Basel II - Achievements and Challenges

Klaus Duellmann

HEC Montréal,13 April 2007

The views herein are my own and do not necessarily reflect those of the Deutsche Bundesbank.

Motivation

- Where do we stand? - The roadmap:
  - June 2004 : Basel Committee endorsed Basel II framework
  - January 2007: Basel II has become effective for EU member states
  - January 2009: Basel II is on target to become effective in USA
- Where do we go from here?
  - Which are the outstanding challenges of Basel II implementation?
  - What lies beyond Basel II?
  - In which directions should further research expand?

Agenda

DEUTSCHE BUNDESBANK EUROSYSTEM

- Which were the aims of Basel II?
- Which are its main achievements and challenges of implementation?
- How to measure credit concentration risks?
- Which are future challenges for banks (and regulators)?

What were the aims of Basel II?

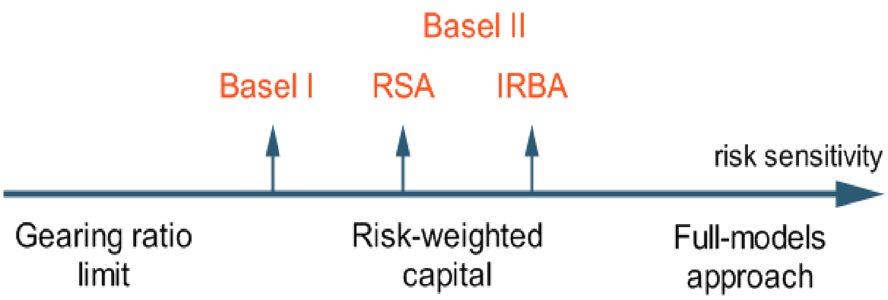
DEUTSCHE BUNDESBANK EUROSYSTEM

Basel Committee on Banking Supervision, 1999

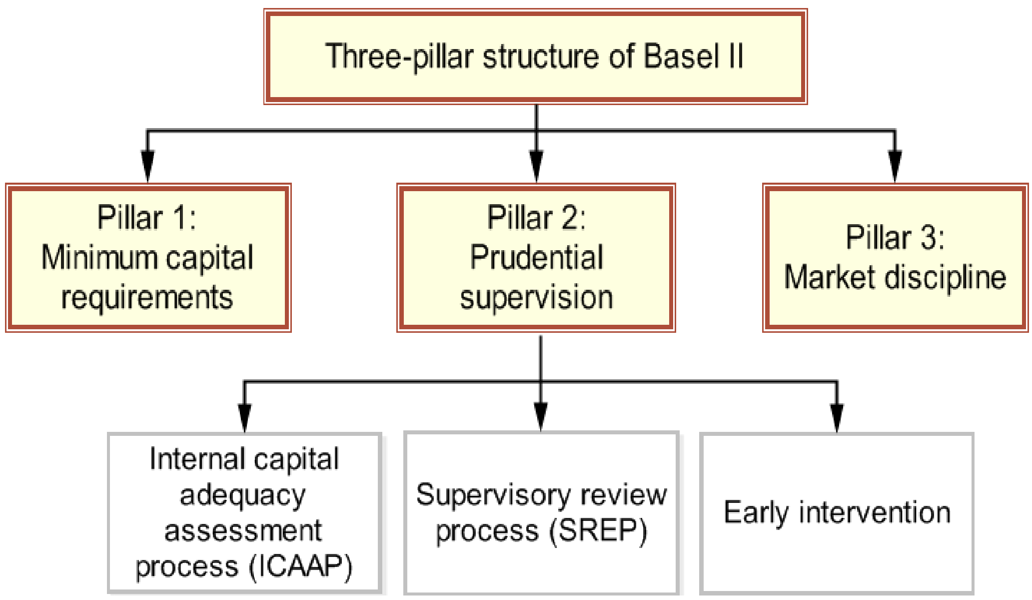
- Enhance competitive equality
- Flexible framework, responsive to future developments in risk management practices
- Recognize improvements in risk measurement
- Address financial innovations
- Improve risk sensitivity of regulatory capital

