

The new Basel II rules will challenge the way banks practice Asset- & Liability Management

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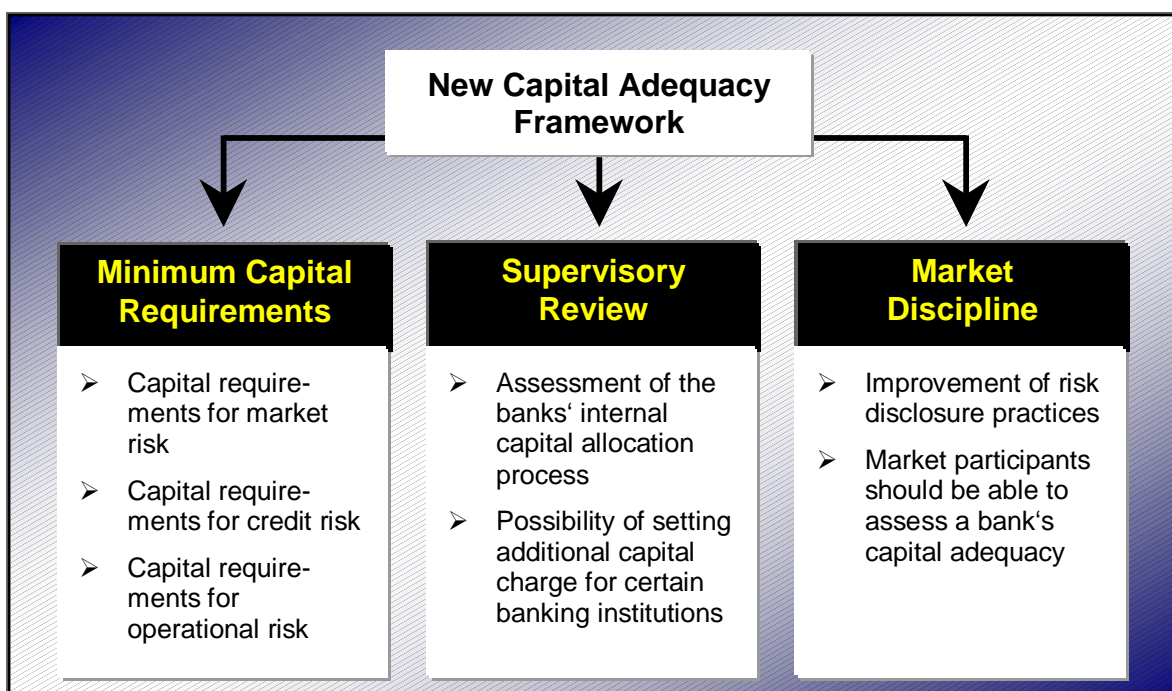
Over the last few years the management of interest rate risk has increasingly caught the attention of regulatory bodies. With the publication of its new Capital Accord («Basel II») the Basel Committee on Banking Supervision has strongly emphasized the need for sophisticated risk management methods and tools in the area of Asset- & Liability Management (ALM). Especially for commercial banks, an adequate ALM practice is today considered to an inevitable instrument for controlling risk and optimizing the risk-return-relationship. More generally spoken, each and every financial institution undertaking maturity transformation should understand the significance of actively managing interest rate risk and measuring returns on a risk-adjusted basis. From today's perspective, it's important to notice that many banks will not only need to implement the new Basel requirements but need skilled resources and sophisticated tools to cope with an increasing complexity in the financial markets.

The following article gives an overview on Basel's new regulatory standards for interest rate risk management. Above that, implications of «Basel II» with respect to state-of-the-art ALM systems will be discussed in more detail.

The concept of Basel II

In June 1999, the Basel Committee published its first consultative paper, A New Capital Adequacy Framework, which contained a proposal for a fundamental revision of the capital adequacy rules for credit risk. In January 2001, the Committee has revealed its 500 pages extensive second consultative paper which deals with various subjects like credit risk, operational risk, risk mitigation, securitization and ALM. The proposed Basel II recommendations are built on three reinforcing pillars, which are believed to contribute to safety and soundness in the financial system. The first pillar specifies minimum capital requirements for market, credit and operational risk, while the second insists on supervisory review of institutions' capital adequacy and internal assessment processes. With the third pillar – “market discipline” – the Committee aims to establish high disclosure standards and enhance the role of market participants in encouraging banks to hold adequate capital (see figure 1).

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In its January paper, the committee has decided to deal with interest rate risk in the banking book under the second pillar and not – as previously intended – under pillar one which implied a capital charge for outlier banks. The reasons for that lie in a variety of the assumptions underlying interest rate risk management (see next section).

Interest Rate Risk in the Basel II concept

As part of its second consultative package the committee has released a revised version of its 1997 Principles for the Management of Interest Rate Risk. The new «Basel II» ALM rules, Principles for the Management and Supervision of Interest Rate Risk, focus on 14 principles whereof 13 principles are applicable independent of whether the positions are part of the trading book or reflect the banks' non-trading activities.

The process of interest rate risk management is based on a top down three-step process. First, the board of directors has to approve the overall risk policy and the principles for managing interest rate risk. Second, senior management has to establish appropriate policies and procedures for monitoring and limiting interest rate risk. Third, the responsibility for the execution of the defined policies and directives has to be assigned to an independent operative unit. An overall internal control has to be established to review the accuracy and the adherence of the stated process.

