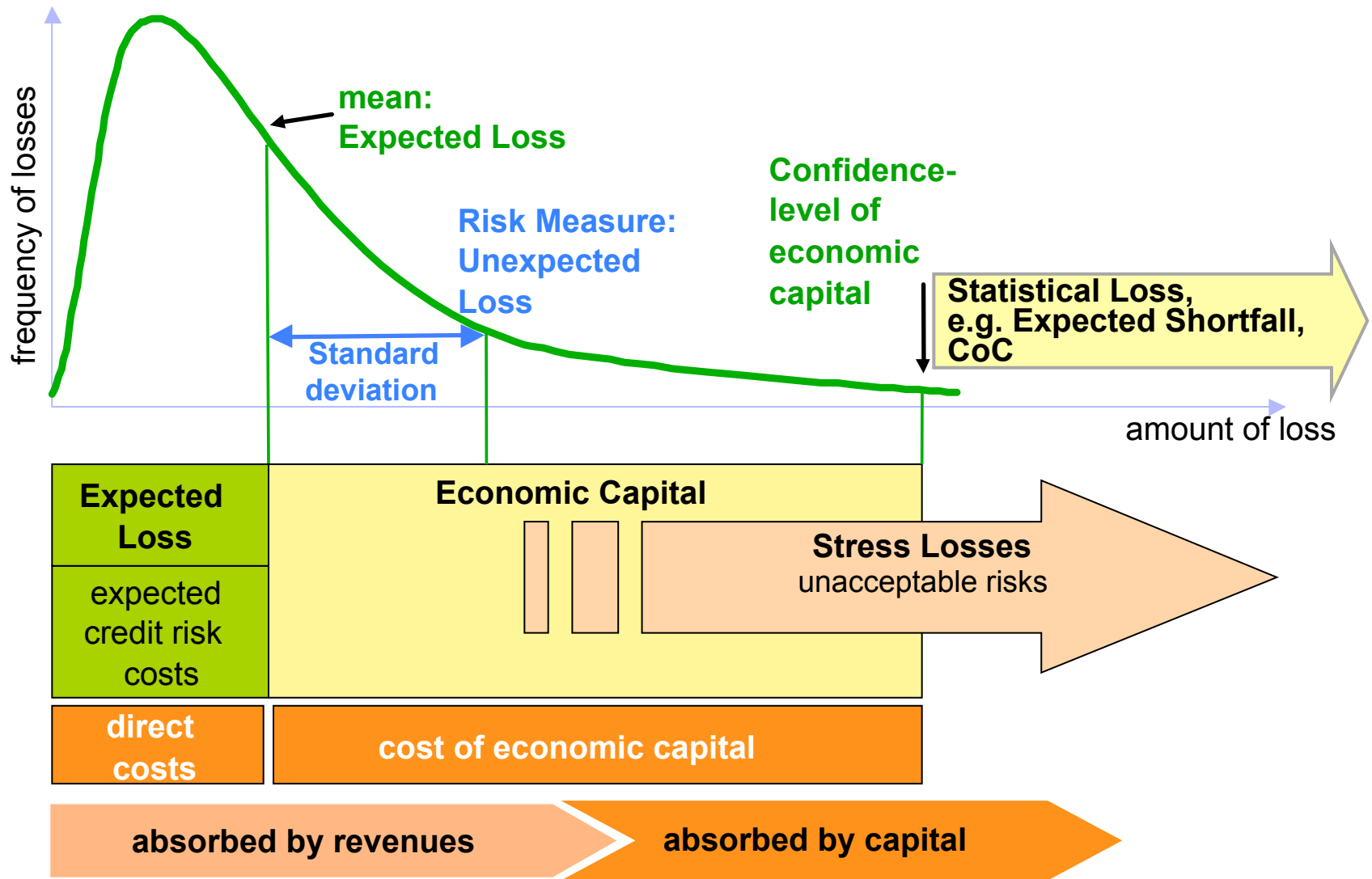


Credit Stress Loss

Susanne Emmer

05 May, 2011

