

How Can a Medium-Sized Bank Develop Its Own Asset/Liability Risk Management System?

MANUAL

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I. Purpose and Target Audience

“In banking, asset liability management is the practice of managing the risks that arise due to mismatches between the assets and liabilities (debts and assets) of the bank. Banks face several risks such as liquidity risk, interest rate risk, credit and operational risk. Asset/Liability management (ALM) is a strategic management tool to manage interest rate and liquidity risk faced by banks, other financial services companies and corporations¹.”

A number of widely differing views of risk management are held by executives, regulators, and investors of financial institutions. The most commonly held view characterizes risk management as a mean of preventing disastrous losses in times of financial distress. In the past many executives believed that the lower the risk the lower the return. Today’s risk manager is a key member of senior executive team who helps to define business opportunities from risk-return perspective. In spite of the fact that Chief Executive Officers (CEO) admits the importance of asset/liability risk management in theory, they do not regard it as a risk. When they speak about a risk manager they consider only the credit risk manager.

The Manual on “How Can a Medium-Sized Bank Develop Its Own Asset/Liability Risk Management System?” focuses on developing an Asset/Liability Risk (liquidity and interest rate risk) Management System in a small and medium-sized bank. The reason why we are now dealing with interest rate and liquidity risk management (from now on A/L Risk) is that while there is a vast body of regulatory and academic literature about credit risk, market and operational risks, relatively less attention has been given to the daily practice of liquidity and interest rate risk management in the banking book.

Why is this subject not as popular as the others? It can be attributed to the lack of bank managers’ knowledge about how interest rate and liquidity risk exposure can influence the profitability of the bank under unfavorable economic circumstances. However some crises, like the current one, have proved the importance of A/L Risk and more and more banks are thinking about employing an advanced A/L Risk Management system. The second explanation could be the difficulties of appropriate data collection, although there are some well known IT companies which are developing very comprehensive, smart and expensive Asset and Liability Management system. Unfortunately, most small and medium-sized banks cannot afford this very costly software.

The purpose of this manual is to share our thoughts with the reader on “How can a medium-sized bank develop its own Asset/Liability Risk Management system”.

The book gives some practical advice on how a small and medium-sized bank can start to develop its own A/L Risk Management system by focusing on the interest rate risk and liquidity risk management policy and the measurement of these risks. The book is divided into two parts. In the first part of the book we are going to give an overview of the main steps of the risk management system development process. In the second part we will introduce the dimensions of risk management based on the liquidity and interest rate risk management system, as well as the organization, process and tools. We

¹ Crockford Neil (1986). An Introduction to Risk Management (2.nd ed.) / Woodhead-Faulkner. O85941-332-2 (Wikipedia Asset Liability Management)

will give some examples through Medium Bank, a fictitious Moscow based small-sized bank.

We are addressing this book to the senior management who are interested in developing a policy of risk management. This book can help them to improve their interest rate and liquidity risk management system in such a way that will enable them to meet the requirements of the international rating agencies. International rating is very important for a bank that wants to issue bonds, look for investors or deal in the international market. Since FitchIBCA, S&P and Moody's, considered to have expertise in credit ratings, are regarded as unbiased evaluators, their ratings are widely accepted by market participants and regulatory agencies. The rating process includes quantitative, qualitative, and legal analysis. Quantitative analysis is mainly financial analysis based on the firm's financial reports. Qualitative analysis is concerned with the quality of management, operating position, company structure, internal regulations (like risk management regulations) and includes a thorough review of the firm's competitiveness, vulnerability to technological changes, regulatory changes and labour relations. We also offer this manual to risk experts of banks as a general guidance to develop internal regulations for A/L Risk management. This book can give an overview to the Treasury management in order to corporate efficiently with A/L Risk management staff as well.

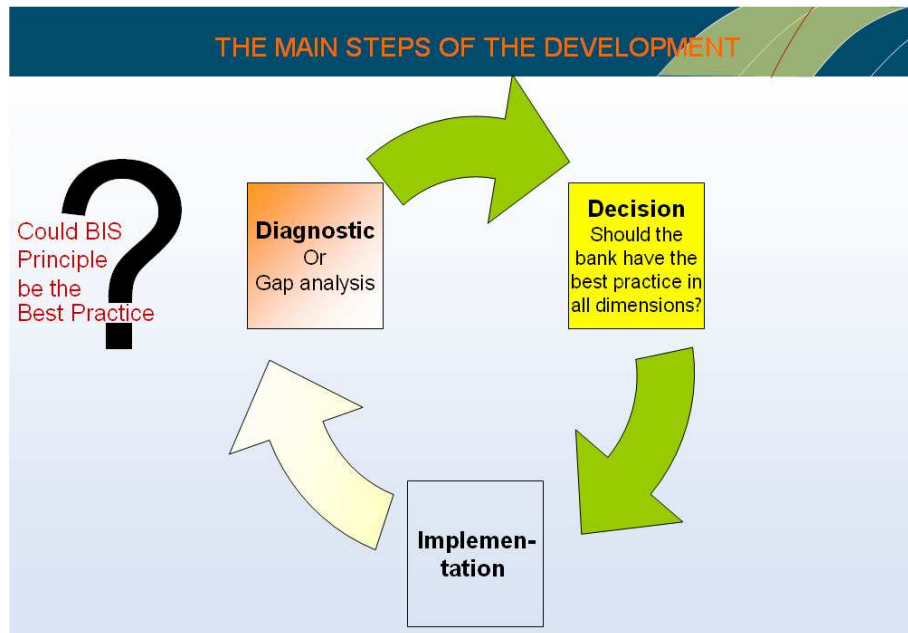
We do not recommend this book to those experts who want to get a very detailed theoretical picture about the different methods of measuring interest rate and liquidity risk exposure and techniques of hedging and managing exposure in the daily activity. This book does not contain the Value at Risk (VaR) methodology for measuring interest rate and liquidity risk exposure in the banking book, but aims to give practical advice to managers of small and medium-sized banks so that they can develop a sound A/L Risk management system. An appropriate VaR model for A/L Risk management should be supported with advanced IT and specialized, high qualified staff and it could be the next stage for the development of the A/L Risk management. Please note there are a lot of handbooks about advanced models for ALM².

² Frank J. Fabozzi and Atsuo Konishi: The Handbook of Asset/Liability Management, Irvin, McGraw-Hill, 1996 / Stavros A. Zenios, William Ziemba Handbook of Asset/ Liability Management, 2006 / Alexander Adam: Handbook of Asset/ liability management from models to Optimal return Strategies, John Wiley and Sons Ltd.

II. Overview of A/L Risk Management system development

The typical steps of the system development are the following:

- Diagnostic, that is used to analyze and describe the gap between current performances and desired future goals, or the best practice.
- Decision, first of all the Board of Directors or the senior management must answer the question “Should the bank have the best practice in all dimensions?” and then they can decide between the alternatives.
- Implementation, when the bank should implement the accepted version.



II.1. Diagnostic phase and the best practice

At the core of this phase there are two questions:

- 1) Where are we? 2) Where do we want to be?

The purpose of diagnostic is to compare the current actual performance of an activity to a target. The benefit is that it provides an objective basis for assessing the actual performance of an activity. The following gap analysis techniques are used to examine and describe the gap between current performances and desired future goals.

The gaps can include:

- the difference between the current operation of an activity and the activity vision, sometimes referred to as "C delta V" (current gap vision);
- the difference between actual and theoretical targets, sometimes referred to as "A delta T" (actual gap target); or
- the difference between actual performance measures and world class benchmarks.

In the case of the liquidity and the interest rate risk management system, we should compare the system used in the bank to the best practice. The tools used by a bank in the diagnostic phase are the following:

- appropriate questionnaire,
- personal interview inside the bank and outside with partner banks,
- research and collection of material about the methodology,
- studying on potential IT support that can help the work.

What is the best practice in the international market?

Parallel with the development of the financial market the best practice of the asset/liability risk management is changing. In the early 1970s³, it started out in the form of a simple gap model which analyzed risk in terms of cash inflows and outflows and the gaps or mismatches in these cash flows. Later on, the cash flow gap models gave way to duration gap models which look more at the attributes of cash flows rather than cash flow themselves. In the 1990s the application of ALM technology spread to the other types of risk with three main areas of development: currencies, equities and commodities. This was the market risk management period. At that time ALM meant market risk management, and everybody had to know the JP Morgan model. In the 2000s the advancement in the theory and the technology of risk analysis and IT databases created advanced risk management in the banking book, which in turn is advancing the state of the art in ALM field.

Related to development of financial market not only the risk management technique was developed in the banking industry, but legal entities also started to measure the risk and limit exposure. The first well-known international effort to deal with the growing exposure of financial institutions to risk and volatilities and especially to the risk of off-balance sheet claims such as derivative instruments happened in 1988. The Bank for International Settlements (BIS)⁴ set the capital adequacy requirements for banking worldwide to account for credit risk (The 1988 BIS Accord, the so-called Basel I). It was followed by the 1996 BIS Amendment to the capital accord to incorporate market risks in the trading book. BIS has published many documents in risk management since 1980. From ALM point of view the most important principles of the Basel Committee: Supervision of banks' foreign exchange positions in 1980, the Principles for the Management of Interest Rate Risk, in 1997 and 2004 and Sound Practices for Managing Liquidity in Banking Organizations or in Financial Groups in 2000, 2006 and 2008. Since BIS serves as a central bank its principles and Accords act as instructions to the Supervisors or to the institutions having legislative powers in the banking sector.

³ The Handbook of Asset /Liability Management (Frank J. Fabozzi and Atsuo Konishi (Irwin McGraw-Hill 1991, 1996)

⁴ The Bank for International Settlements (BIS) is an international organization which fosters international monetary and financial cooperation and serves as a bank for central banks

The Basel Committee⁵ on Banking Supervision principles could be used, as the Best practice (“Basel principle” in the further). The following are the most important principles related to A/L Risk management:

- Amendment to the Capital Accord to incorporate market risk (2005)
- Principles for the Management and Supervision of Interest Rate Risk (2004)
- Management of Liquidity Risk in Financial Groups (2006)
- Sound Practices for Managing Liquidity in Banking Organizations (2000)
- Liquidity Risk: Management and Supervisory Challenges (2008)
- BASEL II

II.2. Decision making phase

At decision making's core is the question:

Should the bank have the best practice in all dimensions in the near future?

Normally the decision maker attempts to come up with as many alternatives as possible. The alternatives are evaluated and the best one is selected. The process of evaluating the alternatives usually starts by narrowing the choices down to two or three and then choosing the best one. This step is usually the most difficult, because there are often many variables to consider. The decision maker must attempt to select the alternative that will be the most effective given the available amount of information, the legal obstacles, the public relations issues, the financial implications, and the time constraints on making the decision. Often the decision maker is faced with a problem for which there is no apparent good solution at the moment. When this happens, the decision maker must make the best choice available at the time but continue to look for a better option in the future.

In the A/L Risk management case there is set of the best practice based on the Basel principles and other methods. There are several books and consultant companies that give detailed description in the theory and the advanced methodology. The main question the decision maker has to answer: **Should the bank need the best practice in all dimensions in the near future?**

The following questions can help the decision maker choose between alternatives:

- From where does the bank collect the data to measure the exposure?
- How often does the bank monitor the limit utilization?

⁵ The Basel Committee on Banking Supervision provides a forum for regular cooperation on banking supervisory matters. Its objective is to enhance understanding of key supervisory issues and improve the quality of banking supervision worldwide. It seeks to do so by exchanging information on national supervisory issues, approaches and techniques, with a view to promoting common understanding. At times, the Committee uses this common understanding to develop guidelines and supervisory standards in areas where they are considered desirable. In this regard, the Committee is best known for its international standards on capital adequacy; the Core Principles for Effective Banking Supervision; and the Concordat on cross-border banking supervision.

- Does the bank need or want to develop the present system?
- How many human resources does the bank need for using this technique?
- How many technical resources does the bank need for using this technique?

When the decision maker(s) makes the best choice available at the time, they have to make a plan for the future on how the bank can employ the advanced methodology if they want to develop the activity in that direction when they need the advanced techniques.

The final product of the diagnostic phase should be the Proposal that contains the findings, namely what is the difference between the target and the current situation, how the bank can reach the best practice, what is the cost of implementing the best practice.

Who are the decision makers in the A/L Risk Management case? In the A/L Risk Management case the Board of Directors and the Asset/Liability Committee are the main decision making bodies. In Chapter III.1.1. you will be provided with more detailed information about the functions of these organizations.

II.3. Implementation phase

Once the decision has been made, it should be performed. Implementation requires some additional planning time as well as the understanding and cooperation of the people involved. The bank has to found a project for the implementation. This project should work according to a detailed working plan that is approved by the project sponsors. The project sponsor should be a member of the Board or the chairman of ALCO otherwise the project's credibility is not enough for a successful implementation. The project manager could be the managing director who is responsible for A/L Risk. The project has to operate according to the classic project management principles.

ALM information system implementation would be the installation of new hardware, software, new databases and application programs, and the adoption of new manual procedures. Implementing new systems, whether they are package software or bespoke developments, is a complex and risky attempt for financial institutions and there are many horror stories which indicate this. One of the key reasons for this is that the implementation process brings along with it radical changes and quite often will touch almost every business process within the bank. Change on such a scale can therefore be a threat to persons, who fear for their places within the organization, and who may have their own agendas regarding to the proposed changes. Communication is very important in the implementation step inside the bank, because most people are resistant to changes simply because they do not understand why it is necessary. In order to ensure smooth implementation of the decision, the decision maker should communicate the reasons behind the decision to the people involved and support them with trainings and workshops.



What is the result of the A/L Risk management implementation? The result should be a sound interest rate and liquidity risk management system, that contains the reasonable organization, and responsibility structure, sound risk management policy and internal regulation on measuring, monitoring and controlling process and appropriate tools, such as methodology for measuring risk exposure, limit system, report system and IT. In the following chapter we will introduce the system based on the dimension of risk management.

Does the bank need external consultant in developing A/L Risk management system? YES, because the external consultant could be useful in both the diagnostic and the implementation phase, they can approach the problem in a different way. They are not involved in the organization. Secondly, the consultants can give the bank know-how. Thirdly they should keep to the deadline according to the contract, and this could influence the behavior of the bank staff too.

After the decision has been implemented, the decision maker must follow-up on the decision to see if it is working successfully. If the decision that was implemented has corrected the difference between the actual and desired outcome, the decision is considered successful. However, if the implemented decision has not produced the desired result, once again a decision must be made. The decision maker can decide to give the decision more time to work, choose another of the generated alternatives, or start the whole process over from the beginning.

II.4. Case Study

Let me introduce Medium Bank, our fictitious bank.

Medium Bank was founded in Moscow, Russia in 1993. They were not very active until 1998 but now they are close to the 150th place in Russian banks ranking. In the past few years the macroeconomic environment has been favorable for the Russian banking system and banks have benefited from the strong economic growth, political stability and funds inflow into the country. The bank operates in 30 branches and outlets in St. Petersburg and Moscow and has plans to attract a foreign strategic investor to enter its capital to get positive effect on the Bank's international ratings, level of corporate governance and funding costs.

