



Interest rate risk management of mortgages in France

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Main features of mortgages in France

■ Outstanding

- €650bln of residential mortgages
- Retail accounts for 79% of outstanding

■ Origination

- €150bln in 2007
- Slight decrease since half-year 2007

■ Duration

- An average life of nearly 18 years ...
- ... which increases annually by 10 months
- New loans proposed of up to 30 years and sometime longer

■ Type of rates offered to customers

- 75 to 90 % of the loans outstanding is fixed (FR)
- 10 to 25% the loans carry a periodically adjustable rate (indexed on Euribor), but generally with some form of interest-rate cap

Main types of mortgages in France

■ Strong competition

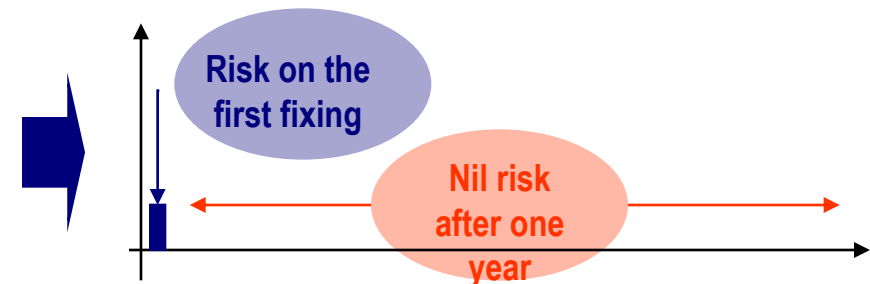
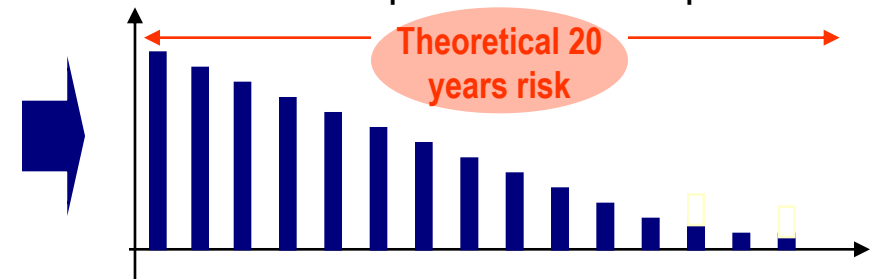
- Mortgages are a call product for high-street banks
- The growth of online brokers increased competition further
- Competition goes on for the entire life of the loan, through loans repurchase, in particular in times of decreasing rates
- **Commercial margins are tight**

■ Very varied guarantees

- The proportion of loans backed by a mortgage is on a constant decrease
 - less than 50% in 2007
- Symmetrically, the percentage of loans backed by sureties and/or insurance unabatingly increases
 - These guarantees are given by banks subsidiaries
 - These institutions only take a mortgage in case of default

Principles of interest rate risk management in the banking book (in France)

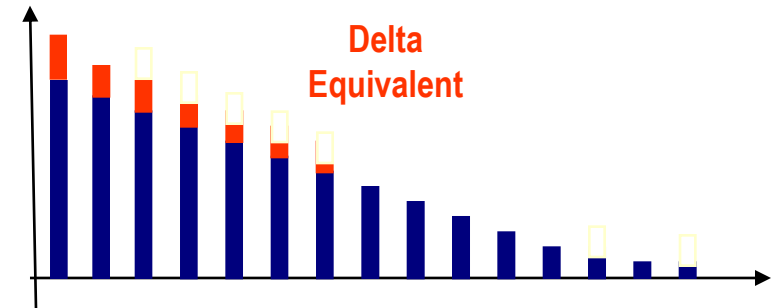
- French banks manage the interest-rate risk in their banking book through a measuring of the fixed-rate surplus (or deficit) over the fixed-rate liabilities.
 - Principle of establishing fixed rate gaps (1 year equivalent) for all fixed rate assets and liabilities at the time of measurement,
 - Banks apply a set of limits (maximum gaps)
 - The main hedging instruments are fixed-rate liabilities such as deposits and swaps (IRD)
- The classical French housing loan (18 years, fixed rate of 5%, constant K+i monthly instalments) generates on such a basis a 20 year interest rate risk.
- The other loans (generally pegged to the Euribor) only generate a small interest rate risk limited to the index (between 3 months to 1 year)



