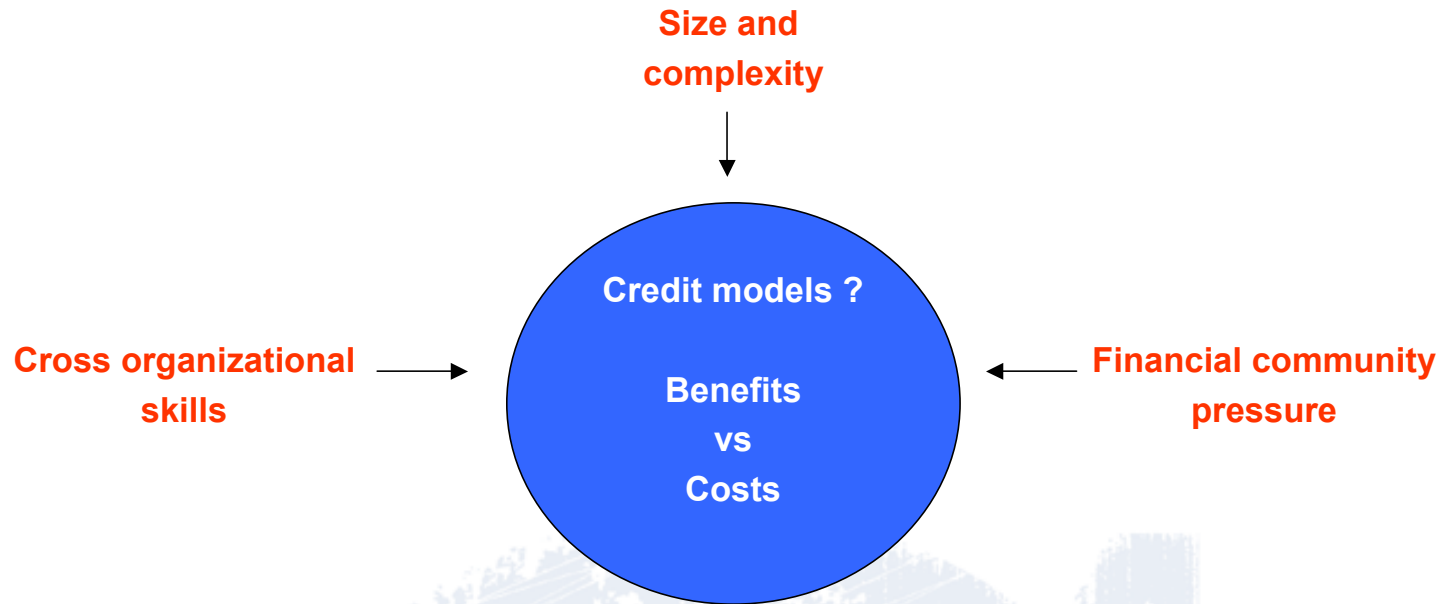


Implementing Basel II

AGENDA:

- **Credit Modelling - Why?**
- **The Credit Model framework**
- **Data problems**
- **Modelling problems**
- **Validation problems**

Credit modelling - Why?



Credit Modelling: Size and Complexity

Complexity

Org. size

Data amount

Operational risk

Product, client
and geographical
scope

Low



High

SMALL

MEDIUM

LARGE



Low



High

Number of
defaults

Number of
losses

Do not need IRB?

Can run IRB

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Credit Modelling: Size and Complexity

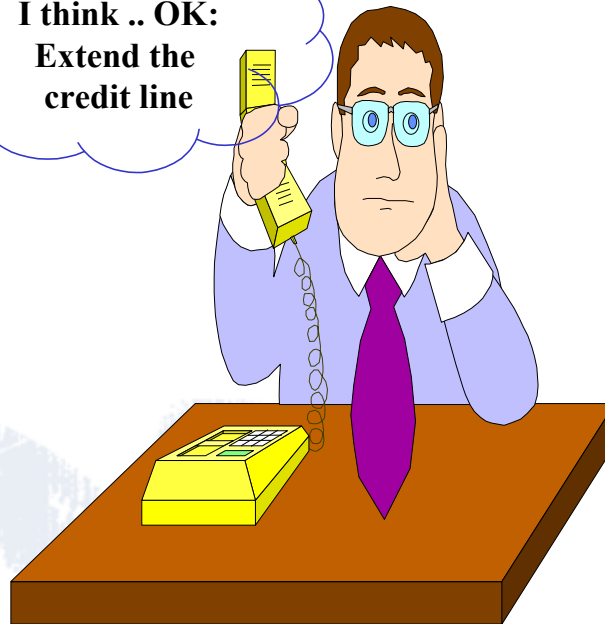
THEORIST

Basel (Ω) = $3'' \alpha * (25,4 - \rho^2 * 3,45) - 0,27 ([\sum 5.79 * GDP_i]) + 0.45 * \text{Gov. spread to Corp's}$