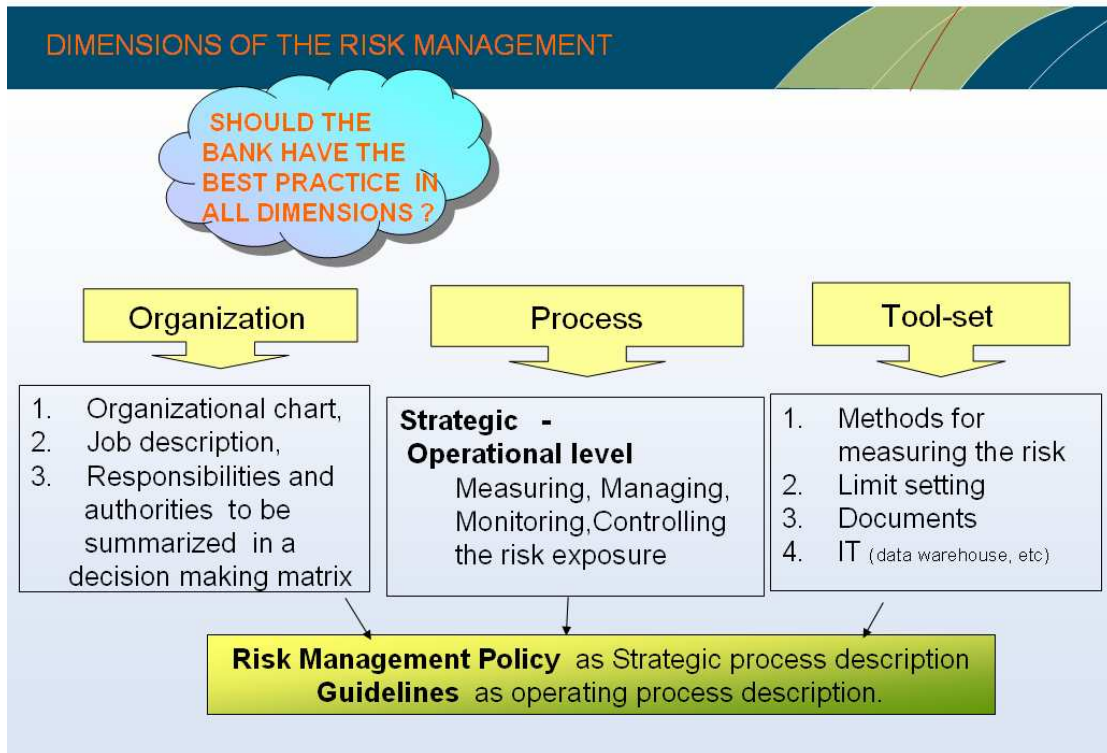
The bank is a dynamically developing medium-sized commercial bank with total assets of RUR 10 billion, shareholders equity of RUR 0.6 billion, loan portfolio of RUR 7 billion and total customer deposits of RUR 6,5 billion as of December 31, 2006 based on audited financial statements prepared in accordance with IFRS. The main products of the bank are mortgage and consumer loans.

Now the Bank's strategy is focused on the retail sector and lending to small and medium-sized enterprises. To better manage the balance-sheet the bank has decided to start developing a sound A/L Risk management system. They have a basic ALM system, but they only send report to the CBR about the maturity gap and liquidity ratios. They produce maturity and the repricing gap and calculate ratios according to the IFRS requirements.

The global liquidity conditions have adversely affected the bank ability to tap the markets. The bank is currently facing refinancing risk due to the bulky repayments. Overall, Russian banking sector liquidity is very vulnerable and the situation is aggravated by the nature of retail term deposits, substantial funding concentrations and generally low interbank and depositor confidence. Thus employing quantitative models for managing ALM risks are well-timed and appropriate to the bank needs.

III. Dimensions of A/L Risk Management

When a bank starts to develop a sound A/L Risk management system, it should analyse the present situation according to the dimensions of the risk management.



The first dimension is the organisation of the bank, namely how the bank structures its activity. The second dimension is the process of the A/L Risk management in two aspects. Strategic level encompasses risk management functions performed by senior management and BoD. The strategic level is described in the Risk Management Policy. The operational level includes risk management within a business area or across business lines. It partly involves measuring, managing, monitoring and controlling performed by middle management or units devoted to risk reviews. Also belonging here is ‘On-the-line’ risk management; this is where risks actually emerge. These risk management activities are performed by individuals who take risk on the organization’s behalf in their front office and loan origination functions. Risk management in those areas is confined to guidelines set by management. The third dimension is the tool-set, which more or less belongs to the operational level, because it is contained in the guidelines.

III.1 Organization and responsibilities

III.1.1 Organizational structure related to A/L Risk

Efficient asset/liability management cannot operate without appropriate organizational structure. In this chapter we focus on those decision making bodies, decision makers and organizational units that directly influence A/L Risk.

The Basel Principles⁶ emphasizes the role of the management: “The board of directors in a bank should approve strategies and policies with respect to risk management and ensure that senior management takes the steps necessary to monitor and control these risks consistent with the approved strategies and policies. The board of directors should be informed regularly of the interest rate risk exposure of the bank in order to assess the monitoring and controlling of such risk against the board’s guidance on the levels of risk that are acceptable to the bank. Major hedging or risk management initiatives should be approved in advance by the board or its appropriate delegated committee. Senior management must ensure that the structure of the bank’s business and the level of the risk it assumes are effectively managed, that appropriate policies and procedures are established to control and limit these risks, and that resources are available for evaluating and controlling interest risk”. The key elements of a medium- sized bank organizational structure related to asset/liability management activities are discussed in the following.



The Board of Directors (BoD)

The Board of Directors (BoD) is practically the main decision making body in a bank, they should be responsible for managing the affairs and direction of the bank as a whole. They set the strategic course and the objectives for the bank’s business while identifying the corporate risk tolerance culture and overseeing the integrity of the corporate policies and decision making. BoD has to approve the Risk management policy and they are to receive a report about the risk exposure of the bank at least once a year.

Risk Management Committee

It is generally a Board level subcommittee constituted to supervise the overall risk management functions of the bank. The composition of the committee may vary in banks depending upon the size and volume of the business. Generally it could include the head of Credit Committee, ALCO and Operational Risk Management Committee.

Chief Executive Officer (CEO)

⁶ Basel Committee on Banking Supervision: Principles for the Management and Supervision of Interest Rate Risk (Basel 2004)

The CEO is the main operative decision maker. Without his or her support the risk management system could not be efficient. The CEO's support should be a clear identification to all departments of the organization to cooperate with the A/L Risk Manager in establishing and maintaining the A/L Risk management process.

Asset/Liability Committee (ALCO)

Asset/Liability Committee (ALCO) is a senior level committee with the decision-making capacity and responsibility to review, discuss and direct the financial policy, position, risk exposures. Asset/Liability Committee as the group of the senior management is the most important decision making body from the asset and liability point of view.

ALCO is typically responsible for establishing, documenting and enforcing all policies that involve asset and liability management, such as liquidity, interest rate, foreign exchange, commodity and equity risk. ALCO is also responsible for delegation of market risk limits to the Chief Risk Officer (CRO) or Chief Financial Officer (CFO) of the bank. ALCO may delegate to CFO or CRO the authority to make day to day decisions on its behalf, including the authority to extend business unit mandates beyond their annual date, to approve excess of limits provided that these do not breach overall risk limits approved by the BoD.

Treasury and Trading Room

Treasury is responsible for the "front-office" functions of the Bank's treasury and funding activities, it contains the trading or dealing room. Treasury develops and implements effective funding/borrowing, investment and hedging strategies to support the Bank's activities and establishes rates for Special Clients in accordance with the policy approved by ALCO. Key responsibilities include:

- the management of the Bank's liquidity according to needs and requirements of prudence
- the management of interest rate, liquidity and market risks according to the risk management policies and guidelines approved by the BoD and ALCO
- management of the investment portfolios
- management of trading books and trading activities within the limits approved by ALCO
- immunization of risks and management of hedging instruments
- management of funding sources and liabilities
- proposing the borrowing and investment strategies to ALCO
- coordinating and negotiating master counterparty agreements and associated documentation for derivative and repurchase/reverse repurchase transactions

Strategy and Finance Division headed by CFO

The division is in charge of finances functions, developing valuation and finance policy, ensuring integrity of P&L, managing business planning process, and supporting business needs. Controlling uses transfer prices system.

Back and Middle Office

The office operates independently from the front-office and is responsible for settling, reconciling and bookkeeping transactions, monitoring front and back office positions, limits consumption and daily P&L. The office provides independent mark-to-market of the bank's position and supports business needs. There are some banks where the middle office is responsible for market risk management.

III.1.2. A/L Risk Unit

According to the Basel principles, "Banks should clearly define the individuals and/or committees responsible for managing risk and should ensure that there is adequate separation of duties in key elements of the risk management process to avoid potential conflicts of interest. Banks should have risk measurement, monitoring, and control functions with clearly defined duties that are sufficiently independent from position-taking functions of the bank and which report risk exposures directly to senior management and the board of directors. Larger or more complex banks should have a designated independent unit responsible for the design and administration of the bank's measurement, monitoring, and control functions."

A/L Risk unit should be responsible for the following:

- developing and implementing appropriate risk management systems (incl. IT)
- revising the part of the risk management policy related to the risk management and guidelines yearly and submitting to the ALCO and BoD
- preparing scenario analysis and stress test
- identifying, measuring and monitoring on Bank's financial positions, risk exposures and performance for the funding, investment and hedging activities carried out by Treasury
- preparing reports on risk exposure to the ALCO and BoD
- deriving and recommending limits for interest rate, liquidity and market risks exposure
- performing the secretariat of the ALCO

There is no consensus in the financial industry where A/L Risk unit should be inside the bank: in Finance, in Risk Group or in Treasury. Namely CFO, CRO or the Treasurer should be responsible for the A/L Risk. Generally choosing between them depends more on the capacity and capability of the person managing either department than on functional reasons. Delegating A/L Risk management to Finance department will be the most appropriate but may stimulate focusing on the earnings. Otherwise if Treasury is responsible for managing interest rate and liquidity management, it is necessary to segregate control functions from risk taking. A/L Risk inside of Risk Group is not prevalent. Unfortunately, in Russia in the medium-sized bank most of the ALM team is based in Treasury (62%)⁷.

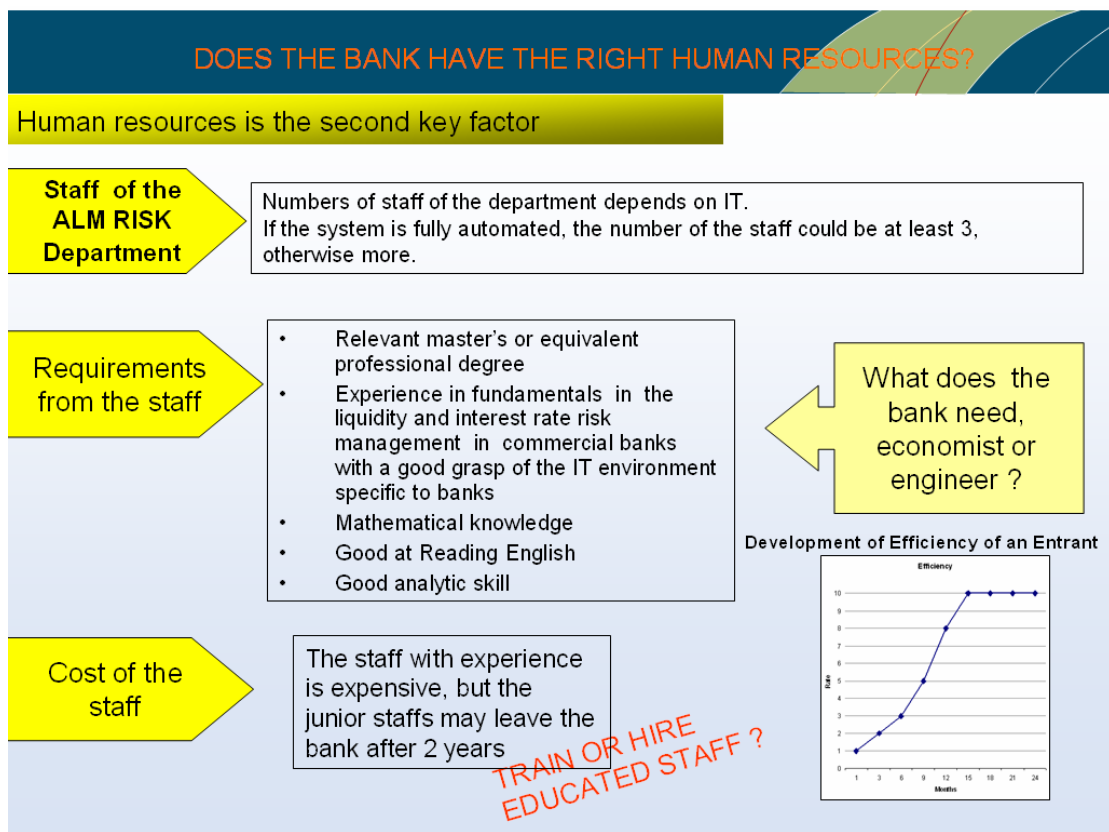
⁷ The results are based on IFC sampling observation.

The members of the A/L Risk Unit

Human resources are really a key factor in the success of A/L Risk. The following table summarizes the main requirements. The bank cannot get a real picture about the interest rate and liquidity risk exposure without qualified staff and appropriate IT. Number of staff depends on the size of the bank and the level of IT system. A/L Risk unit staff should number at least 3 persons, but in a small bank the market risk unit, the middle office and the A/L Risk unit can be combined in one department. The staff being responsible for the operational risk can also be part of this unit. The department could be A/L Risk, Market and Operational Risk Management Department with 4-6 persons.

When the bank has undersized resources for this purpose, human resource management is very difficult, especially in terms of fluctuation of the staff. For the efficient work, the Department needs qualified junior and experienced staff. Experienced staff is expensive and for new experienced staff it takes 2 or 3 months to adapt their skills to local circumstances.

An entrant needs about 1 year to be able to work in an efficient way. However, after 1 or 2 years at least 50 percent of the junior staff leaves the bank, because they are not satisfied with the salary and their position – they are not entrant any more. Consequently, for using mainly junior staff the bank needs more employees, which may result in increased expenses. It is worth for the bank to retain and support the staff if the bank is satisfied with their work.



III.1.3. Decision Making Matrix

The Decision making matrix is a key part of the responsibilities. It contains a detailed description of who has the right to make decisions or approve the issue. The more detailed, the more efficient the matrix is. Everybody has to know who is responsible for

what in the organization; otherwise the bank is unable to operate right, sound way. By reducing uncertainty they promote actions.

The decision making matrix is used to describe Multi Criteria Decision Making. The rows contain the subject of the decision; authorities and the columns contain organizational units or the manager of the organizational units.

DECISION MAKING MATRIX (sample)

	Board of Directors	ALCO	CFO	CRO	Head of ALM Risk	Head of Treasury	Dealer
Risk Management Policy	x						
Guideline for liquidity risk		x					
Guideline for interest rate risk		x					
Excess limits			x	x	x		
Strategic liquidity management, over 1 year fund							
operational liquidity management in 1 year fund or placement						Inside the limits	Inside the limits
Strategic interest rate risk management limits		x					
Operational interest rate risk management						Inside the limits	Inside the limits
Pricing methodology (deposit and loan)		x					
Hedging		x				Inside the limits	Inside the limits

III.1.4. Case Study

Rules of procedure of Assets and Liabilities Committee (ALCO) at Medium Bank

I. Legal status and basic functions of ALCO

ALCO is a permanent committee created by the BoD of Medium Bank, and the main level managing body of asset/liability management. It has decision rights concerning those issues which are delegated.

II.1. Members of ALCO:

The Chairman of ALCO is the CEO; Vice chairman is Chief Financial Officer (CFO). Members are the CEO, CFO, Chief Risk Officer (CRO), Treasurer, ALM manager, who is also responsible for the market and operational risk management, head of the business lines, head of the marketing and sale and the head of the IT could be invited⁸. The key tasks of secretariat are performed by ALM Department

II.2. Competences and obligations of the members of ALCO

The chairman of the ALCO has the right to call or postpone the meetings of ALCO, and to set the items on the agenda of the meetings. He chairs the meetings of the committee and approves the minutes of the meetings. The deputy chairman takes up the ALCO chairman's duties in case of his absence. Members of the committee have voting power; carrying out the tasks adjunct to the ALCO membership is an obligation resulting from their sphere of activity. Attending ALCO meetings is obligatory for ALCO members or their designated deputies for some occasion. The secretariat of ALCO has to be informed on the absence of the ALCO member, on the previous working day the latest. The secretariat is responsible for preparing ALCO meetings, setting up the agenda, and for controlling the proposals' formal requirements. Besides he/she is responsible for sending the invitation and proposals to the

⁸ According to the SunGard Bancware: Global ALM Practices Surveys 2005 Alexander Wolf, ALCO members are CFO (97%), Treasurer (77%), ALM Manager (70%), CEO (66%), Business line managers (61%), Controller (37%), CRO (6%).

participants, for making and having approved by the chairman minutes and résumés of the meeting, for posting the decisions to the authorized persons, and for the retention of ALCO documents. The documents (yearly work-plans, proposals, and minutes) should be retained for a certain period (3 years). Invited persons could be recommended by the proponents for discussing each item on the agenda. Invited persons do not have a voting power.