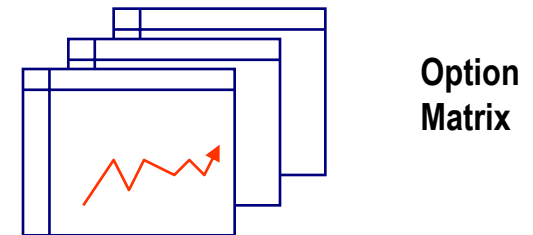
Principles of interest rate risk management (in France)

- French banks also include in their interest-rate risk management explicit or hidden optional risks booked on their balance sheet.

- Either they add them to the fixed-rate gaps, according to their delta equivalent



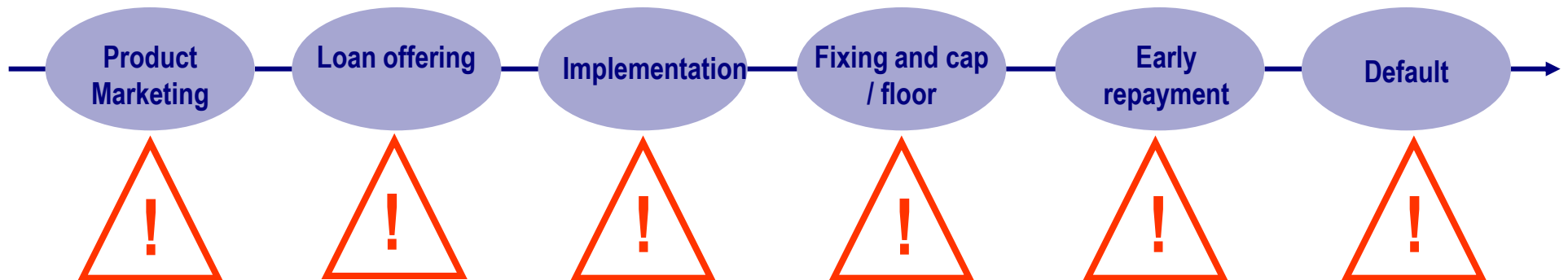
- Or they manage them separately, as if it were a market option book



- French housing loans include numerous options:
 - a guarantee of the interest rate during the offering period up to the last drawdown
 - early repayment option,
 - right to a loan with a pre-defined rate (Home-Finance Savings Scheme), known as “Epargne-Logement” in French (EL)

... consequences

- Home-Finance loans represent the main source of interest-rate risk for the French banks
- This interest-rate risk includes multiple explicit or implicit options
- Lending spreads are tight
- The interest-rate risk management has the aim of protecting these low spreads
- This requires a fine-tuned management (modelling, measuring, hedging, back-testing) of the successive stages of a home-finance loan.
- .



