IASB meeting 1 June 2011
Agenda paper 5B

D0656D-2011

General principles on interest rate risk management for the banking book

AGENDA

interest rate risk management for the banking book

- **Overview**
- Models
- Internal hedging derivatives
- Key points
- Organisational & performance issues
  - Bank A
  - Bank B

OVERVIEW

IRR for the banking book: regulatory framework

- As pointed out in Basel Committee July 2004 Chapter X, Principle 14:
  - **All material interest rate risk** associated with the **banking book must be assessed**. To do this, internal systems must accurately incorporate all of a bank's interest rate sensitive on- and off-balance sheet holdings;
  - internal systems must be capable of measuring risk using both an earnings and economic/sensitivity approach.

- **In this respect, best practice should at least comprise:**

  A. A methodology to identify the different risk components, with particular focus on those affecting the IRR (slide 11)

  B. A set of instruments to deal with the management of IRR:

  1. Standard measures for IRR sensitivity (PV01, bucketing, etc.) & limits. Slide 6-8
  2. Models for optionalities (prepayment option & sight depos) & for Equity. Slides 13 -21
  3. Standard measures for refixing and basis risk.

     Slide 12

OVERVIEW

trading vs banking book, objective of IRR management

- **Trading book vs Banking book:** as for the management of interest rate risk, the trading book exposure is usually treated separately from the one arising from the banking book.

- IRR management activity relates to the “pure” interest rate component of the larger Net Interest Margin (NIM), which includes both credit & liquidity spreads.

- ***The main objective of IRR management of a bank with an “originate and hold” business model is to reduce the volatility of the “pure” interest margin and to produce a stable stream of “pure” interest income.***

OVERVIEW

IRR for the banking book: ALM's compromise

- **ALM should strive for a compromise between the stream of future NIMs and current NIM: they are two sides of the very same coin. This is typically achieved via a framework of limits consistent with the size of the existing banking book.**
- **ALM adopts the trading and treasury tools to its own needs (PV01 [(1)], bucket sensitivity, vega, stress scenario) to**:
  - spot sources of IR risk;
  - assess the impact of interest changes on the current & future interest margin stream.

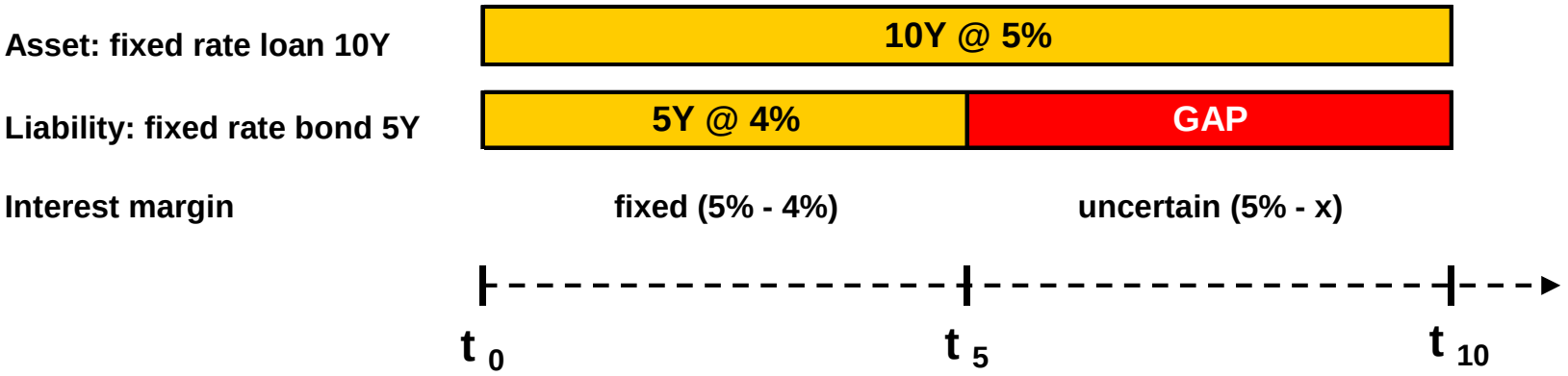
Future interest margins perspective - economic value/sensitivity approach: potential impact of interest rate changes on the present value of all future cash flows related to the existing banking book → long-term effects of changes in interest rates

Current interest margin perspective: effects of IR changes on net interest income → near-term perspective, not providing indication of the impact of IR changes on the bank's overall position

OVERVIEW

Repricing risk

- Repricing risk (also known as refinancing risk) appears whenever the duration of assets differs from the duration of liabilities.
  If assets' duration > liabilities' duration:



- If Interest rate ⇧, the future liability would cost more.
- If interest rate ⇩, the future liability would cost less.

OVERVIEW

Repricing risk

- A better understanding of IRR exposure could be assessed by bucketing cash flows and theirs sensitivities. Let's assume the following banking book:

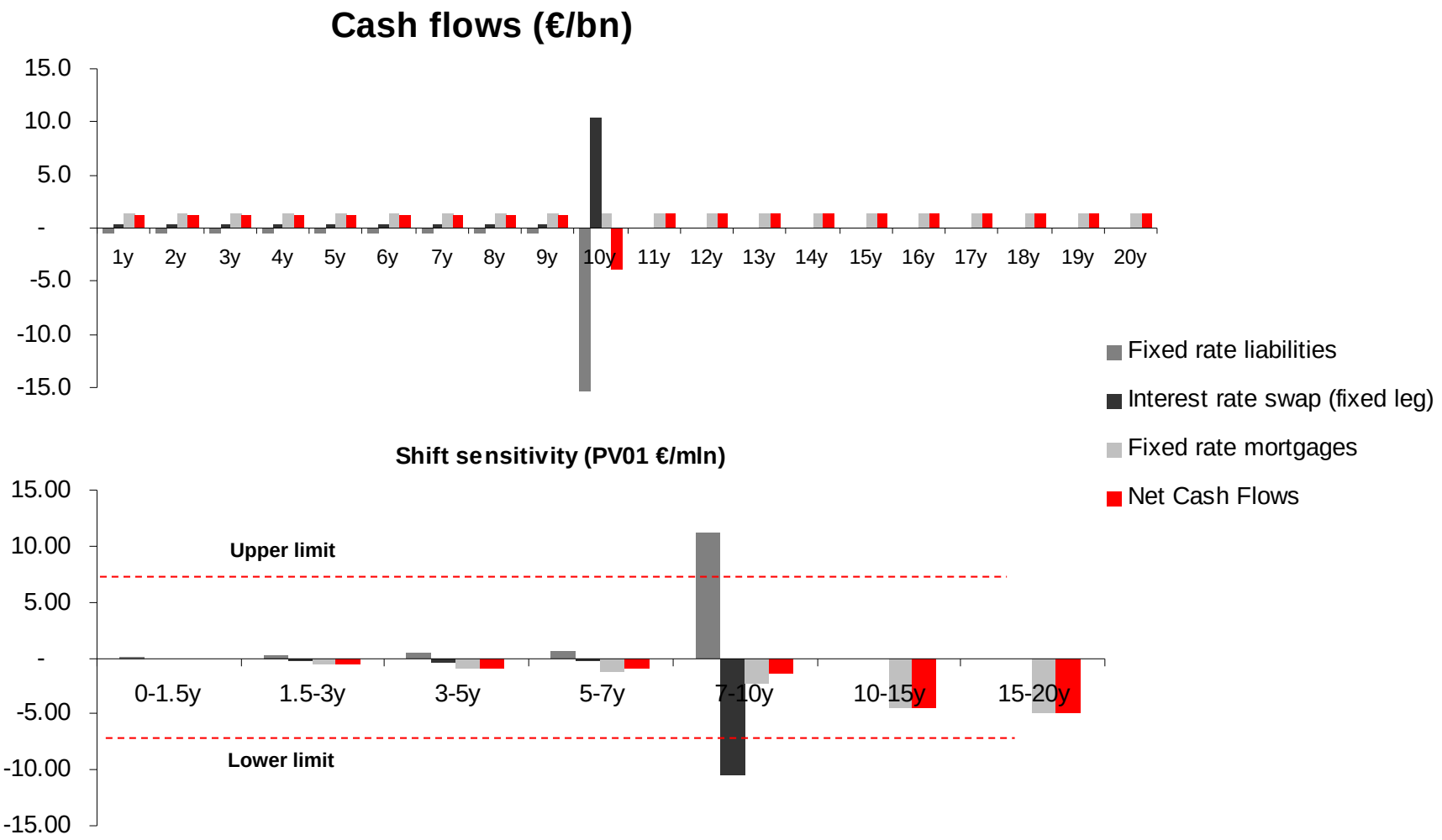
Not prepayable

ASSETS	Notional	Maturity	Rate
Fixed rate mortgages	15 €/bn	20y amort.	4.00%

LIABILITIES	Notional	Maturity	Rate
Fixed rate liabilities	15 €/bn	10y bullet	3.50%
Interest rate swap	10 €/bn	10y bullet	Rec 3.50% Pay EUR1M