III. Competence of ALCO

ALCO makes decisions on individually unregulated issues related to the assets and liabilities management of the bank. ALCO is supposed to control continuously tendencies on the money- and capital markets, and relevant changes in the asset/liability structure of the bank. If needed, necessary measures are to be taken. ALCO approves the liquidity plan, liquidity risk-, interest rate risk-, market risk management methods of the bank, the value of maximum risk exposure and the strategy of Treasury on the investment- and trading portfolio. The ALCO specifies the recent list of conditions, the value of interest rate margin, the possibilities, principals and measure of deviation from the margin, the method of setting internal settlement interest rate (FTP) and the stock limits for the banking clients' securities and derivative deals. ALCO reviews and articulates the funding policy.

IV. Operation of ALCO

According to the yearly working plan the ALCO has its meeting on every month, on Monday and at 10.00 am. Calling extraordinary meetings, written voting, and postponing meetings is approved by the chairman (vice-chairman) of ALCO. The responsible body of Medium Bank for arranging ALCO meetings is ALM Department. The secretariat informs the chairman on the planned agenda of the following meeting, and on the list of persons that should be invited in connection with the items on the agenda. After the approval by the chairman the secretariat prepares the invitation cards, and by the preceding 2 days earlier posts the invitations and the documents related to the items on the agenda to the members of the ALCO. The invitation card contains information on the scene, date, approved agenda and proposing bodies. The invitation card for invited persons should contain the scene and date of the meeting, and the short description of the item on the agenda for which the invited person was invited. Secretariat collects and posts the proposals and controls the compliance with the requirements of the proposals. A proposal can appear on the agenda only in case it's posted to Secretariat 2 days before the meeting. Before appearing on the agenda the proposal has to comply with the requirements on the content and form, and without considerable completion has to be suitable for making decisions, and after the control of the Secretariat, in case of written voting the proposal has to be posted to the ALCO secretariat by 12 o'clock on the day before the deadline of the decision making.

Responsible person for the authenticity, professional quality, for complying with the formal restrictions and for completing the specified reconciling and coordinative tasks is the proposing body. The purpose of proposals is to prepare draft resolutions on measures based on conclusions drawn from description and analysis of facts, data and experiences. Requirement on draft resolutions is proper description, going into details, and pointing out responsibilities. The possible surplus resources of each measure have to be pointed out in the draft resolutions. The purpose of written reports is to present information on and overview periodically or occasionally the processes of each subject. Suggestion for decision has to be prepared only in justified cases.

The course of ALCO meetings

In case of absence of the ALCO chairman, the meeting is chaired by the deputy chairman of ALCO. The meeting is started by setting quorum. If the majority of those persons who have a voting right are present, the chairman declares the quorum. During the meeting the chairman introduces each item on the agenda and asks the competent member or invitee to present or eventually verbally complete the item on the agenda. The member or invitee can grant his/her right to present to another member or invitee. The chairman chairs the dispute over the proposals, brings the proposal to a vote, and finally makes the decision. Majority principle is applied to the decision-making process, using open-vote method. After closing the dispute over a principal, the chairman puts the formulated draft resolution to a vote. The resolution is valid if it's supported by the majority of present persons having a voting right. In case of equality of votes the vote of the chairman is decisive. The members of the committee do not have a voting power in such cases, where he/she, his/her close relative or his/her company is interested. In extraordinary cases – which need a quick decision – the chairman can order a voting process without calling a meeting in order to decide in a certain question.

Minutes of the ALCO meetings have to be prepared on each ALCO meeting. The minutes are prepared by secretariat. Minutes need to contain: persons present on the meeting (persons having right to vote and invited persons), the approved agenda, and the exact text of approved proposals. In justified cases the chairman can order to put down the substantial elements of the debate over an item on the agenda

into the minutes.

The secretariat of ALCO has to prepare and have the minutes signed by the chairman in 5 days, in urgent cases in 1 day following the meeting. The secretariat has to post the approved minutes immediately to the members of ALCO. The secretariat of ALCO keeps a record of the execution of approved proposals, and follows the execution with attention.

Head of the organisational unit is responsible for executing decisions and proposals are obliged to record the fact of execution and inform the record keeping body on it. The way of transferring information is filling out with a short report in 5 working days after handing over the questionnaire sent by the secretariat of ALCO. The Secretariat prepares a quarterly summary of the execution of proposals for the chairman of ALCO.

Requirements on the content of proposals discussed by ALCO

Cover sheet of the proposal (complying with the formal requirement) has to contain who disagrees partly or fundamentally. The substance of the differences in opinions has to be marked in the management summary, and if necessary an alternative decision has to be outlined in the draft proposal.

- Reconciling sheet, the departments and the result of reconciliation has to be marked
- Management summary (if the length of the proposal makes it necessary)
- Detailed description: It's a concise summary, which contains the substance of the issue and the proposal: (recommended points of view is Precedents, background, Overview of the tasks, main statements, the decision, etc., the changes and the effect on the yearly plan of the bank due to the decision have to be pointed out. And Detailed explanation (according to the points of view contained in the management summary) and Differences in opinions
- Detailed decision proposals (the responsible person for and the deadline of the realization), in case of differences in opinions alternative proposals on decision
- List of enclosures
- Enclosures

Medium Bank is planning to change the organizational chart related to the ALM risk that we described above. The CFO will be responsible for the ALM. The name of the organization unit will be A/L, Market and Operational Risk Management Department. The jobs and responsibilities of the organizational unit will be the same as we described above. The headcount in the unit is 6. The unit consists of 4 experienced and 2 junior staff.

There are 3 persons responsible for market and operational risk, 2 persons are in charge of liquidity and interest rate risk management and 1 person is the head of the unit. The bank will organize a workshop for the department or send them to a training course.

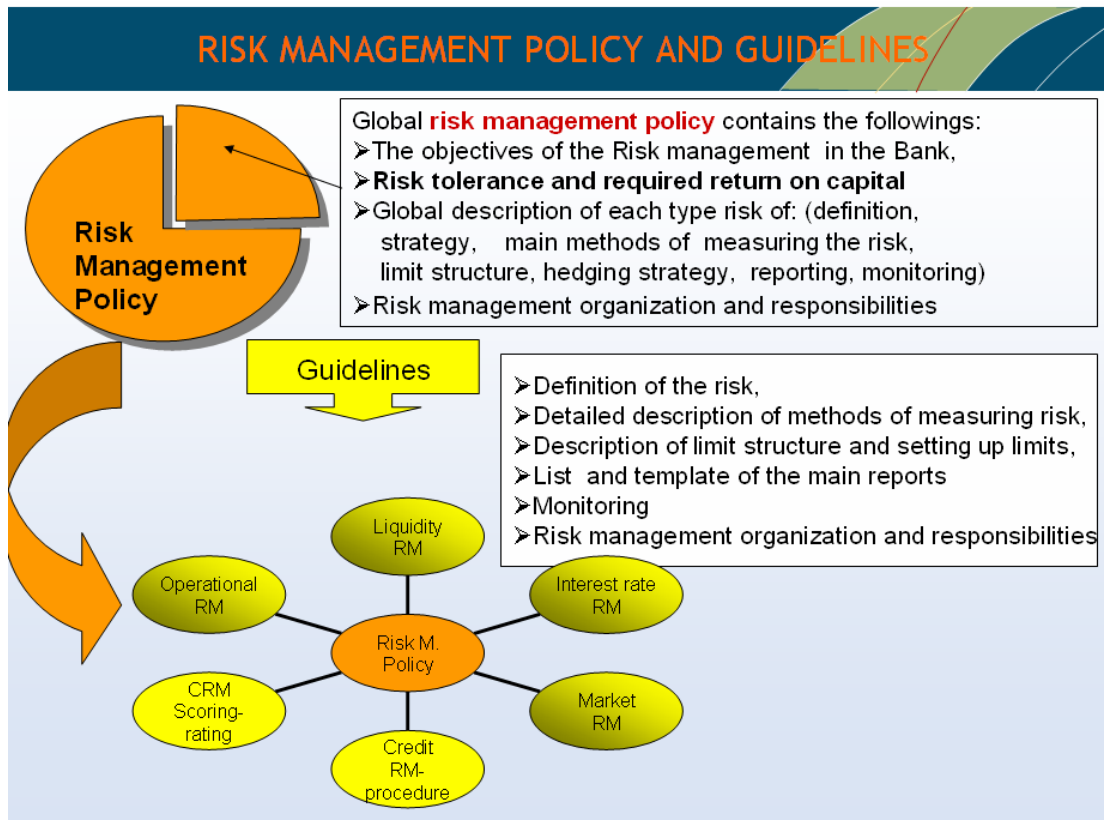
III.2. Levels of A/L Risk Management Process

III.2.1 Risk Management Policy – strategic level

Strategic level encompasses risk management functions performed by senior management and the BoD. The strategic level is described in the Risk Management Policy that contains risk definitions, ascertaining institutions risk appetite, formulating strategy and policies for managing risks, establishing adequate systems and controls in order to ensure that overall risk remains within acceptable level and return compensates for risk taken. The success of policies and procedures depends upon the management. Hundreds of pages of advanced procedures sitting on a shelf are useless if no one employs them. However, even a simple set of procedures is more efficient if people believe in them and take personal responsibility for upholding them.

The risk management policy should be based on the Basel Committee Principles and clearly defined and consistent with the nature and complexity of their activities. It is the

basic document that must be approved by the Board of Directors. Interest rate and liquidity risk management policy should be a part of the risk management policy.



The risk management policy should contain the following:

1. Objectives of risk management
2. Risk tolerance and required return on capital

Banks should make a distinction between expected and unexpected losses. Expected losses are those that the bank knows with reasonable certainty will occur (e.g., the expected interest rate movement) and are typically reserved for in some manner. Unexpected losses are those associated with unforeseen events (e.g. losses due to a sudden downturn in economy or crisis that influences the interest rate movement). Banks rely on their capital as a buffer to absorb such losses.
3. A policy statement identifying the types of instruments and activities that the bank may employ or conduct is one mean. It should clearly identify permissible instruments, either specifically or by their characteristics, and should also describe the purposes or objectives for which they may be used. The statement should also define a clear set of institutional procedures for acquiring specific instruments, managing portfolios, and controlling the bank's aggregate risk exposure. The banks should identify the risks inherent in new products and activities and ensure these are subject to adequate procedures and controls before being introduced or undertaken.
4. Global description of each type of risk: definition, strategy, main methods of measuring the risk, limit structure, hedging strategy, reporting, monitoring
5. Risk management organization and responsibilities

III.2.2 Guidelines – operational level

The operational level of the risk management is described in the guidelines. Effective procedure and guidelines lay out specifically what people should do --what they should not do-- in a given situation. It has to contain the definition of the risk, detailed description of methods for measuring risk, description of limit structure and setting up limits, list and template of the main reports, monitoring and the risk management organization and responsibilities. The detailed description of the methods, limits and reports can be found in the tools of the A/L Risk Management chapter.

III.2.3 Case Study

Medium Bank set out the Risk Management Policy of the Bank. The Liquidity and Interest rate Risk Management Chapter of the Policy is the following:

1. Asset/Liability Management risk (ALM risk) is the risk for unexpected economic outcomes resulting from market movements affecting the balance sheet structure in the banking book.

The objectives of the ALM policy: undertaking an interest rate, liquidity, market risk exposure, in compliance of all legal provisions, by which the Bank does not incur a loss that would jeopardize its profitability, equity or its safe functioning, or one that provides an opportunity of realizing profit by exploiting the change of market condition. ALM Risk management of Medium Bank involves the application of four basic elements in the management of assets, liabilities, and Off Balance sheets (OBS) instruments:

- Appropriate board and senior management oversight
- Adequate risk management policies and procedures
- Appropriate risk measurement, monitoring, and control functions
- Comprehensive internal controls and independent audits.

The bank manages risk that originates from the asset/liability structure of the banking book together with the trading position in condition that they manage trading book separately, but the bank has no trading book activity now. The bank gives the list of products that influence the ALM position in the Appendix of its Policy.

2. The interest rate risk is the exposure of a bank's financial condition to adverse movements in interest rates. Accepting this risk is a normal part of banking and can be an important source of profitability and shareholder value. However, excessive interest rate risk can pose a significant threat to a bank's earning and capital base.

Interest rate risk management policy: undertaking a risk exposure, by which the Bank does not incur a loss that would put at risk its profitability, equity or its safe functioning, or gives an opportunity of realizing profit by taking advantage of the movements of interest rates.

The bank measures separately the exposure that comes from different sources of interest rate risk.

The bank manages the risk by setting up limits based on the maximal acceptable loss, with stress testing, scenario analysis.

The bank overall limit for the interest rate risk exposure is based on capital requirement measured by repricing gap with BIS weight. Limit is 25% of the core capital.

3. Liquidity risk is the risk for the bank being unable to meet its obligations as they come due because of insufficient liquid assets, an inability to liquidate assets or to obtain adequate funding.

Liquidity risk managing policy: the Bank should be able to fulfil its payments when due and able to carry out the necessary transactions, while maintaining the profitability of its operations.

The Bank distinguishes between market liquidity risk and funding liquidity risk. Within funding liquidity risk, banks address their practices related to management of the following:

- Structural (over one year- long term, or strategic-gap, ratios and funding mix, cash capital, survival horizon)

- Tactical (similar concept as long term but for shorter term, operational, cash-flow), intraday (cash and collateral management)
- Contingency (Stress testing, sensitivity analysis and scenario testing, special liquidity asset pool, contingency plans, ratios and earmarked liquidity asset pool)

The Bank measures its liquidity position in the major currencies (RUB, USD, EUR) in which it is active. In addition to assessing its aggregate foreign currency liquidity needs and the acceptable mismatch in combination with its domestic currency commitments, the bank also undertakes separate analysis of its strategy for each currency.

The bank manages the risk by setting up limits based on partly the maximal acceptable loss and the capital requirement, by analysing stress testing, scenario analysis and prepare a contingency plan in place that addresses the strategy for handling liquidity crises and include procedures for making up cash flow shortfalls in emergency situation. The bank overall limit for the liquidity risk exposure is based on analysing the capacity of external funding, because it is more realistic than the capital requirement. The maximum limit of 0 for the 30 days, and RUB -500 for 31-90 days, RUB-1500 for the other categories.

Regulatory and economic capital should not directly be tied to funding liquidity risk.

The main decision making body of the Bank is the BoD in strategic questions, and the ALCO at operational level.

The CFO is responsible for the daily activity.

III.3.Tools of liquidity risk management⁹

III.3.1. Definition of liquidity risk

Liquidity risk is the risk for a bank being unable to meet its obligations as they come due because of insufficient liquid asset, an inability to liquidate assets or to obtain adequate funding. Liquidity risk comprises both funding liquidity risk and market liquidity risk though these two dimensions of liquidity are closely related.

Funding liquidity risk is the risk that the bank will not be able to meet efficiently both expected and unexpected current and future cash flow.

Market liquidity risk is the risk that a firm cannot easily offset or eliminate a position without significantly affecting the market price because of inadequate market depth or market disruption. Within the market liquidity risk the bank should periodically review its efforts to establish and maintain relationships with liability holders, to maintain the diversification of liabilities, and aim to ensure the capacity to sell assets.

