



RISK MANAGEMENT

LA GESTIONE DEI RISCHI AZIENDALI

Financial crisis and the importance of risk management

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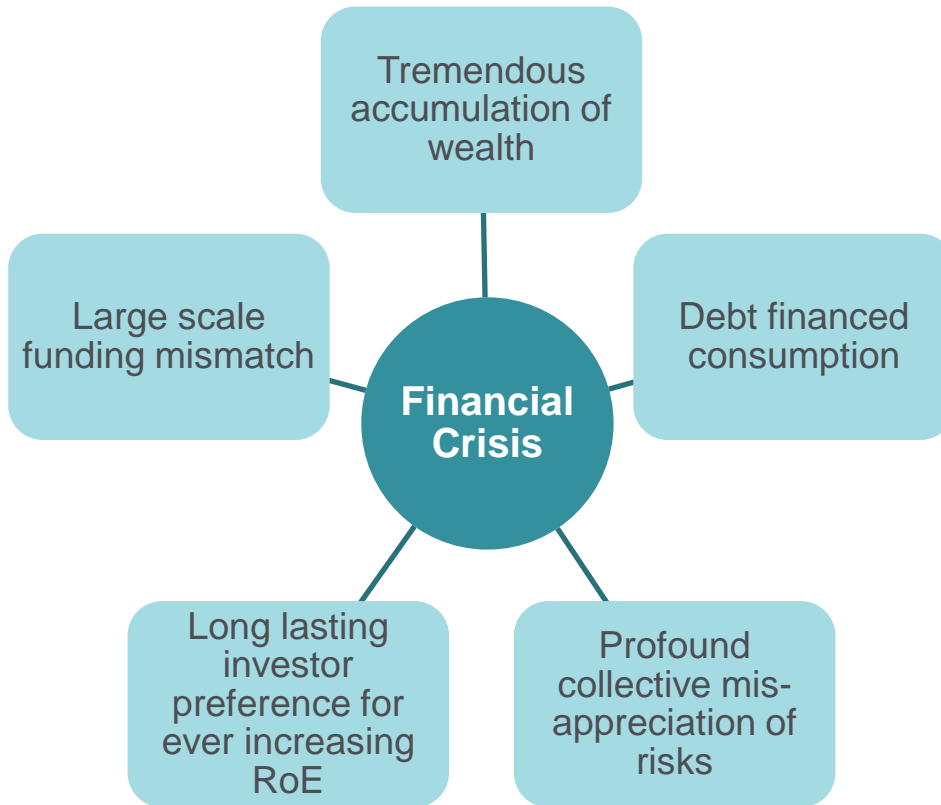


- Financial Crisis: Munich Re's ERM framework in action
- Measures taken to avoid adverse impact of the crisis
- Conclusions

FINANCIAL CRISIS: MUNICH RE'S ERM FRAMEWORK IN ACTION



Drivers of financial crisis



Observations

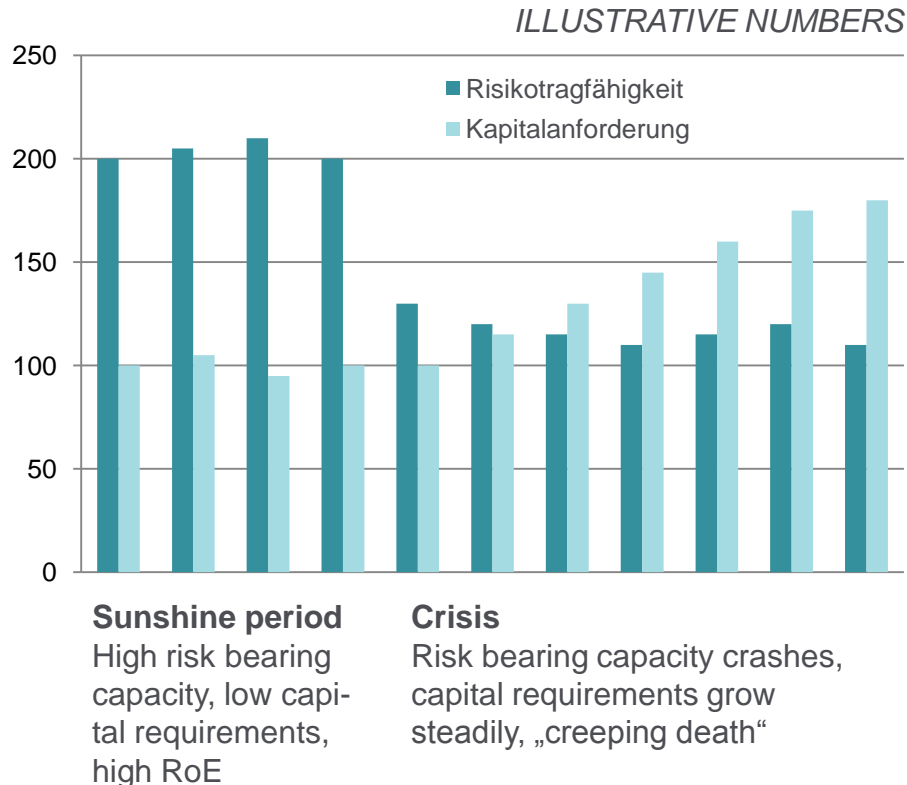
Combination of factors which are individually problematic, but collectively devastating

Absence of transparency on this toxic constellation

Question: is it realistic to assume that similar constellations can be identified in the future?

