

Linking stress testing to capital adequacy

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- **Motivation for capital stress testing**
- **Difficulties when comparing economic and regulatory capital adequacy**
- **Link between capital adequacy and stress testing**
- **Reporting and evaluation of results**
- **Integrating stress testing into capital management process**

Motivation for Capital Stress Testing

Objective

Under capital adequacy aspects, being able to continue business even after severe (but not catastrophic) losses

- Avoid “surprises”
- Identify major threats to regulatory and economic capital
- Trigger timely mitigation

Calibrating stress events e.g. to “1 in 10 years”

Problem

Cannot be ensured with “traditional” regulatory and economic capital concepts

- Regulatory Capital: Only sets *minimum* capital ratios to be fulfilled through the economic cycle; no explicit *target* ratios set by regulators
- Economic Capital: Defines risk-based capital requirement to protect debt capital on a very high confidence level

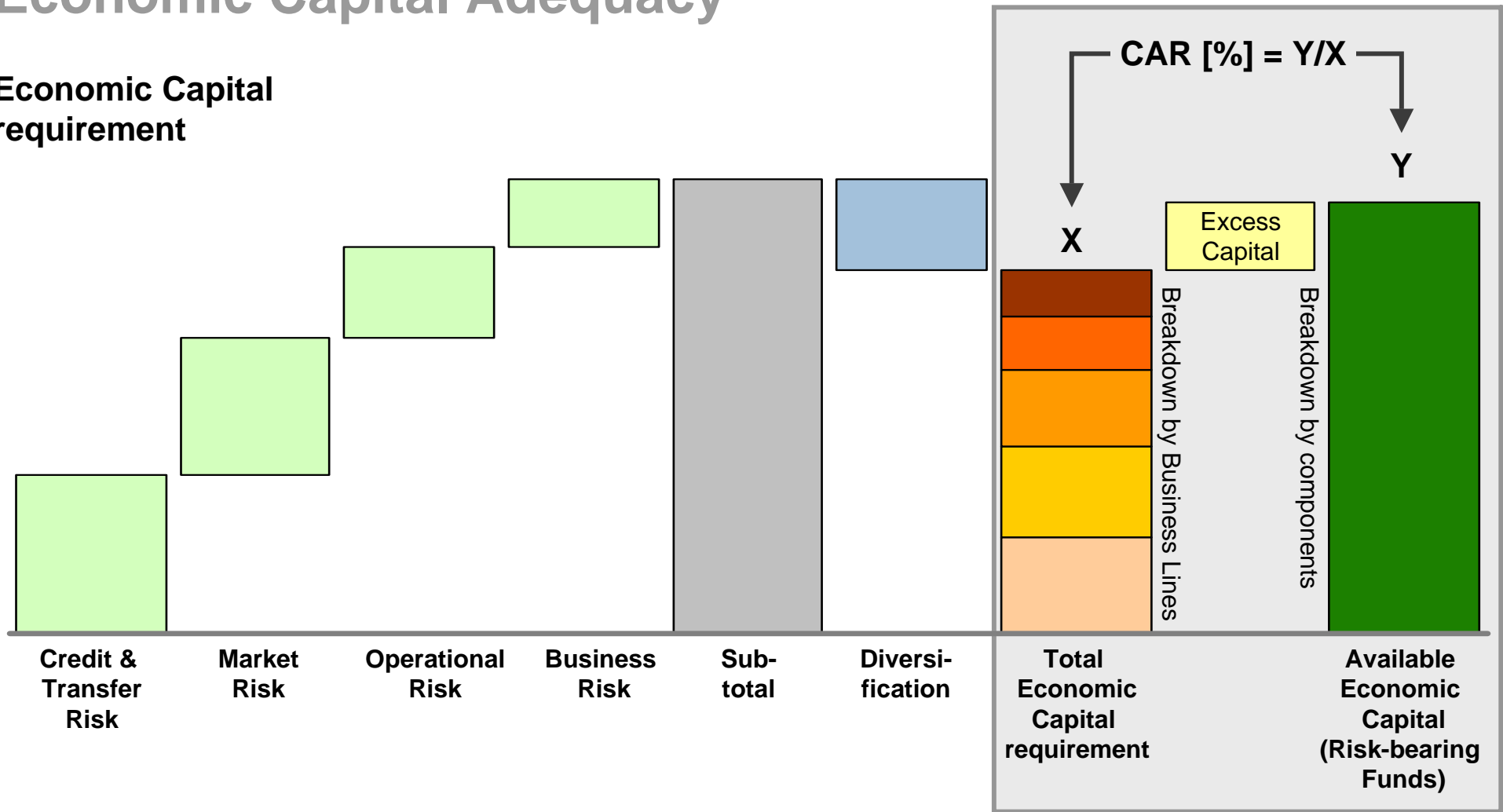
Solution

Hold sufficient capital buffer to withstand severe losses without falling below external or internal capital *minimum* standards (as opposed to *target* standards)

- Using stress testing to derive required buffers
- ... independently for regulatory and economic capital framework

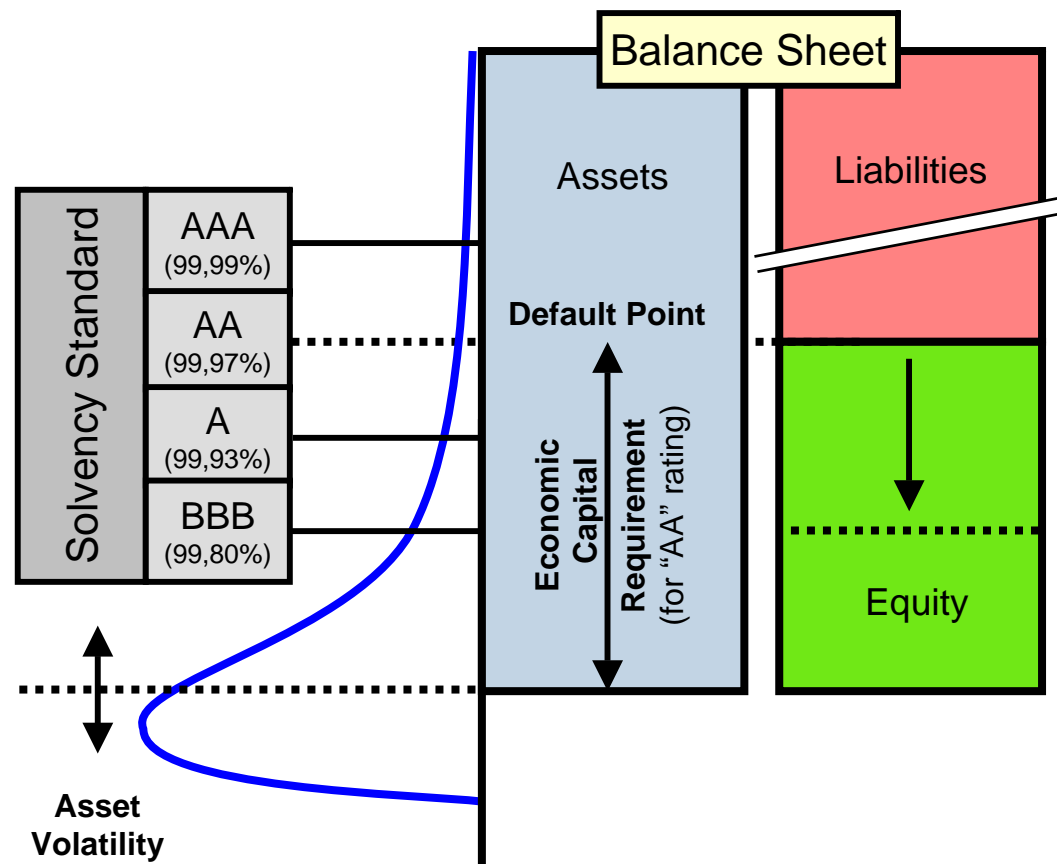
Capital Adequacy Ratio (CAR) - Relative Measure of Economic Capital Adequacy

Economic Capital requirement



Economic Capital Requirements - Overview

Higher solvency standard requires higher level of Economic Capital



Target vs. minimum solvency standard

- Economic Capital concepts are usually based on high **target solvency** standards (e.g. "AA" rating"; 99,97% confidence level)
- After stress losses **minimum solvency** standard has to be ensured (e.g. "BBB rating"; 99,80% confidence level)
- Accordingly, for stress test purposes Economic Capital requirement needs to be **re-calculated (or scaled down)** to the minimum solvency standard