PRACTICIAN

I think .. OK:
Extend the
credit line



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Credit Modelling: Cross Organizational Skills

Hints to the theorists:

No amount of sophisticated analytics will replace experience and professional judgement in managing risk

J.P. Morgan (CreditRisk™)

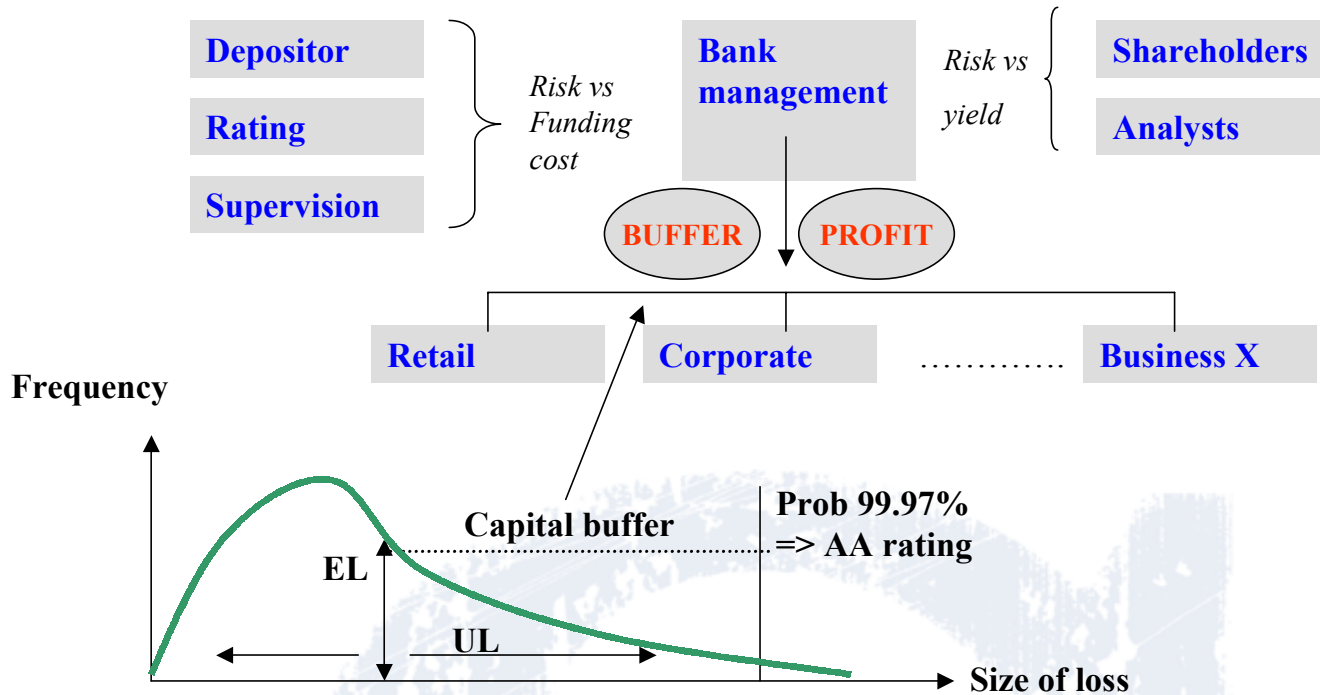
Hints to the practitioners:

Be humble. Use analytical solutions as a valuable guide and learn about their benefits and limitations



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Credit Modelling: Financial Community Pressure



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Credit Modelling: Financial Community Pressure

- **Improved credit process**
 - **Challenging conventional wisdom**
 - **Cost reduction - optimizes the value chain**
- **Best practice disclosure**

The logo for SYDBANK, featuring the word "SYDBANK" in a bold, black, serif font. The text is underlined with a thin blue line. The logo is centered at the bottom of the slide, overlaid on a faint, light blue circular graphic that resembles a stylized globe or a network of connections.