Enhance competitive equality and Responsive to risk management improvements

- Abandon the one-size-fits-all approach of Basel I
- Move to a framework that treats similar banks in the same way
  - Revised standardized approach (RSA)
  - Internal ratings based approaches (IRBA)



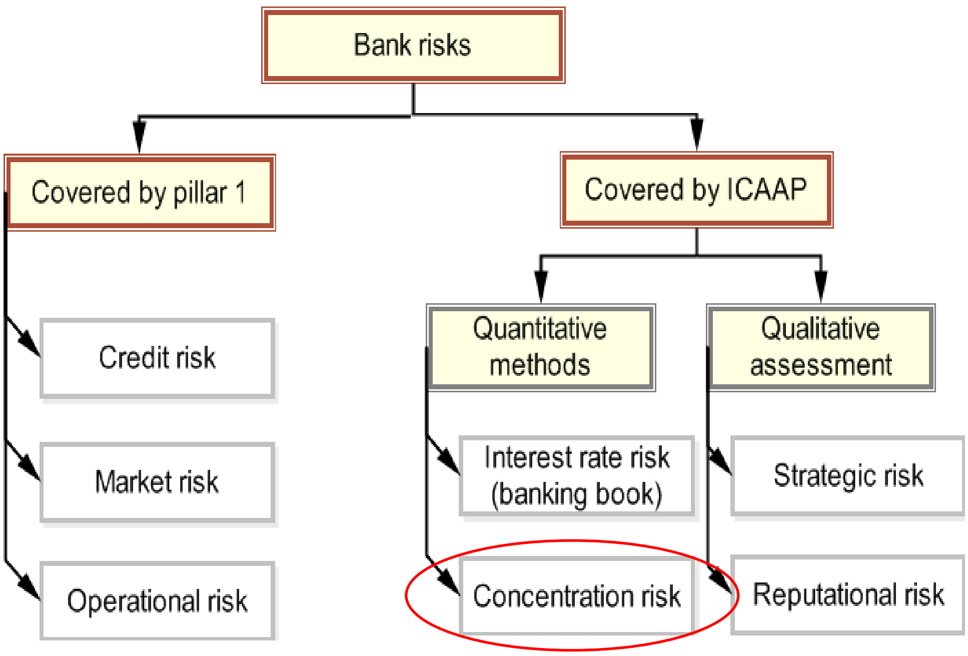
Improvements in risk measurement



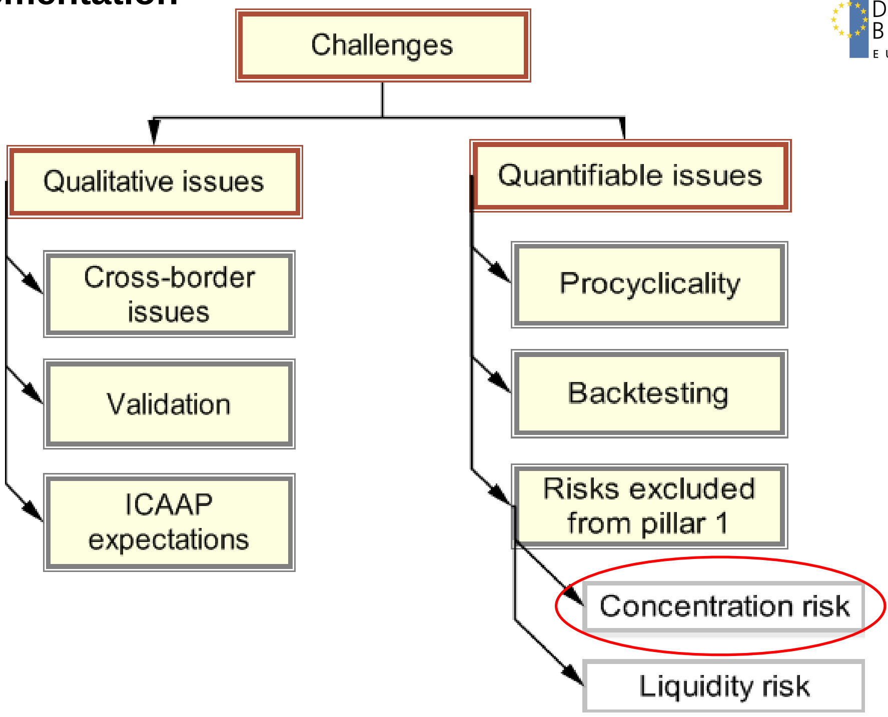
Address financial innovations

- Model-based minimum capital requirements
  - Wider recognition of credit risk mitigation