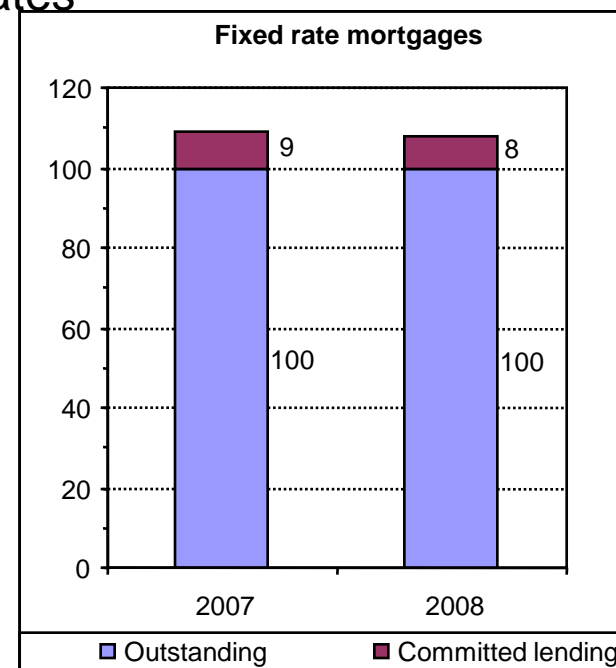


**The management of risks of fixed-rate loans
(80 % of the origination of new loans in France)**

Risk and management of the committed (and not yet extended) lending

- When a bank gives its agreement to lend, it commits itself on firm conditions /
 - on the interest rate applicable, when the loans has a fixed rate,
 - on the level of the cap when the loan is an adjustable-rate one).
- The loan offer generally has a two-month life.
- Drawdowns are subsequently possible till two years after the acceptance of the offer (in the case of new buildings)
- Banks are therefore exposed to rising market interest rates
- The future loans outstanding represents approximately 8% of the extended loans outstanding, depending upon the state of the market (volumes, structure)

➤ The interest rate risk loans on committed but not yet extended lending is thus relatively significant. It can nevertheless be quite easily estimated, monitored, and managed.



Risk and management of early repayments

- French law is favourably disposed towards the borrower, with respect to early repayment (ER)
- The maximum penalty « ... may not exceed the amount of a half-year interest on repaid principal at the average loan rate, not exceeding 3% of the outstanding principal before repayment)»
- As a consequence of this formula, and in the case of decreasing rates, in most case this leads to the following:



legal indemnity << actual indemnity

- This penalty is moreover bargained upon by the customers, which increases the risk.

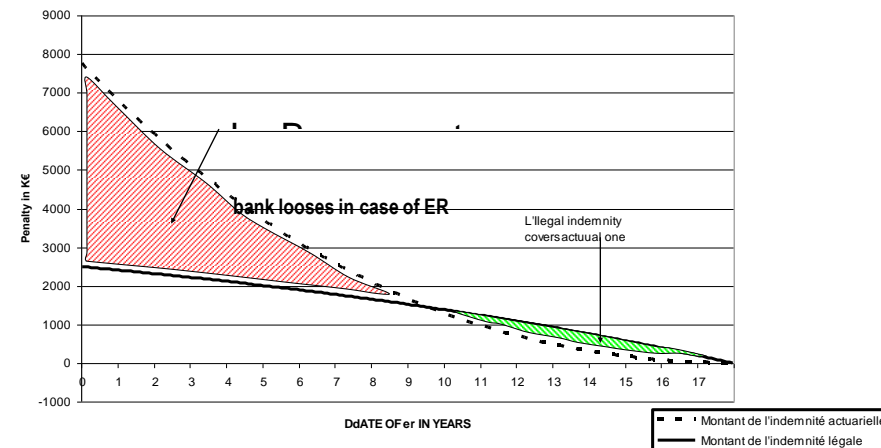


The ER risk is a major one linked to the risk of decrease of the interest rates

Breakeven point of legal penalties expressed in number of years

Loan duration: Drop in interest rates of:	10Y	15Y	18Y
- 100bp	4Y	7.5Y	9.6 Y
- 200bp	6.6Y	10.8Y	13.1Y

Comparison of actual/legal penalties by ER date



Risk and management of early repayments

- Early repayments on fixed-rate mortgages have two origins :
 - **Life events** (sale of asset, move, family split-up, death,...)

Such events are independent from market rate changes:

-> These events are therefore statistically measurable, in part, depending upon the characteristics of loans and borrowers:

- Original and residual duration
- Age and family situation
- Size of the funded asset (surface area, location, price...)
- Etc.

Failing these, the « structural » early repayment rate can be estimated by reference to the ER rate of the Home-Finance Savings Passbook loans (low interest rate loans which the borrower has almost never any interest to repay early).

The structural ER rate can be estimated to stand at **3% annually**, according to such a proxy.