RoE requirements and risk models of banks

Calibration of risk models based on historic data



Comments

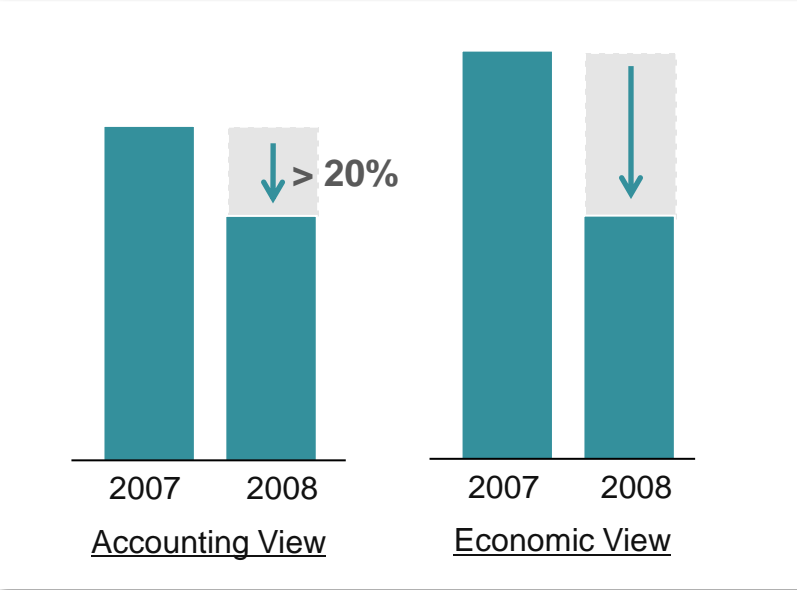
- Calibration of capital requirements based on historic data lead to underestimation of requirements in sunshine periods
- Ever growing RoE expectations have been addressed this way
- Leading to double pro-cyclicality in crisis: (1) Risk bearing capacity crashes, while (2) capital requirements grow steadily
- While the former is inevitable, the latter is the straw that breaks the camel's back
- Result: Banking sector lost sight of its financial stability in its effort to improve its RoE
- The price the banking sector is going to pay for its failures will be stunning

Financial institutions should acknowledge that mis-calibrated capital requirements are not sustainable

Development of (re-)insurance industry's capital basis throughout 2008



Decline of equity typical for recent disclosures



Main reasons for higher drop in economic view

- Increased hedging costs in an economic view (enormous rise of market volatility) esp. for life insurance business
- Different consideration of goodwill and other intangibles
- Market-consistent valuation of liabilities in an economic balance sheet in a low interest environment

Shareholders' equity and economic capital position of (re-)insurers declined substantially

The crisis and ERM according to CRO Forum

Integrated risk governance

- Sound and comprehensive internal risk governance
- Risk management needs to be preemptive, independent and empowered
- Clearly articulating and monitoring the company's risk tolerance
- Compensation should be based on risk-adjusted performance

Risk models

- Indispensable tools for variety of reasons, increasingly used for regulatory purposes
- But they can never be a substitute for common sense
- Require regular improvement in the light of experience and need the complement of sound management judgment to be effective

Liquidity risk management

- Liquidity risk distinct from risk to capital adequacy
- Liquidity risk management to rely on scenario testing
- Liquidity risk of insurers is fundamentally different from that of banks

Valuation and risk disclosure

- Renewed market confidence requires accurate valuation and the prompt disclosure
- Market-consistent valuation of both assets and liabilities should become the principle that underpins financial information and prudential oversight in insurance
- Rating agencies should be brought under supervision
- Use of ratings in financial regulation should be curtailed

Group supervision

- Crisis emphasizes the need for international cooperation among regulators
- Principle and economic risk-based approach for the supervision of groups needed
- Efforts of the IAIS should be strengthened by introducing binding standards that would accelerate regulatory convergence

First real test for Munich Re's risk management frameworks after 2002-2003 crisis



ERM developments at Munich Re

Development and implementation

Strategic decision taken after 2002–2003 crisis:

- Redesign of investment strategy to reduce dependency on capital markets; state-of-the-art ALM implemented
- Sustainable profitability achieved in core businesses
- Central ERM teams established under CRO leadership (2004); risk governance/measurement/reporting strengthened

Reality check

- Subprime crisis in 2007 and subsequent capital market crisis in 2008 constitute an extremely taxing environment
- First real test of ERM framework
- Highlights the importance of risk management in its original role – in addition to the business enabler

