

# The art of stress testing

## Firm-wide stress testing at a financial institution

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# Let's start with a question

A bottle of wine (full, made from glass) falls down from the balcony on the 5<sup>th</sup> floor of an apartment building, onto the (concrete) pavement.

How likely is it that the bottle breaks?

How likely is it that the bottle stays intact?

# Objective

*The objective of this presentation is*

“To indicate how firm wide stress testing can assist in the ability to assess a bank’s future capital adequacy on a going concern basis.”

*It is the aim of this presentation to make the audience aware that*

“Successful stress testing is about effective and efficient communication on potential developments on the risk profile of the company.”

# Agenda

1. Fortis Bank Nederland
2. The art of stress testing
3. The stress testing framework: targets
4. The methodology
5. Round up

# 1. Fortis Bank Nederland

- Until 2008: Part of Fortis
- 2008 – 2010: Fortis Bank Nederland
- 2010 onwards: merge with ABN AMRO



# 1. Fortis Bank Nederland

## ➤ *Until 2008*

- Netherlands based subsidiary of Fortis Bank SA/NV
- Active in merchant banking, commercial banking, private banking and residential mortgages.
- Fortis Bank was a daughter of Fortis, a globally active diversified banking and insurance group.

## ➤ *October 2008*

- Nationalisation of banking (and insurance) activities in the Netherlands of Fortis
- This included the participation in RFS holdings (ABN AMRO)
- Stand-alone, diversified bank (balance sheet EUR 185 billion; 10,000 employees)
- De Nederlandsche Bank takes over role as 'home regulator' from Belgian counterpart

# 1. Fortis Bank Nederland

## ➤ 2008 – 2009: Stand-alone bank

- October 2008: Action plan to complete separation of Fortis Bank S.A./N.V.
  - Necessity to realise a Firm wide stress testing framework for Fortis Bank Nederland
- January 2009: Basel Committee: Principles for sound stress testing practices and supervision
- February 2009: Support by Deloitte to realise the Firm-wide stress testing framework
- November 2009: Green light for integration with Dutch State acquired businesses of ABN AMRO
- December 2009: Firm-wide stress testing framework for Fortis Bank Nederland implemented

## ➤ 2010

- Integration with Dutch State acquired businesses of ABN AMRO into the new ABN AMRO Bank

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## 2. The art of stress testing

- Some points of attention from “Principles for sound stress testing practices and supervision” (Basel Committee, 2009)
- Intermezzo – Dealing with black swans
- Firm-wide stress testing is an art and not a science

# Principles for sound stress testing

## Some attention points

- Prevent 'failure of imagination' and 'a false sense of security'
- Include expert judgement from across the organisation.
- Cover a broad range of scenarios covering all major risk types.
- capture the effect of reputational risk
- Include risks arising from off-balance sheet vehicles and other related entities.
- Senior management should take an active interest in stress testing
- The latter was the approach by banks that were highly exposed to the financial crisis and fared comparatively well

# Dealing with Black Swans

## Intermezzo

“JPMORGAN CHASE managed to avoid big losses largely thanks to the tone set by its boss, Jamie Dimon. A voracious reader of internal reports, he understands financial arcana and subjects staff to detailed questioning. PowerPoint presentations are discouraged, informal discussions of what is wrong or could go wrong, encouraged. These “soft” principles are supplemented by a hard-headed approach to the allocation of capital.”

(The Economist, 13 February 2010)



# Firm-wide stress testing is an art and not a science (1-2)

## ➤ Considering that

- quantitative analysis covers the scientific aspect of risk management on a going concern basis;
- Stress scenarios are applied to existing (and approved) risk models;
- Experts' interpretation of 'what could go wrong' is central in firm-wide stress testing;
- The participation of senior management is a prerequisite for dealing successfully with (potential) stress events;
- "JPMORGAN CHASE managed to avoid big losses largely thanks to the tone set by its boss, Jamie Dimon (Economist, 13 February 2010)"

(see next slide)

# Firm-wide stress testing is an art and not a science (2-2)

The departure point in this presentation is that  
Firm-wide stress testing is an art, and not a science



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# 3. The stress testing framework

