funding
100%	Other uncovered short term funding Committed credit lines to large corporates	

Bottom-up pricing of products – cost of liquidity

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How cost of liquidity is factored in the calculation of a deposit

Overnight non-operational deposits from corporates

Withdrawal assumption for stress scenarios: 40%

liquidity buffer funded at swap, yield 0.4% below swap

marginal operating costs ≈ 0

- 40% of the non-operational deposits can't be used for loans but have to be invested in high quality liquid assets which yield 0.4% less than the benchmark
- Cost of liquidity = 0.16%
- Even at a coupon of 0% the non-operational overnight deposit has a margin of -0.16%

Capital regulation has an impact on asset pricing, liquidity regulation on liability pricing

How to manage NSFR and LCR

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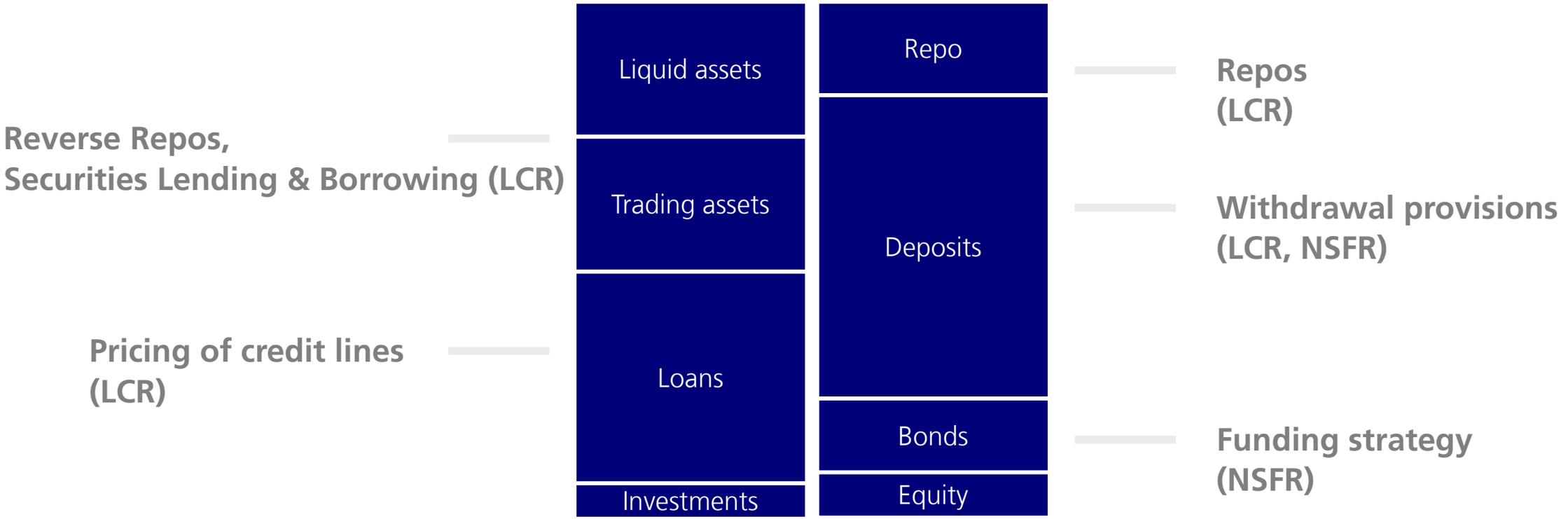

Negative interest rates on deposits have a considerable impact on the management of the LCR

Overall effect for liquidity

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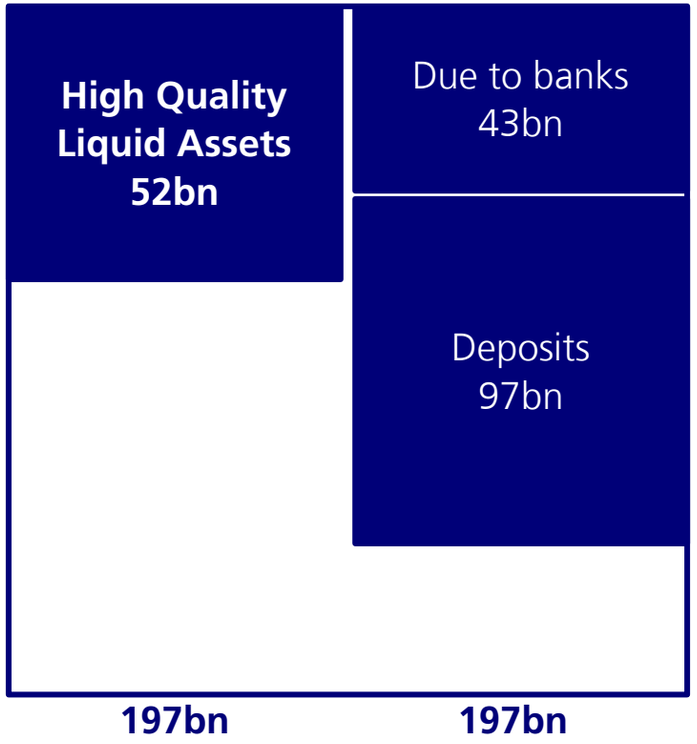
In CHF bn.