Alphabet of Credit Risk Measures

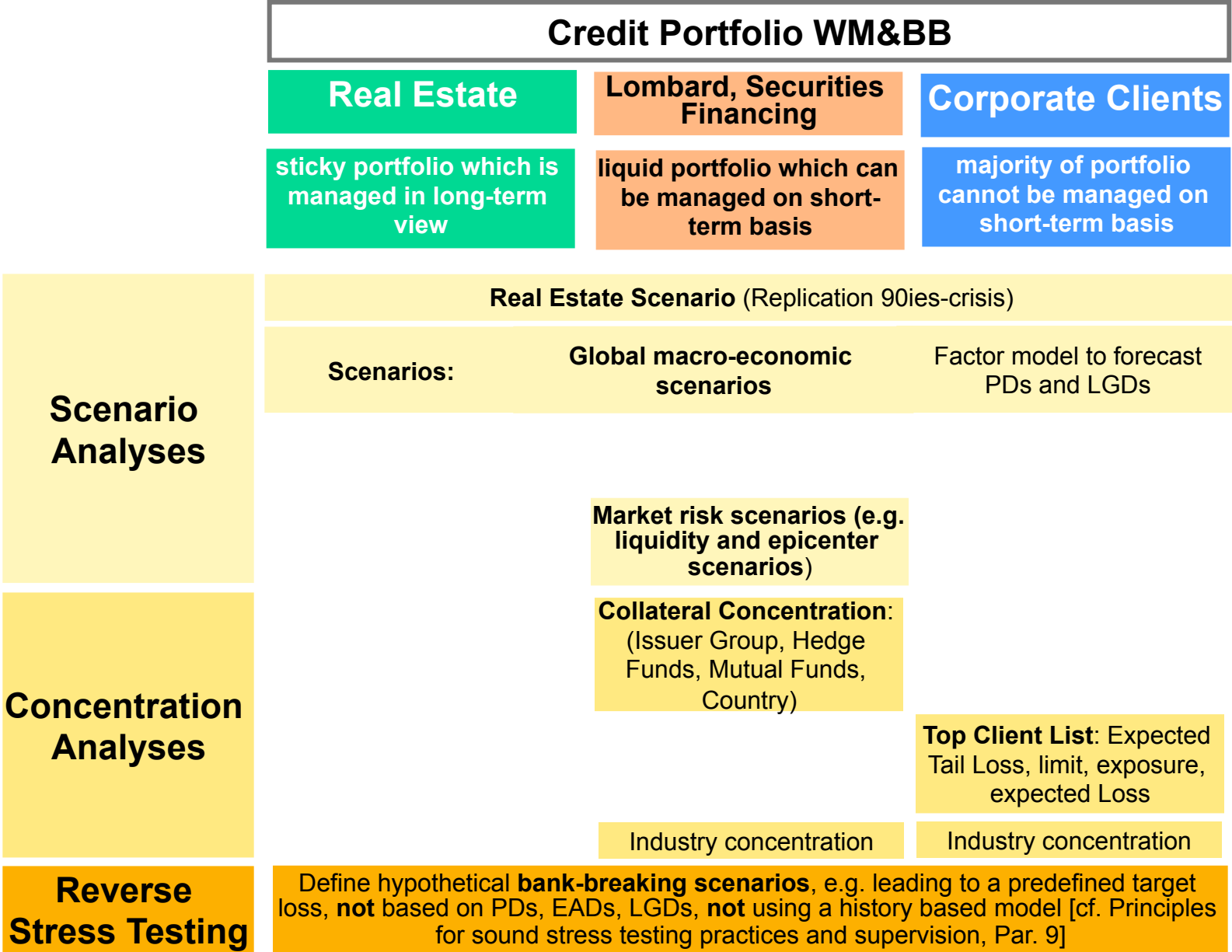


What is Stress Testing About?