## Targets (1-2)

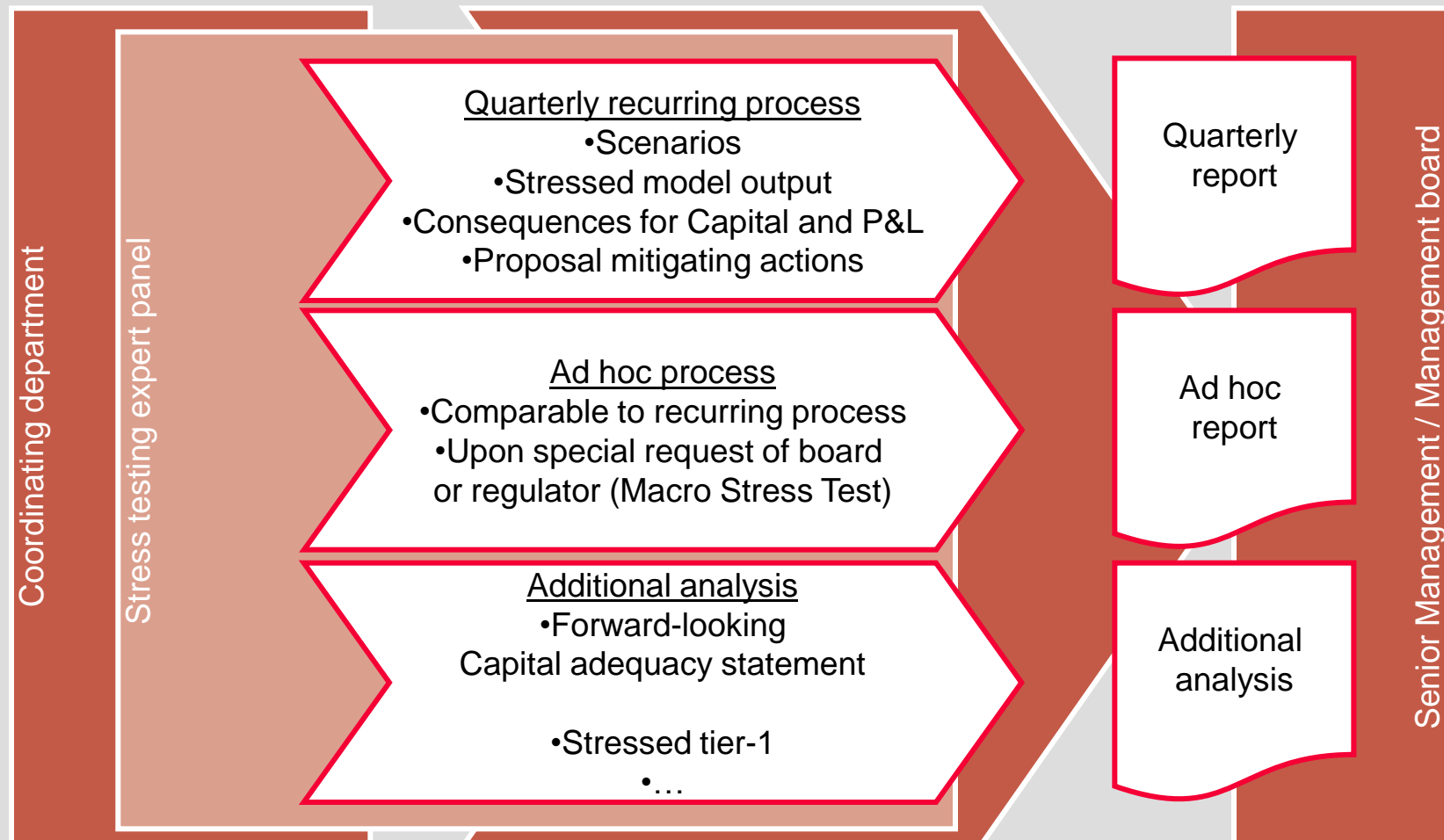
- Establish a stress testing community
  - Exists of risk / portfolio / capital experts from throughout the company
  - Is called upon by the coordinating department to participate in answering management / regulatory questions
  - Meets periodically as expert panel
  
- Establish an agile and adaptable reporting process
  - Input of the expert panel lead to a quarterly report to senior management
  - Ad hoc reporting can be delivered at request of the board or regulator

# 3. The stress testing framework

## Targets (2-2)

- Provide a touchstone for future capital adequacy of the bank
  - Addition to capital adequacy analysis
  - What will happen to the bank, if in the future highly unexpected events take place?
  