The concept of liquidity is complex and any suggestion that a single metric will adequately reflect the true liquidity risk of a bank is misguided in order to the bank uses a range of metrics being customized to meet the bank needs. The bank should manage different strategies, including diversification of liabilities by types of depositors, investors, products, marketplaces, currencies, relationships with investors, financing and selling assets. The bank regularly assesses its secured and unsecured funding capacity to better understand their current and prospective funding liquidity risk in varying conditions. Liquidity risk arises from many sources, including a financial firm's business decision to provide liquidity to the markets, potential damage to a firm's reputation (even-driven sources), specific products and activities (transaction- and product-driven sources), and potential changes in the macroeconomic environment

⁹ This chapter mostly based on the Principles of Liquidity Risk Management (institute of International Finance, March 2007)

(market trend). The following list contains the sources of liquidity risk according to its relatedness to the asset or liability side of the bank.

Asset-related	Liability-related
<ol style="list-style-type: none"> 1. Insufficient availability of collateral 2. Disruption in payment/settlement system 3. Increased collateral requirements due to market risk losses, ratings triggers or asymmetric documentation 4. Inadequacy of a firm's infrastructure to conduct securitization transaction 5. Reduced liquidity of outright market for securities 6. Too large a trading position relative to market volume, open interest, and number of market makers 7. Failure of specialist liquidity providers in niche security markets 8. Unwillingness of counterparties to take settlement risk on collateral transfer across time zones 9. Spurious diversification, while portfolios might be diversified strategies may be correlated across counterparties 10. Lack of demonstrable liquidity due to bespoke nature of transaction 	<ol style="list-style-type: none"> 1. Accelerated withdrawal of relationship-based and transactional deposits from bank and dealers 2. Lack of competitive deposit strategy and products 3. More rapid loan than deposit 4. Loss of access to unsecured wholesale funding or extreme increase in cost 5. Material dependence on wholesale short- and long-term unsecured funding, including from higher-rated counterparties 6. Failure of major provider of unsecured funds 7. Concentration of wholesale funding sources 8. Reduction in the availability of money market lines available to the bank 9. Reduction in ability to raise term money 10. Reliance on credit dependent sources of secured funding, correspondingly, availability of committed irrevocable secured funding lines 11. Restricted access to secured funding markets 12. Reliance on synthetic funding from better-rated counterparties 13. Technology risk related to funding 14. Rating downgrade
<p><u>Generic On or Off Balance Sheet</u></p> <p>Currency mismatch between assets and liabilities, Change in regulatory or tax rules, Reduced internal capital generation, OTC transaction (stock borrowing transaction)</p>	

III.3.2. Methods for Measuring Liquidity risk

III.3.2.1. Measuring funding requirements

Within funding liquidity risk, banks address their practices, using metrics related to management of the following:

- A. Tools for tactical -namely intraday and short term- liquidity management include the cash-flow, cash and collateral management.
- B. Tools for structural -medium and long term- liquidity management are the following:
 - Funding matrix based on contractual and expected cash-flow in total and in each currency,

- Funding matrix based on planned transactions in total and in each currency. The bank should forecast future cash flow of assets, liabilities and off-balance sheet.
 - Liquidity indicators including measuring liquidity dependence on depositors, financial institutions, hedging of investments by equity, hedging credits by deposits, liquidity vulnerability and so on.
 - Liquidity costs
- C. Tools for Contingency management include stress testing, sensitivity analysis, special liquidity asset pool, ratios and earmarked liquidity asset pool

A) Metrics for short term liquidity risk exposure

The purpose of measuring daily liquidity level is to maintain the solvency of the bank on a daily basis. For this purpose, the bank has to prepare a short term cash-flow report for at least 8 days and calculate the following positions on daily basis:

1. Positions of foreign exchange nostro accounts
2. Position of the local currency nostro accounts (e.g.: the central bank account and the management of the compulsory reserve deposit)
3. Position of the collateral (repo and etc.) by Treasury department
4. Highly liquid securities

For the sound liquidity and cash management the bank should set out separate and detailed policy guidelines for cash management, and develop a model for optimizing the cash utilisation.

B) Metrics for medium and long term liquidity risk exposure

B. 1.) The bank measures liquidity risk exposure using the following funding matrixes based on the cash-flow mismatch (liquidity) gap. Maturity ladder or Funding matrix based on the contractual and expected cash-flow. The Bank should prepare monthly the funding matrix in each currency (local currency, EUR, USD, CHF, other currencies) in a way that assets placed at and liabilities withdrawn from Bank for the actual position of the on- and off-balance sheet items. Receivables and payables with maturity must be sorted into categories of overdue, 0-30 days (0-7 days, 8-14 days, 15-30 days), 31-90 days, 91-365 days, 1-2 years, 2-5 years, and over 5 years as set out in the completion guide.

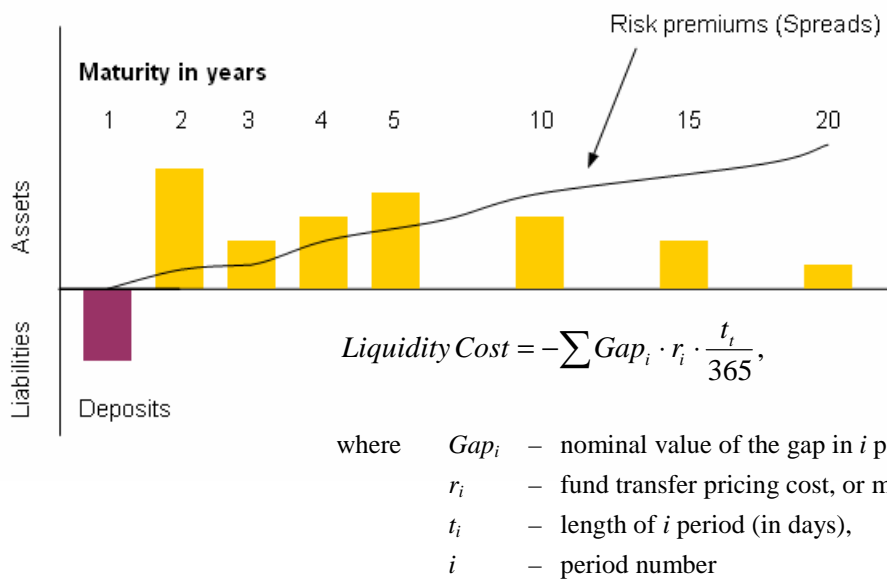
Even though demand depositors can withdraw their funds immediately, in normal circumstances they do not. On average demand deposits stay at banks for quite long periods - often two years or more. Banks can use part of the retail deposits as a core source of funds that, over time, can fund loans. The second step should be restructuring, based on past observation. The item restructured could be the retail and other client deposits in accordance with their expected maturity. Also the bank has to categorize the utilization of credit lines assuming normal business activity. Eventually restructured maturity ladder results in realistic maturity gap. The bank can analyze it, or calculate the cumulative gap that is the gap of the previous period + actual gap.

Liquidity planning is a key component of forecasting liquidity problems. It allows managers to make important borrowing decisions before relatively predictable events occur. Such forward planning can lower the cost of funds by determining an optimal funding mix and minimize the amount of excess reserves that the bank needs to hold. Effect of planned transactions on mid-term liquidity in total and in each currency

(domestic currency, EUR, other currencies) could be measured by the funding matrix completed according to forecasts.

The cost of liquidity could be measured on at least six-monthly basis calculated with a risk bonus curve. The cost of liquidity is the additional charge of the recent loan (risk bonus) assuming a complete, maturity-matched refinancing (i.e. the cost of liquidity depends on the bank's specific and financial market assessment). The risk bonus curve could be the difference between the yield curve of real financing possibilities and the most liquid swap yield curve.

Liquidity costs are premiums the bank has to pay depending on its credit ratings. These are costs that have to be charged to customers in the financing¹⁰.



The gaps established while analyzing the maturity structure of the expected funding matrix are linked to the adequate points of the risk bonus curve according to stress tests, so that the value of risk due to an open liquidity risk position can be set. The results show the changes in liquidity risk due to the new financing structure arising because of the alteration of the market position of the bank, and the cost of shaping a closed liquidity structure. **Liquidity risk** is the risk of a future increase in liquidity costs of the open funding position of the bank.

B. 2) Liquidity ratios

The bank should commensurate asset/funding diversifying strategies with the nature of their business, the environment in which they operate, and the types of products and markets in which they are active. There are several ratios that are useful for assessing the liquidity of the bank. The following table shows some of the most common:

¹⁰ Based on Reuters Presentation in Seminar on Liquidity and interest rate risk in the international Practice Moscow 2008

Ratio name	Calculation of the ratio
Dependency ratio on significant deposits	<p><u>Cash + Tradable securities + Short term banking exposures</u> Sum of significant deposits</p> <ol style="list-style-type: none"> 1. Cash: Stock in cash-desks (local and foreign currency). 2. Tradable securities 3. Short term banking exposures: central bank and banking deposits maturing in 0-14 days 4. Significant deposit could be deposit over the percentage of the regulatory capital.
Dependency on financial institutions	<p><u>Cash + Tradable securities+ Short term banking exposures</u> Resources from financial institutions</p> <ol style="list-style-type: none"> 1. Resources from financial institutions: resources from financial institutions
<p>Liquidity Vulnerability</p> <p>Easily withdrawal liabilities covered by mobile assets</p>	<p>To this effect, liabilities are sorted by the extent they are withdrawal and assets are sorted by how easily they can be mobilised.</p> $\text{Liquidity vulnerability} = \frac{\text{Easily disposable assets}}{\text{Easily withdrawal funds}}$ <p>Easily modifiable assets:</p> <ol style="list-style-type: none"> 1. Cash in hand and settlement accounts 2. Placements on the interbank market with short maturity (within 14 days) 3. Treasury bonds and government bonds (except for treasury and consolidated government bonds) <p>Easily withdrawal funds:</p> <ol style="list-style-type: none"> 1. Sight deposits and current account deposits, 2. Time deposits 3. Liabilities from repurchase agreements <p>Short term (maturing within 14 days) deposits from the interbank market.</p>
Coverage ratios of bank investments	<p><u>Shareholders' Equity</u> Tangible assets + Intangible assets + Business shares</p>
Coverage of loans by deposits	<p><u>Deposits</u> Loans</p>
Coverage short term liabilities by liquid assets	<p><u>Liquid assets</u> Short term liabilities</p> <p>The assets included should only be those which are highly liquid.</p>

III.3.2.2. Measuring Asset Liquidity Exposure

According to the IIF firms having significant reliance on asset liquidity should evaluate haircuts and the timing of cash flows from the sources. In determining the amount of availability liquidity and the liquidation horizon, the evaluation should include a determination of whether the asset is encumbered as well as an assessment of market haircuts, market capacity constraint, access to central bank facilities, concentrations in

collateral, potential name – specific concern, and the operational ability to complete the transaction. In particular:

- Encumbered assets should be excluded from incremental liquidity value
- Haircuts should be evaluated in business as usual as well as in stressed conditions
- Capacity of the markets for a particular asset class should be evaluated and
- Operational capability to facilitate the transaction should be in place and tested

The firm that relies on secured funding sources to a significant extent should have robust processes in place to evaluate asset liquidity under a variety of business as usual and stressed conditions. It should be recognised that liquidity values of similar assets may vary across firms depending on the nature of their business and their respective market capabilities.

The bank could assess the ability to convert its unsecured funding to secured basis. The loan (“collateral”) value of its unencumbered portfolios is reviewed daily. The treatment should differentiate between the use of assets as collateral for borrowing and for generation of cash by sales of such assets and also take into consideration the business strategy for the assets in question, the potential P&L impact of the any disposition, and whether management would be willing to absorb potential losses, taking into account tax effect.

The bank should practically categorize the assets based on their liquidity. Liquidity categories can be high, medium and low or set up by the likelihood of the action to be taken. Most firms use haircuts or volatility analyses to determine the liquidity value of assets.

Liquid assets could be diversified by using the following attributes: Pledgeable assets (depending on central banks and industry criteria), repoable assets, securitizable assets (retail consumer loans) with cash structures or with synthetic structures (credit default swap). Securities need to be grouped by their liquidity value. High values, would apply to eligible central bank holdings. Other criteria to be included in considering liquidity values and categorization are rating and credit quality, market price availability, maturity, type of security, reason for holding (trading, investment, and hedge), access to secured funding for security, issuer type/country, currency, size of position and time to settlement.

Firms could base haircuts on prior experience, best practice assumption, liquidation scenarios, and regulatory requirements, practices adopted in market or credit risk or market liquidity models (VAR type statistical techniques are often applicable in analyses ancillary to liquidity risk analysis, such as estimating the mark-to-market value of marketable assets, including the likely volatility of market values within relevant time frames (e.g., one day, one week or one month).

III.3.3. Scenario analysis, stress test and limit setting

Most financial firms use a variety of metrics to monitor the level of liquidity risk to which they are exposed. The basic approaches may be categorized into three types: the liquid assets approach, the cash flow approach, and a mixture of the two.

- Under the liquid assets approach, the firm maintains liquid instruments on its balance sheet that can be drawn upon when needed. As a variation on this approach,

the firm may maintain a pool of unencumbered assets (usually government securities) that can be used to obtain secured funding through repurchase agreements and other secured facilities (the relevant metrics in this approach are ratios.)

- Under the cash flow matching approach, the firm attempts to match cash outflows against contractual cash inflows across a variety of near-term maturity buckets.
- The mixed approach combines elements of the cash flow matching approach and the liquid assets approach. The firm attempts to match cash outflows in each time bucket against a combination of contractual cash inflows plus inflows that can be generated through the sale of assets, repurchase agreement or other secured borrowing. Assets that are most liquid are typically counted in the earliest time buckets, while less liquid assets are counted in later time buckets.

When the bank starts to prepare scenario analysis, the expected funding matrix has to be supplemented with several assumptions and then the gaps should be determined. The bank should ensure that stress tests are used to measure the behaviour of all sources of cash inflow and outflows that could potentially be material to the firm under various sets of assumptions. For example, Scenario on the narrowing of the liquidity could be that financing ability decreases due to (1) worsening of scoring, and (2) deposit withdrawal, or there's a rising need for liquidity due to utilization of credit lines.

For each scenario it could be valid that the matured loans have to be renewed. This needs financial sources and the liquidity crisis period is 90 days long.

The liquidity risk limits should set boundaries for the level of liquidity risk exposure for the bank and where appropriate, should also provide the capability to allocate limits to individual portfolios, activities, or business units. Limit systems should also ensure that positions that exceed certain predetermined levels receive prompt management attention. Setting up limits should be based on the estimated funding capacity of the bank (central bank and credit facility, facility of secured repo).

The IIF Committee believes in “the industry’s resources would be better spent improving capital measures related to other, more material risks and on strengthening liquidity risk management. Pursuing a costly solution to an immaterial problem is inconsistent with risk based regulation.” According to the Committee, when setting up the limits a bank should take into account the following:

- The diversification of funding sources is usually accomplished by having the others: different types of wholesale investors (e.g. central banks, pension funds, money market funds and money managers).
- The bank could have notional limits by type of liquid asset, issuer, and issuer name credit rating, other meaningful criteria, and/or longer liquidation time frames/larger haircuts as inventory in specific products grows.
- Firms should ensure that regarding potential funding from central banks are evaluated taking into account the level of severity and type of crisis. Firms should differentiate between different types of central bank facilities (e.g. standing and emergency).

III.3.4. Contingency Plan¹¹

Policy:

The Contingency plan addresses potential, early warning signals of risk. Contingency planning should include establishing policies and procedure and clear divisions of roles and responsibilities for liquidity events so as to avoid confusion or lack of clarity of roles during crisis. This should include strategies and procedures for timely, clear, consistent, and uninterrupted internal and external communication flows to ensure timely decision to prevent undue escalation of issues and to provide adequate assurance to market participants, employees, clients, creditors, regulators, and shareholders. This could include the designation of a formal crisis team that can be a contact point for senior management. The planning process should include the designation of back ups for key functions and assurance that key systems and processes have been considered in the firm's business continuity planning.

Organisation:

Contingency plans need to involve Treasury, risk and business areas, IT, settlements, communication and finance areas. Most firms have a liquidity crisis team in place that is chaired by the Treasurer or CFO. A member of the Treasury or risk can be the contingency coordinator to ensure that working groups understand their tasks and those decisions and actions are logged and communicated as appropriate. There are some banks, where the crisis team meets on a regular basis to review stress scenarios in business as usual conditions.