Risk and management of early repayments

□ Interest-rate trends

The early repayments are then « opportunistic » or circumstantial, triggered by:

- decreasing interest rates
- The ageing of the loans (the sliding on the curve, if it is normally sloped) ...

In order to model the circumstantial ER, one must take into account :

- the « lag » between the decreasing market rates and the initiation of the ER flows
- the financial « friction » generated by the re-negotiation of a loan (guarantee fees, etc.)
- the business and marketing environment (media, competition, etc.)

- In any case, the access to a reliable, precise, and detailed base of information is instrumental in the assessment of the appropriate ER law.

Risk and management of the adjustment options

- Considering competition on the housing loans market and the customers expectations of ever increasing flexibility options such as the adjustment in the periodicity of instalments (speeding up, temporary interruption, postponement) have been introduced.
- These options are contractually defined (duration and maximum amount of contractual repayment waivers).
- Adjustment options are generally free, as they are included in the calculation of the interest rate.
- In general, this risk is limited (equilibrium between borrowers who want to speed up repayment and those who want to slow down) ...
... it can nevertheless fluctuate across the business cycle.
- It is very difficult to precisely assess this risk,
 - for want of historical data,
 - for want of appropriate data in the information systems (loans with options, track-record...).

Risk and management of non-performing loans

- 3 categories of non-performing loans :
 - Loans which will return to normal
 - > reversion to the legal repayment schedule
 - Loans which will be restructured
 - > lengthening of the repayment schedule
 - Loans which will be accelerated
 - > shortening of the repayment schedule
- Each scenario generates different changes on the amortisation profile of the loans.
 - The Basle 2 ratings provide interesting information in terms of probability of default and loss
 - It is necessary to have access to statistics on recoveries actions
- The default rate remains very low in France (<<1%) : the interest-rate risk generated by default is therefore not very high.
- Nevertheless, in the event of an anticipation of a rise in the default rate, one must provide for the modelling of this risk.



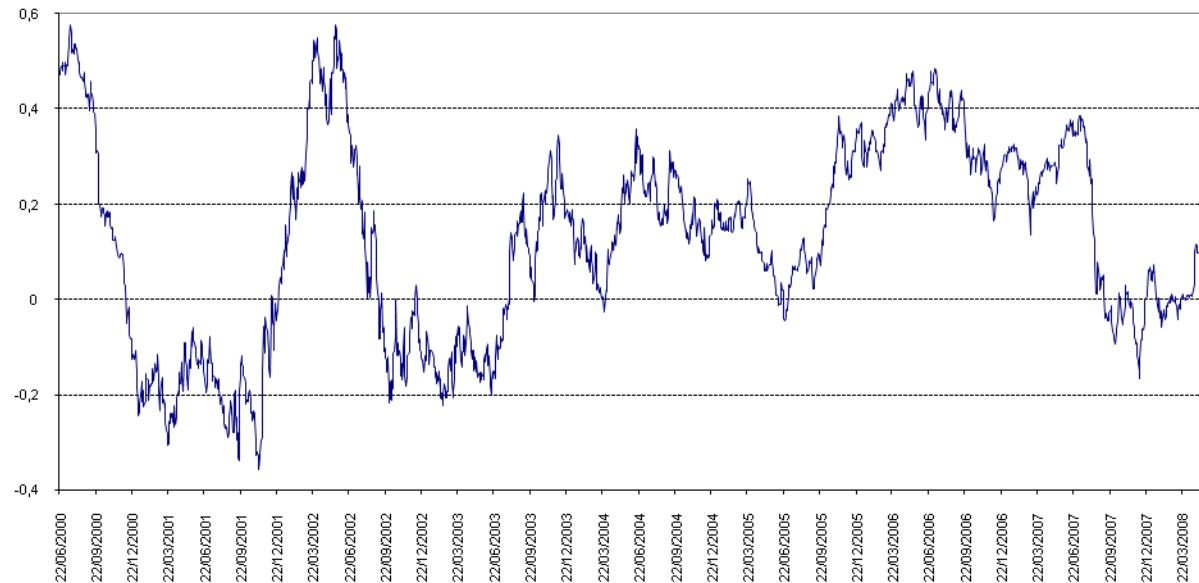
The Management of Risk of Adjustable-Rate Loans