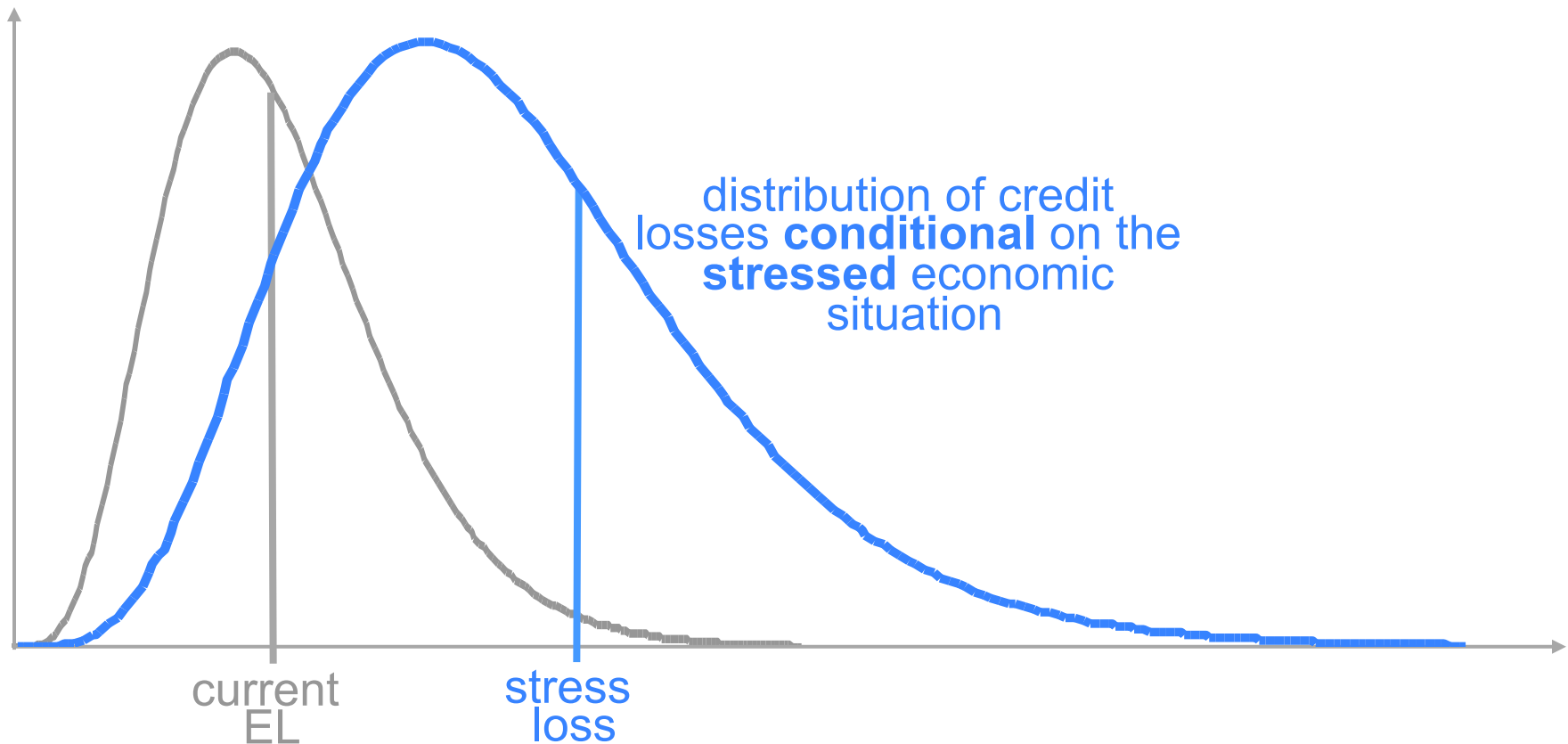
Stress testing

- is promoted by supervisors (Basel II capital adequacy framework)
- is an important risk management tool, supplementary to traditional methods
- indicates how much capital the bank needs in critical situations
- provides forward-looking risk assessments
- overcomes limitations of models and historic data
- feeds into capital and liquidity planning procedures
- facilitates the development of risk mitigation or contingency plans for critical situations