Major External Capital Requirements - Overview

	BIS	FED (for "well capitalised" status)	Rating agencies
Total Capital Ratio ¹⁾	≥ 8%	≥ 12%	No direct link between rating and (regulatory) capital adequacy
Tier I Capital Ratio ²⁾	≥ 4%	≥ 6%	

Usually major regulatory capital constraint for international banks

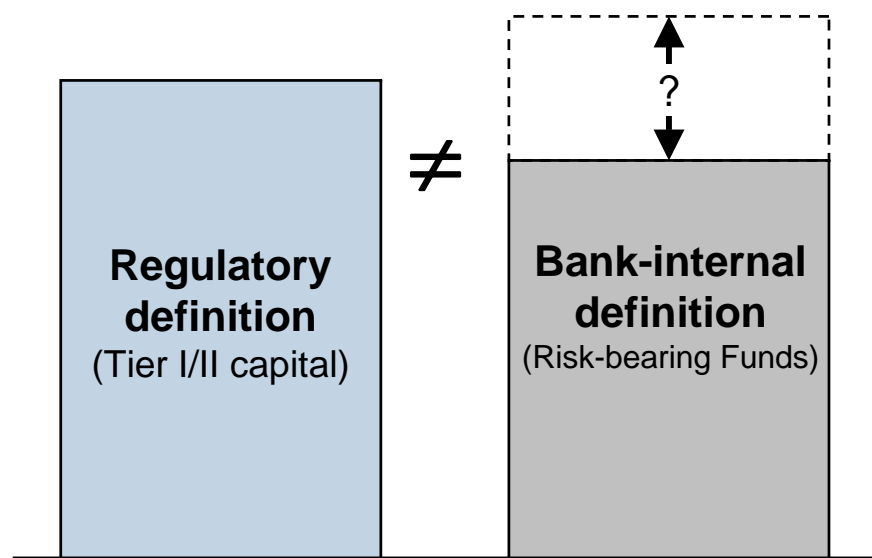
Capital Stress Testing should focus on a bank's major capital constraint

¹⁾ Available Tier I capital / Risk Weighted Assets (RWA)

²⁾ Available Tier I+II+III capital / RWA

Internal and Regulatory Definition of (Available) Capital Usually Not Directly Comparable

Available Capital



Example for differences

- **Subordinated debt:** Part of regulatory Tier II capital and usually not part of internal risk-bearing funds
- **Hybrid capital:** Included in regulatory Tier I capital, but excluded from IFRS/US-GAAP book capital
- Different **legal entity consolidation:** Certain entities may be excluded from regulatory consolidation, but included in economic capital framework
- Treatment of **goodwill:** Deduction from regulatory capital may differ from economic capital treatment
- Treatment of **deferred tax assets:** May differ under different regulatory regimes
- **Evaluation reserves:** Haircuts applied for regulatory capital may differ from economic capital treatment
- **Planned profit:** No recognition in regulatory capital

The Capital Adequacy Ratio (CAR) Can Be Used to Compare Economic and Regulatory Capital Adequacy

Economic Capital View	
Definition	
$\text{CAR} = \frac{\text{Risk-Bearing Funds}}{\text{Economic Capital requirement}}$	
Example	
Risk Bearing Funds	= EUR 8,0bn
Economic Capital requ.	= EUR 7,5bn
$\text{CAR} = \frac{\text{EUR 8,0bn}}{\text{EUR 7,5bn}} = 107\%$	

Regulatory Capital View	
Definition	
$\text{CAR} = \frac{\text{Actual (Tier I) capital ratio}}{\text{Minimum (Tier I) capital ratio}}$	
Example	
Actual Tier I - Ratio	= 7,6%
Min. Tier I - Ratio	= 6,0%
$\text{CAR} = \frac{7,6\%}{6,0\%} = 127\%$	

If CAR falls below 100% → Undercapitalization

Two Methods to Derive Stress Losses

Based on Economic Capital Model

Economic Capital model already provides potential loss levels

Pros

- Simple calibration to chosen stress event probability via adjustment of confidence level (e.g. to 90% for “1 in 10 years” event)
- Diversification between risk types already included
- Easy to calculate since all data is already available

Cons

- Identification of specific risk drivers is difficult
- Covers only those risks which are captured by the Economic Capital concept