  - Supervisory formula for securitization
  - Recognition of double-default effect
- Internal risk measurement approach
  - Mark-to-market approach for equity
  - Internal model method for counterparty credit risk (OTC derivatives)
  - Internal assessment approach (ABCP)
  - Advanced measurement approach for operational risks

Improve risk sensitivity



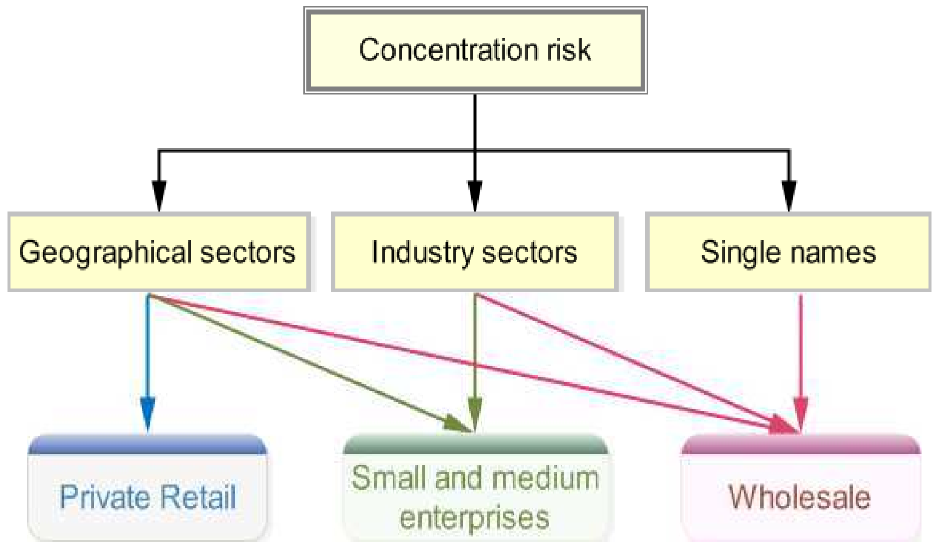
Implementation



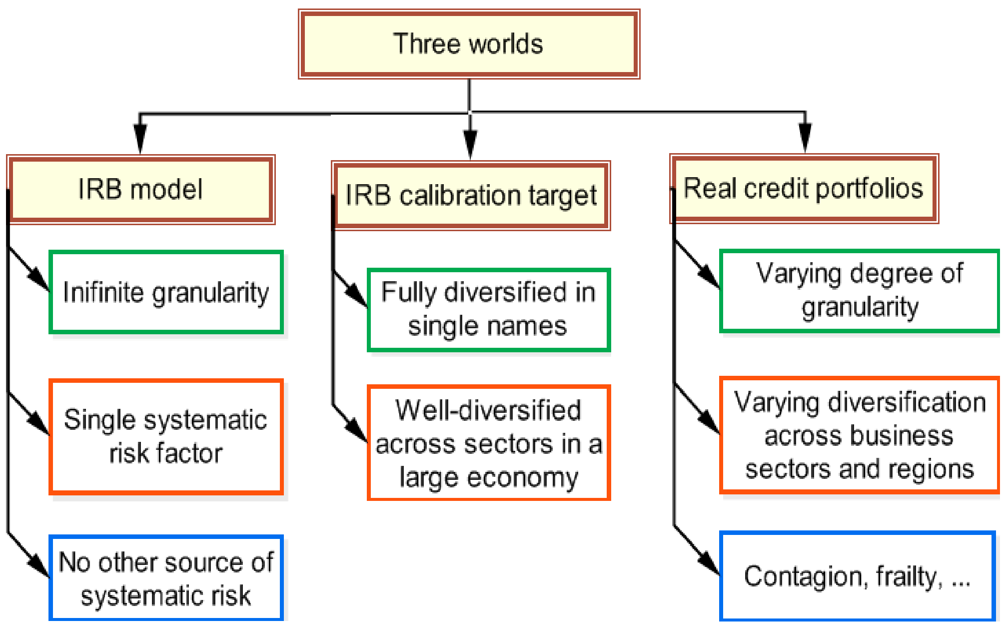
Concentration risk – Some recent quotations