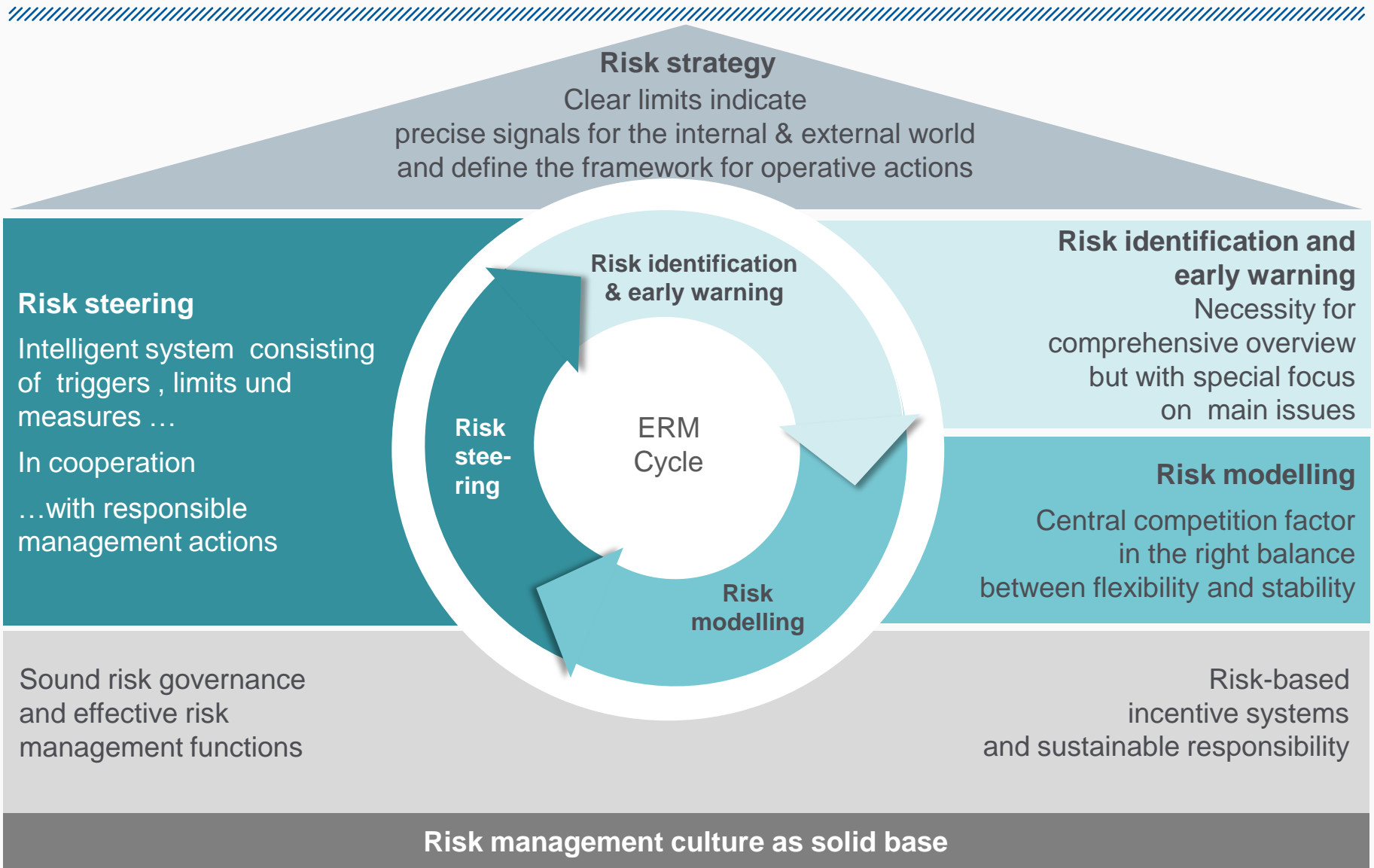
Evaluation and enhancements

- Efforts around ERM have prevented Munich Re from the worst in this crisis
- Strengthens position of ERM teams
- Identification of areas for improvements ongoing