Regulation – too-big- to-fail

When is a bank too big to fail?

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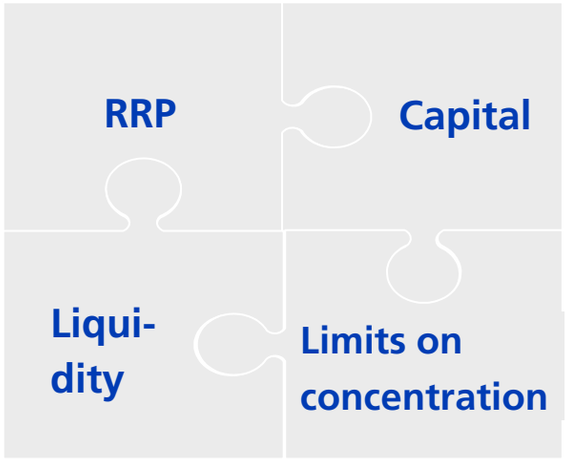
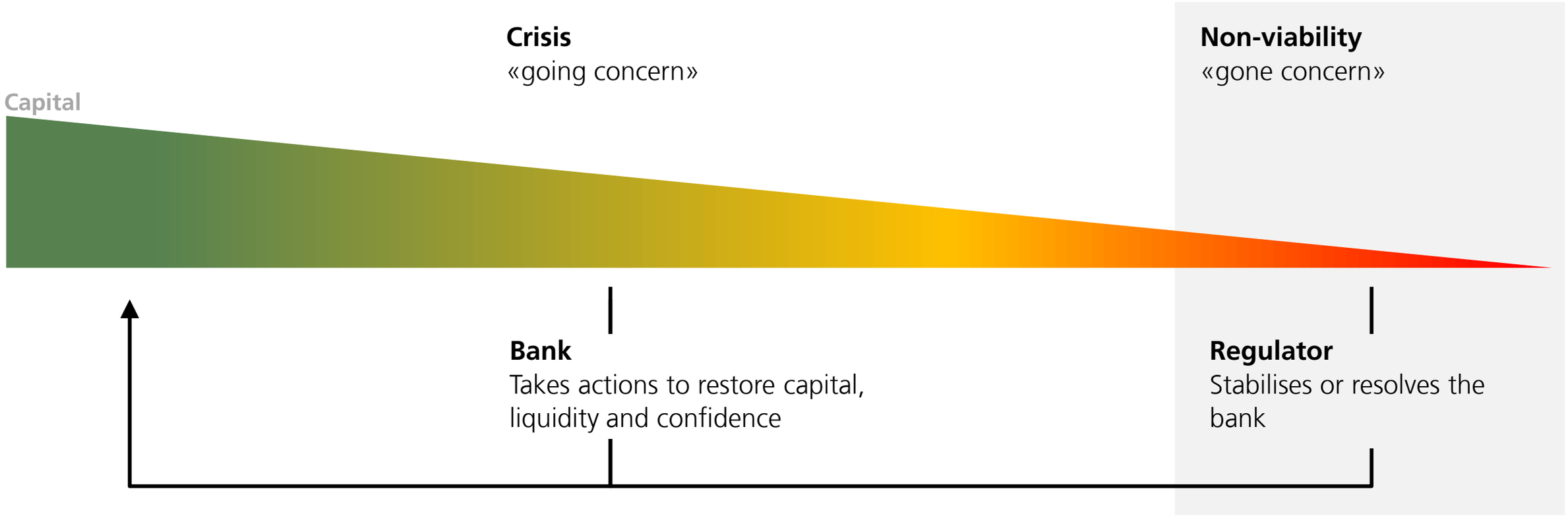
Systemically relevant operations	Systemically important banks (SIB)
Can’t be substituted in the short run	Size & complexity
▪ Loans and deposits with non-financial customers ▪ Payment services	1. Market share in systemically relevant operations 2. Size (balance sheet) 3. Risk (RWA)

Additional requirements for SIB



Don’t squeeze the tax payer



Capital quality

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Not only equity capital is recognised as regulatory capital, but also bonds and hybrids

Common Equity Tier 1 (CET1)	Core capital	Equity, disclosed reserves
Additional Tier 1 (AT1)	Additional Core capital	Contingent Convertible Bonds (CoCos) with high trigger
Tier 2	Additional capital	Contingent Convertible Bonds (CoCos) with low trigger
Bail-in	Gone-concern capital	Subordinated Bonds that are written-down, if the bank is non-viable

Recovery and resolution planning

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Crisis
«going concern»

Non-viability
«gone concern»