- The targets are laid down in the bank's Firm-wide Stress Testing Policy

### 3. The stress testing framework



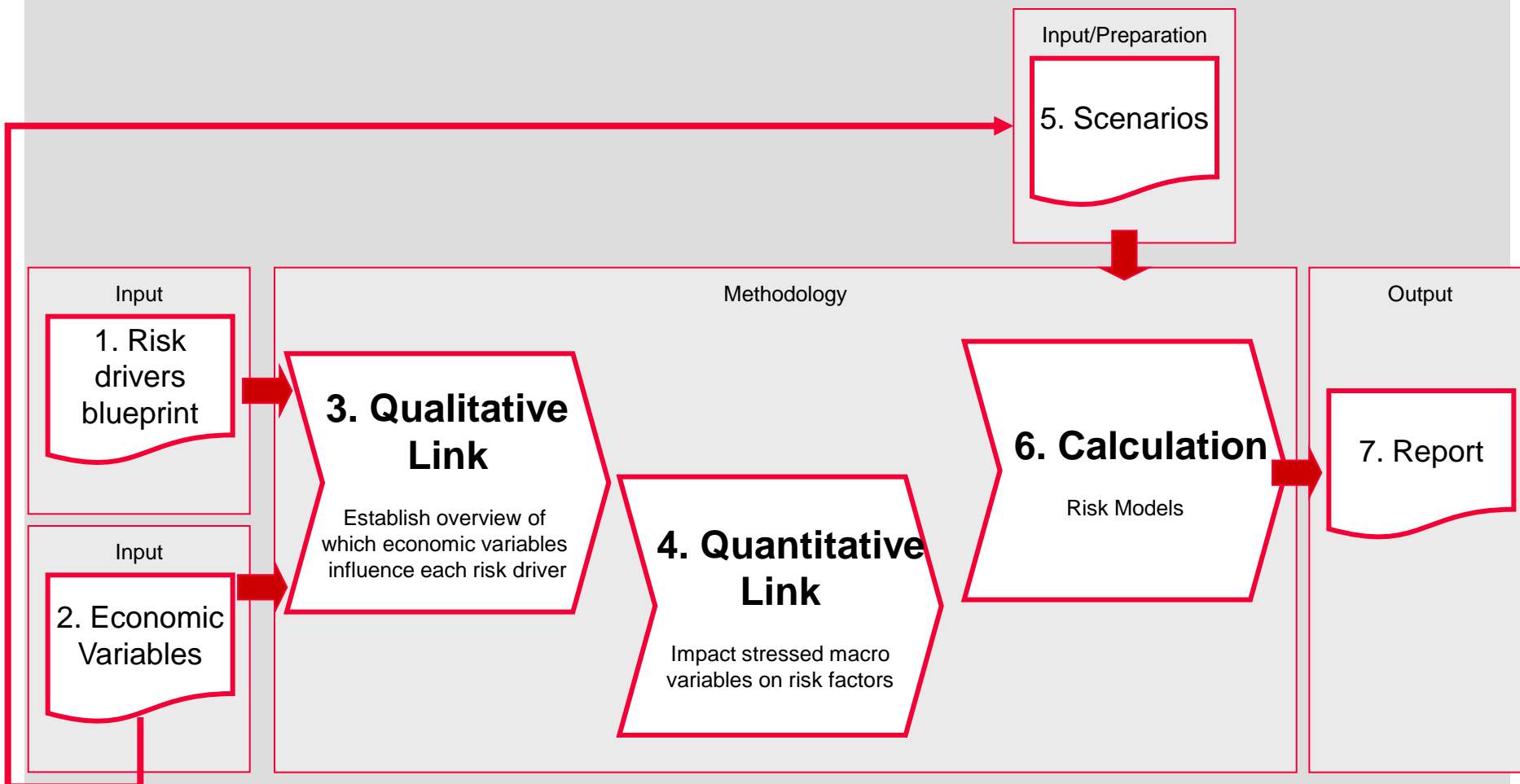
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## 4. The methodology

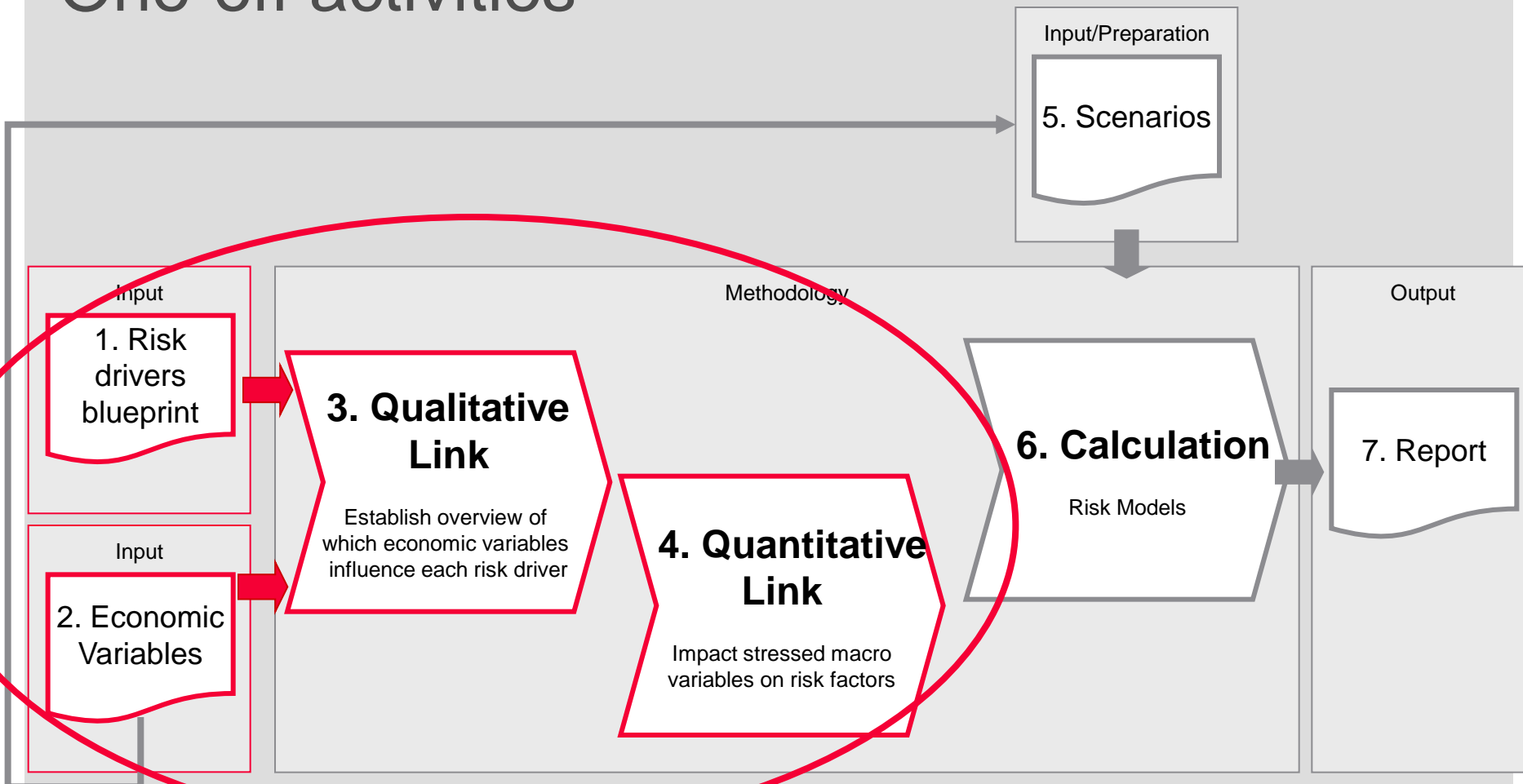
- Overview of approach
  - One-off activities
  - Recurrent process