OVERVIEW

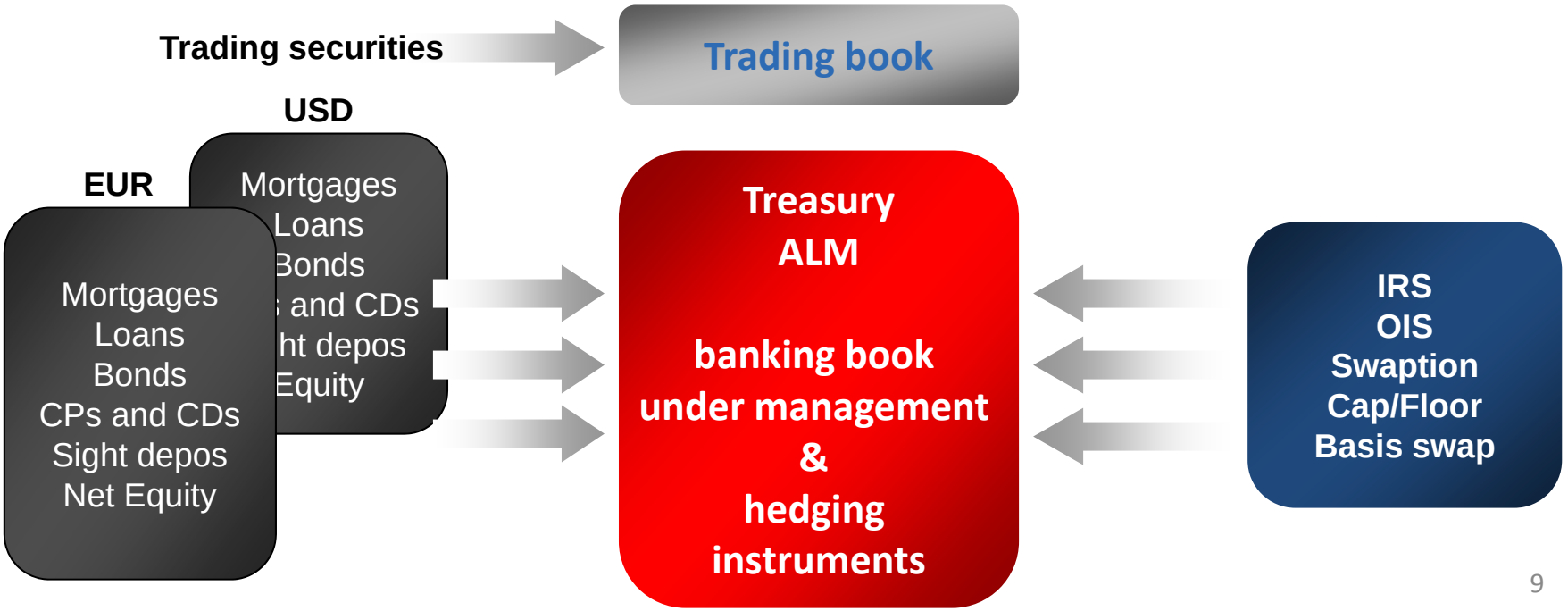
Repricing risk: bucket sensitivity & limits



OVERVIEW

managing open portfolios

- As mentioned, the Banking Book is what is not managed in the Trading Book
- All single items belonging to a specific category (mortgages, bonds, sight depos, equity, etc.) flow undiscretionally into the banking book under management. With the exception of net equity, non-interest bearing items are excluded.
- The resulting portfolio is tautologically an open portfolio/a sum of open portfolios managed as a single unit by the Treasury/ALM via an open portfolio of hedging instruments

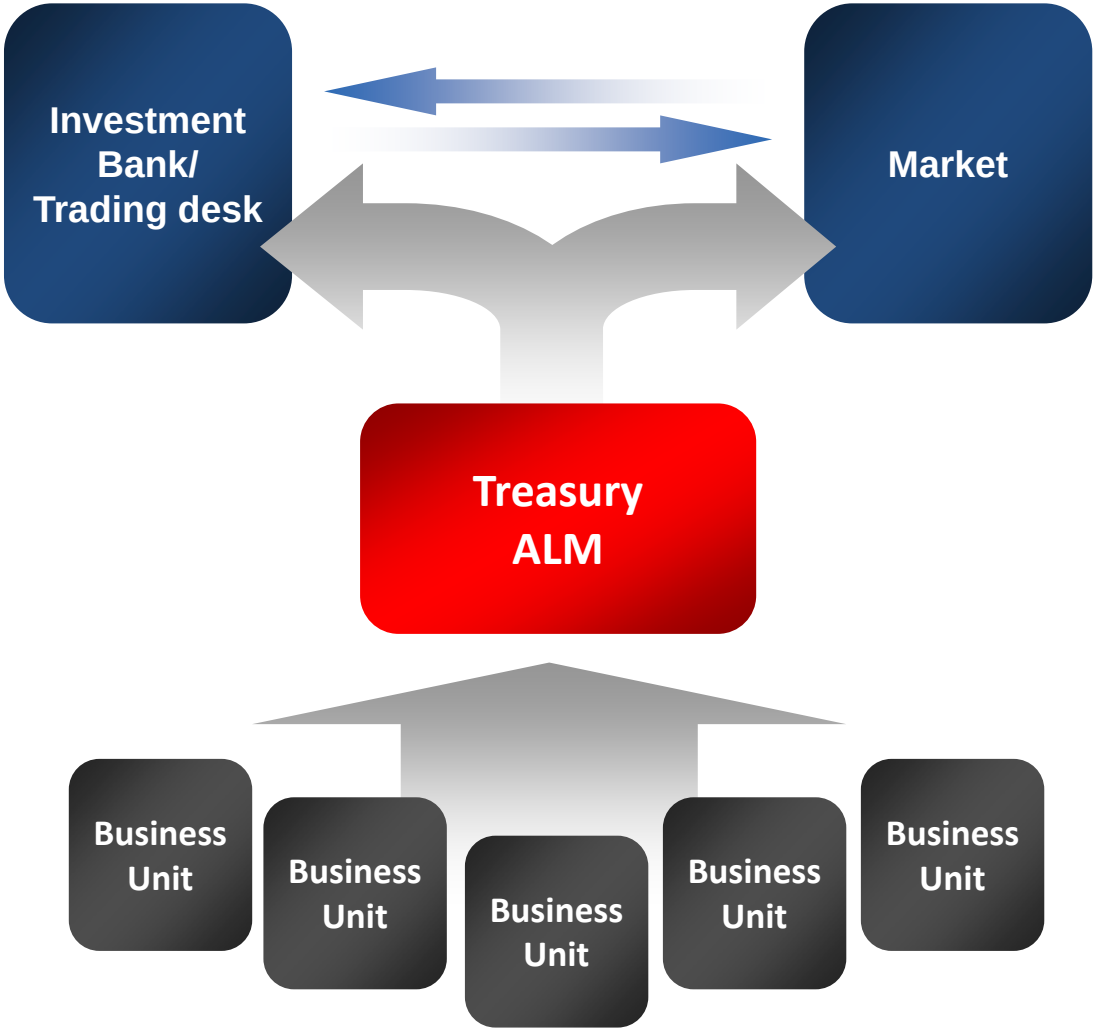


OVERVIEW

transfer pricing and internal deals

- Bank's treasury department gathers "pure" interest rate risk exposure stemming from the business units at the relevant benchmark rate (i.e. IRS or Euribor) via Transfer Price Process;

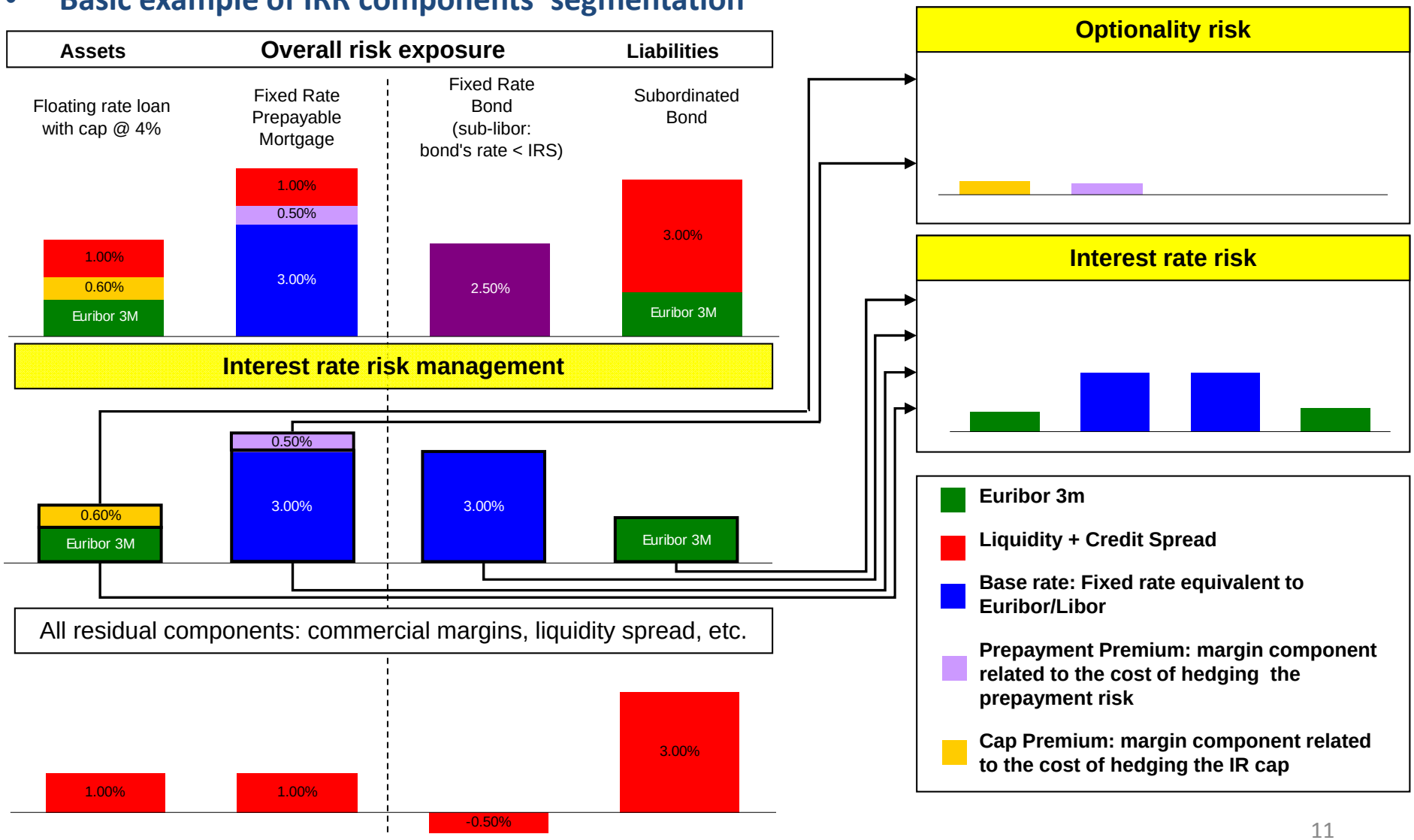
- The treasury manages its net risk position by dealing with:
  - the group's investment bank and/or
  - the internal trading desk and/or
  - market counterparties