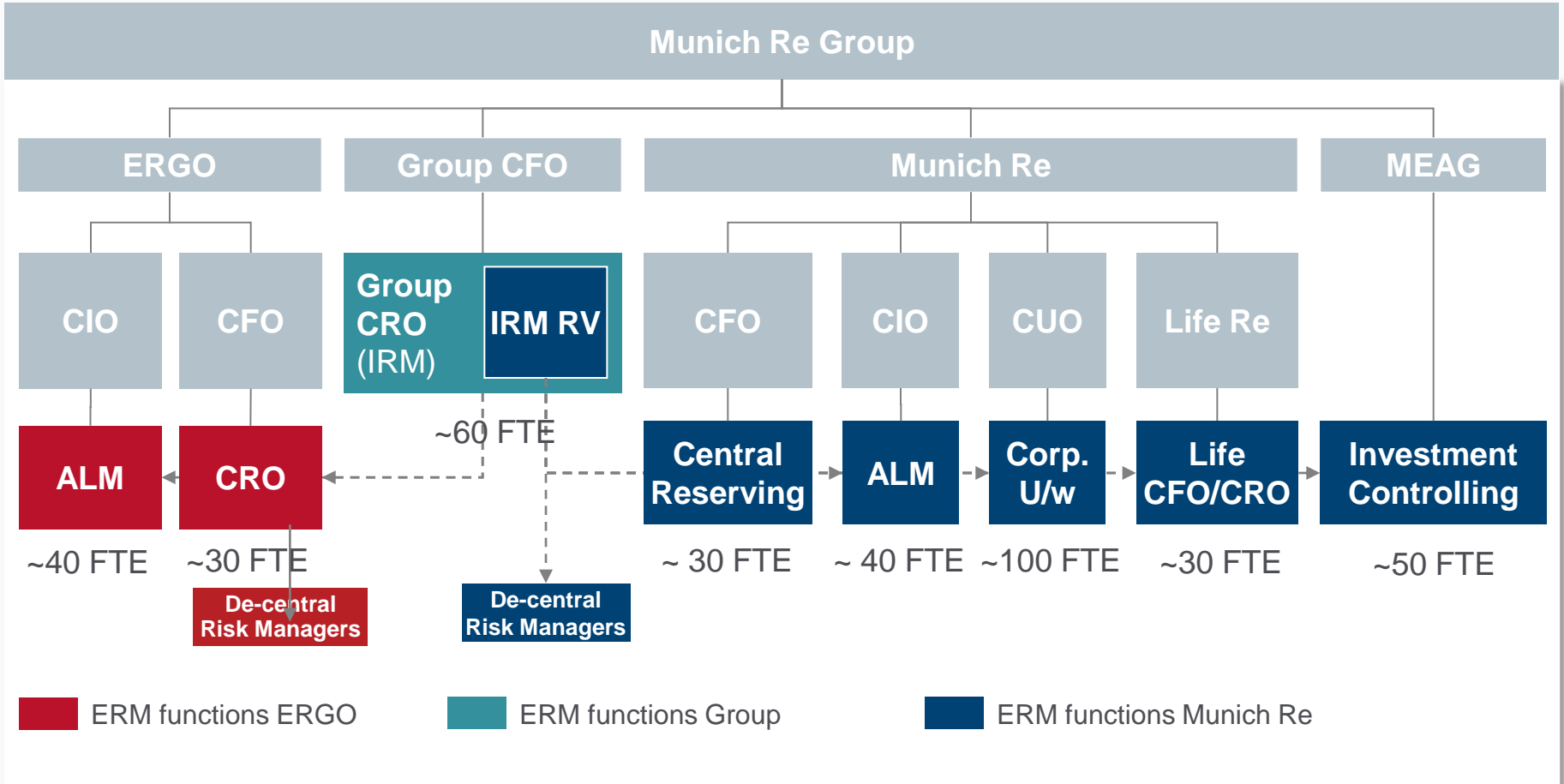


2002 crisis has triggered necessary developments of ERM

Elements of Munich Re's ERM



Munich Re ERM functions encompass more than 350 staff



ERM-Functions embedded in segments – functional reporting lines between Group
IRM and ERM functions established



Clear-cut comprehensive risk management framework

Main criteria		Additional criteria	
Capital strength	Avoiding financial distress	Accumulation risk	Liquidity
<ul style="list-style-type: none"> ▪ Economic risk capital: 175% * VaR 99.5% ▪ Rating: Target AA rating ▪ Regulatory: Solvency according to regulatory requirements 	<ul style="list-style-type: none"> ▪ Limiting the probability of having to raise capital resources to no more than 10% by considering the variability of economic earnings and the existence of the excess capital buffer 	<ul style="list-style-type: none"> ▪ Group-wide binding limits detailed by <ul style="list-style-type: none"> – NatCat – Terrorism – Pandemic – Counterparty credit risk – Individual risk accumulations 	<ul style="list-style-type: none"> ▪ Adequate liquid resources to meet <ul style="list-style-type: none"> – Known/expected requirements – An insurance claims shock – Margin/collateral calls (derivatives) ▪ Liquidity implications of a run-on-the-bank also monitored

Criteria for investments and ALM risks

Examples

- Market-/credit risks (value at risk): limits set for each operating entity
- Investment limits for alternative investments, non-investment-grade investments

Comprehensive framework to manage risk appetite

Early identification of risks: Scenario-based analysis, taking Munich Re as an example

Scenario developments prior to the economic crisis

Scenario 1: Global recession

- Global economic collapse/stagnation
- Relatively slow recovery process (> 1 year)
- Loss of confidence
- Further insolvencies and downgrades
- Rising unemployment rates

Already reality

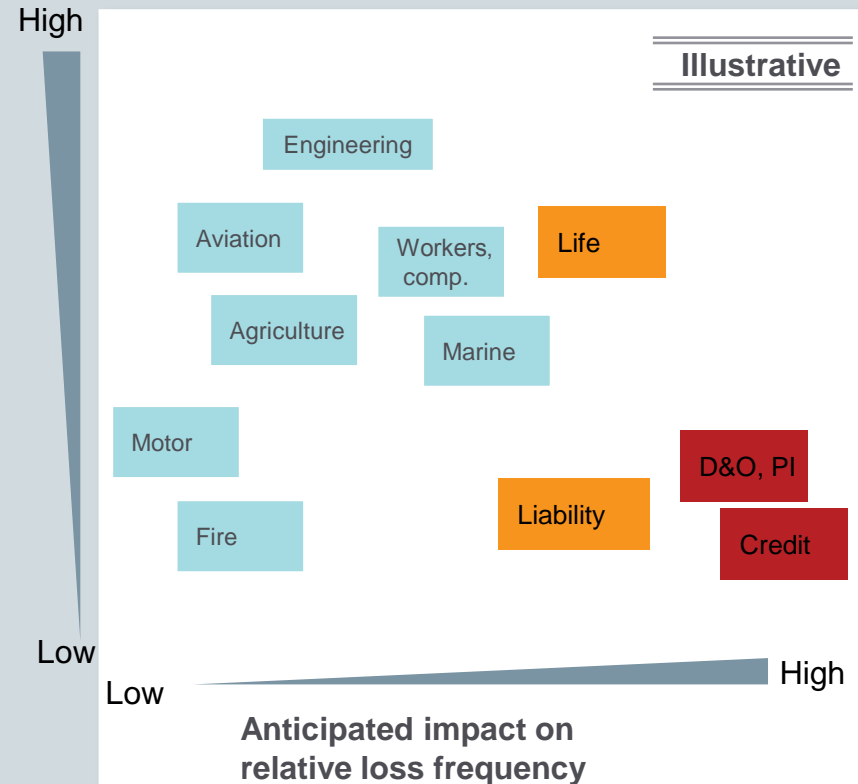
Scenario 2: Severe worldwide economic crisis lasting several years