# Overview of approach



# Overview of approach (1-2)

## One-off activities



# One-off activities

- Full overview of risk drivers
- Understanding of economic events
- Qualitative and quantitative link
- Review of regulation
- Gap analysis
  
- Additional one-off activities
  - Firm-wide Stress Testing Policy
  - Central ownership of methodology
  - Formation of expert panel
  - Approval cycle

# >Full overview of risk drivers

## ➤ Goal

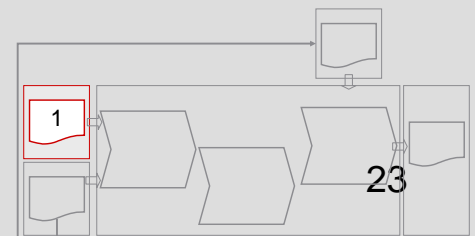
- Exhaustive list of risk drivers in models
  - sorted per portfolio / risk type;
  - indicating the IT system in which the models are kept;
  - which asset types they apply to.

## ➤ Why?

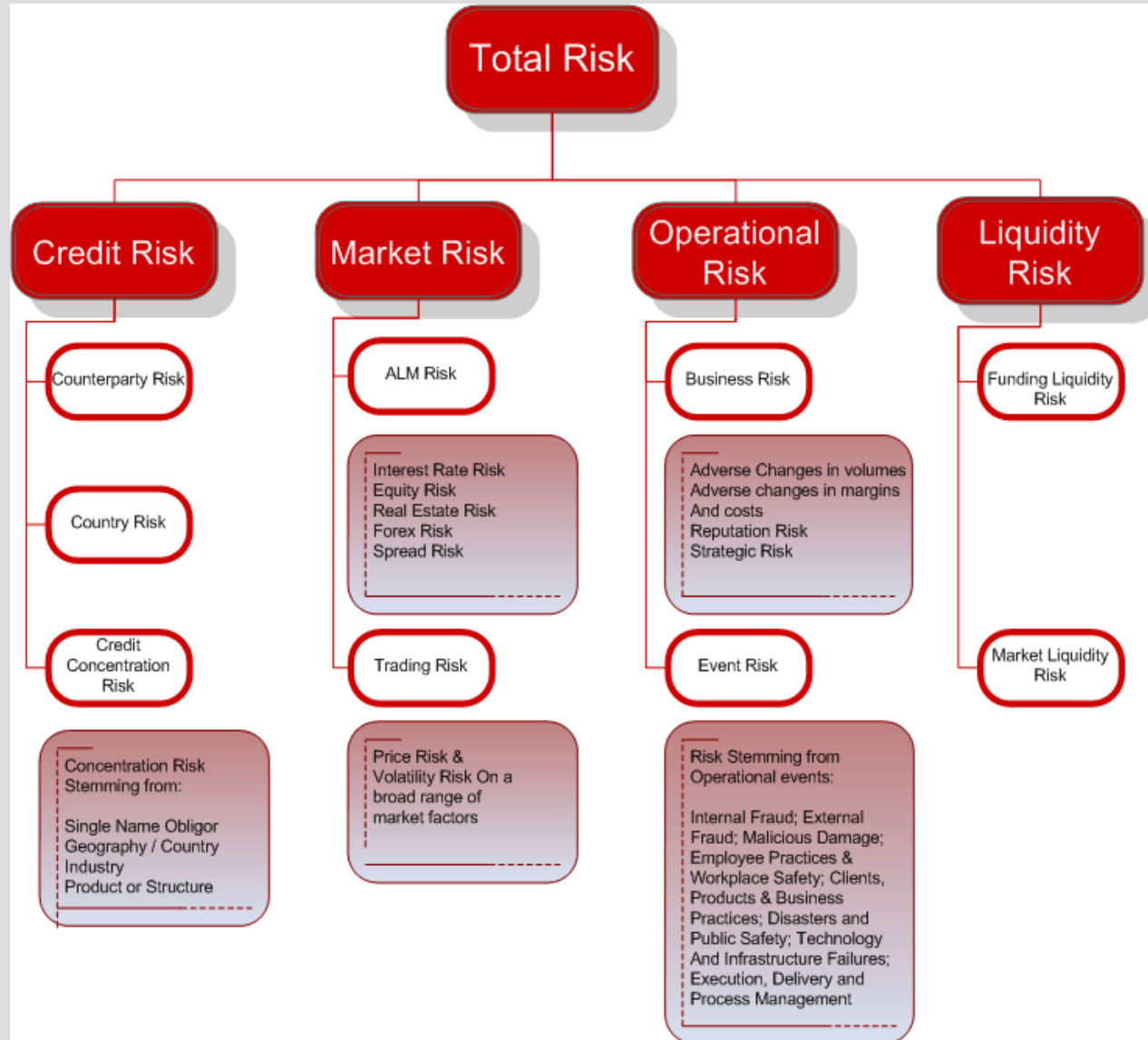
- Most (all) risk models are based on (macro) economic or similar variables
- These risk drivers indicate how the risks modelled are related to general economic development
- It is the starting point for the stress testing analysis