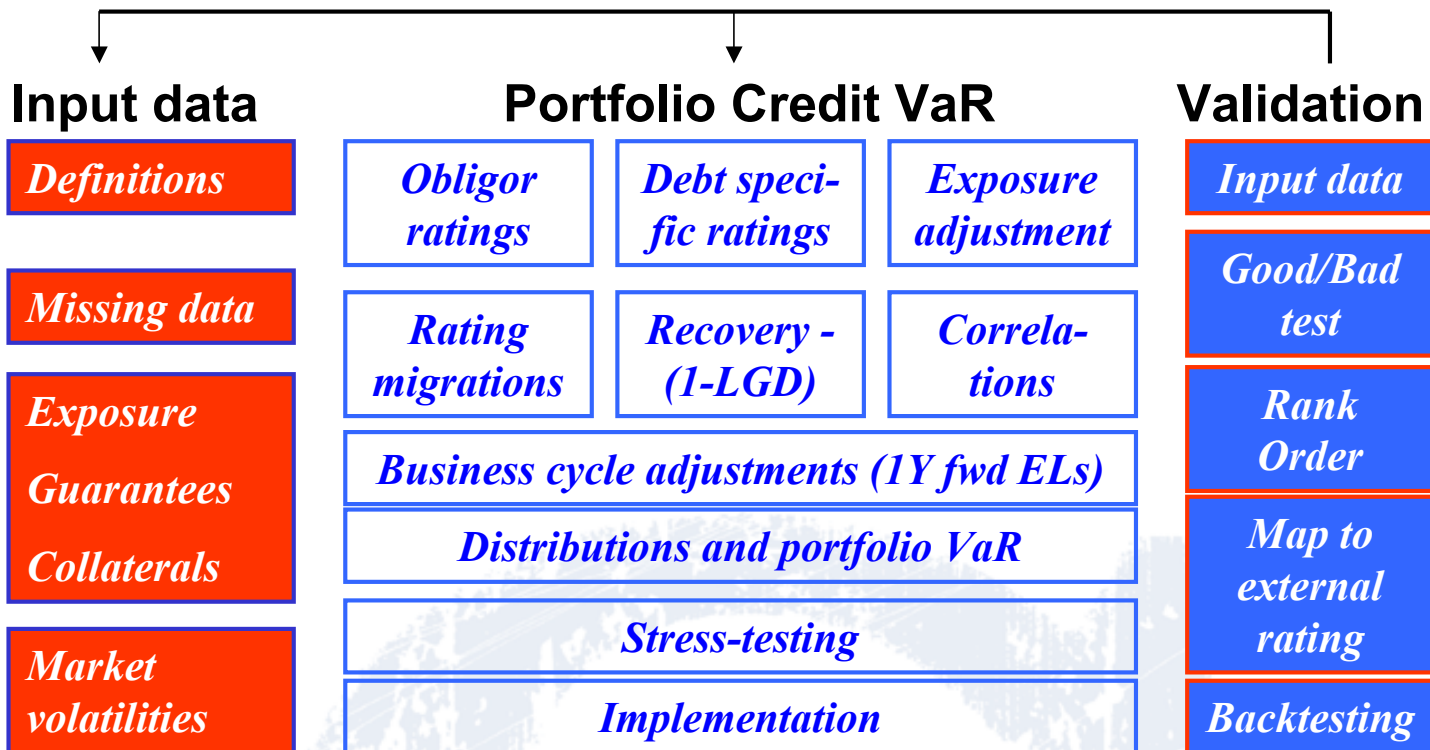
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Credit modelling - Why ?

Points to consider before making a choice

- **The size of the business area.**
- **The complexity of the business area.**
- **Organization/culture - centralised vs decentralised credit management.**
- **Is this decisive to the pricing?**
- **Is it decisive to internal profitability analyses?**
- **Shareholders versus rating/regulators.**
- **Models of expert environment and maintenance.**
- **Data availability and quality - costs.**