Action plans:

Bank should have in place an asset reduction plan and financing strategy for firm-specific and market-related liquidity events. Some firms define states of a crisis and define appropriate measures to mitigate a crisis. During the disruption secured funding asset liquidation would be possible for high-grade paper (in particular, eligible central bank assets) but higher haircuts would be applied based on liquidity quality. The bank can take attention the unused credit facilities from the Central bank or other counterparties, but the latest can be disappearing in the trouble.

The existence of recourse provisions in asset sales, the extension of liquidity facilities to securitization programs, and the early amortization triggers of certain asset securitization transactions can involve significant liquidity risk to institutions engaged in these secondary market credit activities. Institutions should ensure that their liquidity contingency plans fully incorporate the potential risk posed by their secondary market credit activities. With the issuance of new asset-backed securities, the issuing banking organization should determine the potential effect on its liquidity at the inception of each transaction and throughout the life of the securities in order to better ascertain its future funding needs. An institution's contingency plans should take into consideration the need to obtain replacement funding, and specify the possible alternative funding sources, in the event of the early amortization of outstanding asset-backed securities. It should be recognized that an early amortization of a banking organization's asset-backed securities could impede its ability to fund itself--either through re-issuance or other borrowings--since the institution's reputation with investors and lenders may be adversely affected.

¹¹ This chapter based on the principles of Liquidity Risk Management, IIF, March 2007

III.3.5 Case Study

Medium bank: Medium Bank employs the following methodologies for measuring liquidity risk exposure and limits.

Methodology name	Limit size
Short term liquidity	
Limits of foreign exchange nostro accounts	The account balance should exceed the overdraft credit line linked to the account or zero if there's no overdraft credit line.
Foreign exchange position of Treasury	The net liabilities from foreign exchange interbank deals (money market deposit deals, foreign exchange swap deals, repo deals) in one day (T+1) cannot exceed the securely accessible volume of overnight liabilities.
Cash flow table	<p>Medium-sized bank produces the cash-flow report for following 8 days on a daily basis every day. The Middle office collected the data from IT system and email letters from the branches and the Accounting department.</p> <p>The negative gap of the following day in the table cannot exceed the securely accessible volume of overnight liabilities that is 25% of the limits that the bank gets from the counterparties banks for o/n. The bank set limit for the cumulative net funding requirement, which is 50% of the interbank possibilities.</p>
Highly Liquid assets	The highly liquid assets (money market deposit deals matures in 30 days, banking book bonds, repo deals, derivative deals and foreign exchange spot deals) must exceed the maximum financing need in 30 days of (non treasury) departments, which are to be set according to historical data and business forecasts.
Mid term liquidity	
Maturity gap based on expected events. Case: the limit of cumulated gap is independent from foreign exchange	<p>The Medium bank produces the maturity gap in domestic currency, USD and EUR separately every month. <u>Based on statistical analysis Medium Bank assumed</u> that 20% of retail deposit could be withdrawn from that bank within 1 year, and 10% in 1-2 years, 30% in 2-5 years and 40% over 5 years.</p> <p>The limit for the gap of each matrix:</p> <p>The absolute value of the negative value of cumulated gap on balance- and off-balance sheet items in each category (except for the category over 5 years) cannot exceed the sum of funds securely accessible from interbank market (e.g. repo deals, liabilities from the central bank).</p>
Maturity gap based on the business plan: the limit of cumulated gap is independent from foreign exchange	<p>Medium bank produced the funding matrix based on the business plan half-yearly. The assets and liabilities are categorized according to the expected cash flow in the case of retail clients.</p> <p>The absolute value of the negative value of cumulated gap on balance- and off balance sheet items in each category (except for the category over 5 years) cannot exceed the sum of liabilities securely accessible by the subsidiary from interbank market (e.g. repo deals, liabilities from the central bank) and the value of unhedged interbank deposit collection.</p>

Maturity gap

Description	Maturity								
	Total (a+...+j/-+k)	Matured	1-30 days	31-90 days	91-365 days	1-2 years	2-5 years	5 years	Without Maturity
	12	1	4	5	6	7	8	9	10
Assets	10,000	500	2,200	500	500	1,500	1,000	3,000	800
Cash and Current Accounts	200		200						
Trading and Available for Sale Securities	500		500						
Investment Securities	500					500			
Deposits due to the Central Bank and Other Banks	1,000		1,000						
Loans	7,000	500	500	500	500	1,000	1,000	3,000	
Other Receivables	0								
Business shares + Own Assets	800								800
Liabilities	10,000	0	3,200	2,500	2,000	1,300	0	400	600
Deposits	6,700		3,000	2,500	1,000	200	0	0	0
Retail Deposits	4,700		2,000	2,000	500	200			
Other Deposits	2,000		1,000	500	500				
Deposits due to Banks	200		200						
Loans	600					600	0		
Debt Securities	1,500				1,000	500			
Subordinated Liabilities	400							400	
Other Liabilities	0								
Shareholder's Equity and Provisions	600								600
Basis Position	0	500	-1,000	-2,000	-1,500	200	1,000	2,600	200
Cumulated Basis Position	500	-500	-2,500	-4,000	-3,800	-2,800	-200	0	0
Regrouping of Deposits (to be add up)	6,700		3,000	2,500	1,000	200	0	0	0
Retail Deposits	4,700		2,000	2,000	500	200			
Other Deposits	2,000		1,000	500	500				
Estimated payoffs of Deposits (to be subtract)	6,700		1,078	657	1,205	470	1,410	1,880	0
Retail Deposits	4,700		78	157	705	470	1,410	1,880	
Other Deposits	2,000		1,000	500	500				
Undrawn Credit Facilities	800		100	500	200				
Modified Basis Position	-800	500	822	-657	-1,905	-70	-410	720	200
Cumulated Modified Basis Position	500	1,322	665	-1,240	-1,310	-1,720	-1,000	-800	0
Scenario: Downgrade	3,650	1,800	1,250	500	100	0	0	0	0

Methodology name	Limit size
Liquidity cost	
Treasury position for the next month	Based on the business plan from the business line the Bank compares the bank position to the planned transaction. The Treasury has to manage the difference.
Scenario analysis, Stress test using the Funding matrix. The limit of cumulated gap is independent from foreign exchange	Medium Bank analyzes the downgrade, withdrawal of deposit and utilization of credit lines according to the scenario analysis below. The absolute value of the negative value of cumulated gap on balance- and off balance sheet items in each category (except for the category over 5 years) cannot exceed the sum of liabilities securely accessible from interbank market and possibility of selling the assets in these special circumstances based on the cost. (Calculating the cost)
1. Downgrade	<ul style="list-style-type: none"> 10% of matured banking sector sources (deposits and FX swaps) are not renewed. 10% of maturing mid-term or long-term resources from financial institutes (loans, etc) is not renewed.
2. Withdrawal of deposits	Depositors withdraw 10% of deposits in one week, and 50% of matured fixed deposits is not renewed.
3. Utilization of credit lines	50% of unused credit lines maturing in one year are utilized (in 7 days: 10%, in 8-14 days: 10%, in 15-30 days: 20%, in 31-90 days: 10%).
Dependency on significant deposits	Min 2, Significant deposit is over 15% of the regulatory capital.
Liquidity vulnerability	25%
Coverage short term liabilities by liquid assets	Medium Bank developed methodologies and policies to determine the level of specifically earmarked liquid assets that they should maintain at all times to meet immediate liquidity needs when faced with adverse

	conditions.
Coverage ratios of investment of the bank	The value should be higher than 1.

III.4. Tools of Interest rate risk management

III.4.1. Definition of interest rate risk¹²

The interest rate risk is the exposure of a bank's financial condition to adverse movements in interest rates. Accepting this risk is a normal part of banking and can be an important source of profitability and shareholder value. However, excessive interest rate risk can pose a significant threat to a bank's earning and capital base. Changes in interest rates affect a bank's earnings by changing its net interest income and the level of other interest sensitive income and operating expenses. Changes in interest rates also affect the underlying value of the bank's assets, liabilities, and off-balance sheet (OBS) instruments because the present value of future cash flows (and in some cases, the cash flows themselves) change when interest rates change. Accordingly, an effective risk management process that maintains interest rate risk within prudent levels is essential to the safety and soundness of the bank.

Sources of the interest rate risk

- **Repricing risk:** As financial intermediaries, banks encounter interest rate risk in several ways. The primary and most often discussed form of interest rate risk arises from timing differences in the maturity (for fixed-rate) and repricing (for floating-rate) of bank assets, liabilities, and OBS positions. While such repricing mismatches are fundamental to the business of banking, they can expose a bank's income and underlying economic value to unanticipated fluctuations as interest rates vary. For instance, a bank that funded a long-term fixed-rate loan with a short-term deposit could face a decline in both the future income arising from the position and its underlying value if interest rates increase. These declines arise because the cash flows on the loan are fixed over its lifetime, while the interest paid on the funding is variable, and increases after the short-term deposit matures.
- **Yield curve risk:** Repricing mismatches can also expose a bank to changes in the slope and shape of the yield curve. Yield curve risk arises when unanticipated shifts of the yield curve have adverse effects on a bank's income or underlying economic value. For instance, the underlying economic value of a long position in 10-year government bonds hedged by a short position in 5-year government notes could decline sharply if the yield curve steepens, even if the position is hedged against parallel movements in the yield curve.
- **Basis risk:** arises from imperfect correlation in the adjustment of the rates earned and paid on different instruments with otherwise similar repricing characteristics. When interest rates change, these differences can give rise to unexpected changes in the cash flows and earnings spread between assets, liabilities and OBS instruments of similar maturities or repricing frequencies. For example, a strategy of funding a one-year loan that reprices monthly based on the one-month US Treasury bill rate, with a one-year deposit that reprices monthly based on one-month LIBOR, exposes

¹² This chapter based on the Basel Committee on Banking Supervision :Principle for Management and Supervision of Interest Rate Risk (July 2004), Definition on Page 5 and source on Page..

the institution to the risk that the spread between the two index rates may change unexpectedly.

- **Optionality:** An additional and increasingly important source of interest rate risk arises from the options embedded in many bank assets, liabilities, and OBS portfolios. Formally, an option provides the holder the right, but not the obligation, to buy, sell, or in some manner alter the cash flow of an instrument or financial contract. Options may be stand-alone instruments such as exchange-traded options and over-the-counter (OTC) contracts, or they may be embedded within otherwise standard instruments. While banks use exchange-traded and OTC options in both trading and non-trading accounts, instruments with embedded options are generally more important in non-trading activities.

Open position arises from the following transactions:

- Deposit collection, borrowing, issuing securities constituting loan relationship, conducting repurchase agreement
- Providing loans, lending, investments in securities constituting loan relationship
- Off-balance sheet transactions affecting interest rate risks (e.g. interest rate and foreign exchange swaps, forward foreign exchange and securities transactions, forward interest rate agreements, foreign exchange option transactions)

III.4.2. Methods for Measuring Interest rate risk

The Bank should apply those methods for measuring interest rate risk with which the Bank's current and future interest rate risk positions can be measured. Common methods are:

- A) Repricing risk analysis for measuring yield curve risk
- B) Analyzing basis risks for measuring the effect of the interest income
- C) Fund transfer pricing for measuring the effect of the interest income
- D) Duration

A) Repricing Risk Analysis

Repricing schedule:

The repricing analysis for measuring a bank's interest rate risk exposure begins with a maturity/repricing schedule that distributes interest sensitive assets, liabilities, and OBS positions into "time bands" according to their maturity (if fixed-rate) or time remaining to their next repricing (if floating-rate). The repricing schedule could be filled based on the duration of the items, if the bank is able to do it for each item, but in this book we do not use it. Repricing schedule should be prepared monthly or quarterly in domestic currencies (RUB) and in the main currencies (USD, EUR). Assets and liabilities should be sorted into categories of intervals according to potential repricing, i.e. interest rate changes: within 1 month, 1-3 months, and so on. For analytic reasons, this table is supplemented with the positions that belong to the trading book and data needed for measuring interest rate optional risk.

Repricing schedule could be the base of the following analysis

Rate sensitivity gap:

The bank can analyze the rate sensitivity gap (RSG) as a ratio of rate sensitive assets (RSA) to rate sensitive liabilities (RSL).

$$RSG = RSA/RSL$$

An *RSG greater than 1* implies that there are more interest rate sensitive assets (in par amount) than interest rate sensitivity liabilities. This suggests that, as interest rates rise, the return on assets will rise faster than funding cost, resulting in a higher spread income. If the *RSG less than 1* if the interest rates rise, funding costs will rise at a faster rate than return on assets.

Repricing gap analysis

These schedules can be used to generate simple indicators of the interest rate risk sensitivity of both earnings and economic value to changing interest rates. When this approach is used to assess the interest rate risk of current earnings, it is typically referred to as gap analysis. The size of the gap for a given time band - that is, assets minus liabilities plus OBS exposures that reprice or mature within that time band - gives an indication of the bank's repricing risk exposure. A negative, or liability sensitive, gap occurs when liabilities exceed assets (including OBS positions) in a given time band. This means that an increase in market interest rates could cause a decline in net interest income. Conversely, a positive, or asset sensitive, gap implies that the bank's net interest income could decline as a result of a decrease in the level of interest rates.

Static simulation

Static simulation technique is used for measuring the effect of changing interest rate yield curve on a bank's economic value and interest income perspectives assuming the gap does not change. The measuring procedure is based on simulating the future path of interest rates and examining their impact on the cash flow. In static simulation, the cash flows arising solely from bank's current on- and off-balance sheet positions are assessed and the interest rate change.

Standardized approach

According to standardized approach repricing schedule is used to evaluate the effects of changing interest rates on a bank's economic value by applying sensitivity weights to each time band. The weights are based on estimates of the duration of the assets and liabilities that fall into each time band, where duration is a measure of the percentage change in the economic value of a position that will occur given a small change in the level of interest rates. Duration-based weights can be used in combination with a repricing schedule to provide a rough approximation of the change in a bank's economic value that would occur given a particular set of changes in market interest rates.

The calculation process is the following:

1. The first step is to offset the longs and shorts in each time band, resulting in a single short or long position in each time band. The net position is the sum of the balance sheet items (BS) and the off balance sheet items (OBS) assuming that assets have a positive and liabilities have a negative sign.
2. The second step is to weight these resulting short and long positions by a factor that is designed to reflect the sensitivity of the positions in the different time bands to an assumed change in interest rates. The set of weighting factors for each time band is set out in table below. These factors are based on an assumed parallel shift of 200 basis points throughout the time spectrum, and on a proxy of modified duration of positions situated at the middle of each time band and yielding 5%. If you cannot expect the 2% movement you can use the following calculation: A parallel rate shock substantially consistent with 1st and 99th percentile of observed interest rate changes using a one-year (240 working days) holding period and a minimum five years of observations. (That means 4 interest rate shocks: upward and downward parallel shift according to the first, and the same according to the 99th percentile.)
3. The third step is to sum these resulting weighted positions, offsetting longs and shorts, leading to the net short- or long-weighted position of the banking book in the given currency.
4. The fourth step is to calculate the weighted position of the whole banking book by summing the net short- and long-weighted positions calculated for different currencies.
5. The fifth step is to relate the weighted position of the whole banking book to shareholder's equity.

Time band	Middle of time band	Proxy of modified duration in year	Assumed change in yield	Weighting factor
Up to 1 month	0.5 months	0.04 years	200 bp	0.08%
1 to 3 months	2 months	0.16 years	200 bp	0.32%
3 to 6 months	4.5 months	0.36 years	200 bp	0.72%
6 to 12 months	9 months	0.71 years	200 bp	1.43%
1 to 2 years	1.5 years	1.38 years	200 bp	2.77%
2 to 3 years	2.5 years	2.25 years	200 bp	4.49%
3 to 4 years	3.5 years	3.07 years	200 bp	6.14%
4 to 5 years	4.5 years	3.85 years	200 bp	7.71%
5 to 7 years	6 years	5.08 years	200 bp	10.15%
7 to 10 years	8.5 years	6.63 years	200 bp	13.26%
10 to 15 years	12.5 years	8.92 years	200 bp	17.84%
15 to 20 years	17.5 years	11.21 years	200 bp	22.43%
Over 20 years	22.5 years	13.01 years	200 bp	26.03%

To measure the effect of the changing shape the interest rate yield curve on bank's economic capital the same approach is also kept relevant with changing scenario: yield curve shifts immediately by 200 basis points in short term and gradually for the further periods.