- S&P Ratingsdirect, December 2005
  - “S&P believes that lending concentrations are an important potential risk factor, particularly in Japan and Western Europe.“
  - “The regulatory regimes governing single-name concentrations are generally not stringent enough in our view.“
- ISDA/LIBA/BBA survey of financial institutions, August 2006
  - “How firms manage concentration risk at a group level bears little or no relation to existing large exposures regulatory regimes.“
- Revised Framework (RF), June 2004, para 770
  - “Risk concentrations are arguably the single most important cause of major problems in banks.“

Credit concentrations and asset classes



Credit concentrations and IRB model



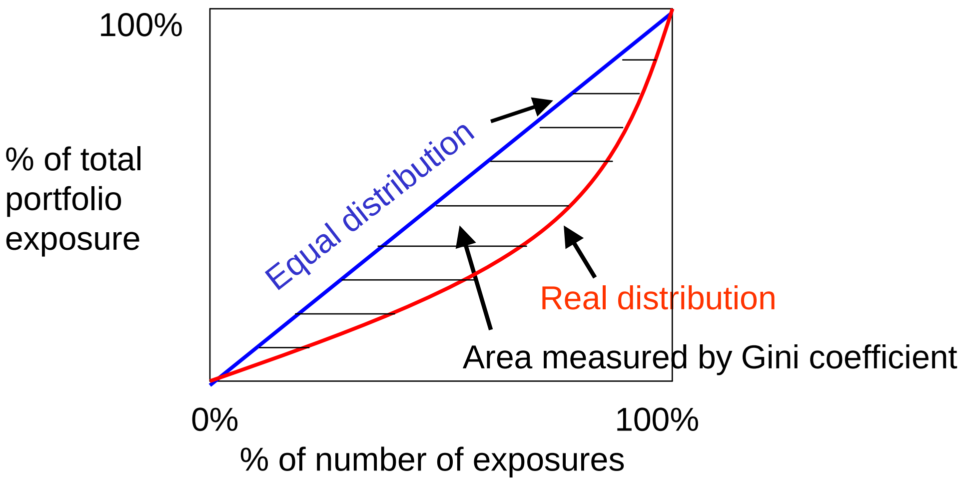
Concentration risk –
How can it be accounted for?

Methodology	Coarse granularity	Sectoral concentrations
Ad-hoc	Herfindahl index, Gini coefficient, ...	Herfindahl index, ...
Model-based	Granularity adjustment for IRB model	Multi-factor portfolio model

Measuring granularity: Gini coefficient

DEUTSCHE
BUNDESBANK
EUROSYSTEM

- Measures distance from equal distribution of exposures



- Does not fulfill superadditivity property: If any two loans are merged, concentration measure should not decrease.