OVERVIEW

Segregation of risk components

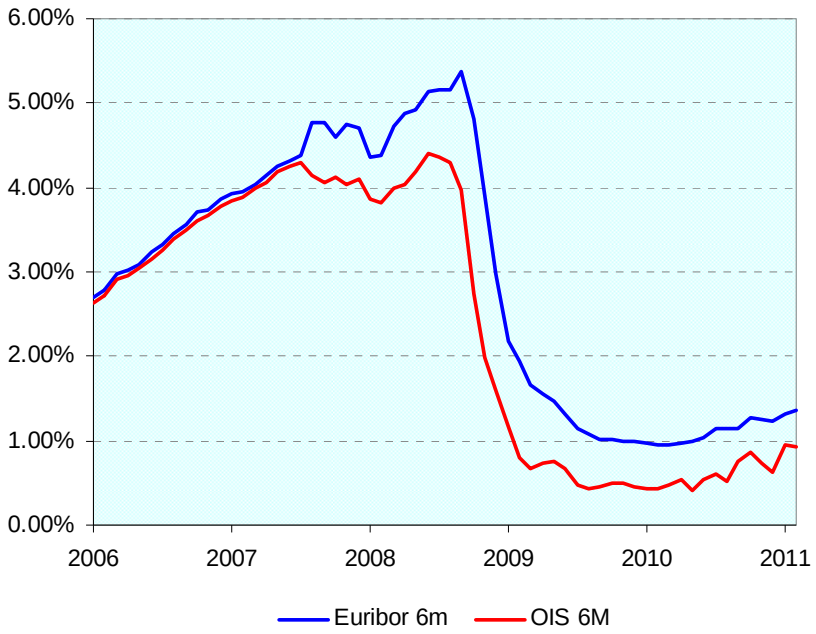
- **Basic example of IRR components' segmentation**



OVERVIEW

Refixing & basis risk

- Before the 2008 liquidity crisis, basis risk on the same currency was not an issue (i.e. Euribor 6m was quasi equivalent to Euribor 3m refinanced on forward rate for 3 months) and banks managed the refixing risk via OIS(2): It was sufficient to wait for the fixing day and enter into an OIS to hedge this risk perfectly.
- As a consequence of the crisis, Euribor/Libor vs OIS rates started to diverge significantly



- Both repricing and basis mismatch requires now different hedging mechanics.
- The cost of the basis is also a component to be included in the "interest risk management" and transfer price process. See slide 11.

(2) Overnight Index Swap

AGENDA

interest rate risk management for the banking book

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MODELS

- Any IRR measure is based on the various assets' and liabilities' **cash flows**.
- In some cases, these cash flows are not fully determined. In these cases, one has to use **expected cash flows**, i.e. a **model**.
- The three most important areas where this is true are **loans with prepayment options, sight deposits**, and **non-financial assets and liabilities**.

MODELS
Prepayment Risk

- In many countries, debtors have a **contractual or legal right to prepay** all or a portion of their fixed-rate mortgage.

- If the prepaid loan has carried a relatively high interest rate, the bank incurs an **economic loss**. In many cases, the customer does not have to pay a **prepayment penalty** that (fully) compensates the bank for this loss.

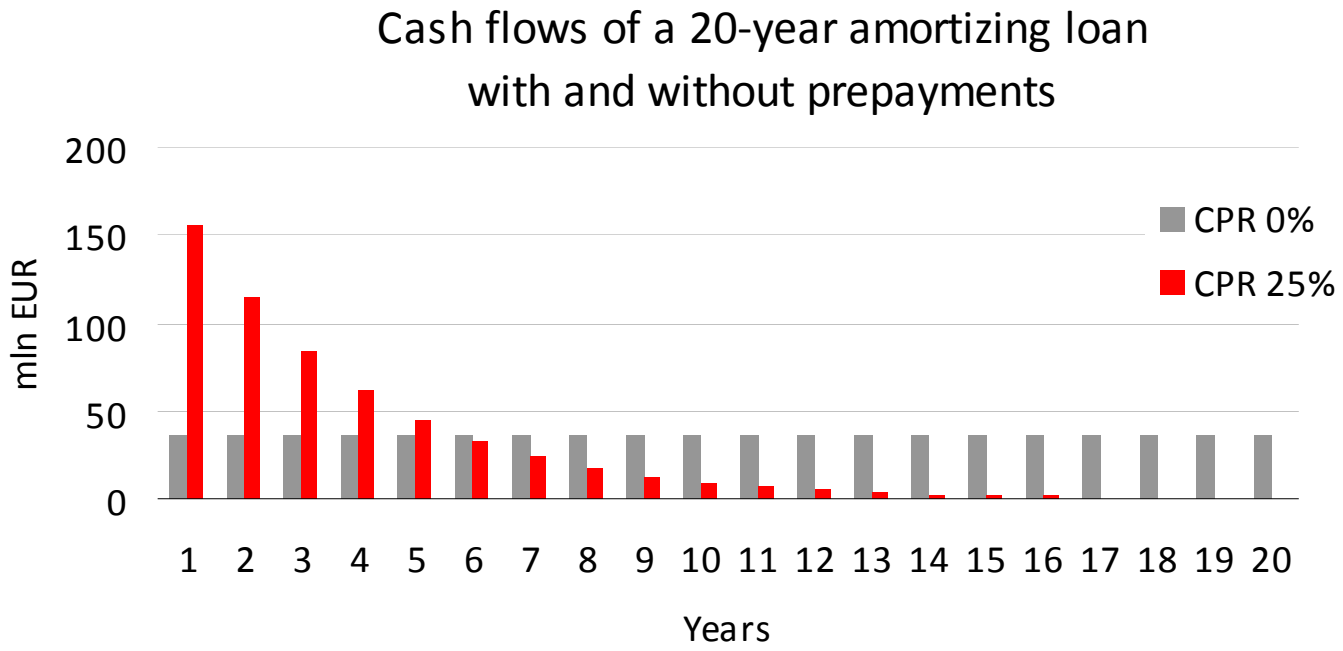
- In risk management, this prepayment right is considered an **option**. It has to be taken into account as, **on average**, it will shorten the loans' cash flow profile – and therefore, by implication, **change the bank's IRR**.

- Prepayment risk is necessarily modelled at an aggregate, i.e. **portfolio**, level. A **"law of large numbers"** effect usually reduces the uncertainty sorrounding the question, To what extent will any one customer actually exercise his option?