The process of the calculation is the same as above. The weights calculated on the modified duration are in the following table.

Time band	Middle of time band	Proxy of modified duration in year	Assumed change in yield	Weighting factor
Up to 1 month	0.5 months	0.04 years	200 bp	0.08%
1 to 3 months	2 months	0.16 years	168 bp	0.27%
3 to 6 months	4.5 months	0.36 years	141 bp	0.51%
6 to 12 months	9 months	0.71 years	119 bp	0.84%
1 to 2 years	1.5 years	1.38 years	100 bp	1.38%
2 to 3 years	2.5 years	2.25 years	84 bp	1.89%
3 to 4 years	3.5 years	3.07 years	71 bp	2.17%
4 to 5 years	4.5 years	3.85 years	59 bp	2.29%
5 to 7 years	6 years	5.08 years	50 bp	2.54%
7 to 10 years	8.5 years	6.63 years	42 bp	2.79%
10 to 15 years	12.5 years	8.92 years	35 bp	3.15%
15 to 20 years	17.5 years	11.21 years	30 bp	3.33%
Over 20 years	22.5 years	13.01 years	25 bp	3.25%

Dynamic simulation for measuring optionality

In the dynamic simulation approach, the simulation builds more detailed assumptions about the future course of interest rates and the expected changes in a bank business activity over that time. The more sophisticated techniques allow dynamic interaction of payment streams and interest rates and to better capture the effect of embedded or explicit option.

The Bank has to measure the interest rate risk that arises from the *optionality* due to potential repayment of loans before maturity or potential withdrawal of time deposits before maturity. The scenarios that are employed in the liquidity risk management could be used here too.

B) Basis risk analysis

The Bank prepares basis risk analysis denominated in domestic currency, EUR, USD and CHF containing all balance sheet items and any off-balance sheet items that are exposed to interest rate risk quarterly. Assets and liabilities are sorted into categories of intervals according to benchmark interest rate into repricing periods up to 1 month, 1-3 months, 3-12 months, 1-5 years, 5-10 years, 10-15 years, over 15 years.

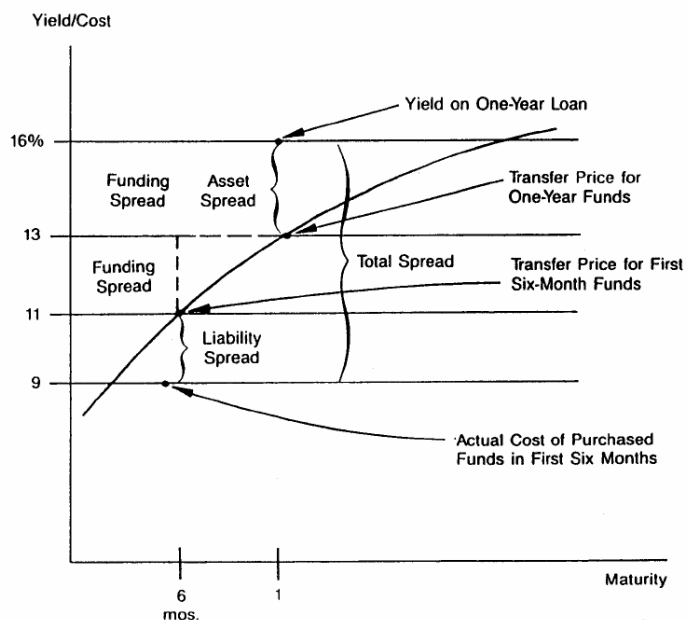
The bank prepares a quarterly forecasted basis risk analysis based on plans (projections) as of the end of the following quarter in the similar structure.

For example: Bank could analyse the effect of a 100 basis point shift of the central bank's prime rates on interest income and expense over one year period. The effect on the profit could be shown in two scenarios: the Bank does not change the interest rates of variable items (only the interest rates of floating items change), and the Bank responds to the Central Bank's interest rate decision as it has reacted upon a Central Bank's interest rate decision in the past (according to historical data).

The analysis of parallel move of announced and benchmark interest rates to the central bank's prime rate should be completed on the basis of historic data (suggested time range: 2 years). The table should contain the value of announced and benchmark interest rates at the end of the quarter, the daily average of difference between the historic data (2 years) and the central bank's prime rate and the coefficients of correlation.

C) Fund Transfer Pricing Analysis¹³

Among the methodologies of interest rate risk management we can mention the Internal Fund Transfer Pricing (FTP), which is a well known practice in the financial sector. It is part of the overall management information, accounting and control system which includes pricing, budgeting profit planning, asset/liability management. Through fund transfer pricing bank can analyze more efficiently its net interest margin, because fund transfer pricing allows quantifying the variances caused by the imbalance of funds provided and funds used by the bank. Financial institutions utilize the Single Pool Rate Matching, Specific Matching, Multiple Pool Rate Matching and Matched Maturity.¹⁴



¹³ This chapter based on Dr. Judit Burucs: "Thoughts on Fund Transfer Pricing" was published by Analytical Journal No.7. Circulation is 10 000. The Project introduction accompanied the article. (http://www.abajour.ru/files/07_08_buruch.pdf.)

¹⁴ Keys to community bank success: Utilizing management information to make informed decisions-Funds transfer pricing (FTP), Journal of Bank Cost & Management Accounting, 2001, by Katafian, Robert E.

Matched Maturity¹⁵ is basically a gap approach **similar to the repricing gap**. Each individual customer account is matched to a market driven index (transfer pricing yield curve). FTP creates a shadow¹⁶ of assets and liabilities for each expected cash flow item on the balance sheet and attaches to each a market price based on its term. Real assets are accordingly funded by “shadow” liabilities to produce a match-funded spread; conversely, real liabilities receive income from “shadow” assets for the same purpose. A unique charge or credit rate is assigned to each record according to its origination date on the basis of repricing tenor, contractual cash flow and some adjustment (repricing spread, liquidity term, embedded option and etc.)

In the process, the lending and deposit units obtain a leveled balance sheet and a net interest spread per record is established. The FTP posts mismatched earnings from business units into a special Funding Mismatch Unit. This unit can be the Treasury, Funding Center or ALCO in practice. Funding Mismatch Unit acts as the central clearing house for funds, benchmarking all transfer rates against a market derived yield curve plus other market pricing factors. Calculated debits and credits are applied to book balances until the earlier of maturity or repricing. If the bank uses a single curve, asset and liability transactions of identical attributes are assigned with an identical transfer rate. When measuring performance, a transaction’s transfer rate remains unchanged over its repricing life. Effectively, this insulates the transaction’s margin contribution from the effect of subsequent market interest rate changes.¹⁷

Selecting a transfer pricing yield curve is a critical aspect of the FTP. Should we use the funding rate or investment rate? When implementing a FTP system banks must determine a “funding curve” that most accurately reflects their source or assets on the whole sale market. Some banks may utilize an interbank rate such as LIBOR, interbank SWAP curve, a treasury yield curve or state bond yield curve. Using credit risk free market indices like state bond curve will encourage banks to make loans that are less profitable than they appear and to discourage deposits that can be profitable. Note however, that if the bank is significantly deposit rich (most of savings banks, which have more deposit than loans), the bank tends to select a marginal investment curve for their benchmark. Furthermore, bank should apply a separate benchmark yield curve to each of the currencies in which it operates, because each of the currencies in which a bank deals represents a distinct and independent source of interest rate risk. Interest rate in the European Union, Russia or USA may shift in opposite directions for completely unrelated reasons.

The funding curve for a financial instrument shows the relationship between indicators such as time to maturity and the interest rate. Adjustments to a base FTP¹⁸ yield curve are often necessary to reflect unique attributes of the particular institution and

¹⁵ Internal Transfer Pricing of Bank Funds by Valerie Giardini, Bank Administration Institute

¹⁶ A bank’s focal point for market risk: The transfer pricing mismatch unit, Journal of Bank Cost & Management Accounting, 2000 by Chittenden, John

¹⁷ A simple example will illustrate this process. Let us assume that the institution has only two items on its balance sheet: 3 year duration deposit on which it pays 6.5% interest rate and 8 year duration mortgage on which it receives 10% interest rate. A net interest margin is 3.5% (10%-6.5%). Assume further that the bank is asset rich (it possesses more loan than deposits) and can borrow in the wholesale market at 7% for 3 years and 8% for 8 years. The FTP allows the institution to split up its 3.5% net interest margin into a 2% net interest margin on loan (10%-8%), a 0.5% net interest margin on deposit (7%-6.5%), and interest rate risk mismatch of 1% (8%-7%).

¹⁸ Adjustments to the base FTP rate index curve, Journal of Bank Cost & Management Accounting, by Ersoz, Ali Murat / Transfer Pricing, Financial Risk management in Banking, Theory & Application of Asset & Liability Management MCGraw-Hill, by Dennis G. Uyemura, Donald R. Van Deventer

instrument. The decision to apply a certain adjustment method to use should coincide with the bank's own cultural and fundamental principles which are as follows:

- 1) Institution Credit Risk Adjustment. If the bank is not deposit rich, the base yield curve needs to be adjusted to reflect the bank's own credit risk. There are some banks that use their own actual senior debt market spread.
- 2) Bid/Asked Spread or Funding Commission Adjustment: The brokering cost (commission or fee) can be factored into the transfer pricing yield curve. The typical products: for this approach all assets and liabilities are managed by the treasury department of a bank.
- 3) Term Liquidity Adjustment: Term liquidity is the impact of the repricing frequency of an instrument being shorter than expected maturity. The liquidity premium can be estimated by observing rate differentials between the organization's wholesale funding curve and swap curve. Swap rates quote the cost to transfer interest rate risk, so differences between actual funding rates and swaps represent the cost to raise physical liquidity, less term repricing risk. Adjustments to the base yield curve are necessary for instruments that have the same duration or repricing period, but which, due to different liquidity characteristics, are not of the same value or cost to the bank. A fixed rate loan with 5 year duration may receive a lower FTP charge than a similar asset with the same duration due to the ability of the bank to convert the loan into a more liquid investment, by using a secondary market for securitization.
- 4) Option Pricing Adjustment is used to reflect the cost of providing the customer the right to unilaterally change the contractual terms of a transaction.
- 5) Prepayment Penalty Adjustment can be incorporated and applied in transfer pricing in two ways: The first is after the transaction that is applicable to larger-sized transactions, especially where an economic prepayment fee is charged to the borrower. Transfer rates are assigned based on the contractual amortization or maturity schedule. When prepayment occurs, the original transfer fund is sold back to the Treasury with the mark to market prepayment loss (or gain) passed to the business line unit in the form of a cost allocation. The second way is before the transaction that is used for loan products where there is generally no prepayment penalty charged (e.g. mortgage loan). The FTP is increased by an amount that will compensate the Treasury over the expected average life of such loans for the prepayments that will occur.
- 6) Mandatory Reverse Deposit Requirement Adjustment is the lost interest on the deposit without interest or lower interest that needs to be held in the Central bank by the bank.
- 7) Interest payment Adjustment. The banks should adjust their funds transfer price to an interest payment frequency. A funds transfer debit or credit adjustment is to be made for all interest earning and interest bearing products which interest payment frequency is different from the basic yield curve.
- 8) Other adjustments can also be made though are not common in practice. Among them are: Tax Advantage Adjustment for fixed asset in auto or commercial leases, or Stand by Liquidity Adjustment.
- 9) Adjustment or transfer pricing in the case of indeterminate maturity deposits and non interest bearing assets. In the case of the indeterminate maturity deposit especially in the case of demand deposits finding the appropriate FTP is a real

challenge and the bank should find its own way. The current rate¹⁹ method, the average rate methods and the blended term approach are well used.

In the FTP the residual spread between the interest rate and transfer rates can be used in simulating funding center strategies and measuring mismatched risk exposure. Transfer prices can also help forecasting²⁰ margin performance of business units. When they project the future balance sheet, they can be assisted by a simulation tool based on the FTP which models balance sheet and interest income/expense behaviors, separating the future impact of existing business from planned, new business. The model needs the same information about the cash flow, repricing, maturity, currency, embedded option and other characteristics of existing business as the other ALM model. This simulation model provides then forecast of a business unit's pre-ordained interest margin based on its existing book of business. Business unit managers can project the additional new business volumes that must be booked at appropriate margins to meet their overall net interest contribution target. The business unit's simulation forecast is rate environment sensitive; managers can understand and consider rate-dependent volume effects on their business performance. Planning usually focuses on a single, "most likely" scenario for interest rates and on assumptions such as prepayments while ALM mutually tests the future balance sheet and net interest revenue projections across numerous and varying assumptions. The originating unit's net contribution to the overall recorded margin of the bank is a traditional historical post performance measurement view. The FTP cannot eliminate all effects of interest rate changes from originating business units or unscheduled volume reductions. Rate-volume variance analysis must consider this element. FTP insulated the originating unit's performance only from the effects of pricing risk, not from volume risk.

Measuring mismatch exposure is the following: After allocating the contribution margin based on transfer prices, any residual spread is credited to a funding center. This spread is what the bank earned from accepting funding mismatches. In aggregate, though, sources and uses of funds in the balance sheet create numerous funding mismatches. The residual spread provides limited information about the aggregate balance sheet mismatch to which the bank is currently exposed. This is because it is derived from transfer price assigned at interest rate setting. To understand and measure the earnings' impact on the funding center of the existing mismatch, a transaction's remaining-term transfer price needs to be used. A transaction's remaining term transfer price is the price that would be assigned today based on its remaining repayment characteristic and today's alternative yield curve, so the spread between the different

¹⁹ *The current rate* method transfer prices the deposit at rates that are in place for the current processing period. Changes in market rates are immediately and fully reflected in assigned transfer rate.

The moving average methods, a form of the average rate transfer pricing, intends to describe the sluggish pricing observed for these types of liabilities. A time period for the moving average is chosen based on the observed or estimated repricing responsiveness for the deposit category.

Blended term analysis initiates by assuming a portion to a product line as core stable based on historical analysis of past cash flow patterns in balances. Non volatile balances profiles secure longer moving averages. Balance and time segmentation continues until some amount is apportioned to a volatile portion which receives short transfer rate. Blended term transfer rate is a weighted transfer price with cash flow.

Transfer pricing Indeterminate-maturity Deposits, Journal of Performance Management, by Thomas E. Bowers

²⁰ Fund transfer pricing and A/L modeling, Journal of Bank cost & management Accountant, 2000, Payant, W Randall.

points of the curve indicates how much could be earned for accepting mismatches today. To analyze the bank's aggregate existing mismatches, the remaining term transfer price is applied to the transfer priced principal balances for all sources and uses of funds. The impact of overall mismatch on future earnings can be evaluated in an income simulation model. This procedure isolates only the funding mismatch components in the simulation's funding risk assessment. The income simulation of the funding mismatch assists the funding center in its management. The difference between the origination term and remaining term simulation results represents the spread the bank created from two factors – first accepting prior mismatch exposures which effects on earnings may not be felt immediately and secondly because transaction's remaining lives shorten over time.

Income simulation can be performed with different assumptions for interest rates, prepayments, volume growth, spreads, etc. FTP should remove future interest rate risk planned business unit net interest revenue and yield a mismatch calculation which is very meaningful for a Treasury department.

D) Duration

The Bank can use duration (Average Remaining Maturity) for asset/liability management, however it is difficult for many banks to analyse the volatility of everything on the balance sheet in order to use it for bonds. Duration analysis is the expected life of a fixed-income security, taking into account its coupon yield, interest payments, maturity, and call features. Duration attempts to measure actual maturity, as opposed to final maturity, by measuring the average time required to collect all payments of principal and interest. The duration of a callable bond, also called its effective duration, may be considerably shorter than its stated maturity in a period of rising interest rates. Thus, as market interest rates rise, the duration of a financial instrument decrease. For example, a 30 year mortgage may have an effective duration of only 11 to 12 years, which means the loan will probably be paid off in about one third of the time, supposedly carried by originating lender as an earning asset.