Credit Stress Testing Landscape



Uncertainty of Stress Losses

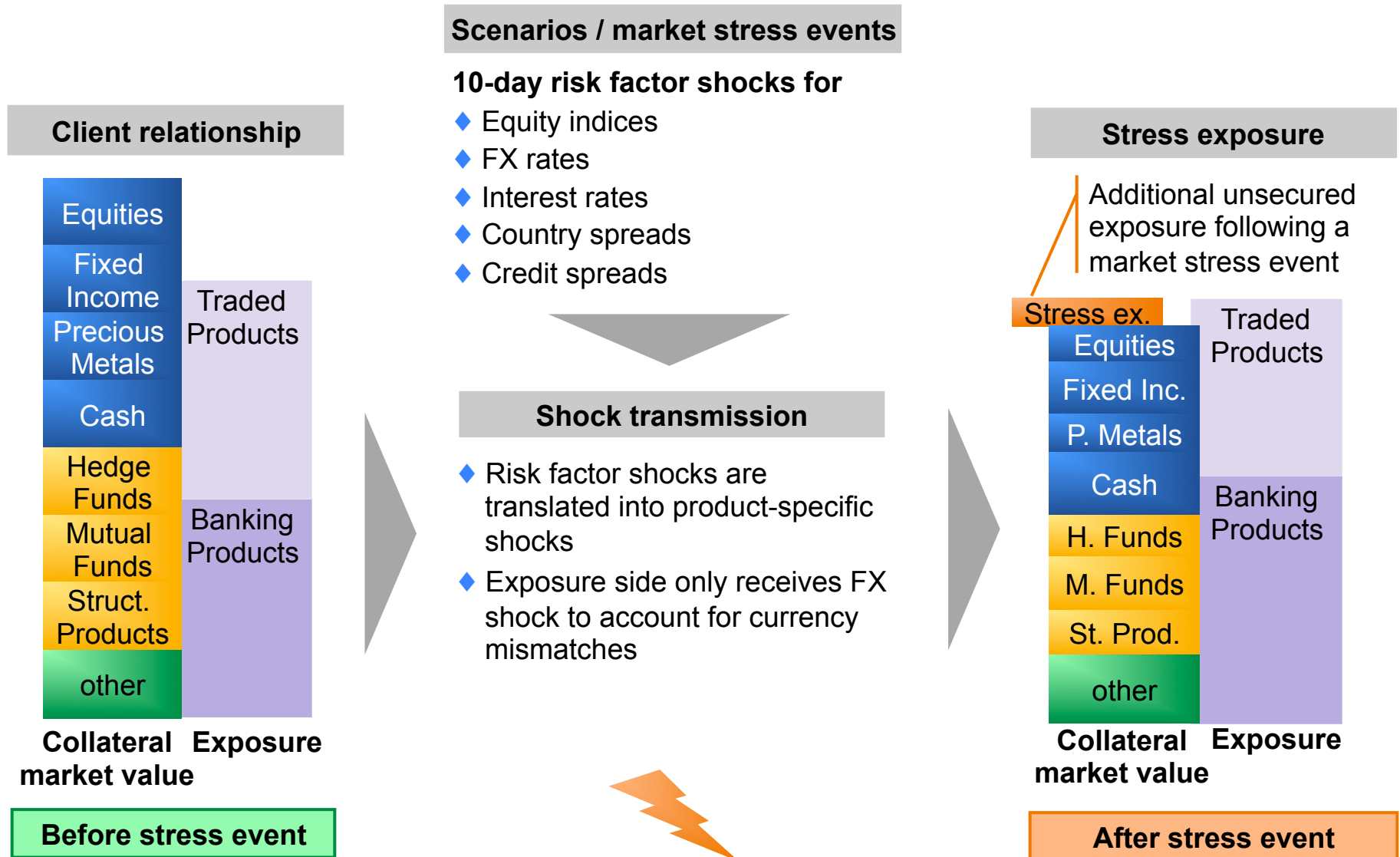


- ◆ The stress loss measure does **not** suggest the **worst possible outcome**
- ◆ Even if the economy turns out to be as assumed in the stress scenario, the loss outcome may significantly vary around the expected value (stress loss)
→ alternative measure for stress loss could be a quantile or ETL of the distribution or confidence interval

Section 1

Lombard Stress

Market Scenario Stress Testing in Credit



SECTION 2

Macro-economic Stress Testing

Sensitivities

	Identify macroeconomic factors for each segment which impact the default rate, i.e. interest rate IR, GDP growth, RE prices, FX rate EUR/CHF
Sensitivities	Analyse historic time series to estimate how a change in a driver impacts the default rate resp. LGD, e.g. IR up 1% => PD up by x%
Forecast	Use sensitivities to forecast future PDs and LGDs for stress scenarios defined in terms of drivers, e.g. $PD=f(IR, GDP\ growth, RE\ prices, \dots)$

Sensitivities for various economic drivers are estimated on portfolio relevant segmentation:

Real Estate	Lombard, Securities Financing	Corporate Clients
private mortgages IPRE	private clients market stress	e.g. Energy intensive Financial Services Manufacturing Services Real Estate Construction Restaurant Hotels ...