- Significantly decreasing economic prosperity
- Deflationary trend followed by strong inflation
- Severe unemployment
- Low oil prices
- Bankruptcy of countries
- Very large number of insolvencies
- Long-lasting, massive loss of confidence

Still probable

Reinsurance classes of business affected

Anticipated decline in premium income



Sensitivity of premium volume and claims varies by line of business

Economic risk capital (ERC) as of 31.12.2008

Breakdown of Group required economic risk capital



€bn						
Risk category ¹	Group		RI	PI	Div.	Explanation
Year ended	2007	2008	2008	2008	2008	
Property-casualty ²	7.0	8.0	7.8	0.6	-0.4	+€500m changed approach towards Storm Europe ³ , +€250m decreased external risk mitigation, +€200m exposure change
Life and health	3.3	4.0	3.5	1.1	-0.6	Higher PV of adverse scenarios due to lower interest-rates, mainly US and CAN
Market	7.9	5.4	4.3	3.7	-2.6	Reduction in equities exposures and increase in interest-rate risk
Credit ⁴	1.5	2.7	2.1	0.7	-0.1	Thereof +€750m due to higher credit spreads and +€200m due to increase of credit exposures
Operational risk	1.2	1.4	1.0	0.4	0.0	Enhanced operational risk model
Simple sum	20.9	21.5	18.7	6.5	-3.7	
Diversification effect ⁵	-4.4	-5.0	-5.5	-1.3	1.8	
Sum ERC	16.5	16.5	13.2	5.2	-1.9	

Group ERC stable despite material shifts in risk profile

¹ Risk categories broadly based on refined "Fischer II" risk categories recommended for standardised industry disclosures.

² Contains Credit reinsurance.

³ Different representation of scenario with neutral net effect on sum ERC.

⁴ Default and migration risk.

⁵ The measured diversification effect depends on the risk categories considered and the explicit modelling of fungibility constraints.

Capital position

Summary of economic capital disclosure



Position as at 31 December 2008 (31 December 2007)

€bn		31.12.2008	31.12.2007
Available financial resources		24.6	34.3
Economic risk capital ¹		16.5	16.5
Economic capital buffer		8.1	17.8
Economic capital buffer after share buy-back and dividends ²		7.0	16.3

■ Solvency II capital ■ Hybrid capital

Strong economic capital position despite capital market crisis and significant capital repatriation in 2008

¹ Solvency II capital based on VaR 99.5%, Munich Re internal risk model based on 175% of Solvency II capital. Solvency I ratio is 264% as at 31.12.2008.

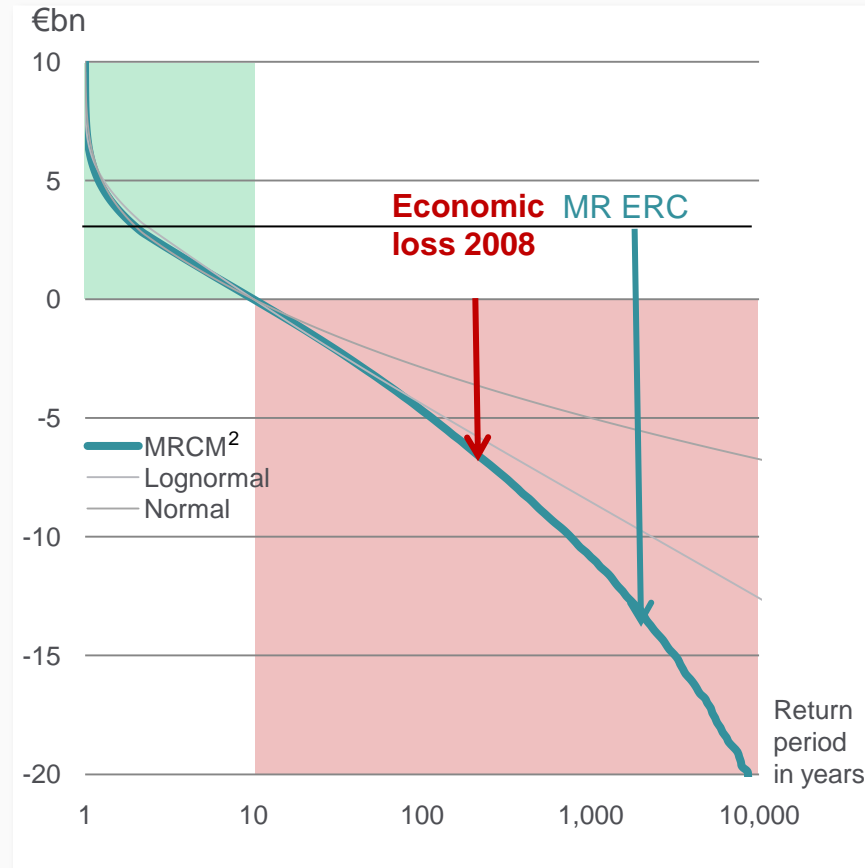
² Announced dividends in 2009 of €1.1bn, €0.05bn outstanding from 2008/2009 share buy-back programme.

AFR change and relation to economic earnings

AFR development in 2008



Relation to probability distribution of MRCM²






Probability distribution of MRCM is strongly heavy-tailed

¹ Dividends and share buy-back (-€2.5bn) and higher goodwill/intangibles due to M&A (-€0.9bn).

² Munich Re capital model.