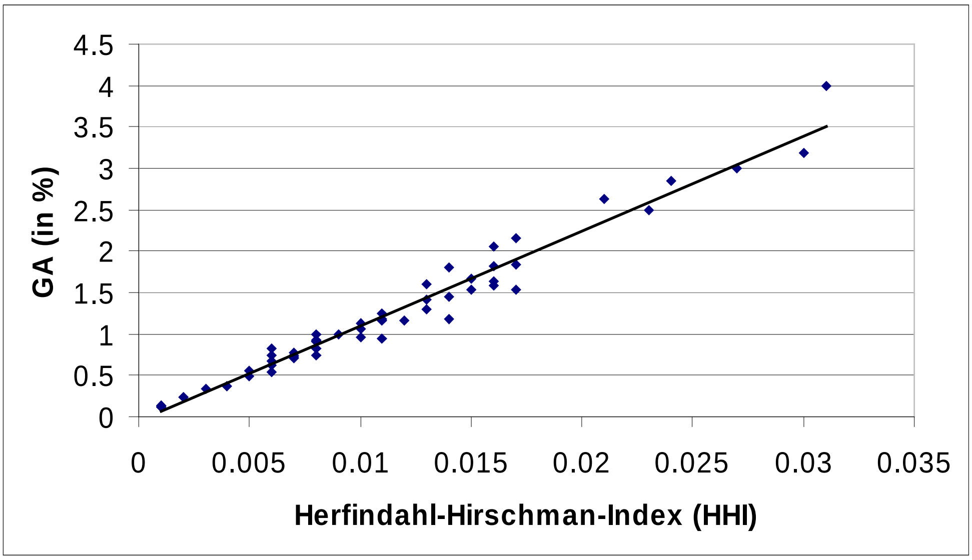
Measuring granularity: Ad-hoc methods

- Examples
  - Herfindahl-Hirschman-Index (HHI)
  - Gini coefficient
- Advantages of ad-hoc measures
  - Easy to communicate
  - Provide a ranking in terms of concentration risk
  - Parsimonious data requirements
- Note:
  - For IRB capital calculation identity of the obligor is immaterial
    - Capital charges depend only on risk characteristics of the loan
  - For granularity assessment need to aggregate information on obligor level

Measuring granularity: Model-based methods

- Example
  - Granularity adjustment for IRB model (Gordy and Lütkebohmert (2007))
- Advantages of model-based approaches
  - Translate concentration risk into a capital figure
  - Capture default dependencies (e.g. through asset correlations)
  - Pose no fundamental additional technical challenge since aggregation of single exposures on obligor level also required for ad-hoc measures
- Conclusion: Model-based methods strictly preferable

Granularity adjustment and HHI



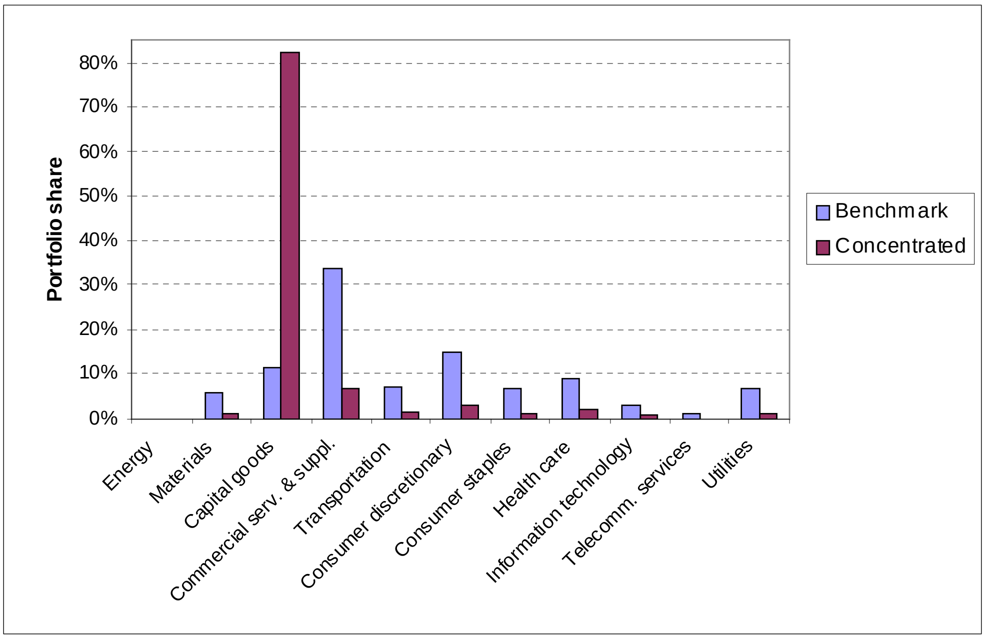
Based on: Large exposure credit portfolios of 60 German banks

What is more important: name concentration or sectoral concentration?