MODELS
Prepayment Risk

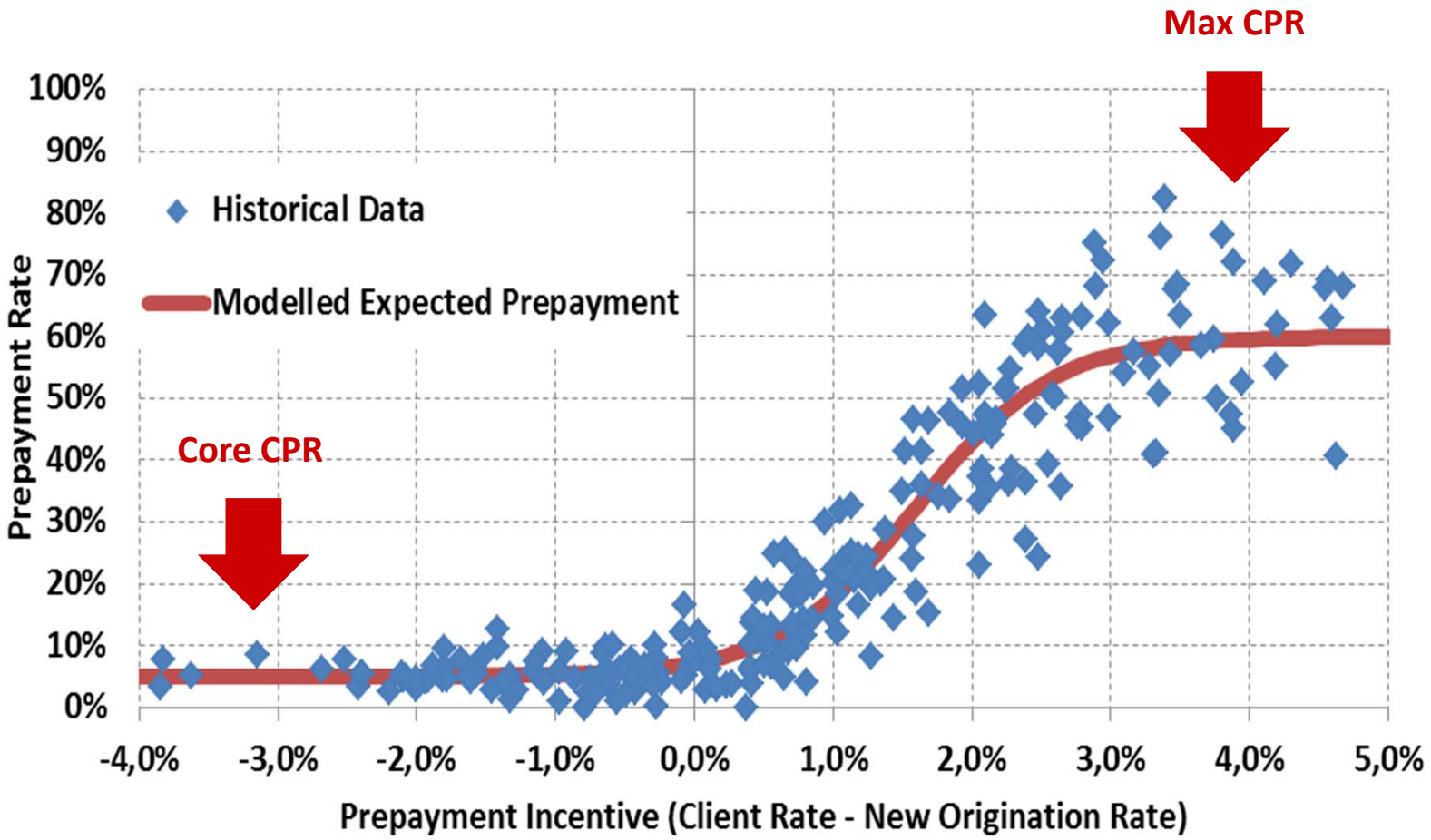
- Banks use different models to capture prepayment risk. To illustrate, we present one popular approach, called a **Constant Prepayment Rate** (CPR) model.

- Depending on the assumed CPR, the cash flow profile changes significantly:



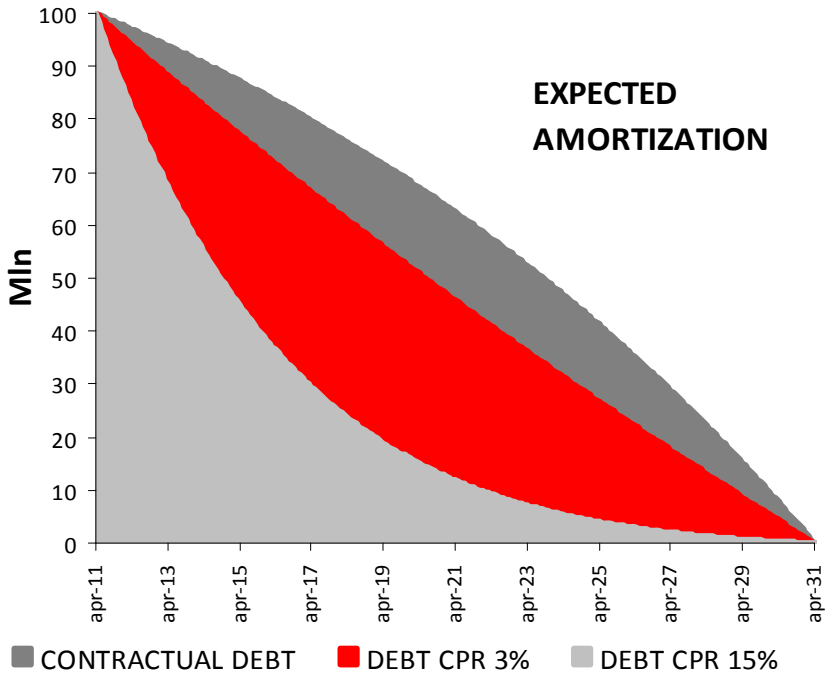
MODELS
Prepayment Risk

One important input when calibrating such a CPR model are **historical data** of actual prepayment rates:



MODELS
Prepayment Risk

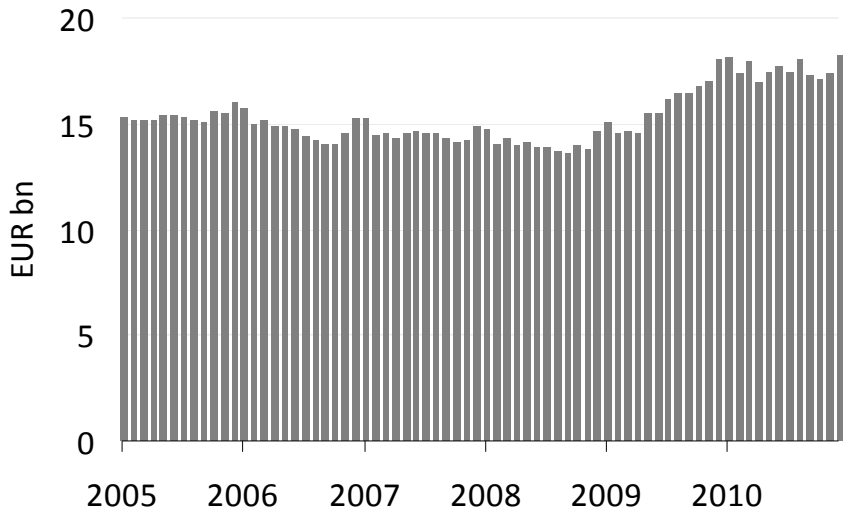
In practice, a pool of mortgages might be separated into different layers that represent different degrees of prepayment risk:

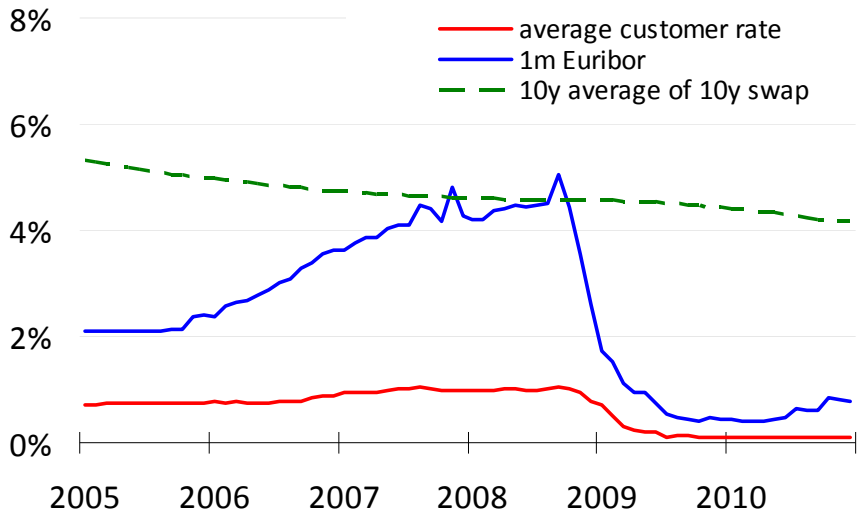


- The **"core CPR" layer** (dark grey area) reflects the portion of mortgages which are **highly likely to be prepaid**.
- The **"max CPR" layer** (light grey area) reflects the portion of mortgages which are **assumed not to be prepaid**.
- The **"uncertain CPR" layer** (red area) represents the portion of mortgages which **might be prepaid** – and which could be hedged using options.

MODELS
Sight Deposits

- From a **contractual** view point, sight deposits have an **overnight maturity**.
- However, historical data show that, in aggregate, sight deposits are a relatively **stable source of funding**. Moreover, the **average customer rate** is rather **sticky**:



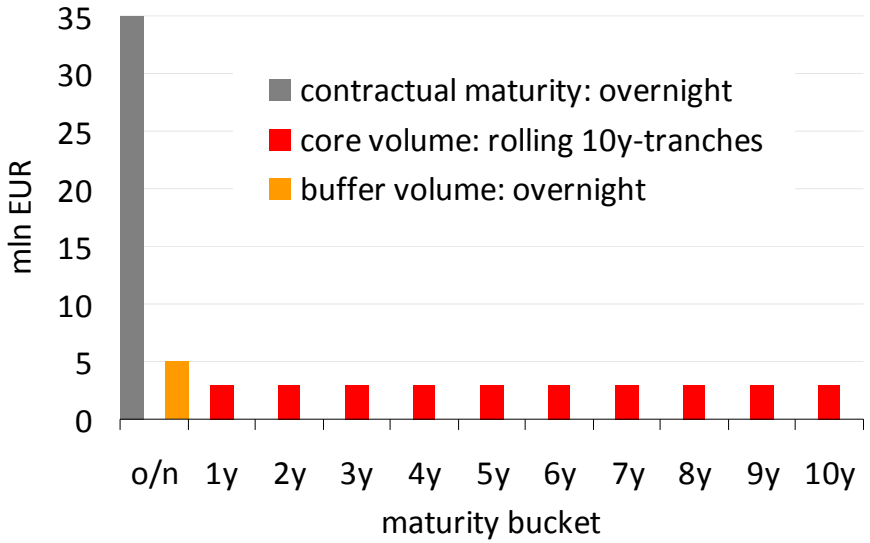


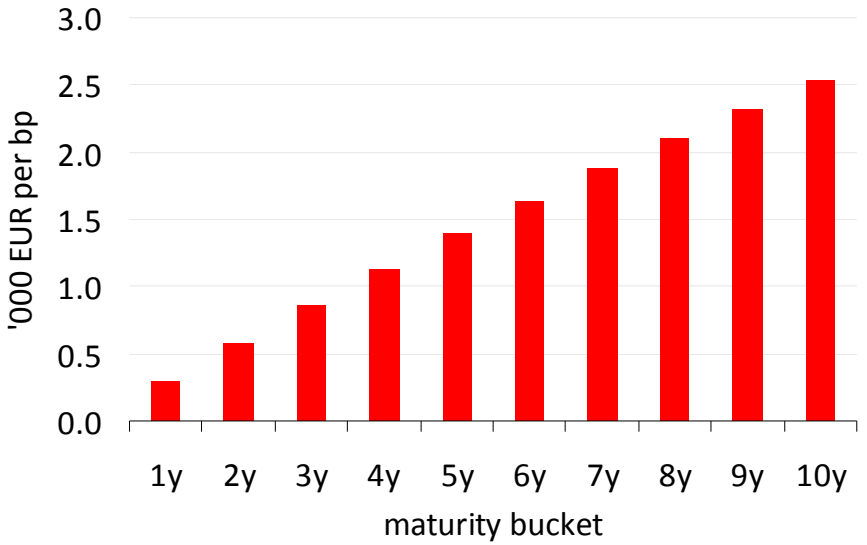
MODELS
Sight Deposits

- Thus, under an IRR perspective, a material portion of sight deposits represents not overnight money but rather a **sticky-rate long-term liability**.

- The widely used **"core volume models"** aim to incorporate this insight into ALM's risk management by adjusting the relevant cash flow profile:

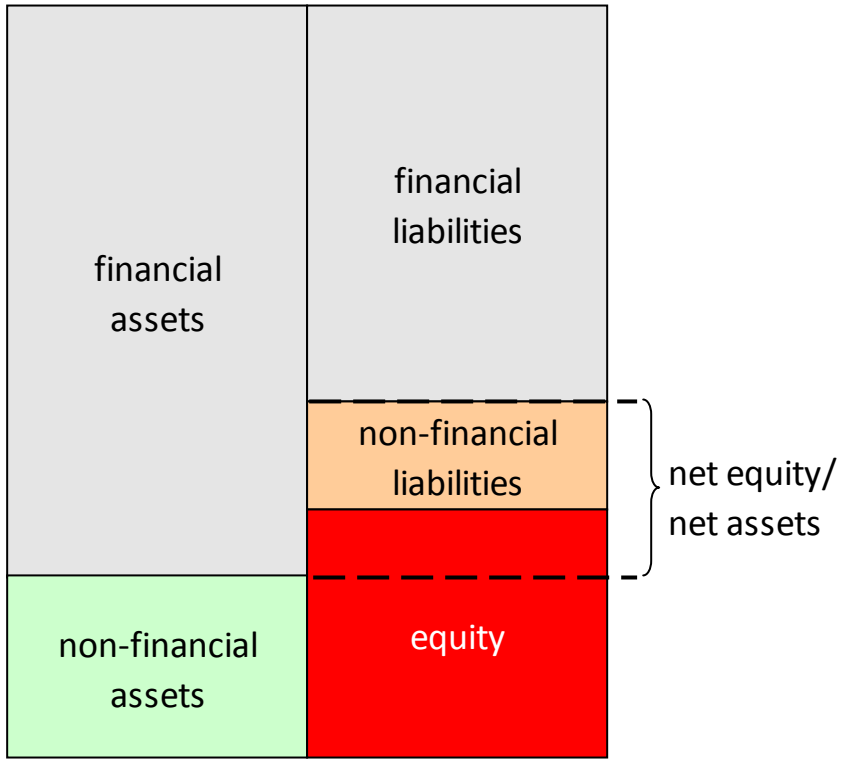
Cash flow profile and interest rate sensitivity
of portfolio of modelled vs contractual sight deposits





MODELS
Non-Financial Assets and Liabilities

- The third area where modelling is used in IRR are **non-financial assets and liabilities**. They are often modelled as "**net equity**" (i.e. equity less assets such as property or equipment plus liabilities such as pension reserves).
- In a recent survey by PwC, 58% of the banks said they incorporated a **target duration for their net equity/assets** into the IRR management. The majority of them used a duration of between 1 and 5 years.
- Many banks use a so-called **replication model** for this purpose (i.e. they model a bottom layer of their equity as a number of staggered fixed-rate tranches which are rolled over at regular intervals).



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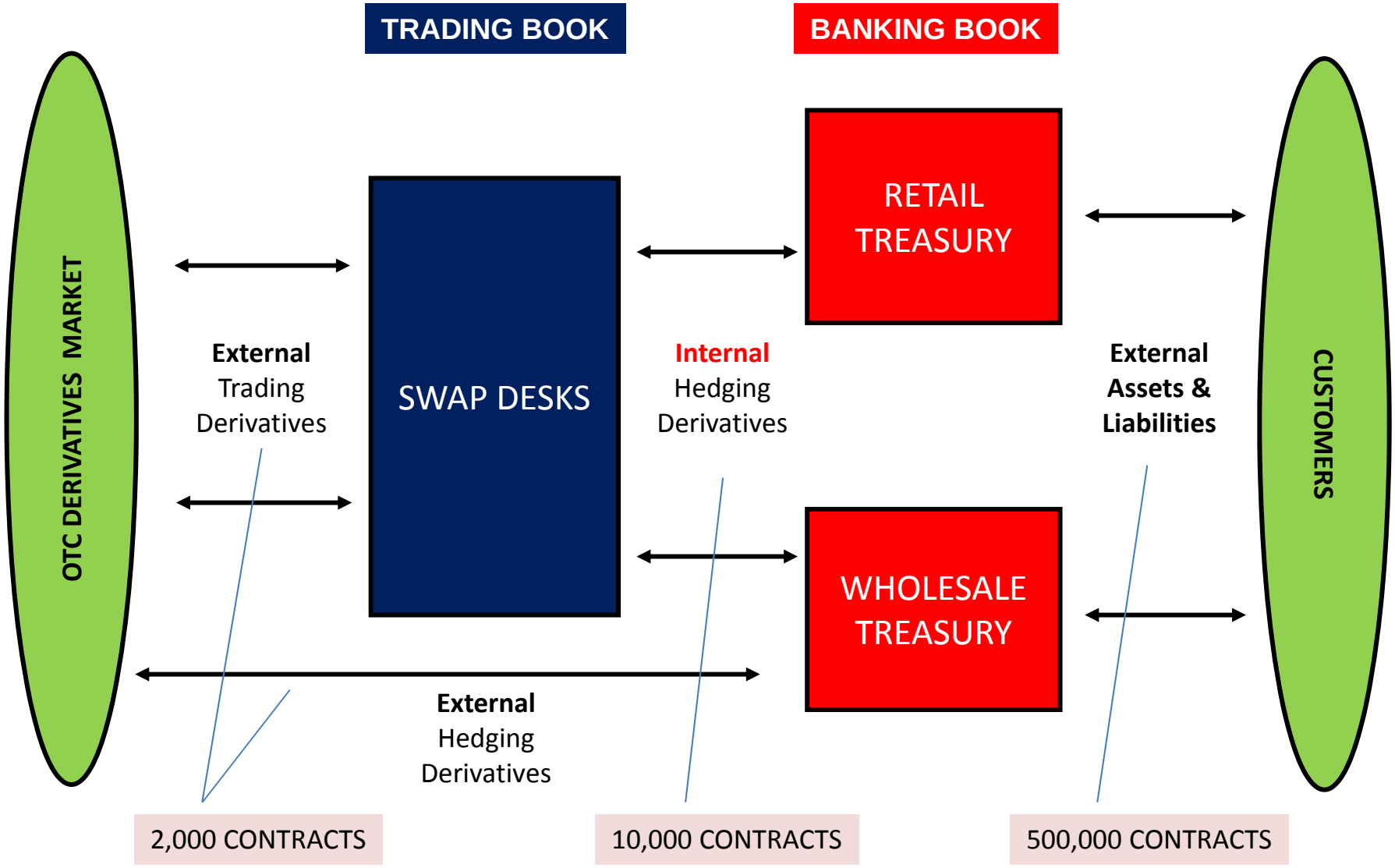
INTERNAL HEDGING DERIVATIVES