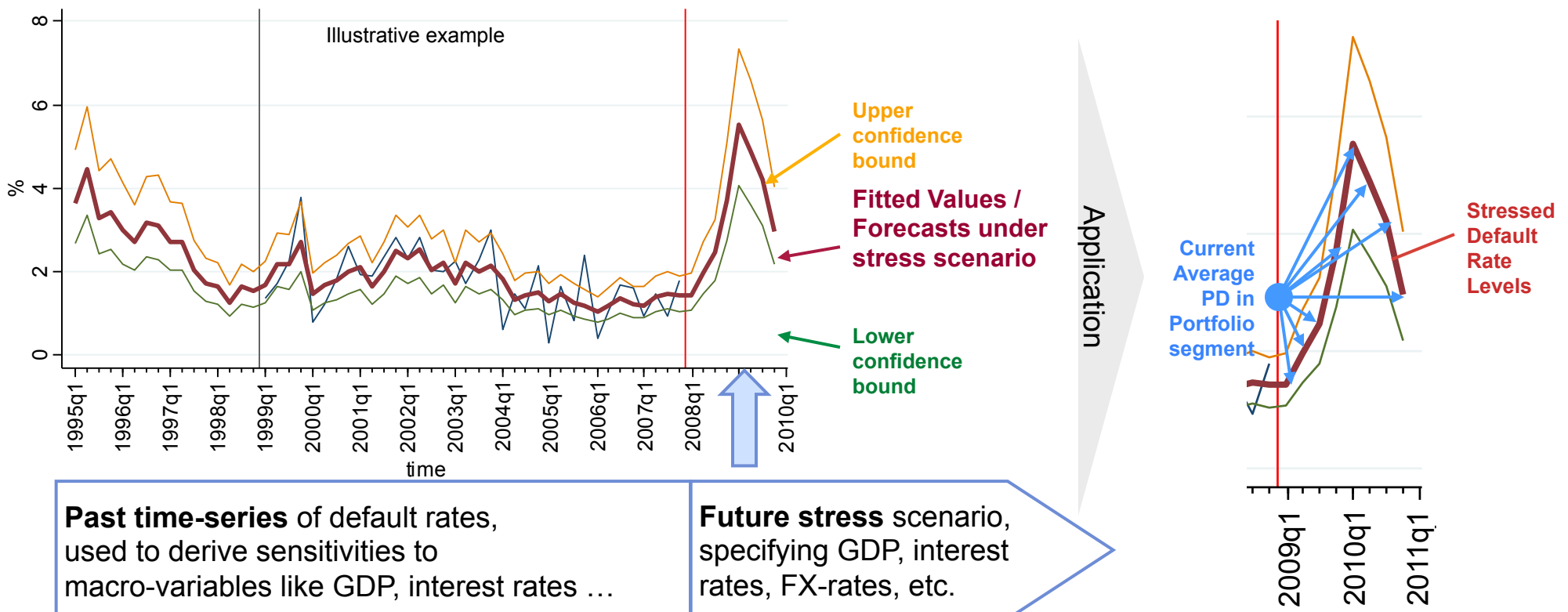
Macro-economic Stress Testing Methodology

- ◆ Sensitivities to macroeconomic variables estimated based on internal history of impairment data

Main drivers: GDP growth, interest rates, FX rate EUR/CHF, Real Estate Price changes

$$PD = \beta_0 + \beta_1 GDPgrowth_1 + \beta_2 InterestRates_2 + \dots + \beta_K REPrices_K + \varepsilon$$

- ◆ Application to given macroeconomic scenario



Calculation of stress loss

Relevant macroeconomic stress scenarios are regularly updated by specialists

These scenarios are translated into PDs and LGDs via formulae for stress PDs and LGDs

Based on the standard expected loss formula we calculate the **stress loss** (conditional on a scenario):

$$EL_{\text{stress}} = PD_{\text{stress}} \cdot LGD_{\text{stress}} \cdot EAD_{\text{stress}}$$

EAD is assumed to be unchanged under stress.

The stress loss is calculated on a contract level and then aggregated to the appropriate level.

