

Analysis of key drivers for value creation in emerging markets on the base of Excel bank valuation model

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Vienna, 31 May 2010

Affidavit

I, **IRYNA ROMANENKO**, hereby declare

1. that I am the sole author of the present Master's Thesis, "Analysis of key drivers for value creation in emerging markets on the base of Excel bank valuation model", 75 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted this Master's Thesis as an examination paper in any form in Austria or abroad.

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List of abbreviations

ALCO – Assets and Liabilities Committee

BSC - Balanced Scorecard

CAPM - Capital Asset Pricing Model

EAD (or ED) - Exposure at Default (outstanding amount at default)

EBV – Excel Bank Valuation model

ECF - Equity Cash Flow

EPS – Earning per share

EVA – Economic Value Added™

FTP – Fund Transfer Prices

DCF - Discounted Cash Flow

GAAP – General Accepted Accounting Principles

IBNR - – Incurred But Not Recognized

IFRS – International Financial Reporting Standards

KPI - Key Performance Indicators

NBU – the National Bank of Ukraine

NWC - Net Working Capital

LGD - Loss Given Default

NOPLAT - Net Operating Profit less Added Tax

NOPAT - Net operating Profit after Taxes

TP – Transfer Prices

RAROC – Risk adjusted Return on (Risk adjusted) Capital

PD - Probability of Default

RWA – Risk Weighted Assets

VAR – Value at Risk

VBM - Value Based Management

WACC – Weighted Average Cost of Capital

Abstract

The main purpose of this paper is to help top management, risk managers and finance specialists of a bank who are involved in the strategic planning and budgeting process to test the strategic management decisions and evaluate their impact on the bank financial performance, profit & losses accounts, balance sheet, economic profit, bank value and share price. To fulfill this challenging assignment the Excel based bank valuation model was developed by the author of this paper. The main distinction of our approach from other similar analytical valuation models is the attempt to look at the bank from the inside point of view and integrate the standard bank valuation model in the strategic planning process of the banks in emerging markets, i.e. in Ukraine.

In this master thesis we provide a short overview of different company valuation models and explain why we used in our work the Equity Cash Flow method for valuing financial institutions rather than Discounted Cash Flow (DCF) method which analysts usually use to value non-financial companies. Earnings that banks generate depend on their financing decisions and choice of leverage. Therefore, to value financial institutions, analysts usually use the Equity Cash Flow (ECF) method instead of DCF applying the cost of equity as a discount factor instead of weighted average cost of capital (WACC). Moreover, in emerging markets it is not always possible to obtain reliable stock market information to apply the Capital Assets Pricing Model (CAPM) to estimate cost of equity, because the market itself is not developed or is illiquid. Thus, in our model we used shareholders expectations of return on invested equity.

We tested our EBV model on Raiffaizenbank Aval (Ukraine) audit report for 2006-2007 obtained from the bank website. Our Excel model includes generation of the main internal management accounting balance sheets, income statements as well as calculation of economic profit, economic capital and Risk Adjusted Return on (Risk Adjusted) Capital (RAROC) ratio for each main banking activity, as well as the bank valuation as a whole entity. To better understand the model and valuation results presented in this master thesis we have also explained the key management accounting and risk management methodologies (such as RAROC, VaR, transfer pricing and cost allocation) that used by banks across the world and that have been approved as the industry standards by Basel II since 2004.

We tested how the changes in the parameters influenced economic profit and value added by main bank's business activities. At the end of our analysis we have identified the list of parameters (external and internal) that are the most important ones for value creation in banking institutions. In addition to the market drivers included in our EBV model, we add the following:

- Information flow (publications, bank strategy, annual reports, brand, etc)
- Stocks liquidity (time to entry/ to exit, cost of transactions)
- Market expectations (overall economic growth, foreign investments)
- Macroeconomic indicators (money in circulation, savings, inflation, etc)

Further investigation in this field could be done to provide more reliable projections of share prices. Risk management department of one Ukrainian regional bank, where the author works now as Risk Management/MIS Expert under EBRD project, recently started to use this EBV model to test capital allocation and risk-based performance planning and reporting concepts.

Introduction

The main purpose of this paper is to help bank top management, risk managers and finance department specialists of a bank who are involved in the strategic planning process to test the strategic management decisions and evaluate their impact on the bank financial performance, profit & losses accounts, balance sheet, Economic profit, Bank value and Share price.

To fulfill this challenging assignment the Excel based bank valuation model was developed by the author of this paper. The valuation model is based on more than ten-year's author practical experience as a banking consultant in emerging markets (Ukraine, Russia, Belarus, Moldova, etc).

In this work we provide a short overview of different company valuation models and explain why we used in our work Equity cash flow method for valuing financial institutions rather than Discounted Cash Flow (DCF) method which analysts usually use for valuation of non-financial companies where operating decisions and financing decisions are separate. Peculiarities of using this model for financial institutions in emerging markets were discussed in Chapter 1 of the master Thesis.

The main distinction of our approach from other similar analytical valuation models is the attempt to look at the bank from the top management point of view and integrate the standard bank valuation model in the annual budgeting and planning process in banks in emerging markets, i.e. in Ukraine.

To better understand the model and valuation results presented in this master thesis, in Chapter 2 and 3 we have explained the key management accounting and risk management methodologies that are used by banks across the world and that have been approved as the industry standards by Basel II since 2004.