The Credit Model Framework

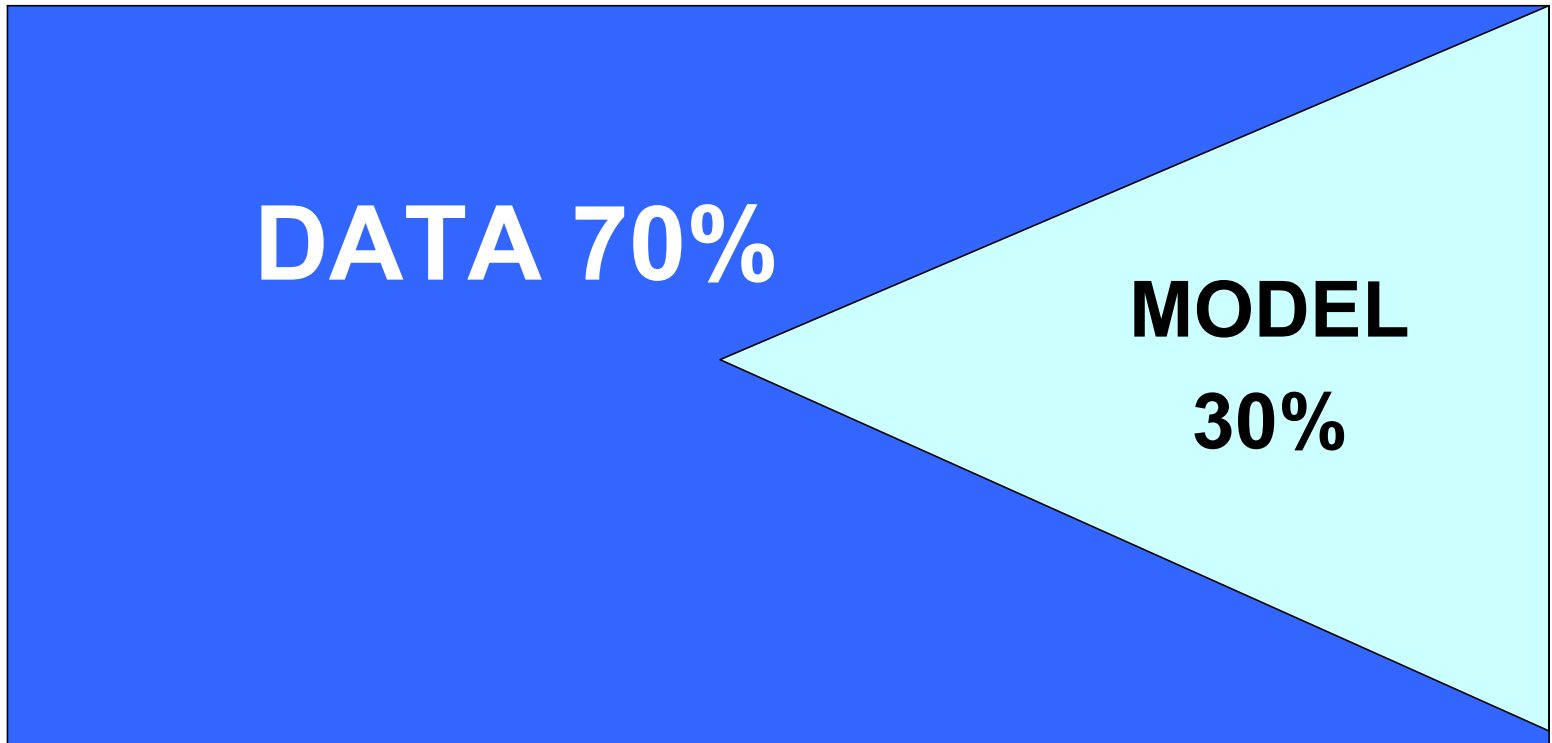


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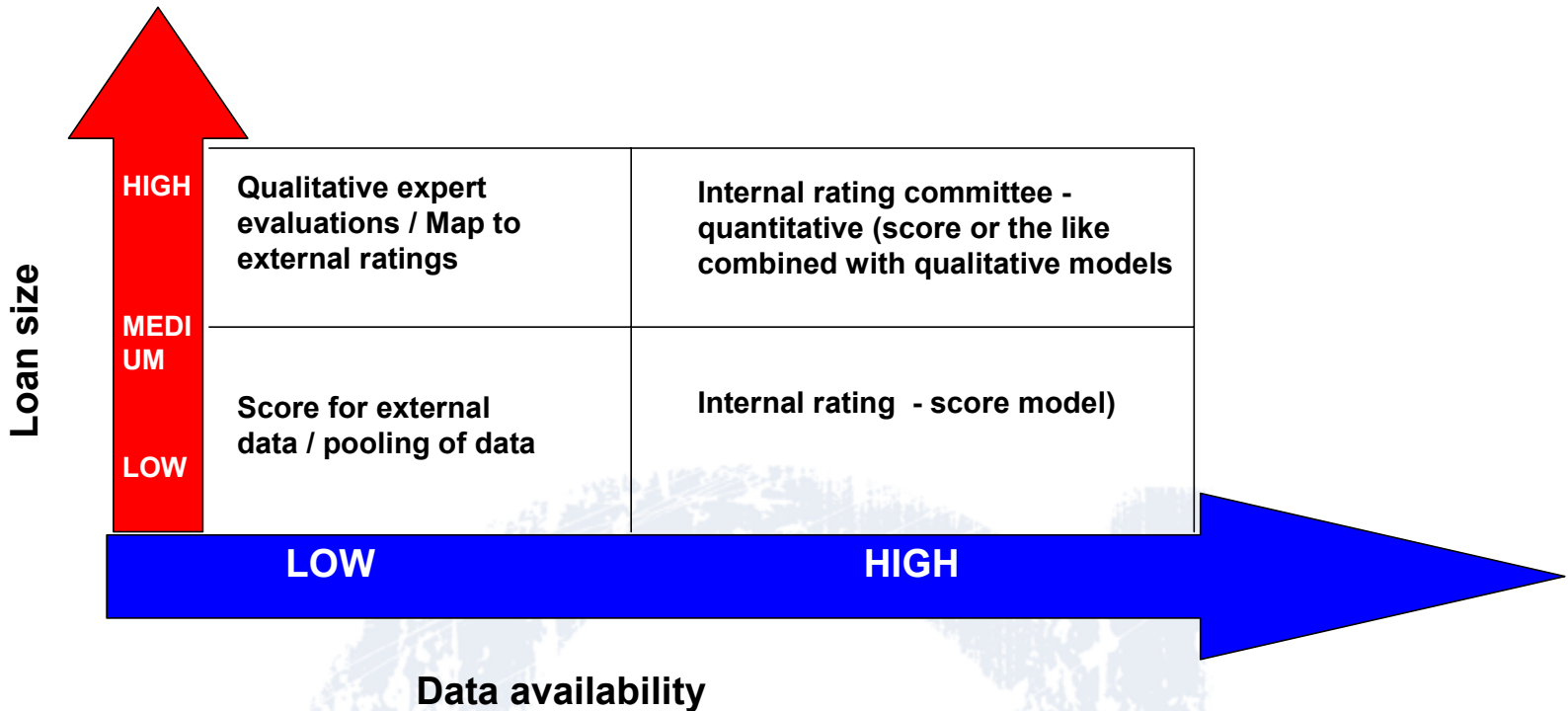
Data problems: examples

- How to capture historic defaults?
- Where and how to register and save background data?
- Do case files contain significant data?
- Has the practice of registration changed in recent years?
- How disciplined are account managers when they register?
- How to validate data quality?
- Do registrations suffice? How to make data counter-cyclical?
- Can we clean poor data?
- Are we short of data?
- Do we have data concerning rejected customers?
- BIS definition and final requirements not yet known in full.

Data problems



Modelling problems: Rating models



Modelling problems: Scoring

Customer characteristics

address, age, housing, marital status, education, lending requirements etc

address, age, housing, marital status, education, lending requirements etc

address, age, housing, marital status, education, lending requirements etc

Segments

Low risk of loss

Medium risk of loss

High risk of loss

Differentiate risk

PD_1

\neq

PD_2

\neq

PD_n

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Modelling problems: Scoring

- We select "good" and "bad customers (with losses)".
- We analyse which characteristics define difference between "good" and "bad".
- Each customer characteristic has several results.
- Each result gets a score.
- Total customer score decides the appropriate risk segment.
- Provides input for pricing.
- Segment correlations? Stress tests? Validation?