A measurement system has to capture all material sources of interest rate risk and assess the impact of interest rate changes on the market value of the economic capital and the earnings. The material sources of interest rate risk that have to be captured by the measurement system can be summarized in the following categories:

- Repricing risk arises from different maturities or repricing periods of a bank's assets, liabilities and off balance sheet positions. An example is the financing of fixed to maturity mortgages with floating rate notes.
- Yield curve risk deals with the fact that the slope and shape of the yield curve underlies continuous changes.
- Basis risk comprises the imperfect correlation between different yield curves (e.g. three-month USD-Libor and three-month U.S. Treasury Bill rate).
- The fourth source of interest rate risk is embedded options of many banking book products. For example giving the customer the right to withdraw his money from a savings account at any time.

Basically two methodologies should be taken into account to analyze the effects of the sources of interest rate risk: the *economic value perspective* and the *earnings perspective*. While the first is known as the present value approach where future cash flows are discounted with the appropriate discount rate, the latter focuses on the nominal values and the net interest income in the near future.

A closer look on these methodologies and how they act in the environment of the stated categories of interest rate risk will be discussed in the next section. The main issue will be the adequate transformation into an ALM system.

What are the requirements for an ALM system based on the Basel principles?

The new Basel requirements pose several challenges to the functional setup of an interest rate risk management system. An adequate ALM system should cover eight different issues as described below.

	Repricing Risk	Yield Curve Risk	Basis Risk	Optionality
Economic value perspective	1	2	3	4
Earnings perspective	5	6	7	8

Table 1: The eight fields of Asset- & Liability Management

An overall problem is the modeling of non-maturing accounts. The system should be able to value such products. The most common method is the replicating portfolio approach. It divides the nominal amount into zero bond trenches with different maturities. The goal is to replicate the repricing behavior of the product as adequate as possible. Therefore regression analysis has to be done. Among other approaches is the replication with constant maturity bonds or models using stochastic optimization techniques. The mapping of non-maturing accounts is a precondition for adequately stating the above mentioned two perspectives.

The first four boxes of table 1 deal with the economic value perspective. Each of them represents a static snapshot analysis. The system has to deliver repricing gap analysis and sensitivity

reports (e.g. the percentage change of the economic value of capital under a standardized yield curve shock (e.g. 200 bp).

1. The repricing gap analysis gives a good overview on the actual repricing risk situation. A more adequate analysis in this area is the key rate duration profile, calculated with a re-valuation of the balance sheet after shifting each key rate by 1 pb. This PVBP report shows the sensitivity of the economic capital against changes of each rate within the yield curve. Thus, the ALM manager will be able to make decisions about adequate hedging strategies reducing the volatility of the economic capital.
2. To cover yield curve risk the system must be able to revalue the balance sheet under different complex yield curve scenarios. This enables the decision makers to generate reports assuming worst case scenarios.
3. Basis risk can be covered only if the system allows the ALM manager to deploy as much different yield curves as he needs to discount the different products in the balance sheet with the yield curve they are tied to. It should allow him to shift the yield curve in different manners and find out what happens if curve shifts are not fully correlated. The outcomes are reports that analyze the behavior of economic capital given the breakdown of market key assumptions.
4. Optionality brings up the issue of how to value embedded options in banking book products. Since these options are closely related to customer behavior (e.g. withdrawal of savings) the mapping of them needs a variety of assumptions. Nevertheless such options can be priced in different ways. Examples are stochastic simulations and prepayment optionalities. Especially in Europe calibration of such models is a difficult task. The problem is the heterogeneity of the products in the different European markets. If optionality is taken into account it is important that the assumptions underlying the results are well understood.

Let's now take a look at the earnings perspective that becomes more important because of the fact that results (e.g. net interest income for a certain time period) are easy to interpret. Different interest rate scenarios and the possibility to include volume, condition and maturity scenarios, offer the opportunity to analyze the budget of the current fiscal year. This sort of simulation is known as dynamic income simulation.

5. Under the economic value perspective the repricing risk affects the market value during the first period until repricing. In contrast, the earning perspective takes into account the income/expense over the whole simulation horizon and not only the time until repricing or maturing of a product. Therefore it is essential that the ALM system is able to simulate potential new business following the same behavior pattern (e.g. fixed floating, amortizing) as the maturing business. The outcome indicates repricing effects with respect to earnings under a variety of interest rate scenarios.
6. For modeling yield curve risk, we have to input different yield curve scenarios into the system. That means patterns of yield curve developments over time. Using complex yield curve movements the ALM manager will be able to assess the impacts of this movements on the banks income and expenses in the defined time period.
7. If yield curve risk can be modeled, the building of different interest curve scenarios over a time period allows the simulation of the breakdown of key assumptions with respect to yield curve correlation (e.g. 3 month US treasury bill curve against 3 month Libor). The outcome visualizes the effect on income/expense.
8. To include optionality into a dynamic income simulation model the ALM system must allow for modeling prepayment and structural movements between fixed to maturity products and repricing products. The problem of client behavior has to be solved by the ALM manager for example with regression analysis. The ALM system must provide the possibility to take into account the outcome of regression analysis.

Conclusions

Interest rate risk management is far more than a regulatory requirement. It offers the opportunity to actively manage the interest rate risk and to earn money. The basis is a risk management system that offers a broad choice of functionalities. It will not only allow the risk manager to analyze the balance sheet in a certain point in time but also to simulate net interest income over different time periods given different interest-, FX-, volume-, condition- and maturity-scenarios. Above that, the system could provide solutions for non-maturing products and capture embedded options as well.