- Empirical example: Consider credit portfolio of
  - 600 borrowers of equal exposure size
  - Allocation to business sectors from aggregate distribution of German banking system
  - PD of 2% and LGD of 45%
  - One-year maturity
  - Asset correlation
    - In the same sector: 25%
    - Between sectors : 2.5% – 23%, average 14%
- Default-mode single risk factor model

Benchmark portfolio and sectorally highly concentrated portfolio

DEUTSCHE BUNDESBANK EUROSYSTEM



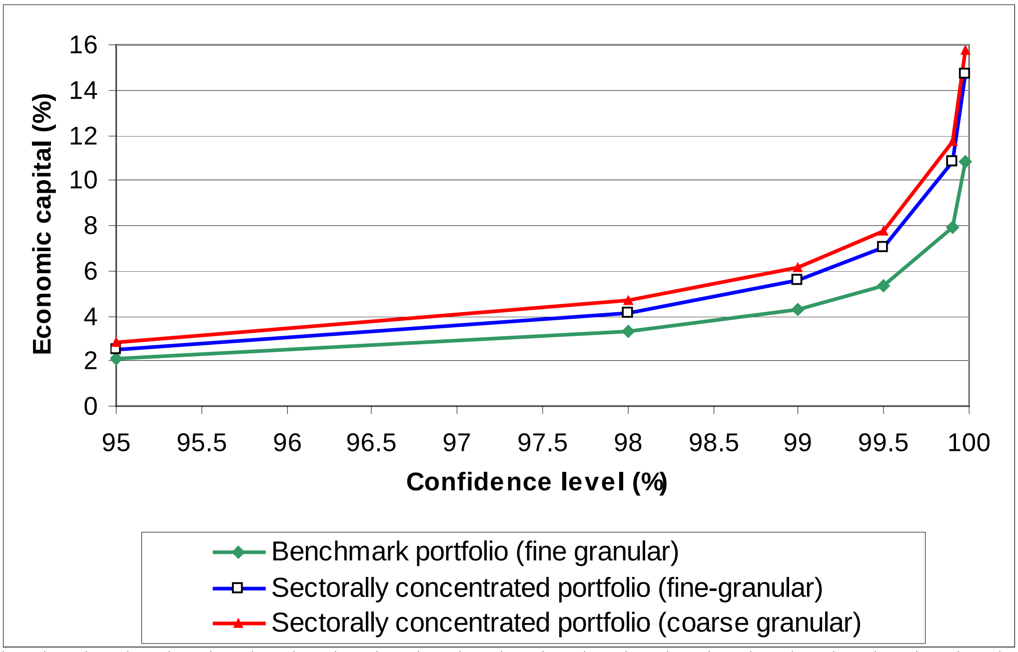
Granularity vs. sectoral concentration

DEUTSCHE BUNDESBANK EUROSYSTEM

Portfolio	**1**	**2**	**3**
Sectoral distribution	**Benchmark**	**Highly concentrated**	
Number of obligors	600	600	248*
Value at Risk** [%]	8.0	10,7	11,6
– Relative to portfolio 1	-	+34.0%	+45.0%
– Relative to portfolio 2	-	-	+8.4%

* Highest name concentration allowed by German large exposure rules
** 99.9% confidence level

Concentration risk and confidence level



Measuring coarse granularity – Where do we stand?

- Coarse granularity can be measured
  - Explicitly by a conveniently simple granularity adjustment of the IRB model (Gordy and Lütkebohmert (2007))
  - Implicitly in any multi-factor portfolio model

Measuring sectoral concentrations – Where do we stand?

DEUTSCHE BUNDESBANK
EUROSYSTEM

- Sectoral concentrations can be measured
  - Explicitly by extending IRB model by a diversification index that is calibrated to a multi-factor model (Garcia Cespedes et al (2006))
  - Implicitly in any multi-factor portfolio model, but accuracy depends on the adequacy of the model itself
  - Can be computationally tedious but progress has been made
    - In approximation formulae (Pykhtin (2004), Duellmann and Masschelein (2006))
    - In importance sampling and factor reduction techniques