## ➤ How?

- Review of risk taxonomy (see next slide)
- Discussion with portfolio and risk type managers
- Interview with risk modellers



# >>Risk Taxonomy



# >Understanding of economic events

## ➤ Goal

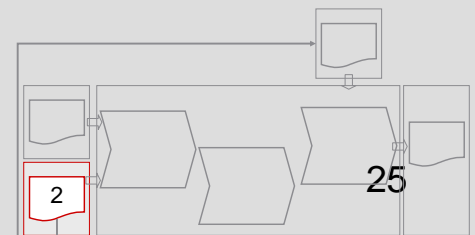
- Understand which are economic events and their key variables that drive potential, 'larger-than-foreseen' losses

## ➤ Why?

- Adverse 'once-in-a-lifetime' events may have a severe impact on the bank
- This severe impact may not be 'caught' by risk models

## ➤ How?

- Understanding the character of major macroeconomic events (*see next slides*)
- Selection of economic variables that affect the bank (*see next slides*)
- Input for creation of forward-looking macroeconomic scenarios
- Prerequisite: scenarios must have a serious potential damage to the bank's income



# >>The character of major economic events

➤ All major economic shifts, compare to one of the following categories of events:

- Supply shock
  - Example: oil crisis
- Demand shock
  - Example: Government debt restructuring

➤ Other ways to look at shocks:

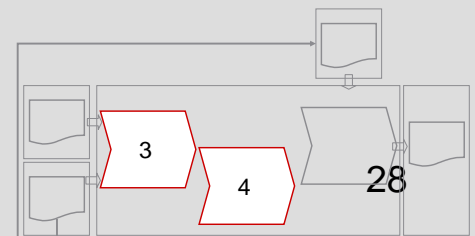
- Asset price bubbles bursting
- Yield curve shifts
- Fear shocks

## >> Selection of economic variables

- Ask the panel of experts to decide which economic variables are of major influence to the bank
  - By adding the economic variables to the list that they indicated individually
  - By jointly deciding what is missing on the list
- This gives a list of 15-25 economic variables that serve as input to develop macroeconomic scenarios
- Examples of economic variables are:
  - Gross Domestic Product
  - Consumer Price Index
  - Short term and long term interest rates

# >Qualitative & Quantitative link

- Goal (1-2)
  - Establish an overview how (macro) economic variables are linked to risk drivers
- Why?
  - The analysis done in these steps serves as preparation for the recurring process
- How?
  - The qualitative links are set by the group of experts and remain stable over time
  - The quantitative link gives how much the risk drivers are influenced
  - Example:
    - In the retail mortgages portfolio, arrear status is a risk driver.
    - The risk driver arrear status is linked to unemployment (economic variable).
    - An increase in unemployment of X% leads to an increase in arrear statuses of Y%.



# >Qualitative & Quantitative link

## ➤ Goal (2-2)

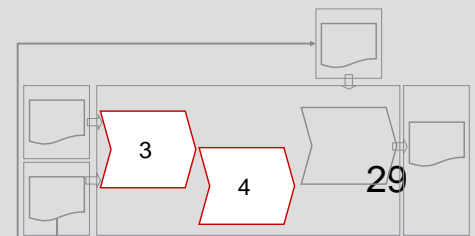
- Provide additional analysis with the information gathered in the linking process

## ➤ Why?

- The analysis done in these steps serves as preparation for the recurring process

## ➤ How?

- Review regulation on stress testing (Basel Committee, CEBS, DNB - local regulator)
- Gap analysis (*see next slide*)
  - Known unknowns
  - IT / Process constraints



# >Gap analysis

## ➤ Known unknowns

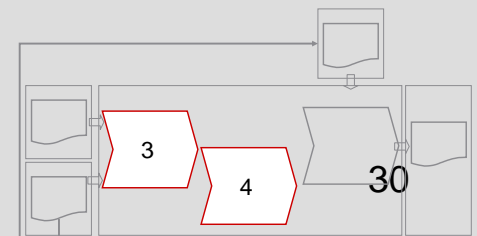
- Can the (through-the-cycle) model deal with extreme events?
- Is the behaviour of clients / counterparties similar under stress?
- Which are the risk drivers used in externally acquired models?
- ...

## ➤ IT / Process constraints

- Rating systems might not be able to deal the 'alternate realities' of stress scenarios
- Recalculating all model input can be a time-consuming process at the modelling department
- ...