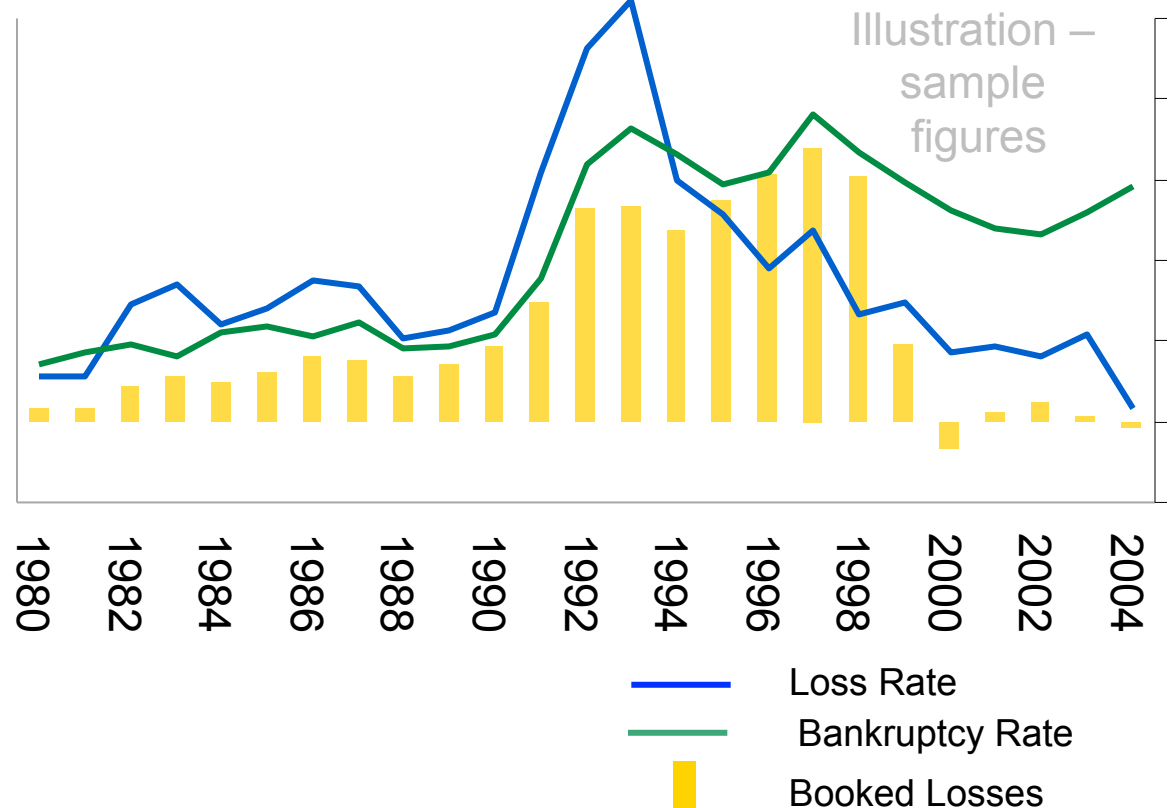
SECTION 3

Real Estate Stress

A New Real Estate Crisis

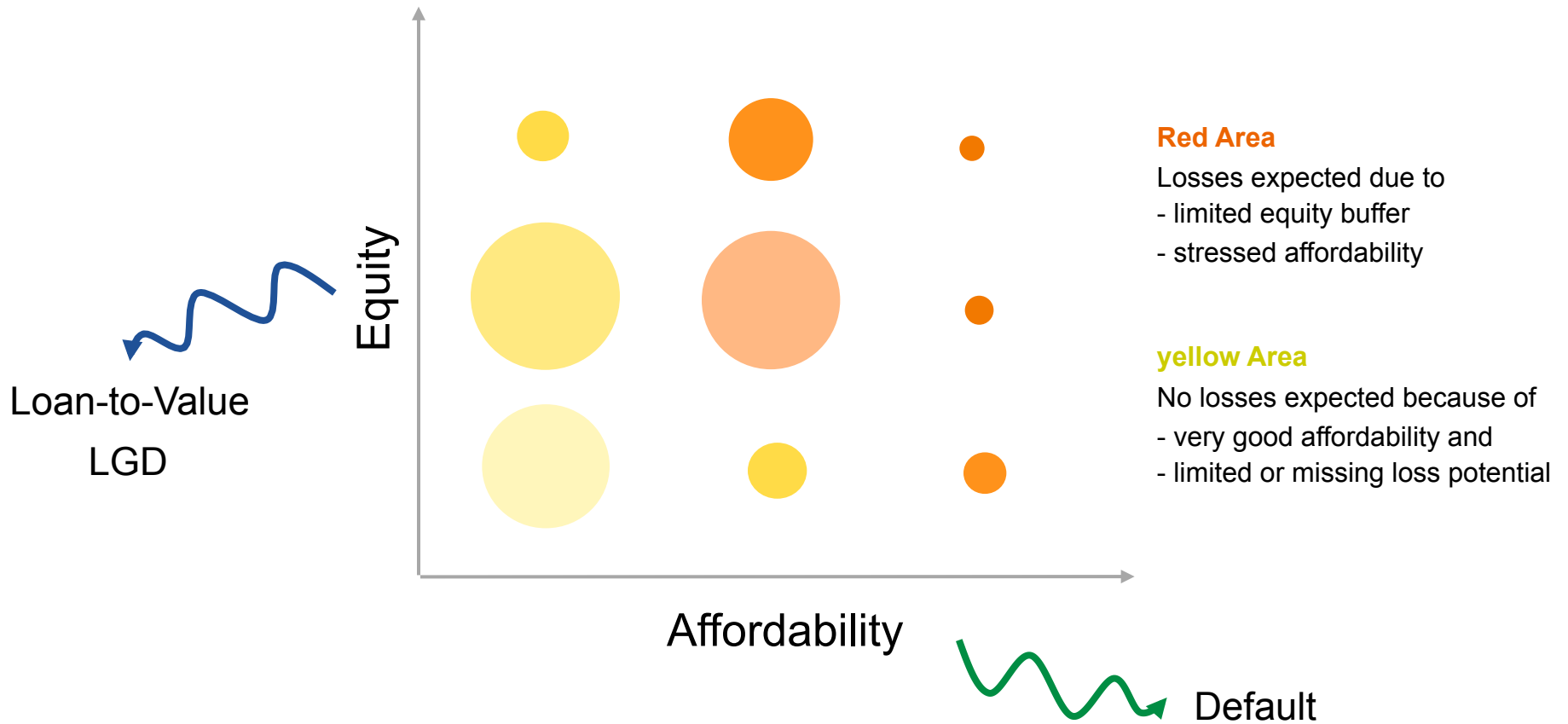
Replication of the real estate bubble from the 90ies