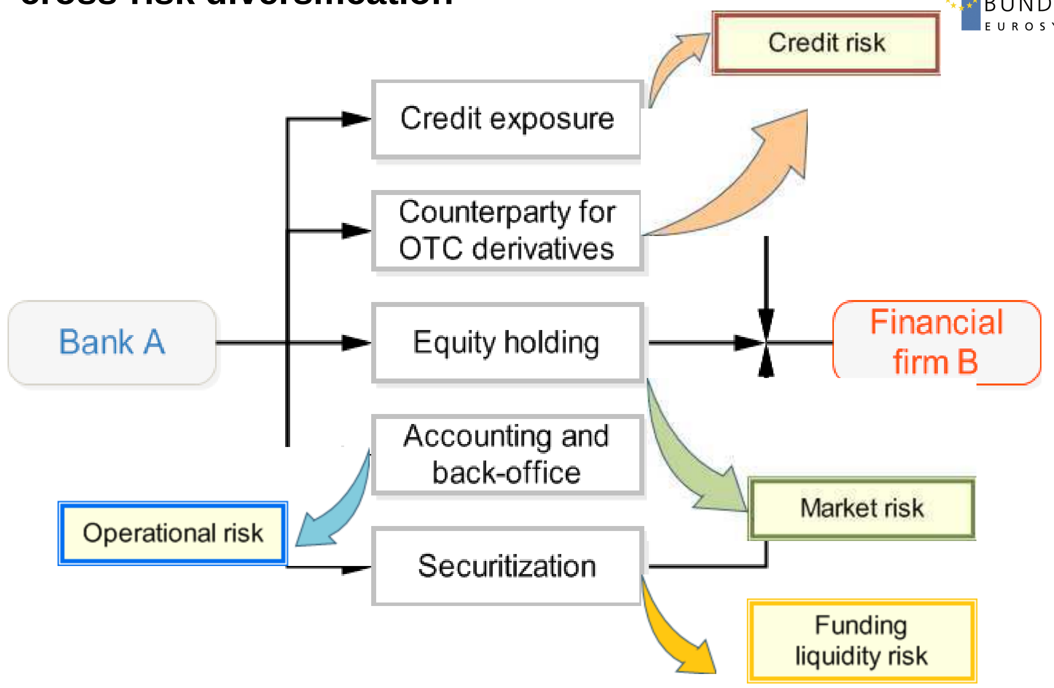
Measuring both types of concentrations – Where do we stand?

DEUTSCHE BUNDESBANK
EUROSYSTEM

- Still no fit-for-purpose method available that accounts for coarse granularity **and** sectoral concentrations
- Integrated measurement of both types of credit concentrations requires multi-factor model
- Comparison of capital figures from multi-factor model and IRB model difficult because IRB calibration target not available

Concentration risks and cross-risk diversification

DEUTSCHE BUNDESBANK
EUROSYSTEM



Aggregation of risks and value-at-risk

DEUTSCHE
BUNDESBANK
EUROSYSTEM

- Credit risk, market risk and operational risk interact!
- Is this still an issue if different risk types are simply aggregated? Yes!
- Risk measure value-at-risk can be super-additive if
  - Loss distribution is very skewed
  - Loss distribution is very fat-tailed
  - Special dependence structures although marginals look fine

Characteristics of operational risk

- Conclusion: Further work required
  - On dependence structures
  - On the interaction of different risk types

Conclusions on credit concentrations (1)

- For typical credit portfolios of banks:
  Sectoral concentration significantly more material
  than coarse granularity
  - Indicative empirical example: Economic capital increases
    - by 10 % from single-name concentration (relatively small banks)
    - by 40 % from sectoral concentration (BCBS WP No 15)
- Model-based methods strictly preferable over ad-hoc measures
  - Risk sensitivity should be commensurate with the magnitude of risk incurred

Conclusions on credit concentrations (2)