## ➤ It is better to be vaguely right than exactly wrong\*:

- Find workarounds (approximations) for known unknowns & IT constraints
- Discuss these workarounds among the group of experts



## >Additional one-off activities (1-2)

- Firm-wide Stress testing policy
  - Assignment & mandate of the management board
  - Application of regulation (Basel Committee, European Commission)
- Central ownership of methodology streamlines the process
  - A department involved in risk strategy:
    - takes ownership of the policy and methodology
    - Moderates discussions with and among experts
    - Provokes appropriate management action
    - Describes and maintains the methodology

## >Additional one-off activities (2-2)

### ➤ Formation of Expert Panel

- Experts, for example: credit portfolio managers or market risk managers
- Individually: insight into how stress influences his/her business
- Together: insight into how stress influences the bank

### ➤ Validation & approval

- Discussion in the Expert Panel
- Under attention of management board
- Appointment of appropriate body / committee for formal approval

# One-off activities

## Summary statements (1-2)

- The **Policy** covers the mandate of the management board and the application of regulation.
- The **Full overview of risk drivers** provides exhaustive insight into input variables driving risk modelling.
- Good **Understanding of economic events** offers all experts and managers involved a proper basis for assessing how stress events affect the company
- The **Qualitative link** shows which economic variables influence risk models

# One-off activities

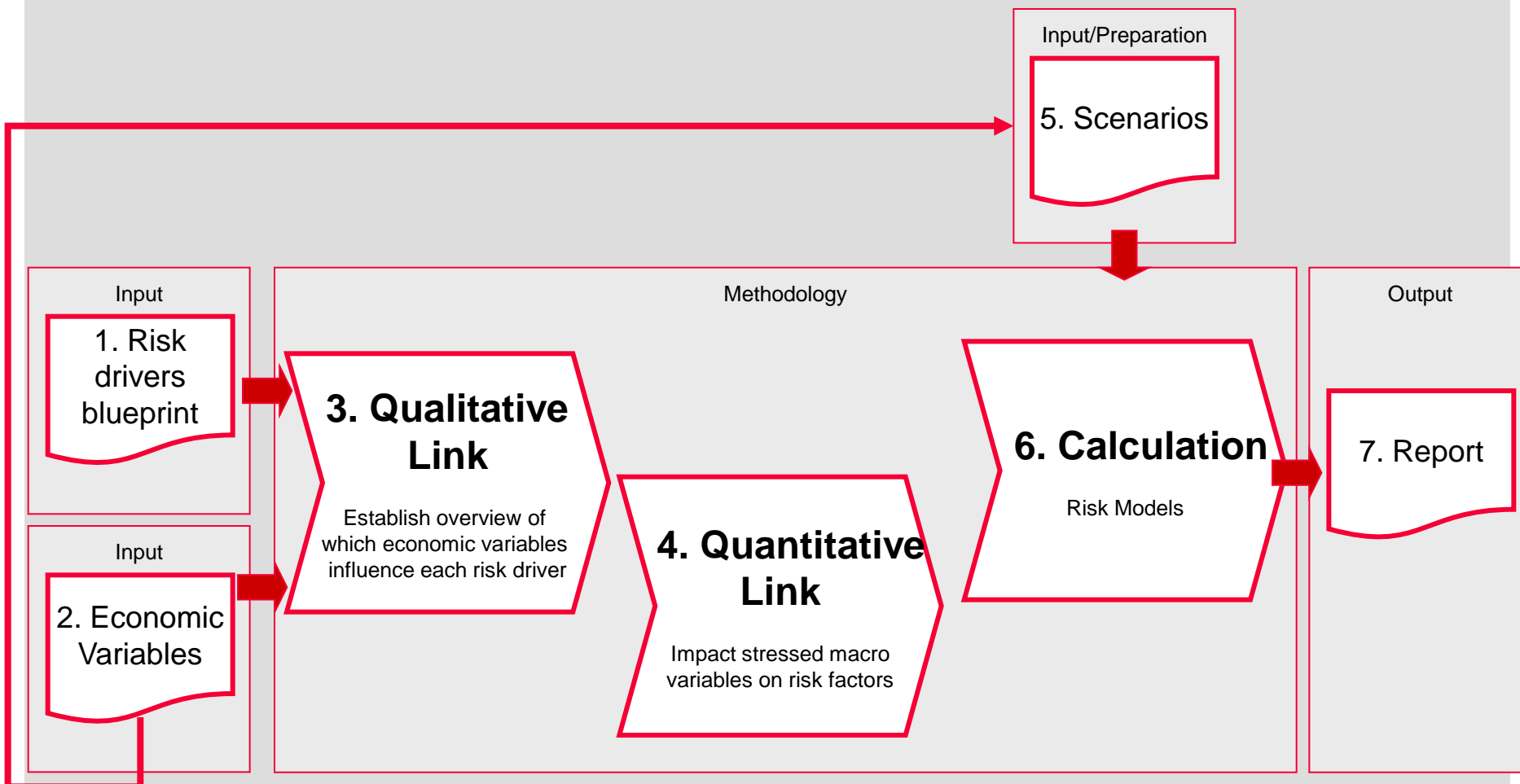
## Summary statements (2-2)

- The **Quantitative link** shows by which magnitude the risk model is influenced by a specific economic variable
- The **Gap analysis** tells where the methodology applied shows potential improvement points
- Formation of the **expert panel** ensures the right embedding in the organisation
- **Central ownership of the methodology** keeps the process efficient and effective.