Based on separate stress scenarios

Stress scenarios to be newly defined and calibrated to chosen stress event probability

Pros

- Impact of specific risk drivers directly identifiable
- ... and therefore more transparent for senior management
- Can also consider stress scenarios not covered by the Economic Capital concept

Cons

- Limited possibilities of combined scenario analysis

Recommendation: Define risk-type specific scenarios; use economic capital concept to support calibration of scenarios to stress event probability

Stress Scenarios Usually Impact Both Available and Required Capital

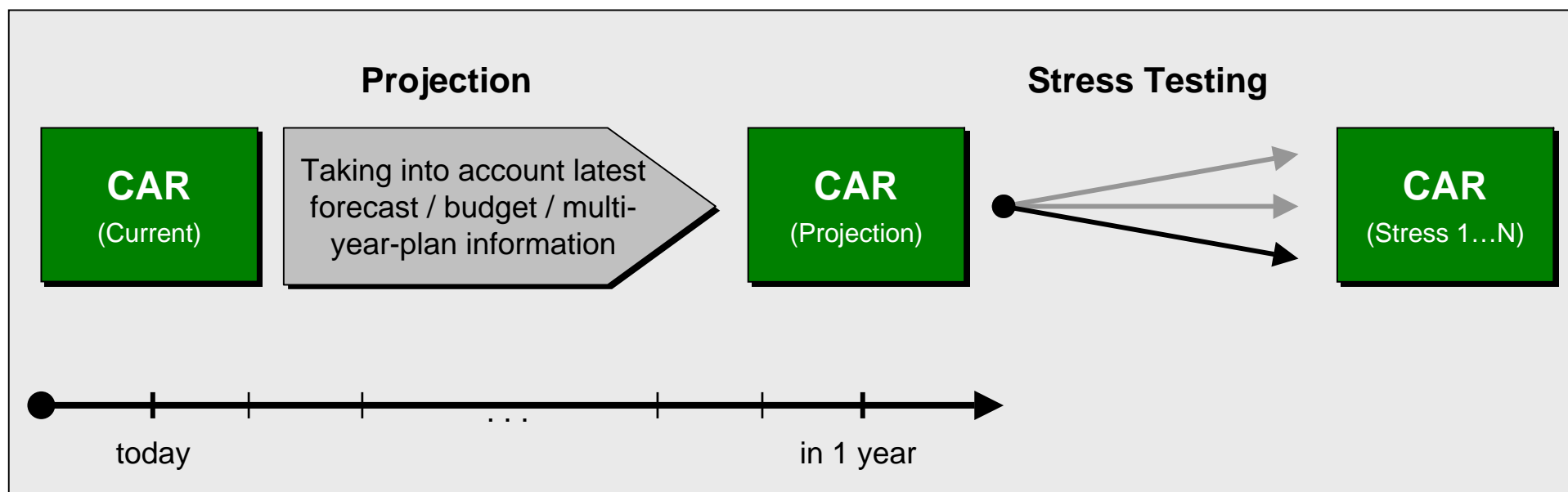
Examples for Economic Capital

Scenario Examples	Risk-Bearing Funds	Required Capital	CAR
Credit losses	↓ Decline in planned profit and/or equity capital	→ If portion of defaulted portfolio is small	↓
Credit losses and rating downgrades	↓ Decline in planned profit and/or equity capital	↑ Impact of increase in PDs	↓
Equity (down) and/or Interest Rates (up) impact on Investments	↓ Decline in valuation reserves (IFRS 39)	↓ Exposure is measured as portfolio fair value	↓
New business below expectations	↓ Decline in planned profit	→ If impact on projected risk profile is small	↓
Impact of own rating downgrade	↓ Decline in planned profit via higher refinancing costs	→ No impact if target rating remains unchanged	↓
■ ■ ■		■ ■ ■	

Stress Scenarios Should Be Applied to 1-Year Forward Projection of CAR

Starting point of capital stress testing should reflect major anticipated business development