Risk steering

More than just ticking off a checklist of measures

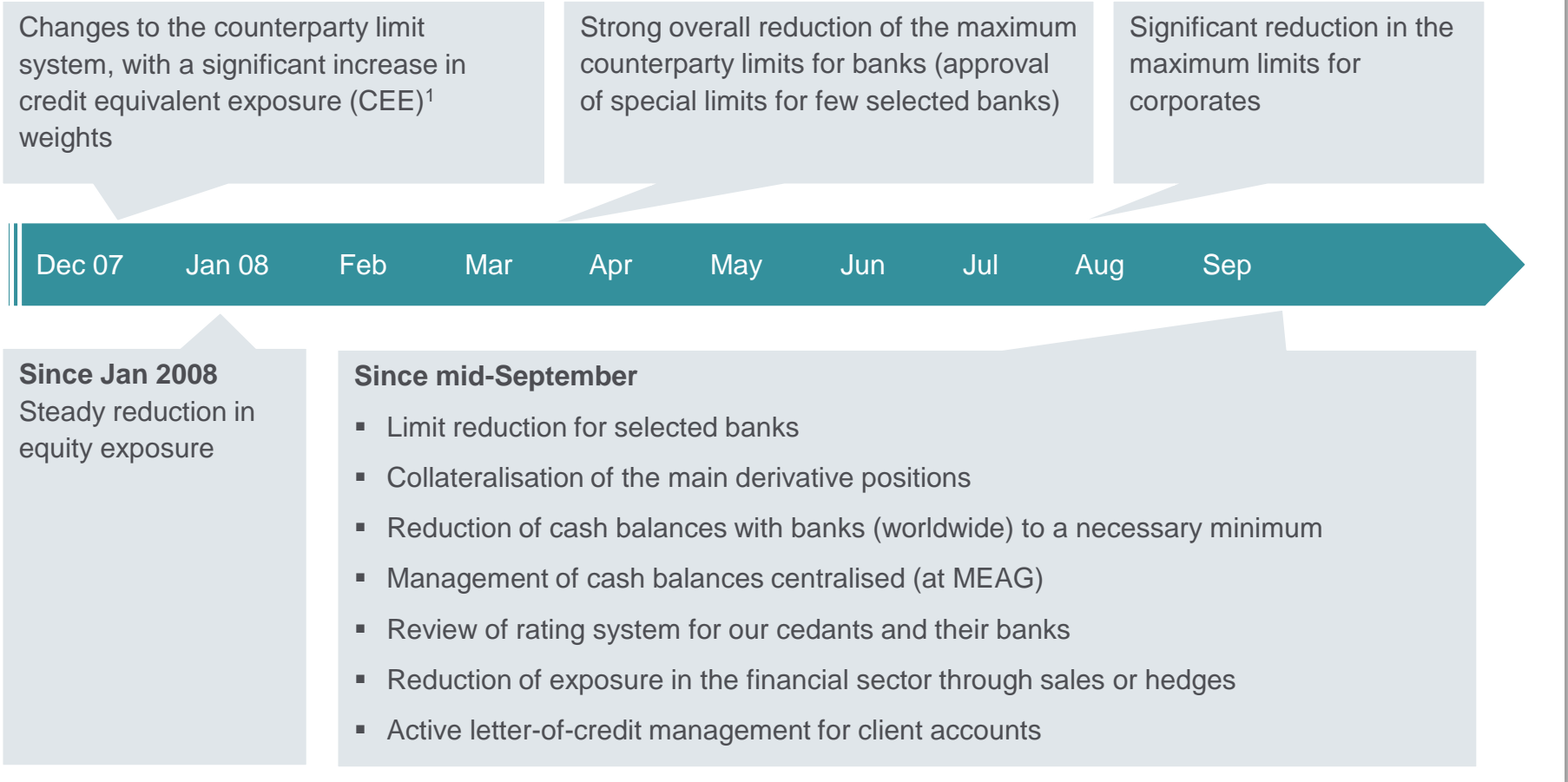
- The quantification of developments is an indispensable prerequisite
- Implementation of a comprehensive system of limits and triggers that
 - the decision-makers are well familiar with and understand
 - covers insurance risks, investment risks and their interaction
 - triggers staggered and clear consequences, e.g. traffic light logic
 -  → "Forbidden zone" → mandatory risk management action
 -  → Close monitoring of further developments, no risk management action necessary yet
 -  → No risk management action necessary
- Functional prerequisites
 - 1. System intelligence (close to reality, capturing of dependencies, proper calibration)
 - 2. Risk management competence at Board level absolutely necessary in order to understand and query the results

Success can only be secured if there is good interaction between man and the "system"!