# Agenda

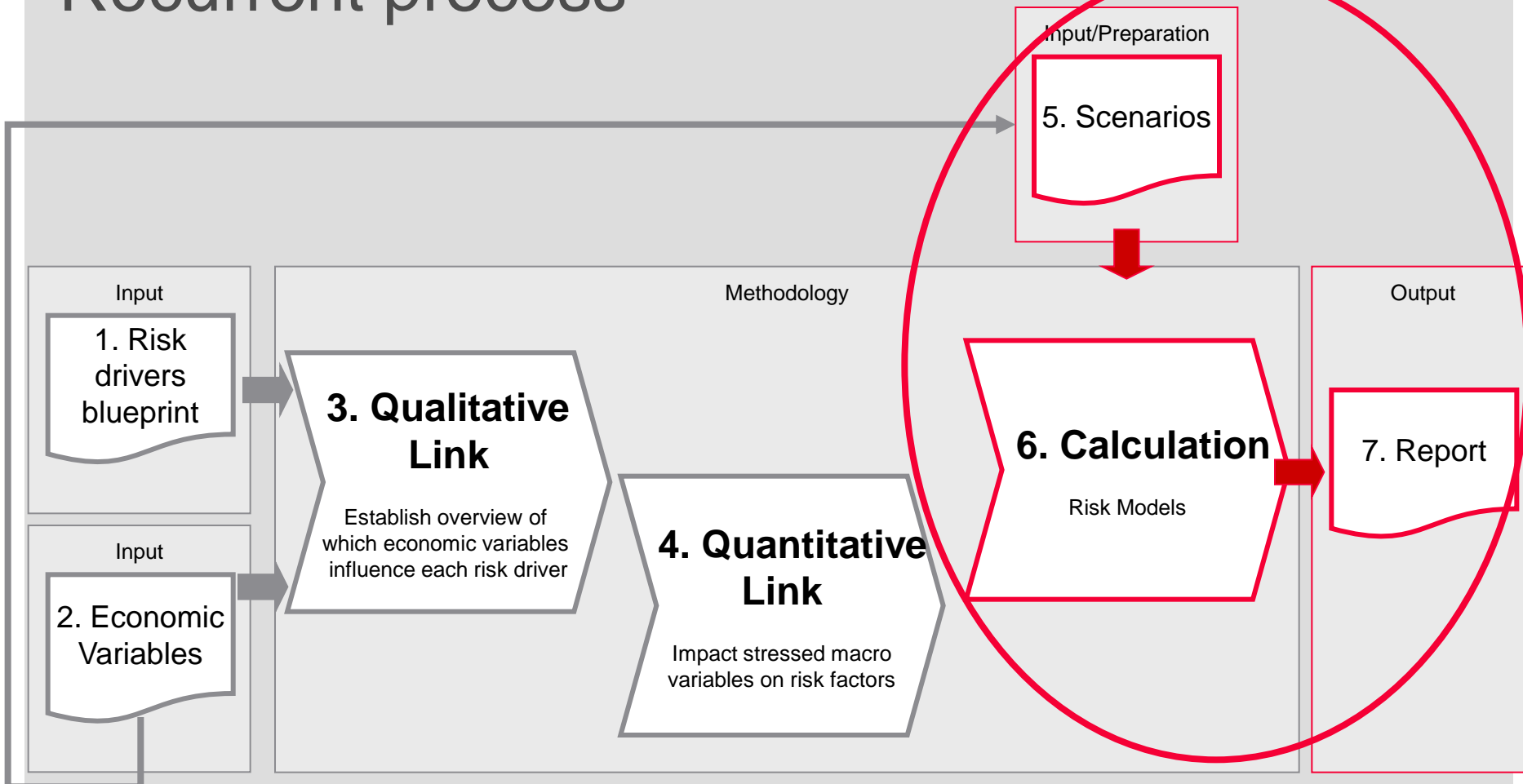
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# Overview of approach



# Overview of approach (1-2)

## Recurrent process



# Overview of approach (2-2)

## Recurrent process

- Scenarios
- Calculation methodology
- Report

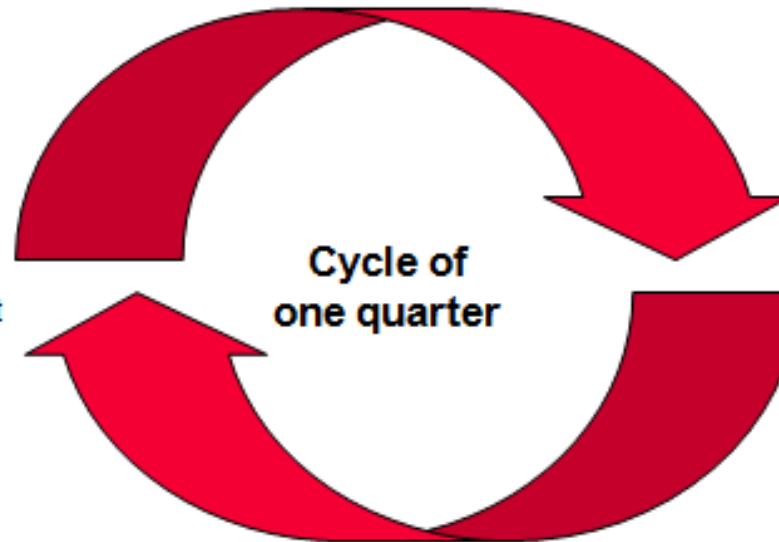
# >Scenarios

## Tasks

- Choose a stress event and develop scenario
- Draft FBNH scenario booklet for quarterly publication