(20 % of French origination)

Risk and management of variable-rate loans: fixing and basis risk

- The first thing is to manage the fixing agenda
- Some loans incorporate a basis risk generated by the gap between
 - the maturity of the index and its periodicity,
 - the fixing and the implementation dates,
- For instance : a 3 month Euribor index reference for a one year interest period


12M Euribor 3M Euribor spread



- This spread can widely move [-0.2% ; +0.6%] and its hedging can heavily bear on the margins.
- Is this risk charged to the borrowers ?

Risk and management of variable-rate loans : Caps and Floors

- Capped loans have been marketed in France mostly between 2004 and 2006 with low-level triggers, between 1% and 3% over the Euribor of the time.
- In order to be included in the interest-rate risk management such options can be delta managed. Nevertheless such a method does not make it possible to manage the gamma and the vega risks and requires frequent adjustments (adding-up of borrower and lender swaps), which can generate qualification difficulties under IFRS.
- Hedging the cap sold to the borrower, through an identical (or very close) features cap bought in the market is therefore the best solution. The disadvantage of such a hedge is that it must be accounted for, under IFRS, in the trading portfolio, whereas the cap on the loan (the hedged element) is accounted for on an accrual basis.
-> Income statement volatility risk
- In the current rates environment, the risk on capped loans is higher than the one on floored loans.



The Management of the Risks of Home-Finance Savings Scheme Loans (a French specificity)

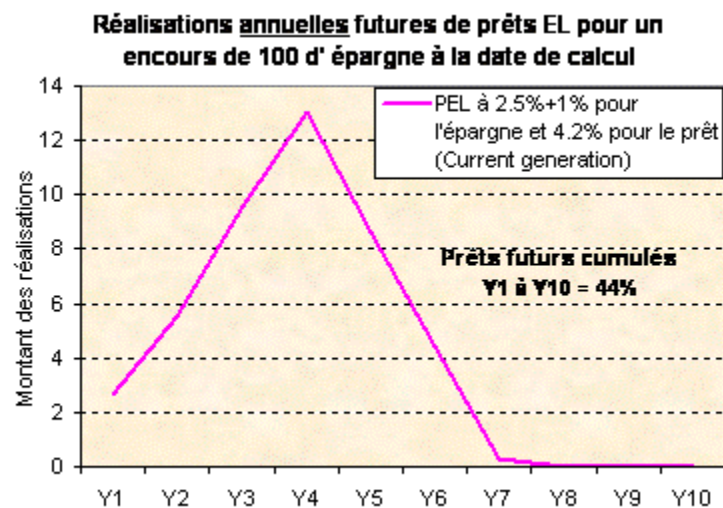
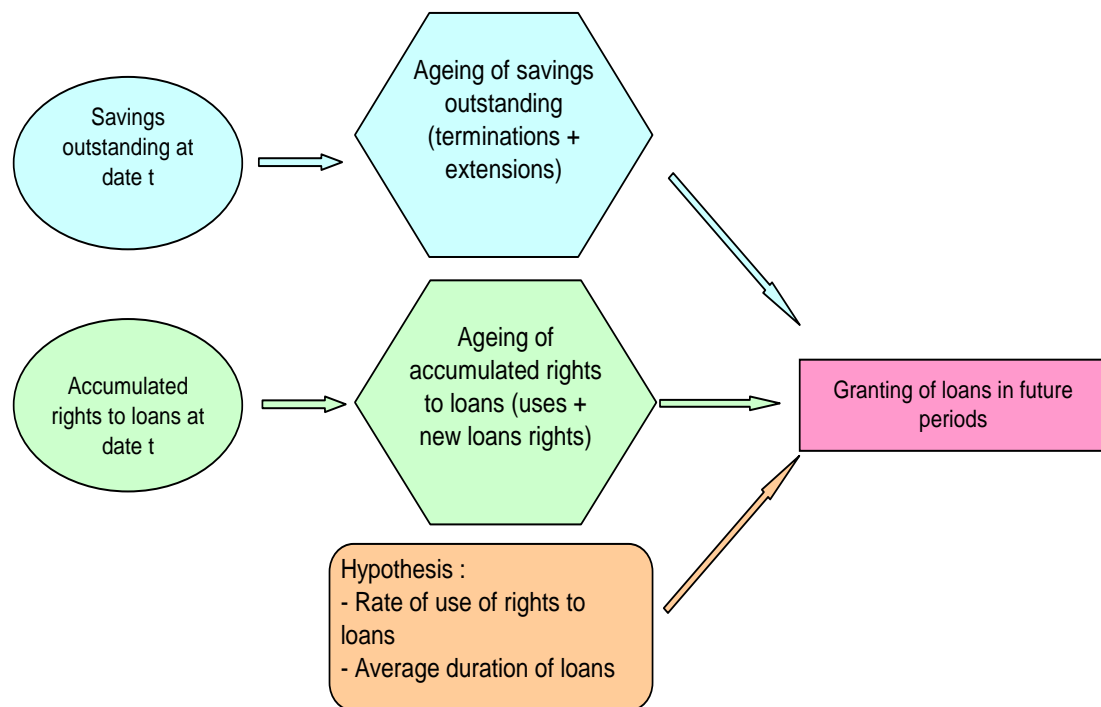
Risk and management of the origination of future loans of Home-Finance Savings Scheme loans (HF)