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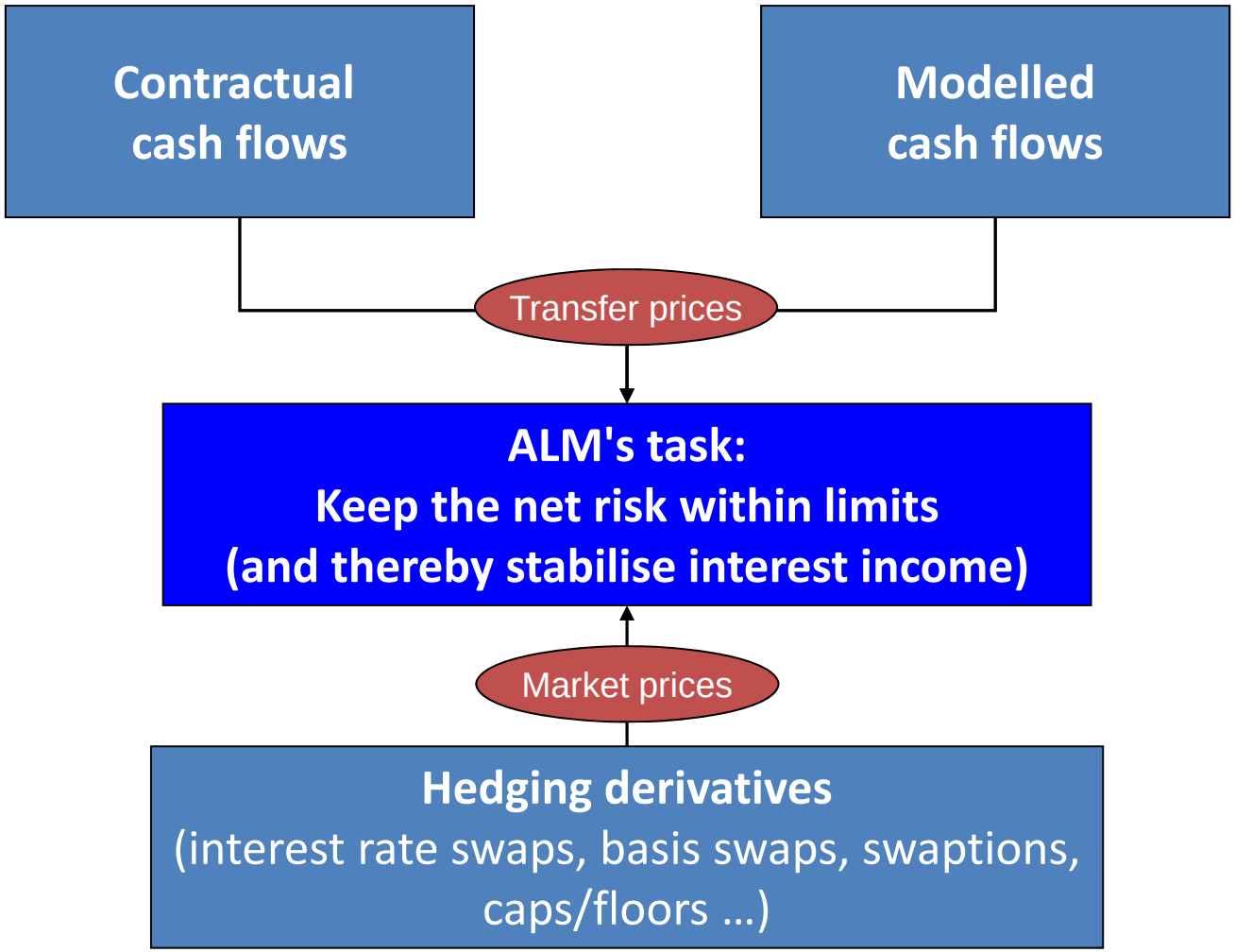
KEY POINTS

IRR is managed

- as a whole: all interest risk profile collapse into a comprehensive measure, namely PV01 sensitivity
- via a framework of benchmark rates through which Business Units transfer the risk to the ALM
- via a framework of limits set at board level
- giving priority to the self-hedging capabilities existing within the banking book (i.e. hedging a fixed rate loan with a portion of modelled sight deposits)
- entering into Interest Rate products such as IR Swap, IR Swaption, Caps & Floors, OIS, Basis Swaps (internal deals or external ones).

KEY POINTS


Contractual cash flows
Modelled cash flows
Transfer prices
ALM's task:
Keep the net risk within limits
(and thereby stabilise interest income)
Market prices
Hedging derivatives
(interest rate swaps, basis swaps, swaptions, caps/floors ...)

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Organisational Issues – Bank A

- A major UK based International Bank operates a centralised policy and control infrastructure for ALM and Risk
- This policy requires all structural interest rate risk to be passed to a dedicated unit within it's Global Investment Bank
- However this risk is managed at a local level within a dedicated Balance Sheet Management (BSM) unit which exists in each local entity
- As a result risk is managed within local limits not global limits

Organisational Issues – Bank A

- This ‘subsidiarisation’ approach for risk mirrors the approach for capital and reflects the entity legal structure
- The approach ensures that the risk management process uses local market instruments and reflects local market practices
- However it also ensures that models used and behavioural assumptions made are in line with group standards and requirements

Organisational Issues – Bank A

- Risk transfer of interest rate exposures to BSM are made at appropriate market rate for the currency and risk tenor
- BSM entities are targeted to optimise Net Interest Income (NII) over the short to medium term in line with plans agreed with central management
- In carrying out this strategy some fair value risk management tools will be used but these are not value or reward drivers
- P&L of BSM shown as NII and main risk disclosure is sensitivity of the projected NII to 25 bp interest rate shift (split by currency bloc)

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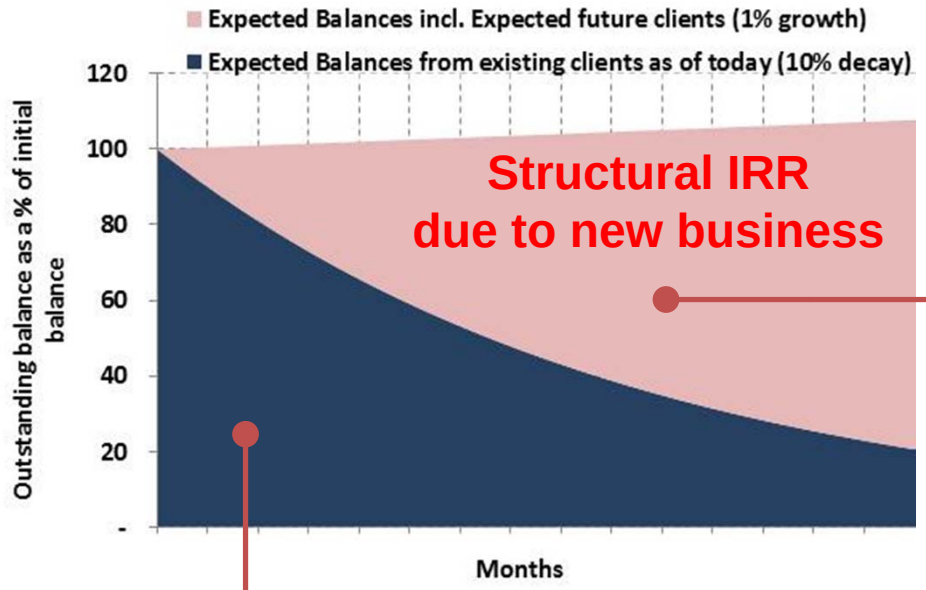
Bank B - Structural Interest Rate Risk calls for 'closed world' and 'open world' risk metrics

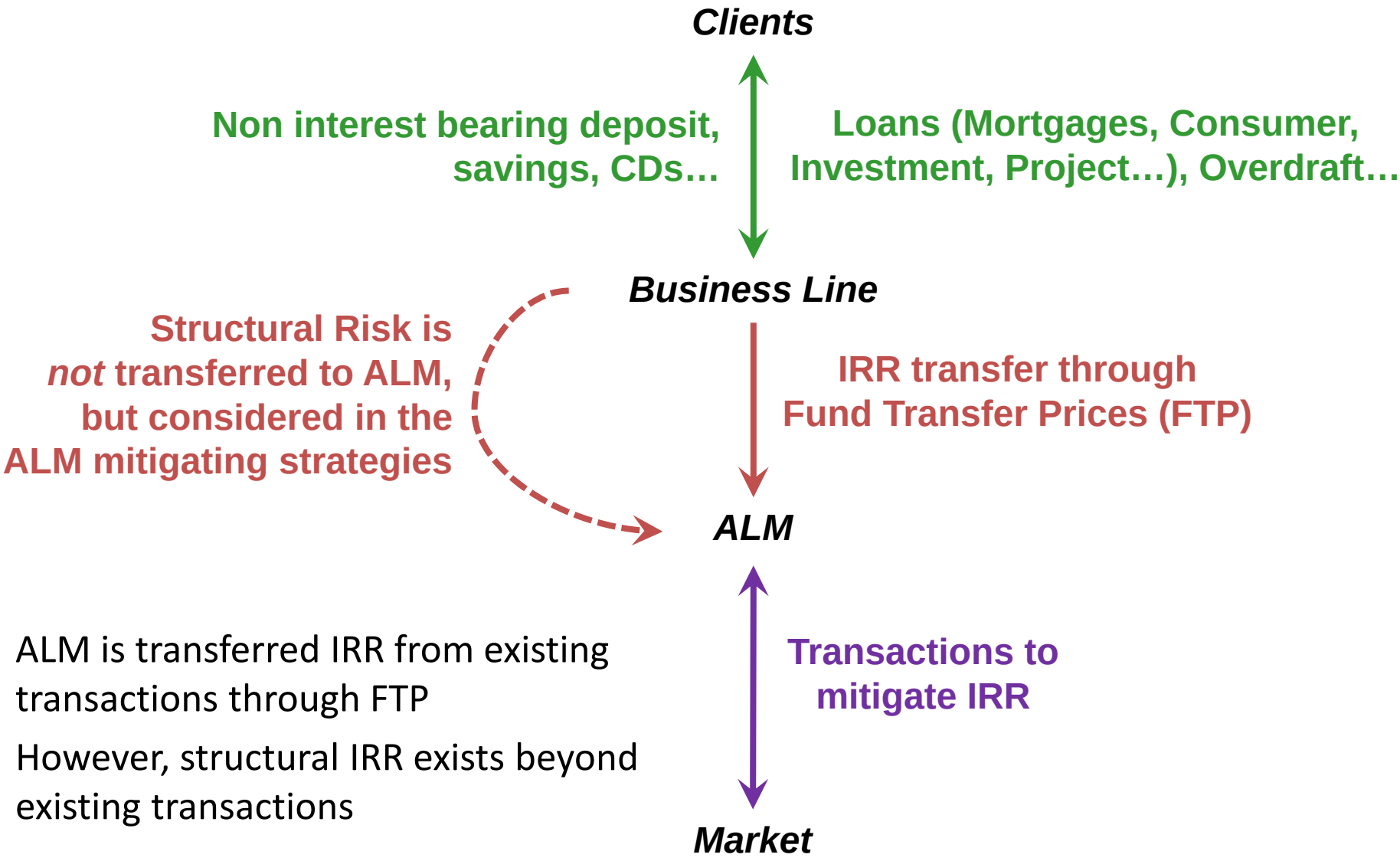


« Open world » interest rate risk metrics
Net Interest Income Sensitivities
(over a few years horizon)