Modelling problems: Scoring

- **Data registrations must be reliable**
- **Data must be sufficient (Paradox: "Bads" must be widely represented!).**
- **Score system must be continuously maintained.**
- **Data relevant today - perhaps insignificant in future.**
- **New data concerning customers may become necessary.**
- **Basel II requirements - EarlyWarning signals**

Modelling problems: Scoring SMEs

Client characteristics

capital structure,
interest cover,
profitability, size,
industry etc

capital structure,
interest cover,
profitability, size,
industry etc

capital structure,
interest cover,
profitability, size,
industry etc

Segments

Low risk of loss

Medium risk of loss

High risk of loss

Differentiate risk

PD_1

\neq

PD_2

\neq

PD_n

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Modelling problems: The LGDs and the EADs

To be estimated:

- **LGDs :**
 - non-normal distributed
 - skewed to the right (betadistributed?)
 - continuous variable

Explained by:

- debt type and collateral
- firm - financial ratios
- industry and macroeconomic data

Modelling:

- transformed linear regressions (ie Moody's LossCalc™ methodology)
- **EADs :**
 - add on's for commitments and financial instruments

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Modelling problems: Business adjustments

- **PD, LGD and EADs:** estimates looking ahead one year
 - **conservative (= through the cycle?) estimates**

PROBLEM IS

- *what type of adjustment is needed?*
- *lack of data history..*

Modelling problems: Correlations and portfolio distributions - selected issues

- Historic correlation of default?
- Merton approach (CreditMetrics or KMV)?
- Conditional approaches to portfolio distributions - identical to McKinsey's CreditPortfolioView?
- How to integrate market, credit and operational risks and to take into account correlations between a variety of riskfactors?
- Should we use betadistributions (or other right skewed distributions) or should we apply Extreme Value Theory?

Modelling problem: The need for stress tests is evident

1: We have problems with data

2: We have myriads of modelling assumptions and model choices

=> All results in "precise" output numbers such as
– ELs, ULs, economic capital

CONSEQUENTLY A WARNING IS NEEDED

**Stress test and validation are a must in credit modelling
and also remember**

No amount of sophisticated analytics will replace experience and professional judgement in managing risk

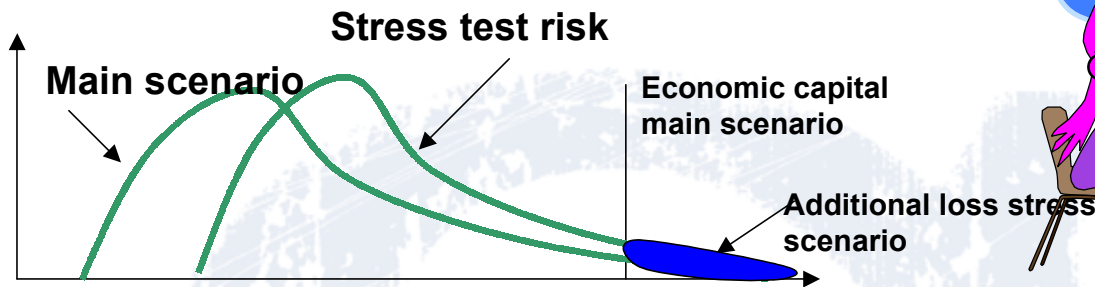
J.P. Morgan (CreditRisk™)

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Modelling problems: Stress testing

- **Stress tests:**

- Assess capital buffer size in relation to buffers from "shocks" in certain industries, housing market, macroeconomy etc to PD, LGD
- Use eg historic shocks - or define criteria...



Modelling problems: Stress testing II.

- **Assess scenario probability**
 - **combine with importance to the Bank**
 - **high probability - very important - close exposure?**
 - **high probability - not important .. evaluate capital buffer**
 - **limited probability - very important .. evaluate capital buffer**
 - **limited probability - not important .. observe**

Validation problems

Validation of models - a requirement - but how?

- **Validate Input**
- **Validate Ratings**
- **Validate CreditVaR**

Validation problems

INPUT

- **Sample account manager supervision**
- **Ratio of missing data to total data**
- **Data cluster analysis - and its causes**

Validation problems

RATINGS

- RankOrder -
 - tests $PD1 < PD2.. < PDn$
- Good/Bad tests
- Prediction

Model	Bad	Correct	<u>Typell:</u> Cost: Lost interest
	Good	<u>Typel:</u> Cost: Recoveryvalue	Correct
		Bad	Good

Realised

Across universe	No	Out Of Sample	Out of Sample & Out of Time
	Yes	Out of Sample & Out of Universe	Out of Sample & Out of Time & Out of Univese
		No	Yes

Across time

- Power curves and other statistical measures
- Feedback to data input