- HF is a regulated product which include a fixed-rate saving period (for example 2.5% tax-free) followed by a period of optional fixed-rate borrowing (for instance: 4%), determined at the product subscription date.
- The terms of borrowing (amount, duration) are dependent upon the interest received by the borrower during the saving period,
- The schedules are regularly updated, according to the changes in the interest rate levels. Each schedule represents a generation.
- All the customers of a generation do not want to borrow (economic interest in relation with the market rates at the time of potential borrowing, need of a home-finance loan, etc.).

Banks must frequently estimate future demand for such loans which confront them to the risk of rise of interest rates.

IFRS rules furthermore that such a risk must be reserved.

Risk and management of the origination of future loans of Home-Finance Savings Scheme loans (HF)



- Anticipations of new loans vary considerably between the various generations of HF.

Conclusion

- Housing loans generate several risk factors which intensity and complexity are summarised in the following table

Risk	Events	Intensity of risk	Complexity of management / measure
Early repayment	Structural, circumstantial, change in the type of rate (variable or capped to fixed), ...	★ ★ ★	★ ★ ★
Cap / Floor / Tunnel	Delta hedge	★ ★ ★	★ ★
EL committed origination	Use of entitlements to loans, at undefined dates and for unknown amounts	★ ★ ★	★ ★ ★
Committed origination	Signed or unsigned loans offers, partial extension of funds for fixed rate loans	★ ★	★ ★
Basis risk	Difference between index maturity and periodicity, difference between fixing and implementation dates, ...	★ ★	★ ★
Impaired	Litigation, unpaid with rescheduling, unpaid with return to normal	★	★
Change in duration	Adjustment of repayment schedule or postponement, double instalments	★	★ ★ ★

Conclusion

The efficient management of these risks are dependent upon :

- The quality of the IT system: the examples taken clearly show the need to have a well documented information system, with historical records (for instance in the case of early repayments).
- IFRS constraints : the implementation of IFRS makes it necessary to implement new types of hedging. Derivatives are not always eligible for hedging, in the banking book (example of hedging through caps).
- Future loans, not yet extended are not eligible either for hedging through derivatives.
- New products governance: the ALM manager must be strongly involved in the definition of new loans types, in order to avoid that the new loans offered include risks too difficult or too expensive to manage (adjustment options, basis risk).