MEASURES TAKEN TO AVOID ADVERSE IMPACT OF THE CRISIS



Munich Re has taken measures proactively and early in the crisis



Crisis management with focus on capital preservation

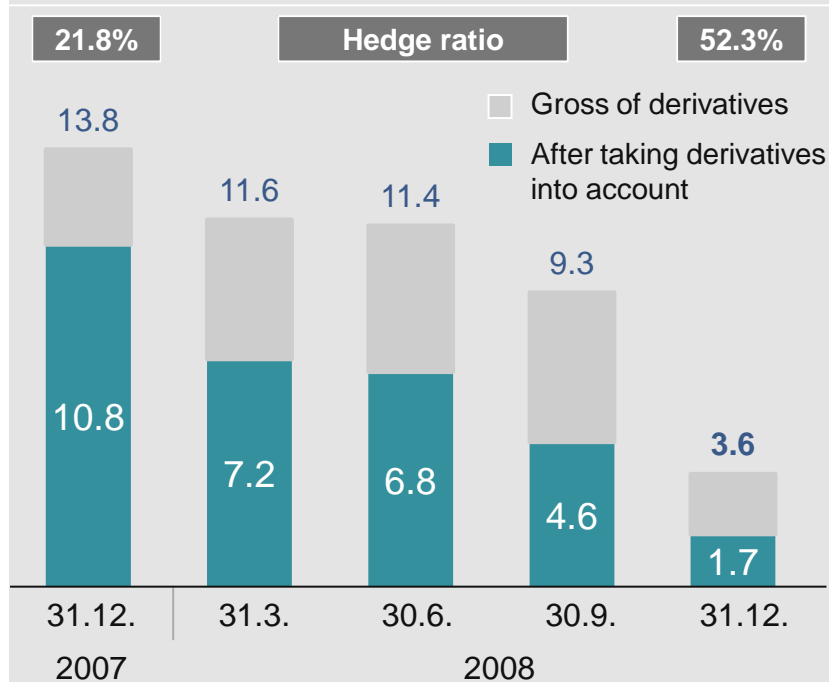
¹ Credit equivalent exposure: Risk-weighted market values, e.g. Pfandbriefe 12.5%, equities 100%.