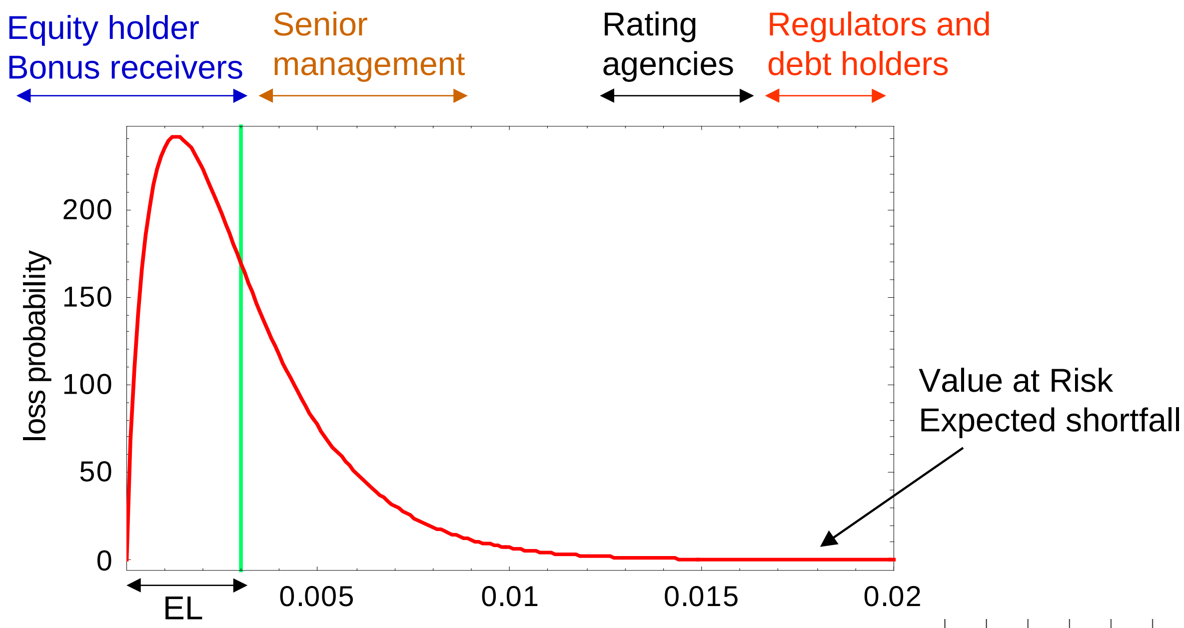
- Measurement of sectoral concentration technically much more challenging than coarse granularity
  - Requires modelling default dependences between borrowers
  - Most general approach of multi-factor model can be computationally tedious
- Challenges in industry practice
  - Exposure aggregation on borrower level
- Finally: Prudential risk management required
  - Integrate credit concentrations into decision making process of loan officers
  - For example through risk-based pricing or compensation scheme

Outstanding challenges for banks

- Improve data quality
- Understand the gap between regulatory capital and economic capital
  - Measure concentration risk
  - Estimate downturn LGDs
- Address risks not (fully) covered by pillar 1
  (i.e. Liquidity risk, legal risk, ...)
- Improve the understanding of the interaction between risks
  - For example, market, credit risk and operational risk
- Further advance stress testing methodologies

Regulatory and economic capital – How far can they converge?

Risk preferences of



Outstanding challenges (not only) for regulators

- Ensure consistent implementation
- Balance level playing field concerns and national discretion
- Harness macro-prudential consequences of regulatory requirements which focus on the micro-perspective
  - Monitor impact of Basel II on minimum capital requirements
  - Monitor procyclical effects
- Carry on dialogue with industry and academic community

References

- Basel Committee on Banking Supervision
  - International Convergence of Capital Measurement and Capital Standards: A Revised framework, June 2006
  - Studies on credit risk concentration: an overview of the issues and a synopsis of the results from the Research Task Force project, Working paper No 15, November 2006
- Duellmann and Masschelein
  Sectoral Concentration Risk in Loan Portfolios and Economic Capital, Deutsche Bundesbank Discussion Paper (Series 2), No 9, 2006
- Garcia Cespedes, Herrero, Kreinin, and Rosen
  A simple multifactor "factor adjustment" for the treatment of credit capital diversification, Journal of Credit Risk, Fall 2006
- Gordy and Lütkebohmert
  Granularity adjustment for Basel II
  Deutsche Bundesbank Discussion Paper (Series 2), No 1, 2007