## Stress Testing Platform meeting

- Present outlook
- Gain input from Stress Testing Platform in choosing a stress event
- Present results of previous stress scenarios

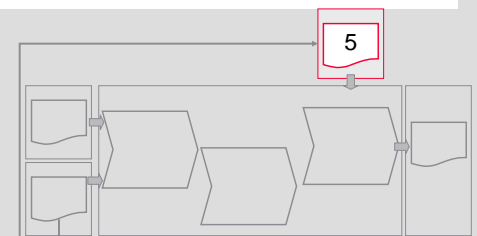


## Stress Testing Platform meeting

- Present drafted FBNH scenario booklet for validation
- Request for input on scenarios

## Tasks

- Outlook development
- Gather input (ongoing process)



# >Scenarios

## ➤ Goal:

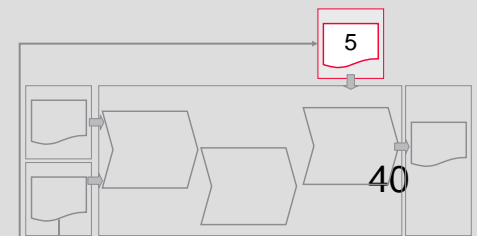
- Provide periodic catchy forward-looking scenarios that would cause serious damage to the bank.

## ➤ How:

- Input from bank's Economic Bureau and external sources
- Expert panel is asked for advice which stress scenario to choose
- Three aspects are considered in developing scenarios:
  - The **Cause** of a scenario (example: Lehman)
  - The **stress event** that accompanies it (example: fear crisis)
  - The **impact** it has on the economy (example: drop in output, asset prices, interbank lending, ...)
- The scenario is then applied to the bank's risk profile
  - to review whether the bank's risk limits are breached
  - to assess the necessary mitigating actions

14 June 2010

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# >Calculation

## ➤ Goal:

- Calculate the effect of stress scenarios on the bank's risk profile.

## ➤ How?

### ▪ Input

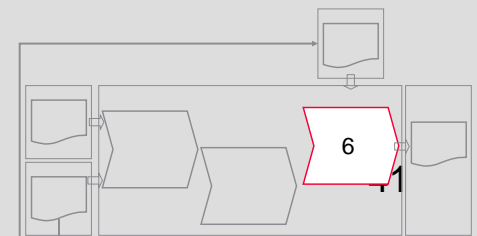
- Quantitative link between model risk drivers and economic indicators
- Stress scenarios, expressed in terms of economic indicators

### ▪ Output: Model output after implementation of the stress scenarios

- Probability of Default (PD), Loss Given Default (LGD) and Exposure at Default (EAD)
- Value-at-risk
- ...

### ▪ Output: key risk indicators after implementation of the stress scenarios

- Risk Weighted Assets (Regulatory Capital)
- Expected Loss
- Economic Capital
- Various ratios (tier-1, solvency, et cetera)



# >Report

## ➤ Goal:

- Inform senior management of impact of stress scenarios on the risk profile of the bank

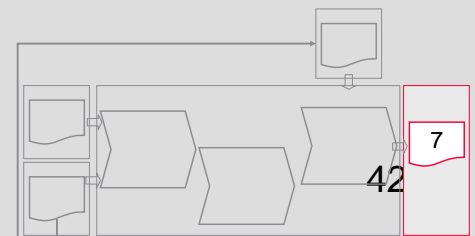
## ➤ How:

- Periodic report
  - Overview of stress scenarios
  - Impact of stress on key risk indicators, specified per business line
  - Advice on management actions



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## 5. Round-up (1-2)

- **Firm wide stress testing assists in the ability to assess a bank's future capital adequacy by**
  1. Discussing in the expert panel of the views of risk type / portfolio experts
    - On effects of stress on their own risk types / portfolios
    - Effects of stress with different originating in a specific risk types on the bank as a whole
    - Discussing effects of contagion and reputational risk
  2. Assuming that it is better to be vaguely right than exactly wrong: results of expert's discussion are key and accompany outcomes of quantitative analysis.
  3. Getting to know how 'what could go wrong' feels by presenting a wide array of stress scenarios that touch the bank as a whole: this prevents failure of imagination.

## 5. Round-up (2-2)

- Fortis Bank Nederland produces a quarterly report that
  - informs the management board;
  - is supported throughout the company;
  - is able to provoke management action when needed.

**“Successful stress testing is about effective and efficient communication on potential developments on the risk profile of the company.”**