ALM IRR Management
Objective = Make sure that interest rate risks remain constantly within pre-determined limits

« Closed world » interest rate risk metrics
Interest Rate Gap and FTP
(Replicating Portfolio-based)

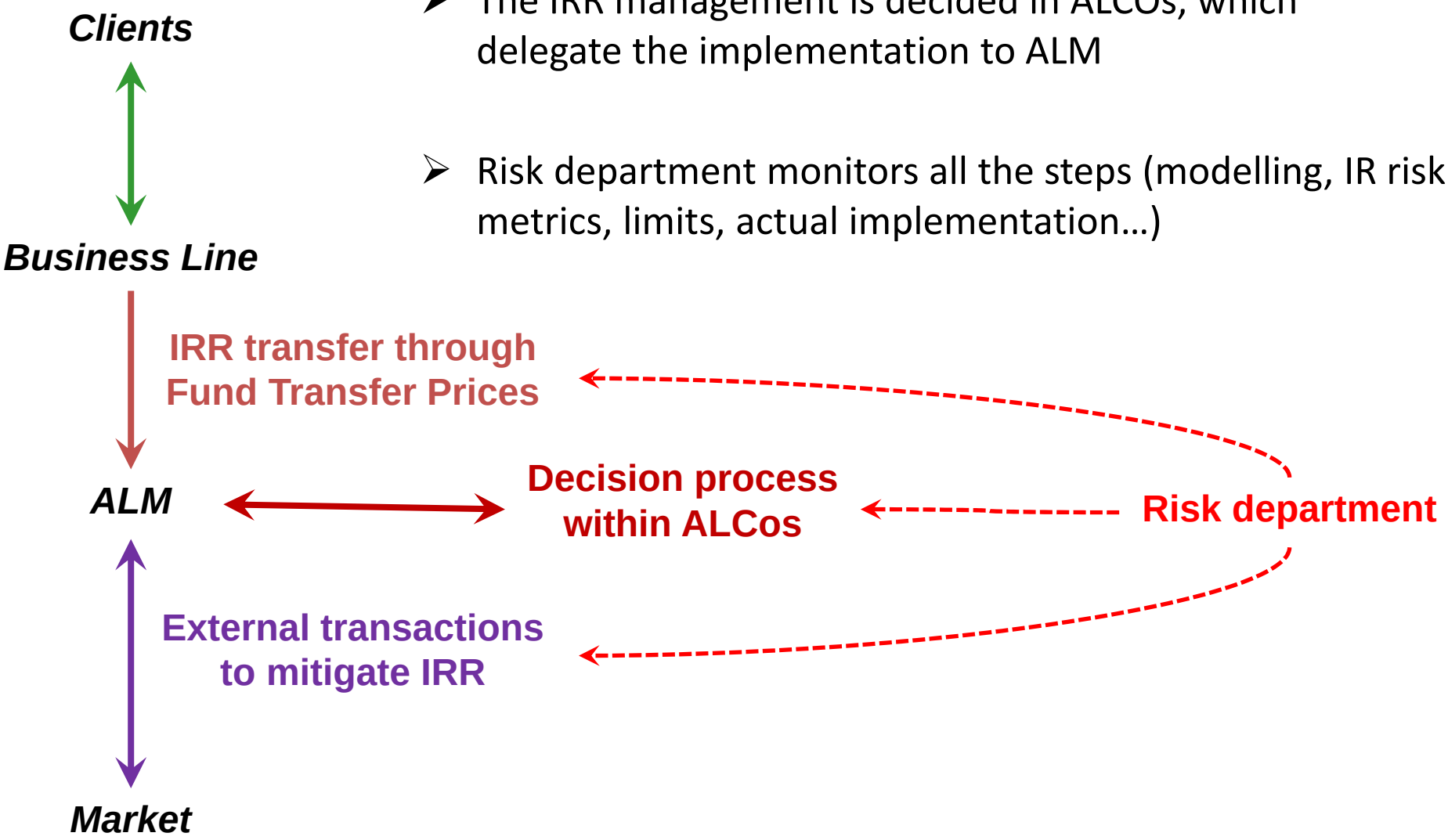
Bank B – FTP does *not* transfer structural risk



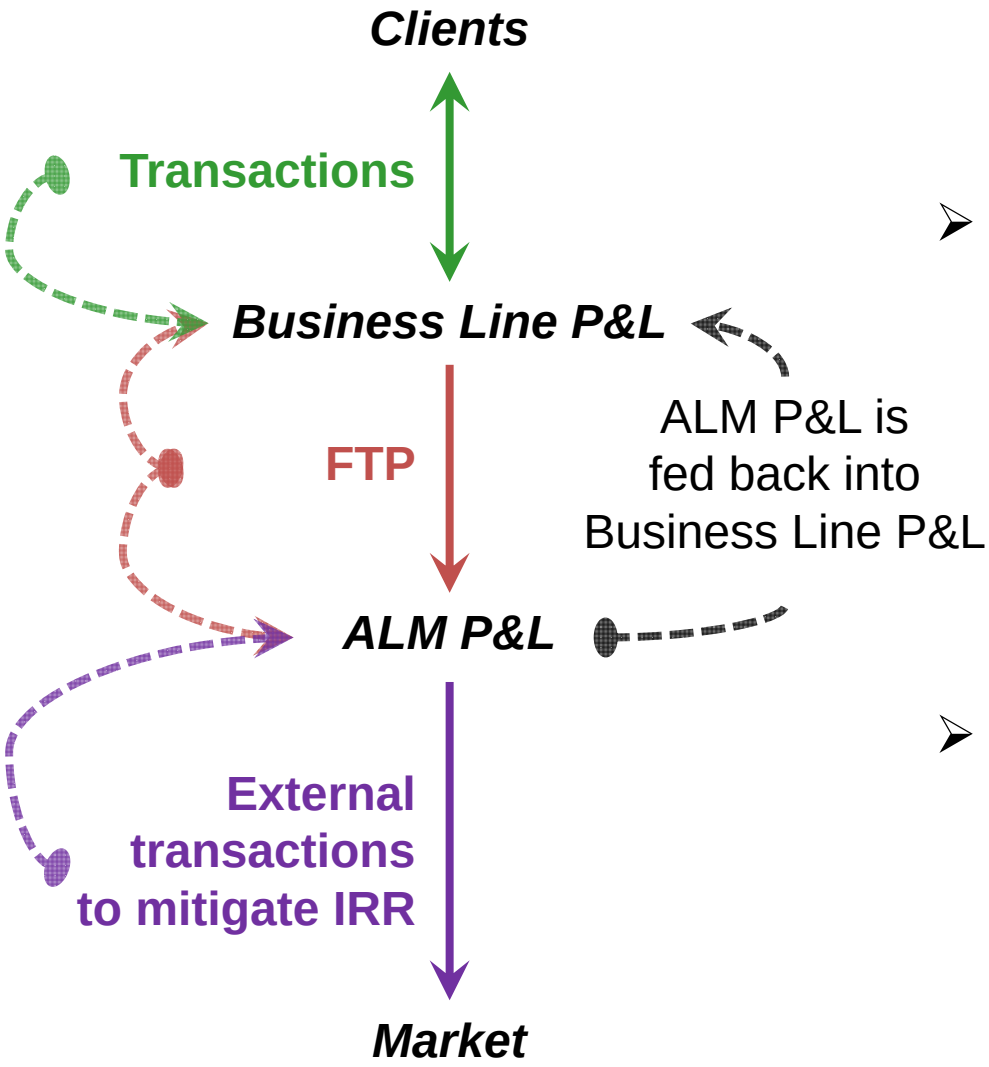
- ALM is transferred IRR from existing transactions through FTP
- However, structural IRR exists beyond existing transactions

Bank B- The risk mitigation decision process is ALCOs-driven, and risk department-controlled

- The IRR management is decided in ALCOs, which delegate the implementation to ALM
- Risk department monitors all the steps (modelling, IR risk metrics, limits, actual implementation…)