- ◆ Starting point: favorable economic environment in real estate market
- ◆ Inflation picks up throughout the country
- ◆ Property prices go up, too, resulting in a general bubble
- ◆ Central bank is forced to react and raises interest rates sharply
- ◆ The economy markedly slows down, unemployment starts to grow, the property markets show first signs of correction
- ◆ A widespread fall of property prices follows



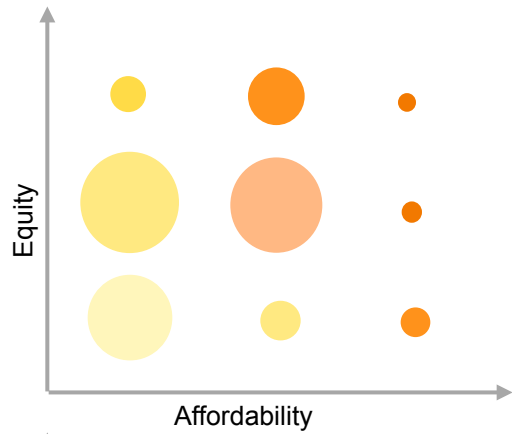
Credit Risk Drivers in Real Estate Portfolio

Portfolio Slice along LtV and Affordability for private mortgages

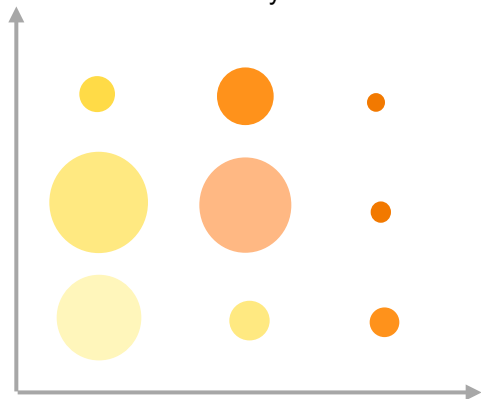
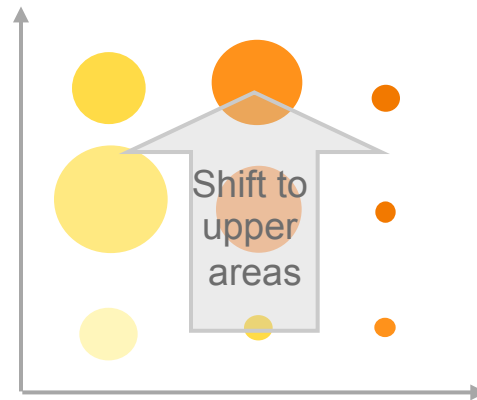


$$\text{Affordability} = \frac{\text{costs (mortgage, maintenance)}}{\text{income (corrected by 2}^{\text{nd}} \text{ homes)}}$$