Capital

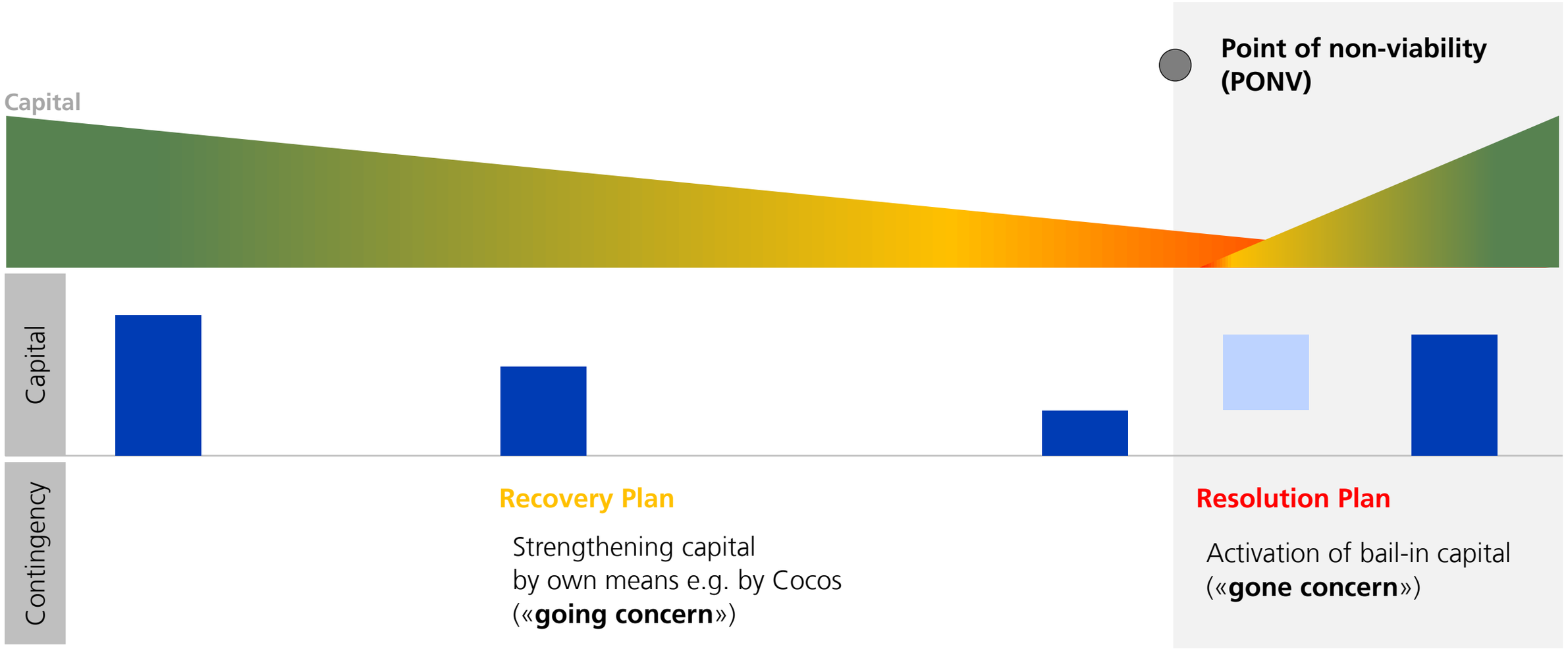
Recovery Plan

Focus:
- Strengthening capital
- Restoring liquidity buffer

Resolution Plan

Focus:
- Bail-in Capital
- Protecting systemically relevant operations

«Going concern» and «gone concern» capital



Liquidity: Increased requirements for SIB

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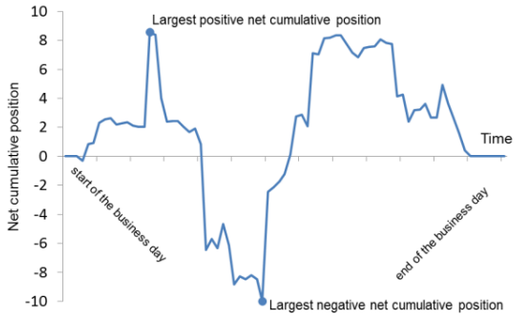
Further add-ons drive minimum LCR far above 100%.
Add-ons e.g. for

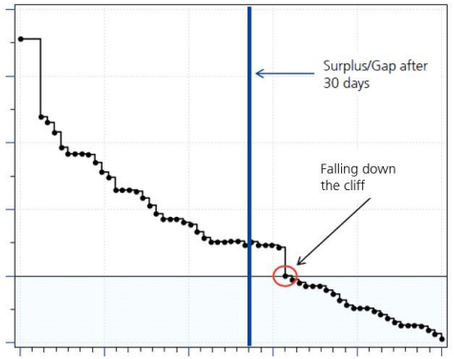
Intraday Liquidity



Source: Basel Committee on Banking Supervision (2013)

Intraday liquidity mainly arise from **FX clearing**

Cliffs



Introduction of a 90-day LCR to
avoid a cliff between 30 and 90 days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