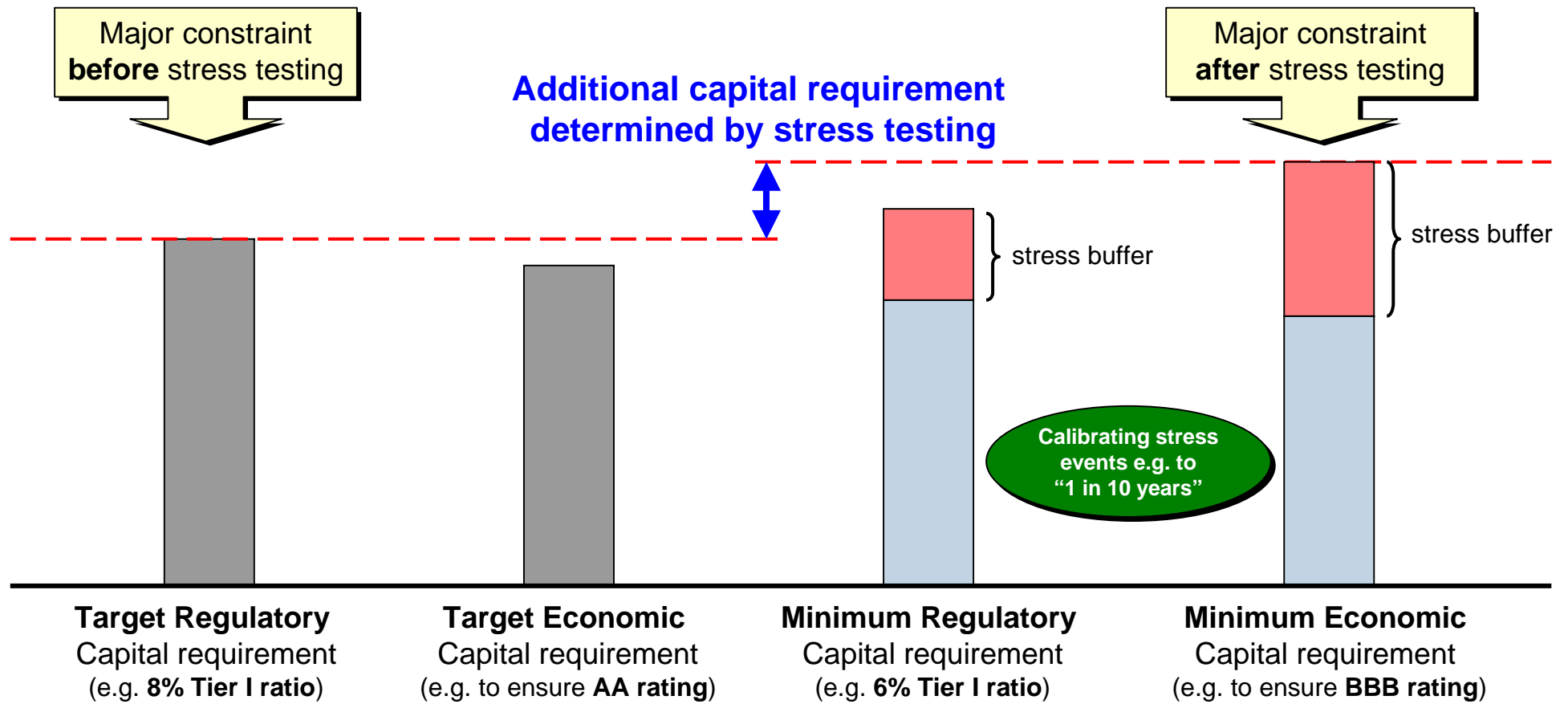
- Requires full integration of all capital components into planning process
 - Regulatory and economic capital
 - Available and required capital
- Should be reflected in latest forecast / budget / multi-year-plan



Capital Stress Testing Supplements Traditional External and Internal Target Capital Requirements - Simplified Overview

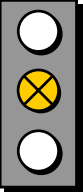
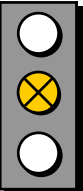

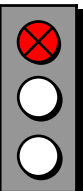
Traditional target requirements

New stress test requirements



Example: Economic Capital View (Simplified)