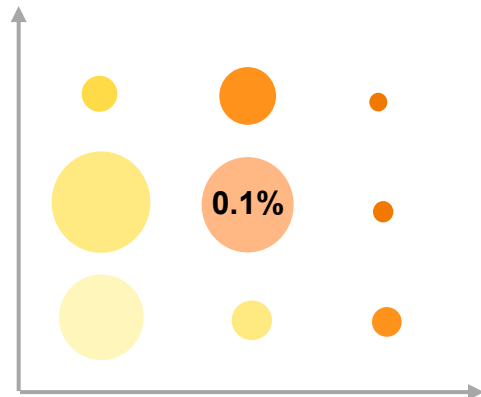
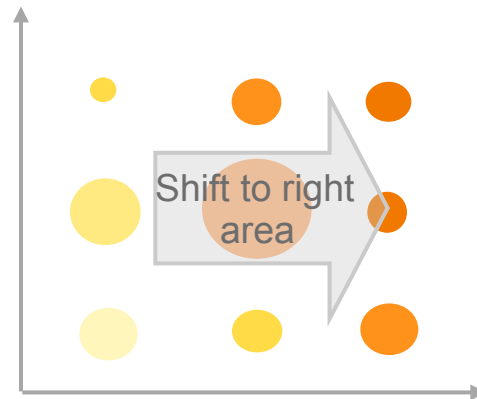
Impact of Scenarios



Real Estate
Price Decline

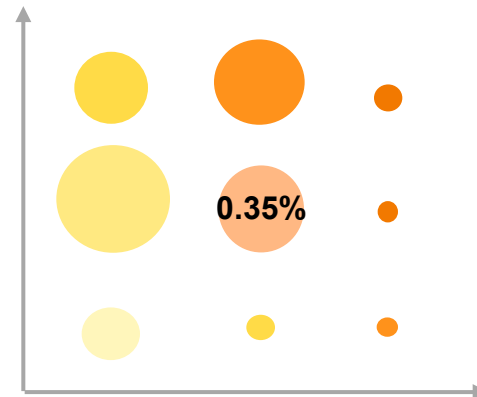


Interest Rate
Increase



Unemployment
Rate Increase

Increase of
Default Rates



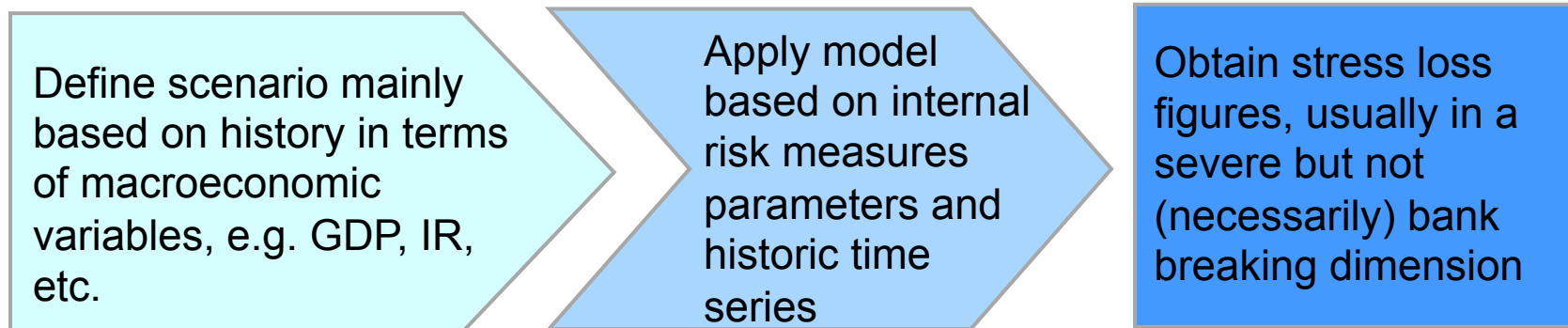
SECTION 4

Reverse Stress Testing

The "Reverse" part of Stress Testing

Current scenarios ask "what happens if" whereas reverse stress testing asks "what needs to happen that we lose x"

Conventional stress test



Reverse stress test