Risk mitigation activities

Capital market impacts reduced

Equity hedging

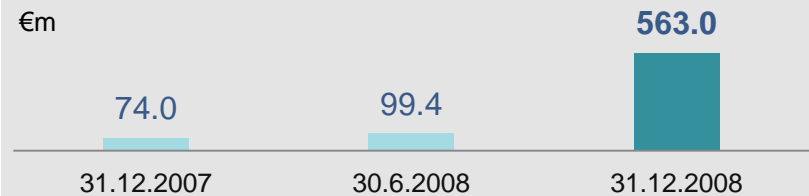
Equity backing ratio¹ %



Equity backing ratio strongly reduced throughout 2008

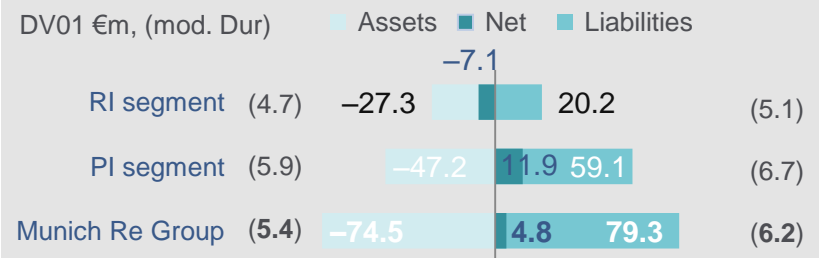
Interest-rate hedging

Market value of interest-rate hedges at ERGO



Interest-rate hedges have kicked in

Interest-rate sensitivities²



Interest-rate risks in segments partly offset each other

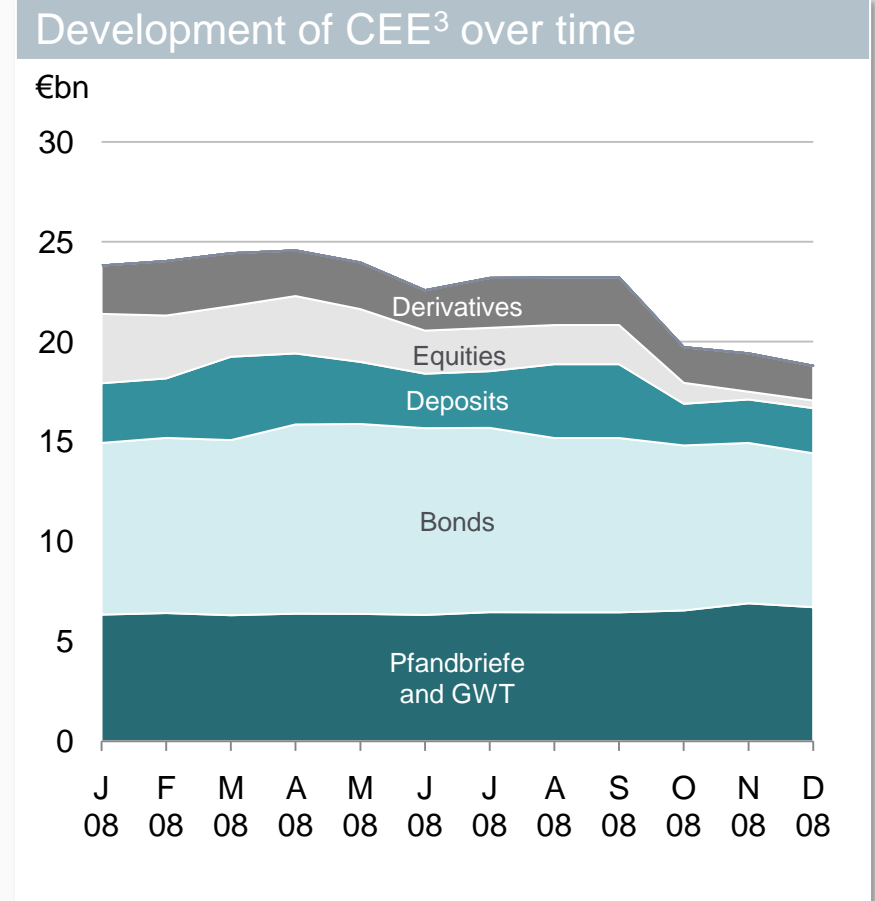
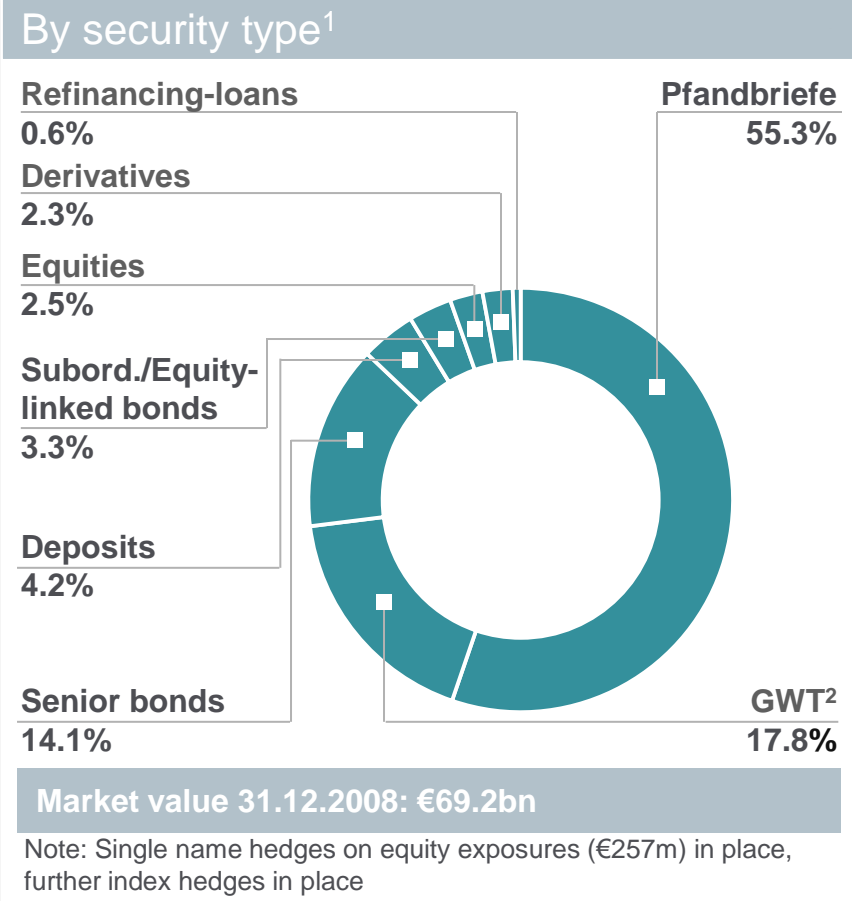
Hedging activities successful during 2008

¹ Proportion of investments in equities, equity funds and shareholdings to total investments at market values.

² DV01: Sensitivity in absolute terms (€m) to parallel upward shift of yield curve by one basis point. DV01 reflects the size of the fixed income portfolio.

Exposure to the financial sector

Credit equivalent exposure continuously reduced throughout 2008



A total of ~73% of market values is attributable to Pfandbriefe and GWT²; Exposure to financial sector mainly focused on Germany (56%)

¹ Economic view – not fully comparable with IFRS figures. ² GWT = Gewährträgerhaftung (Guarantors' liability).

³ Credit equivalent exposure: Risk-weighted market values, e.g. Pfandbriefe 12.5%, equities 100%.

Historical Analysis: Munich Re managed three major economic crises in Germany in the 20th century



	Economic environment	Impact on Munich Re
Hyper-inflation 1922/23	<ul style="list-style-type: none"> ▪ Default of German government and corporate bonds ▪ Depreciation of saving accounts and life insurance policies ▪ Collapse of economic life (salary depreciation, increasing unemployment) 	<ul style="list-style-type: none"> ▪ Initially, claims inflation leading to high combined ratios, subsequently new contract conditions introduced (e.g. interim premium adjustments) ▪ Munich Re investments only partially affected due to foreign participations and real estate <p>Strong competitive position of Munich Re due to available capacity</p>
World economic crisis 1929–32	<ul style="list-style-type: none"> ▪ Decreasing turnover of companies ▪ Crash in stock markets and high corporate default rates ▪ Protectionist trade policy ▪ High unemployment rates 	<ul style="list-style-type: none"> ▪ Drop in premium by 25% ▪ High losses in credit and life insurance ▪ Positive claims development <p>Overall positive and relatively stable returns in each year</p>
Monetary reform 1948	<ul style="list-style-type: none"> ▪ Increased money supply and subsequent inflation in Germany (Reichsmark) ▪ Default of German government and corporate bonds ▪ 90% depreciation of private pension policies 	<ul style="list-style-type: none"> ▪ Munich Re suffered losses due to the depreciation of Reichsmark ▪ Rebuilding of foreign business accelerated by rapid setup of the DM opening balance sheet <p>Financial strength was re-established within three years (e.g. premium increase by 30%)</p>

Munich Re successful in mastering prior crises, but current situation requires analysis of further scenarios

CONCLUSIONS



Conclusions

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Crisis has reduced risk capacity of the insurance industry, especially on an economic basis

Crisis also reveal areas for improvement in ERM

In particular, risk models need enhancement in respect of calibration

Solvency II on the right track

Solvency II will change the way insurance companies are managed

Munich Re well positioned to help clients with ERM and Solvency II



Thank you for your attention