Illustrative

	Description / Impact		CAR	Status	Comment
Actuals ("AA")	<ul style="list-style-type: none"> Available Capital: 8,0 Capital Requirement: 7,5 		$\frac{8,0}{7,5} = 107\%$		Current economic capitalisation rather low but sufficient
Projection ("AA")	Impact of business projection on RBF and Economic Capital requirement Δ RBF: +1,0 Δ EC requirem.: +0,5		$\frac{9,0}{8,0} = 113\%$		Economic solvency expected to slightly improve over next 12 months
Reduced target rating ("BBB")	Reduced confidence level leads to reduction of EC requirement Δ RBF: unchanged Δ EC requirem.: -1,5		$\frac{9,0}{6,5} = 138\%$		Sufficiently capitalized according to „BBB“ minimum rating
Credit stress testing ("BBB")	Credit losses and rating downgrades impact RBF and EC requirement Δ RBF: -2,0 Δ EC requirem.: +0,7		$\frac{7,0}{7,2} = 97\%$		Minimum rating ("BBB") at risk under credit scenario

Detailed Results - Example for Data Sheet

Illustrative

Base Case / Scenario			Economic Capital View					Regulatory Capital View					
			Required Capital	Δ Base Case	RBF	Δ Base Case	CAR	RWA	Δ Base Case	Tier I Capital	Δ Base Case	Tier I Ratio	CAR
Base Cases	Economic	Current / "AA"-Rating	7,5		8,0		107%						
		Projection / "AA"-Rating	8,0	0,5	9,0	1,0	113%						
		Projection / "BBB"-Rating	6,5	-1,5	9,0	0,0	138%						
	Regulatory	Current						100,0		7,6		7,6%	127%
		Projection						103,0	3,0	8,6	1,0	8,3%	139%
Stress Scenarios		Credit Losses	6,5	0,0	7,0	-2,0	108%	103,0	0,0	6,6	-2,0	6,4%	107%
		Credit Losses & Downgrade	7,2	0,7	7,0	-2,0	97%	103,0	0,0	6,6	-2,0	6,4%	107%
		Equities down	5,8	-0,7	7,5	-1,5	129%	101,5	-1,5	7,1	-1,5	7,0%	117%
		Interest rates up	6,4	-0,1	8,5	-0,5	133%	102,5	-0,5	8,1	-0,5	7,9%	132%
		New business below expect.	6,5	0,0	8,4	-0,6	129%	103,0	0,0	8,0	-0,6	7,8%	129%
		Own rating downgrade	6,5	0,0	8,5	-0,5	131%	103,0	0,0	8,1	-0,5	7,9%	131%

Determination of Additional Capital Requirement

Illustrative

Base Case / Scenario		Economic Capital View			Regulatory Capital View		
		CAR	Capital Gap to 100% CAR	Capital Gap to 130% CAR	CAR	Capital Gap to 100% CAR	Capital Gap to 130% CAR
Stress Scenarios	Credit Losses	108%		1,5	107%		1,4
	Credit Losses & Downgrade	97%	0,2	2,4	107%		1,4
	Equities down	129%		0,0	117%		0,8
	Interest rates up	133%			132%		
	New business below expect.	129%		0,1	129%		0,0
	Own rating downgrade	131%			131%		