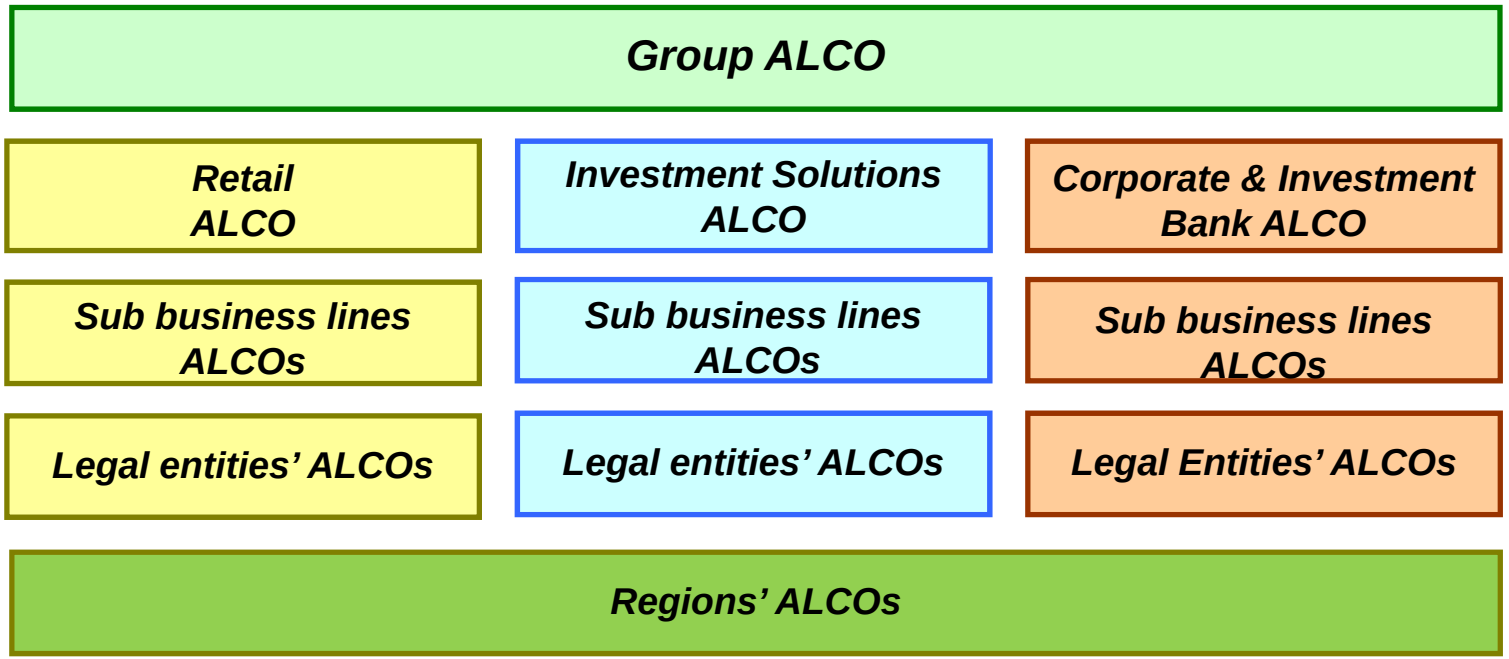
Bank B
ALM P&L is measured



- ALM has a P&L that is reported to ALCO (both actual P&L and forward looking P&L).
- This ALM P&L is given back to business line IRR originates from. This is done at legal entity level (notably when considering issues relating to tax, regulation, minority interest

Bank B
ALCOs – Roll ups

- ALCOs are held at each node of the organization. Nodes are business lines-based and legal entities-based



- Executive Management at each level are involved at each node

Bank B
IR Gaps give a view on *Risk*...

- An IR Gap can typically be represented by the table below:

Avg Balance	1y	2y	3y	4y	5y	6y	7y	8y	9y	10y
Fixed Rate Assets	- 96	- 89	- 81	- 74	- 67	- 60	- 54	- 47	- 40	- 34
Fixed Rate Liabilities	90	81	73	65	59	53	48	43	39	35
Fixed Rate gap	- 6	- 8	- 9	- 9	- 8	- 7	- 6	- 4	- 2	1
P&L impact of +1% rate increase	- 0,06	- 0,08	- 0,09	- 0,09	- 0,08	- 0,07	- 0,06	- 0,04	- 0,02	0,01

- For each time band, the average fixed balance is reported negatively signed for an asset and positively signed for a liability. For the sake of simplicity, time bands above are yearly time band. In practice, the time bands are usually: quarter long for the next year or two, then year long for the next few years, then 5 year long beyond.

- A negative gap means that there is an excess of fixed rate assets over fixed rate liabilities for the considered time band, which means that a rate increase would be detrimental to the P&L of that time band. By « default » of specific management, a gap will be closed with short term borrowings

- Assets and liabilities are usually broken down in smaller categories to help analyses

- Rem: Core deposits' FTP are considered here, not client rates: the non interest rate-component are not considered.

Bank B
... *and* IR Gaps gives a view on *P&L*

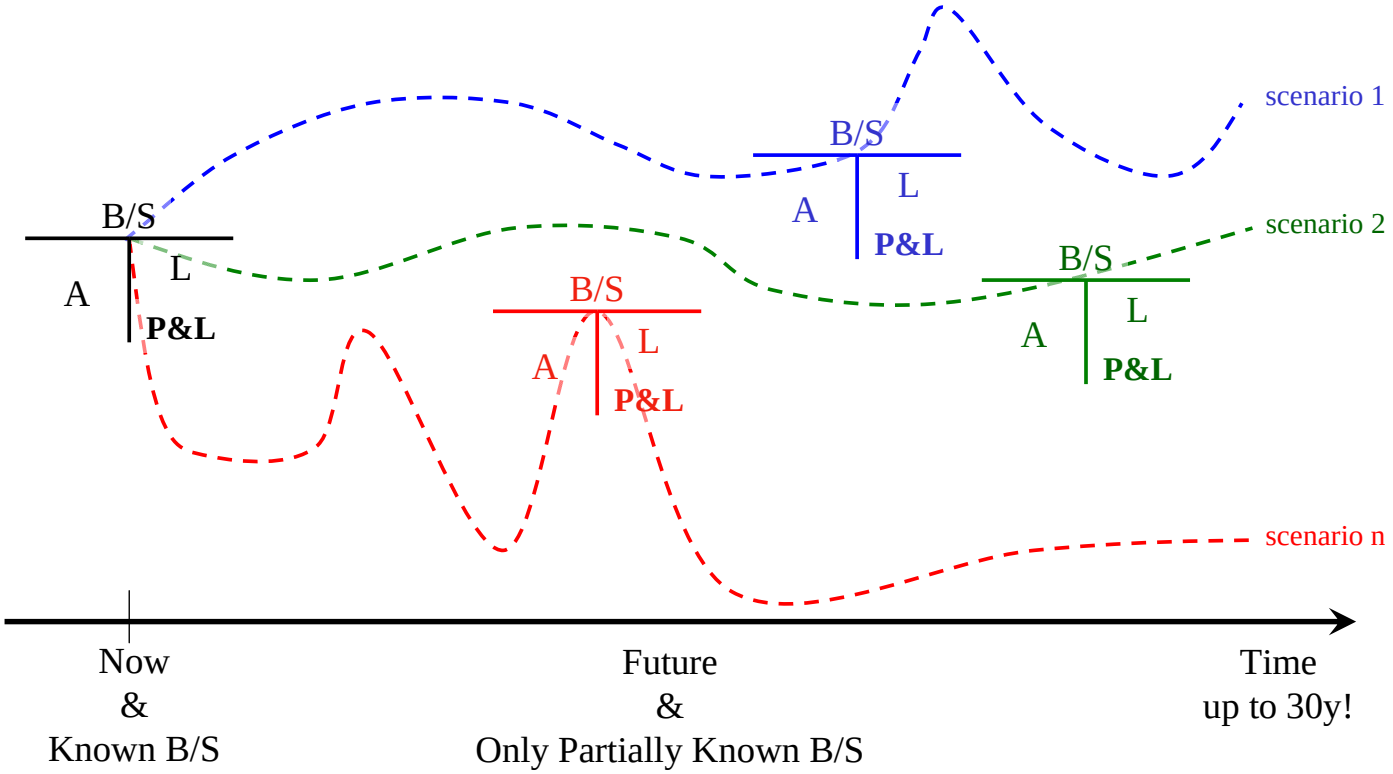
- Actually, the (oustanding) balance perspective is complemented with a rate (ie FTP) perspective: the average FTP is calculated for each time band on assets and liabilities:

Avg Balance	1y	2y	3y	4y	5y	6y	7y	8y	9y	10y
Fixed Rate Assets	- 96	- 89	- 81	- 74	- 67	- 60	- 54	- 47	- 40	- 34
Avg FTP	4,50%	4,45%	4,40%	4,35%	4,30%	4,25%	4,20%	4,15%	4,10%	4,05%
Fixed Rate Liabilities	90	81	73	65	59	53	48	43	39	35
Avg FTP	4,40%	4,38%	4,35%	4,33%	4,30%	4,28%	4,25%	4,23%	4,20%	4,18%
Fixed Rate gap	- 6	- 8	- 9	- 9	- 8	- 7	- 6	- 4	- 2	1
Expected O/N	1,00%	1,25%	1,50%	1,75%	2,00%	2,25%	2,50%	2,75%	3,00%	3,25%
Expected P&L	0,31	0,31	0,29	0,24	0,19	0,13	0,08	0,02	- 0,02	- 0,05
P&L impact of +1% rate increase	- 0,06	- 0,08	- 0,09	- 0,09	- 0,08	- 0,07	- 0,06	- 0,04	- 0,02	0,01

- The gap is closed with expected short term values (O/N)
- This helps forecasting the P&L of ALM, measuring the risks.

Bank B - Net Interest Income sensibilities help capture the structural risk

- Gaps are « closed world » risk metrics: balance sheet accounts are assumed to run off
- Net Interest Income sensitivity analyses enable to get an « open world » risk metric view by simulating the whole (business line-)balance sheet, including future mitigating strategies



- They enable to better fit the « on going » business mode that ALM is involved in (the branches will not stop taking new deposits or originating new loans!)