Calculation

With relation to fixed rate bonds duration is the weighted average of the remaining maturity until each individual payment is due, weighted by the ratio of the discounted net present value of each payment, where discount rates are the individual yields calculated until the due dates of each payment and bond's price.

Regarding to floating rate bonds duration is the average remaining lifetime equals with the remaining period until the next interest rate fixing.

Duration (MD):

$$D = \frac{\sum_{t=1}^m \frac{t \cdot C_t}{(1+r)^t}}{\sum_{t=1}^m \frac{C_t}{(1+r)^t}}$$

- where
- D^* – average remaining maturity (years)
 - r – yield calculated until maturity,
 - C_t – due amount at t time,
 - m – full maturity (years)

Modified Duration (MD):
$$D^* = \frac{D}{(1+r)}$$

where D^* – modified duration (years),
 r – yield calculated until maturity

Duration gap model:

Duration analysis can be used to assess the impact of interest rate changes on market value of bank's asset/liability structure. The duration gap model improves upon static-gap analysis by quantifying the impact of changes in interest rates on the net worth of the bank, rather than solely focusing on the temporal repricing characteristics of the bank's balance sheet. Furthermore, the concept of equity duration, by-product of the duration-gap measurement, allows the bank's management to assess the risk of various asset/liability and capital structures.

If MVA and MVL are the market values of assets and liabilities, respectively, duration gap is equal to:

$$DGAP = DA - (MVL / MVA)DL$$

where DA is duration of assets, DL is duration of liabilities

For instance, if the duration of assets is 4, and those assets are 98 percent funded by liabilities with a duration of 2, the duration gap of the institution is $2.4 = (4.0 - (0.98 \times 2))$.

Based on duration gap model the change in economic value of equity can be found with the following:

$$\Delta EVE = -DGAP \left[\frac{\Delta y}{(1+y)} \right] MVA$$

where y is the general level of interest rates

The interest rate sensitivity or equity duration, of the bank can be expressed as follows:

$$Equity\ duration = (Duration\ Gap) / (Leverage\ ratio)$$

where Leverage ratio equals

$$\frac{\text{Total market value of Rate Sensitivity Assets}}{\text{Total market value of Equity capital}}$$

This indicates that the change in the value of an institution for a given change in interest rates is a function not only of the duration gap, but also of the financial leverage inherent in the institution's capital structure. The duration gap could serve as a strategic planning tool for evaluating and controlling the interest rate risk of the bank. By changing the composition of the balance sheet, the desired duration gap for a particular target account can be attained. The disadvantage of the duration gap model is that it requires extensive data on specific characteristic and current market pricing schedules of the bank.

III.4.3. Setting up limits and stress testing

The goal of interest risk management is to maintain a bank's interest rate risk exposure within self-imposed parameters over a range of possible changes in interest rates.

The interest rate risk limits should set boundaries for the level of interest rate risk for the bank and where appropriate, should also provide the capability to allocate limits to individual portfolios, activities, or business units. Limit systems should also ensure that

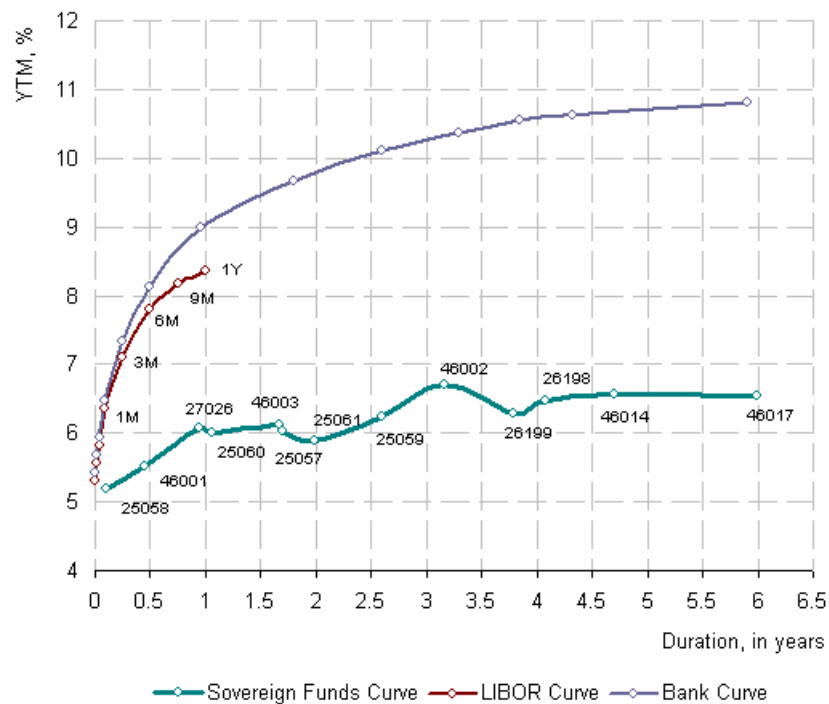
positions that exceed certain predetermined levels receive prompt management attention.

- From an earnings perspective, banks should explore limits on the variability of net income as well as net interest income in order to fully access the contribution of non interest income to the interest rate risk exposure of the bank.
- The form of limits for addressing the effect of rates on the bank’s economic value of equity should be appropriate for the size and complexity of its underlying position. Interest rate risk limits may be keyed to specific scenarios of movement in market interest rates. Specified scenarios should take account of the full range of possible sources of interest rate risk.

The stress test, the worst case scenarios might include abrupt changes in the general level of interest rates, changes in the relationships among key market rates (i.e. Basis risk), change in the slope and the shape of the yield curve (i.e. Yield curve risk) and so on.

III.4.4. Case Study

Medium bank developed interest rate risk management system in the banking book. They employed the following methodology:	
Methodology	Limit
Repricing risk exposure and analyze RSG=RSA/RSL	<p>Potential decrease of the interest income – based on the yield curve 1% parallel movement should not be greater than 10% of the yearly income.</p> <p>The bank sets the limit based on the maximum acceptable loss. What can the bank afford?</p> <p>The potential decrease of the shareholder’s equity - based on the standard interest rate shock (2% parallel movement) of the repricing risk in the banking book - should not be greater than 20% of the sum of the tier I and tier II capital.</p>
Duration	Average remaining maturity of the securities portfolio of the banking book, not hedged with IRS denominated in RUB with duration over 1 year of bank should not exceed 5 years. The limit is based on the duration of the liability side.
Basis risk	Medium Bank’s basis risk exposure is based on the USD fund; otherwise most products of the bank are fix rate, so the bank does not produce basis risk analysis.
Yield curve	<i>The bank is loan rich</i> , it needs a transfer pricing yield curve that reflects the bank’s source and use of the funds on the whole sale market. There is no real good solution in the Russian market; consequently the bank derives it from several benchmark yield curves. The possibilities could be the following:



- For short term: Moscow Interbank Offer Rate (MIBOR) based on 31 banks offer rates: from 2 to 7 days, from 8 to 30 days, from 31 to 90 days., from 91 to 180 days, from 181 days to 1 year, but the market for 3 months money is not liquid.
- From 1 year to 5 years: Yield of bonds issued by banks.
- From 5 years and longer the yields from the state bond markets.

Repricing gap

Description	According to the Maturity Date (Fix) or Repricing Date (Floaters)												Total	
	up to 1 month	1 - 3 months	3 - 6 months	6 - 12 months	1 - 2 years	2 - 3 years	3 - 4 years	4 - 5 years	5 - 7 years	7 - 10 years	10 - 15 years	15 years over		
	1	2	3	4	5	6	7	8	9	10	11	12		13
	a	b	c	d	e	f	g	h	i	j	k	l		m
Interest-bearing Assets	2200	500	250	500	1500	500	500	250	500	500	1000	1000	9200	
Available for Sale Securities - fix	500												500	
Available for Sale Securities - floaters													0	
Held-to-Maturity Securities - fix					500								500	
Held-to-Maturity Securities - floaters													0	
Deposits due to the Central Bank and Other Banks - fix	1200												1200	
Deposits due to the Central Bank and Other Banks - floaters													0	
Loans and Other Interest-bearing Receivables - fix	500	500	250	500	1000	500	500	250	500	500	1000	1000	7000	
Loans and Other Interest-bearing Receivables - floaters													0	
Interest-bearing Liabilities	2700	2500	450	1550	1600	200	0	0	0	0	0	0	9000	
Interbank Deposits - fix	200												200	
Interbank Deposits - floaters													0	
Deposits - fix	2500	2500	250	750	500	200							6700	
Deposits - floaters													0	
Loans - fix					600								600	
Loans - floaters													0	
Debt Securities - fix			200	800	500								1500	
Debt Securities - floaters													0	
Back-ranked Liabilities - fix													0	
Back-ranked Liabilities - floaters													0	
Difference (Assets - Liabilities)	-500	-2000	-200	-1050	-100	300	500	250	500	500	1000	1000	200	
Off-balance Sheet net position of Banking Book		400											400	

The following table shows all Adjustments to the base FTP rate yield curve in the Medium bank:

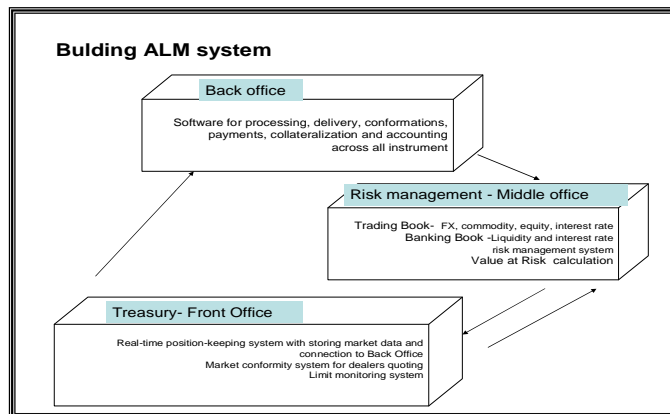
Products	Adjustment to the FTP rate in RUB					
	FTP base rate	Specific credit risk	Term Liquidity ²¹	Prepayment penalty	Mandatory reserve	FTP adjusted
Assets						
Money Market assets	8%	4%	-	-	-	12%
Prime commercial loans	10%	4%	-	-	-	14%
Commercial loans (fixed)	10%	4%	-	-	-	14%
Mortgage loans (fixed)	12%	4%	-	1%	-	17%
Consumer loans (fixed)	10%	4%	-	1%	-	15%
Indeterminate maturity assets	12%	4%	weighted / -	-	-	16%
Liabilities						
Money Market products	8%	4%	-	-	-	12%
Current account (fixed)	1%	4%	-	-	-4%	5% x (1-4%)
Retail term deposit (fixed)	10%	4%	-	-	-4%	14% x (1-4%) = 13.4%
Corporate term deposit (fixed)	10%	4%	-	-	-4,5%	14% x (1-4%) = 13.4%
Indeterminate maturity deposit	12%	4%	weighted / -	-	-	16%

III.5. Necessary IT support to ALM

III.5.1. Requirement on ALM software

The A/L Risk Management is not always perfect, since it is based on several assumptions and approximations. Still, it could be improved upon, if information technology (IT) supports it. The bank should have ALM systems that capture all material sources of interest rate and liquidity risk and that assesses the effect of interest rate changes in ways that are consistent with the scope of their activities.

The following figure presents the basic requirements that an integrated solution for global asset and liability management contains.



Software for Treasury

The Treasury has a key role in ALM. The Treasury needs a position-keeping system that provides real-time transaction data store, market data store, global P&L consolidation across trading rooms and pricing tools. The software should include full drilldown capabilities that enable the Treasury and Risk management to identify and attribute risk to its sources. The sources include business units, trading entities, portfolios, individual deal or deal strategies. The position-keeping system should give possibilities to allocate the deals into the banking book or into the trading book.

²¹ The adjustment is applied for the floating rate based products.

The Treasury also needs an efficient tool to monitor market conformity and prevent off-market trading. The bank should store the market rates (real time) at the time of deal entry, together with the deal rate and produce a report on any deviation from the bank's defined tolerance level. These tolerance levels could be expressed in percentage form or the absolute amount of the percentage difference between the real time value (market price) and traded value (capture price). The latter should be less than the defined tolerance level.

Treasury and the Risk management need limit monitoring system, that controls utilization of daily and overnight position limits as well as stop loss limits. The system should be able to send message to the appropriate level of the management if it is necessary.

Software for Back Office

The bank should be equipped with intelligent systems and technology that integrate every process related to the trade from order management to final settlement. The system should include processing and delivery, confirmation, payment, collateralization and booking and communication with third parties such as counterparties, correspondents and clearing system. The system should provide fully automated support for handling the SWIFT messages.

Software for market risk management

The system for risk management of trading book should calculate regulatory capital based value at risk (at least historical simulation based) as an internal model based method as well as the standard method. The system also needs a wide range of reports covering valuation, risk scenario analysis, cash flows, that can be integrated in line with ad-hoc market requirements. The trading book risk manager system can be developed together with the front office system and take into account the dealers' requirements because the dealers also use these data for daily market risk management.

A complete A/L Risk management system approach is not simply an aggregate of applications, data and organisation. Bank has many business units, which are engaged in different activities and support different products. IT should optimize the exchange of information between each entity within the bank. A key task is to organise the necessary A/L Risk data into a common format (data dictionary). IT plans needs to take account of how key A/L risk management information might change over time. The information might be static or dynamic. The IT platform and operating system should be designed so, that they do not place constraints on managers trying to obtain risk management data. Attempting to calculate and manage A/L Risk on a global basis requires the centralized control of algorithms and immediate access to large amounts of data. ALM data include both historical statistics and current risk characteristics for each transaction in every portfolio.

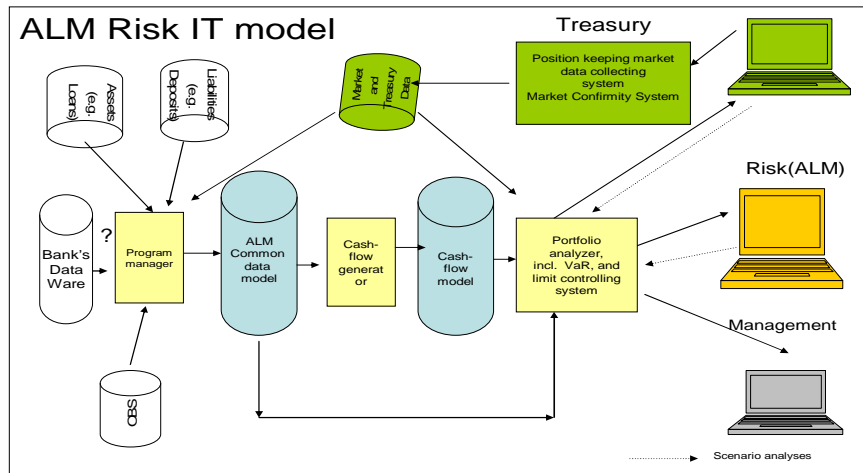
A simple A/L Risk management system consists of three major components:²²

Portfolio Manager – This is basically a database program that facilitates the collection and management of portfolio data. The collection phase depends on the existence of a data warehouse in the bank. If the bank has a data warehouse containing all the data used by the system, the source of collection can be the data warehouse instead of the sources system. The data include details of the portfolio, such as the description and amount of the assets and liabilities, as well as on and off balance sheet items held in the

²² Ravi E. Dattatreya, A practical Approach to Asset/Liability Management in The Handbook of Asset /Liability management by Frank J. Fabozzy and Atsuo Konishi, Irwin McGraw-Hill, 1996

portfolio. The A/L Risk database contains all relevant information on interest rate, exchange rate and liquidity risk deal by deal. Bank's data warehouse should be populated daily with transaction and market information. Transaction information should also be reconciled daily to ensure that market risk is reported accurately. Risk data warehouse should also store a time series of market data in its financial database.