Maximum	0,2	2,4	0,0	1,4
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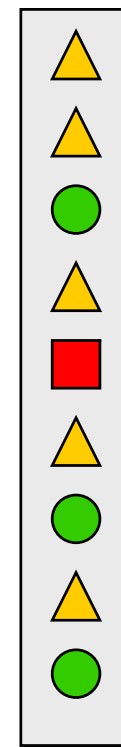
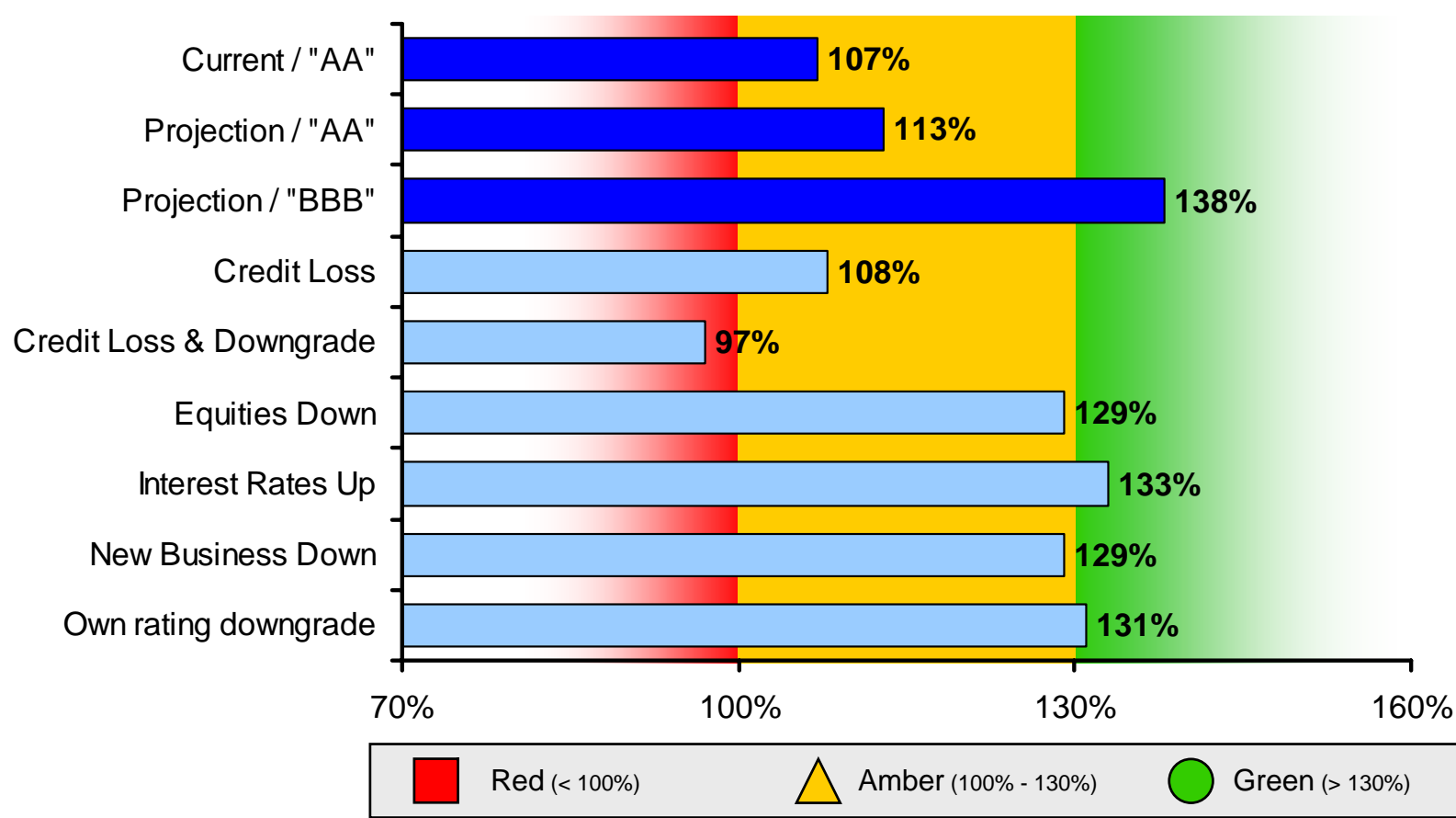
Additional capital requirement in order to achieve minimum CAR of 100% / 130% across all scenarios for Economic and Regulatory Capital View

Summary of Results - Example for Economic Capital View

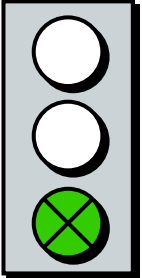
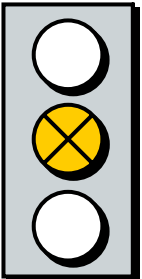
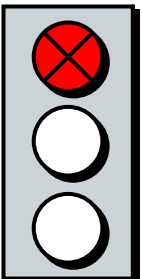
Illustrative

Capital Adequacy Ratio (CAR)

Status



Action Plan to Be Prepared if Stress Test Results have Status Red or Yellow

Status	Definition	Action required
	<p>CAR \geq 130%</p>	<p>No action required</p>
	<p>100% \leq CAR < 130%</p>	<p>Action Plan to be prepared</p> <ul style="list-style-type: none"> ■ Objective: <ul style="list-style-type: none"> – Reduce reaction time in case of emerging solvency threats – Enabling proactive rather than reactive capital management – Support communication with regulators and rating agencies ■ Content: <ul style="list-style-type: none"> – List of alternative management actions (e.g. hedging, capital raising, exposure reduction, ABS) – Prioritisation via cost/benefit analysis
	<p>CAR < 100%</p>	

Thank you very much for your attention!

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