If the software needs to collect the data from geographically different places, the bank should install a computer with a relatively high capacity in a centre of the bank and connect it with the workstation via leased line.



Cash-flow generator – This program obtains portfolio information from Portfolio Manager and generates cash flow from assets and liabilities. Most systems have a mapping engine that converts each deal into plain vanilla deals (depo or loans with one cash flow, namely MM deals). Depending on deals volume the software aggregates deals and generates capital cash flows of each product.

Portfolio Analyser – It should be able to produce a number of numerical and graphical reports, conduct scenario analyses and recommend actions to be taken regarding risk control. It generates a discount function based on available market data and uses it to determine present values and so on. It constructs liquidity gap and interest rate risk gap. It could also contain a risk simulator for scenario analysis (basis risk, and so on). The program sometimes contains Fund Transfer Pricing module and the module that is able to calculate the VaR. The software should include full drilldown capabilities, which enable Risk management to identify and attribute risk to its sources, for example by business unit, trading entity, portfolio, individual deal or deal strategy.

III.5.2. Buying or developing ALM software

There are various suppliers of A/L Risk management in the international software market. The most well-known firms provide integrated, complete software for ALM. Most of the packages contain similar modules. There are differences between them in price and some functionality. When a bank decides to buy software bear in mind that the price of the software is normally the smallest part of the implementation cost. A bank has to pay consultancy fee, and other external costs. Consultancy fee is higher if firm has no office in the country where the bank is located. Before bank buys software, management needs to examine the supply, and discuss detailed conditions of installation with the firm. For software installation bank should set up a project that consists of bank experts form IT, Treasury, Risk management, Accounting and Back Office and firm members. The project sponsors should be CFO or CRO and IT.

SOFTWARES FOR ALM

Functions	Description
Treasury	Treasury front office real-time position keeping system and connection to the ALM
Limit monitoring and Market Conformity	Market risk limit controller system Country and Counterparty limit controller Market conformity modul for dealers qutaing
Back Office/ Middle office	Accounting system
Value at Risk (VAR)	VAR calculation model, BIS capital adequacy
ALM Banking Book	ALM system based on Data warehouse

Suppliers: Reuters, Sungard,
Wall Street, Senders, etc

If the bank has a very smart IT department, and they have enough capacity, the bank can develop software. However please note that developing ALM software is very costly and takes a lot of time. It is more efficient for the bank to work with a smaller local IT company that is able to develop the basics of the ALM software that could be adjusted to the bank requirements. It can be cheaper than buying software from large international company or developing software alone.

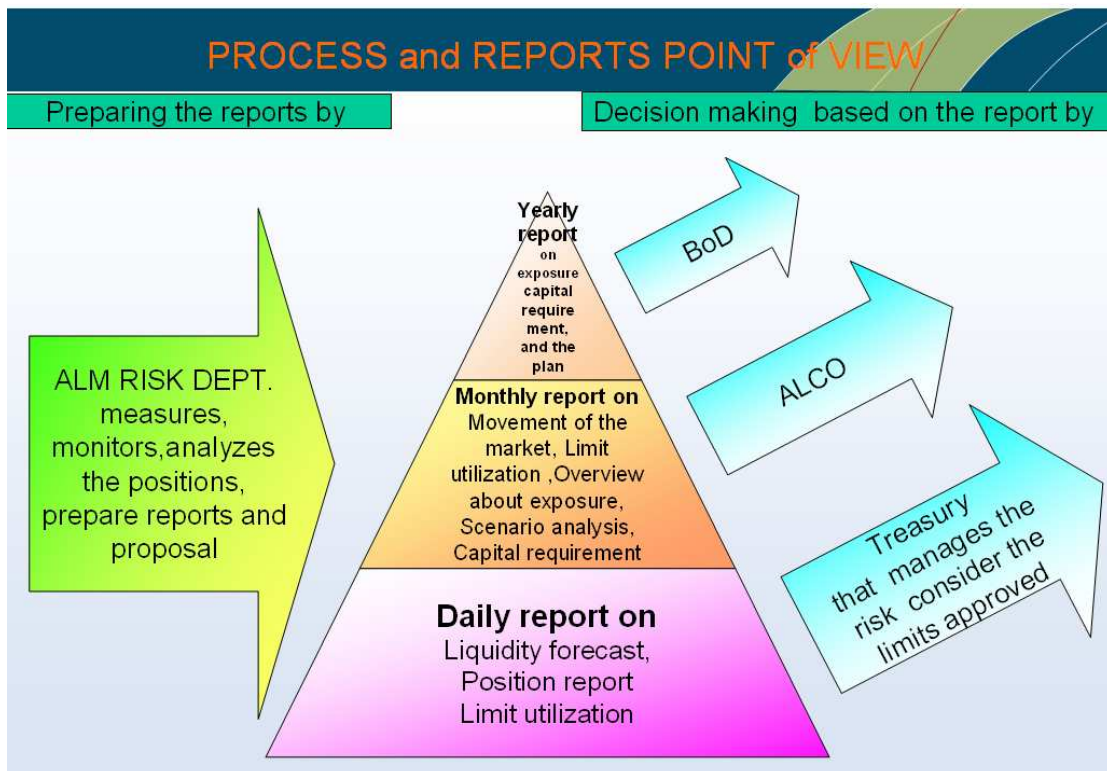
Database of the Medium bank		
Field Name	Field Description	
Account number	It identifies the transaction	Medium Bank bought softwares for the treasury (position keeping, limit monitoring) from the vendor. Bank set up a project and found a local computer company that has a basic ALM system. They decided the data base contains the data that can be found in this table. They have to collect the data from the 3 source systems: deposit, loan and the treasury system.
Product	Banking book product identification	
Currency		
Interest rate	Actual rate	
Minimum-Interest-Rate		
Maximum-Interest-Rate		
Interest-Benchmark	in case of floating rate	
Margin	margin	
Interest-rate type	Fix or floating	
Interest-Adjustment-Frequency	Repricing period	
Last-Interest-Adjustment	Last interest adjustment date of floating structure.	
Next-Interest-Adjustment	Next interest adjustment date of variable structure.	
Trading-Date	Trading date	
Fees	Fee is paid regularly bases	
Settlement-Date	Settlement or Value date of the account	
Maturity-Date	Maturity date or closing date of the account	
Next-Payment-Date	Next repayment date of the capital repayment or annuity structure.	
Last-Payment-Date	Last repayment date of the capital repayment or annuity structure.	
Payment capital		
Payment capital-Frequency	Repayment frequency of the capital repayment or annuity structure.	
Payment interest		
Payment interest - Frequency		
CreditLine		
Current-Account-Balance	Current amount	
Amount-origination	Loan case	
Fund Transfer Price	Transfer price actual value in the trading date	
FTP points	FTP points in the FTP curve	
FTP Adjustment	Curve adjustment (liquidity premium and so on)	
Cash flow of the principal		

III.6. Reports

III.6.1. Basic Reports

According to Basel II bank should establish an adequate system for monitoring and reporting risk exposures and assessing how the bank's changing risk profile affects capital needs. The bank's senior management or board of directors should, on a regular basis, receive reports on the bank's risk profile and capital needs. These reports should allow senior management to:

- Evaluate the level and trend of material risks and their effect on capital levels
- Evaluate the sensitivity and reasonableness of key assumptions used in the capital assessment measurement system
- Determine that the bank holds sufficient capital against the various risks and is in compliance with established capital adequacy goals and
- Assess its future capital requirements based on the bank's reported risk profile and make necessary adjustments to the bank's strategic plan accordingly.



Who prepares the reports and who receives it?

ALM Department should be responsible for the reports to be received by the ALCO and BoD, because these reports should contain not only data from the present exposure, but also an explanation of the reasons. They have to produce forecast, and scenario analysis on how exposure positions influence the bank P/L in the future.

If the bank has no appropriate computer system, collecting data for the gap reports takes a lot of time, and normally they have not enough time to analyze the position of the bank. IT has to support the ALM unit in preparing the report; otherwise the Bank management cannot get the right information for the decision.

If ALM does not produce the daily reports on Treasury position, they have to monitor and if limit utilization does not fit to the limits approved by the ALCO they have to report it to the Bank management.

Daily reports could be produced by Back or Middle office.

What types of reports have to be prepared?

- Position reports on risk exposure
- Overall mismatch report on the position
- Funding requirements for the next month and quarter
- Overall mismatch report on the expected position
- P/L reports
- “What if” scenarios for stress testing
- Scenario base on the forecast
- Limit reports

The form of the report

The report to the ALCO and the BoD should consist of 2 parts. The first part should contain the explanations of results, limit utilization information, proposals on managing the risk exposure and the effect of the new products. The second part should be the appendix, containing detailed reports of position, scenario, P/L.

Daily reports should be more detailed.

III. 6.2. Case study

<i>Medium Bank prepares comprehensive regular reports. The following chart shows the form and the content of the monthly reports to the ALCO and the yearly report to the BoD.</i>	
Overview	Executive summary contains liquidity and interest rate risk exposure in the reporting period. A short forecast of the market movement completes the overview. <u>Economic Capital requirement behind the position of the bank</u> is prepared to the management.
Limit utilization	A table that contains the limits, actual value of the last reporting day, and sums of the limit excess in the reporting period.
Market movement	Short overview of the market movement with table that shows the value of the interest rates in short term and long term in RUB, EUR and USD.
Interest rate risk exposure	Repricing gap and explanation Capital requirement based on BIS Scenario analysis with change of the yield curve Change of the net interest income based on FTP Scenario analysis based on Basis risk effect Duration analysis for security portfolio

Liquidity risk exposure	<p>Report of the daily exposure (graph)</p> <p>Gap analysis based on expected cash flow</p> <p>Scenario analysis (with drawing, prepayment, and so on)</p> <p>Value of the liquidity ratios, explained the difference with previous reporting</p> <p>Treasury position or funding requirement for the next month and quarter</p> <p><u>Scenario analysis</u></p>
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Medium bank reports prepared by ALM unit

Reports on interest rate risk exposure	Can be split	Description
Overall Repricing Schedule (Mismatch) Report	<p>Business lines (retail, corporate, SME)</p> <p>Product groups (loans, term deposits,</p> <p>Currency (RUB, USD)</p>	<p>The repricing mismatch report contains the exposure that arise from timing differences in the maturity (for fixed-rate) and repricing (for floating-rate) of bank assets, liabilities, and OBS positions. While such repricing mismatches are fundamental to the business of banking, they can expose a bank's income and underlying economic value to unanticipated fluctuations as interest rates vary. This analysis should be prepared by currencies.</p>
“What if” scenarios, effect of changing interest rates on interest income and a bank's economic value	<p>Business lines (retail, corporate, SME)</p> <p>Product groups (loans, term deposits,</p> <p>Currency (RUB, USD, EUR)</p> <p>Type of the interest rate (fix, floating, variable)</p> <p>Type of the benchmark (Mosibor, Libor)</p>	<p>Repricing mismatches can also expose a bank to changes in the slope and shape of the yield curve. Yield curve risk arises when unanticipated shifts of the yield curve have adverse effects on a bank's income or underlying economic value. Assuming the structure of the position is unchanged “What if”</p> <ol style="list-style-type: none"> 1. change of the yield curve (parallel moving) 2. change of the shape of the yield curve <p><u>A maturity/repricing schedule can also be used to evaluate the effects of changing interest rates</u> on a bank's economic value by applying sensitivity weights to each time band.</p>
“What if” scenarios of portfolio change		Repricing mismatches can also be prepared based on the planned portfolio.
Basis risk	<p>Overall Business lines</p> <p>Product groups</p> <p>Currency</p> <p>Type of the interest rate (fix, floating)</p> <p>Type of the benchmark (Mosibor, Libor)</p>	<p>The Bank prepares a basis risk analysis denominated in domestic currency, EUR, USD and CHF containing all balance sheet items and any off-balance-sheet items that are exposed to interest rate risk quarterly. Assets and liabilities are sorted into categories of intervals according to benchmark interest rate.</p> <p>The bank prepares a quarterly forecasted basis risk analysis based on plans (projections) as of the end of the following quarter in the similar structure.</p>
“What if” scenarios		Bank analyses the effect of a 100 b.p. shift of market yield

related to basis risk		curve: how the Bank can respond to this event?
Duration analysis		
Liquidity reports		
Daily cash flow for 8 days		Tools for tactical (intraday and short term) liquidity management: cash-flow
Overall Maturity (Mismatch) Report	<p>Business lines (retail, corporate, SME)</p> <p>Product groups (loans, term deposits)</p> <p>Currency (RUB, USD)</p>	<p>Bank should prepare the funding matrix in each currency (RUB, USD, other currencies) in a way that assets placed at and liabilities withdrawn from Bank for the actual position of the on and off balance sheet items. Then the <u>funding matrix should be restructured for expected position</u> based on the past observation:</p> <ul style="list-style-type: none"> - retail and other client deposits are to be regrouped from their contractual category into another category, in accordance with their expected maturity (stable or core deposit especially for the retail deposit, sight deposits) - utilization of credit lines assuming normal business activity <p>Overall Maturity (Mismatch) report for expected position</p>
Treasury position based on the business plan		
Liquidity Cost report		<p>The cost of liquidity is the additional charge of the recent loan (risk bonus) assuming a complete, maturity-matched refinancing (i.e. the cost of liquidity depends on the bank's specific and financial market assessment). The results show the changes in liquidity risk due to the new financing structure arising because of the alteration of the market position of the bank, and the cost of shaping a closed liquidity structure. Liquidity risk is the risk of a future increase in liquidity costs of the open funding position of the bank</p>
What if scenarios effects of the change of portfolio		<p><i>Downgrade:</i> 10% of matured banking sector sources are not renewed.</p> <p><i>Withdrawal of deposits</i></p> <p><i>Utilization Credit lines:</i> 50% of unused credit lines maturing in one year are utilized (in 7 days: 10%, in 8-14 days: 10%, in 15-30 days: 20%, in 31-90 days: 10%).</p>
Indicators		

IV. Conclusion

Every bank needs a sound A/L Risk management system, even though developing an A/L Risk management system is a complicated and time consuming job. Based on the Basel principles the sound risk management system involves the application of four basic elements that are the following:

1. Appropriate board and senior management oversight
2. Adequate risk management policies and procedures
3. Appropriate risk measurement, monitoring, and control functions
4. Comprehensive internal controls and independent audits.

This book introduced you to the basic steps of the development of a sound ALM system based on the Basel principles. In the process of the system development the bank has to answer the main questions:

- Where is the Bank A/L Risk management system?
- How does the bank want to develop it?
- Should the bank need the best practice in all dimensions of A/L Risk management in the near future?
- How can the bank implement the best practice in A/L Risk management?

Analyzing the first dimension of A/L Risk management, we have to emphasize:

- The bank should pay close attention to the role of the BoD and senior management is very important in ALM
- Without the appropriately-operated ALCO, the bank cannot manage interest and liquidity risk efficiently
- Considering that the treasurer belongs to the front office area, CRO or CFO should be responsible for A/L Risk management unit.

Most rating agencies believe that if a bank uses VAR model, its risk management system is advanced. We, however, are of the opinion that a medium-sized bank's A/L Risk management system could be sound without using VaR model in the first stage. As it was mentioned earlier, hundreds of pages of advanced procedures and models sitting on a shelf are useless if no one can employ them. So the bank has to set out a Risk management policy and guidelines that contain those methodologies and procedures that the bank employs in its daily practice.

Studying tools of ALM the bank should define what interest rate and liquidity risk are, how they measure it, what the bank's risk appetite based on the capital requirement and the maximal acceptable loss. An efficient A/L Risk management system could not be without an appropriate IT system; the bank has to develop the IT system parallel with implementing new methodology of risk measurement. IT can support a reasonable report system. Among methods of interest rate risk measurement Fund Transfer Pricing was also introduced. The bank can use it not only for measuring interest rate risk exposure but it could be employed for planning and profitability management throughout the institution.

Building a sound A/L Risk management system is a big challenge for the bank, but it makes bank operations more efficient

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