Usually the bank management would like to know which business segments or products' groups create or destroy value in the bank to make appropriate strategic decisions or motivate managers. For this purpose many banks analyze their different business activities separately using the transfer pricing methodology to allocate interest margin to these activities.

Banks have usually specified the three main banking activities. Performance of these business segments has to be analyzed and evaluated separately:

- Commercial banking (core loans and deposits activity),
- Trading activity (proprietary trading and trading on behalf of bank clients),
- Funds management books (the management of the overall liquidity position and funding requirements on behalf of Assets and Liabilities Committee (ALCO))

First and third activities are usually grouped under the heading "Banking Book" and trading under "Trading Book"¹

Our Excel model, in addition to bank valuation as a whole entity, includes generation of the three management accounting balance sheets, income

¹ Basel II, (June 2004), "International Convergence of Capital Measurement and Capital Standards: a Revised Framework", <http://www.bis.org/publ/bcbs107.htm>, pages 162-169

statements. It also calculates economic profit, economic capital and Risk Adjusted Return on (Risk) Capital (RAROC ratio) for each activity as a tool to compare performance by different business lines with different risks involved.

Explanation of RAROC and VAR models and approach to RAROC calculation on emerging markets is presented in Chapter 2 of this work:

- Economic capital calculation and allocation to cover unexpected credit, market and operational risks inherent in different activities of a bank
- Provisions calculation to cover expected credit risks inherent in different activities of a bank

In Chapter 3 will be presented a short description of other crucial management accounting methodologies for correct economic profit calculation of different bank activities:

- Transfer pricing
- Cost allocation methodologies

It is clear that implementation of the above-mentioned models in emerging markets has specific complications and problems connected to the lack of reliable market data. We also discussed these main problems as well as possible solutions in this paper.

Moreover, RAROC and VaR models have to be based on the bank's internal statistical data that has to be collected for at least 3-5 years on loan losses by products groups, currencies rates, securities price volatility, etc. However, we are not going to go deeply down into statistic in our work. Banks in Ukraine do not have well-developed statistical databases to calculate economic capital anyway. The main task for us in this work is rather to point out the main drivers for value creation in banking and to evaluate their influence on the bank's economic profit and performance.

Thus, we used expert valuation of economic capital needed to cover inherent risks as well as cost of equity estimates and some other important parameters of the model such as transfer rates used to relocate interest margin by products group and business lines. We tested how the changes in the parameters influenced economic profit and value added by main bank's business activities.

The developed model should help the bank top managers to concentrate on value creation for the bank shareholders during their strategic planning process rather than on the simple financial performance planning and measurement.

Chapter 1 Bank valuation models

Summary

In this chapter we provide a short overview of different company valuation models and explain why we used in our work the Equity cash flow method for valuing financial institutions rather than the Discounted Cash Flow (DCF) method which analysts usually use to value non-financial companies where operating and financing decisions are separate. For financial companies we cannot value operations separately from interest income and expenses, because they are main components of their profit.

Another distinction in valuing banks involves the concept of invested capital. Earnings that banks generate highly depend on their financing decisions and choice of leverage. Therefore, to value of financial institutions, analysts usually use the Equity Cash Flow (ECF) method instead of DCF applying the cost of equity as a discount factor instead of waited average cost of capital (WACC).

Moreover, in emerging markets it is not always possible to obtain reliable stock market information to apply the Capital Assets Pricing Model (CAPM) described in this Chapter to evaluate cost of equity, because the market itself is not developed or is illiquid. Thus, in our model we used shareholders expectations on return on invested equity.

At the beginning of this chapter we will summarize the theoretical background of the DCF model. Further in this section we will present the peculiarities of cost of equity, cost of capital and Free Cash Flow (FCF) estimation for banks. At the end we will describe Equity Cash Flow and Economic Profit Discounted methods that we applied in our Excel bank valuation (EBV) model.

We tested our EBV model on Raiffaizenbank Aval (Ukraine) audit report for 2006-2007 obtained from the bank website. Taking into account the global financial crises and the situation in the Ukrainian banking industry in 2008-2009, we assume that there is no high growth potential and the bank is already in a stable slow growth phase.

The Bank financial report was prepared in accordance with IFRS standards. It has allowed us to develop detailed analysis by bank business lines using operational segments financial information disclosed by auditors as required by IFRS 8. The summary of the bank valuation is presented in Appendix 5.

1.1. Overview of Business Valuation models

1.1.1. Discounted Cash Flow valuation model

The purpose of DCF valuation model is to determine the value of a company in terms of its future cash flows. The cash flows are adjusted with certain items (e.g. those not related to company's core businesses or those with no cash effect) in order to make sure the flows adequately reflect the cash actually generated.

The well known formula for Discounted Cash Flows valuation² is:

² Thomas Dangl, Otto Randl, (2009), "Business Valuation, Managing and Measuring Value of companies", EMBA Mergers & Acquisitions lectures slides, Vienna Technical University, page 77

$$\text{Value} = \sum_{t=1}^{t=n} \text{CF} / (1+r)^n \quad (1.1)$$

where,

n = Life of the asset

CF = Cash flow in period t

r = risk adjusted discount rate

An Equity Valuation DCF model values just the equity stake in the business. A firm Valuation DCF model values the entire firm, which includes, besides equity, the other claims in the firm.

The value of equity is obtained by discounting expected cash flows to equity, i.e., the residual cash flows after meeting all expenses, tax obligations and interest and principal payments, at the cost of equity, i.e., the rate of return required by equity investors in the firm³:

$$\text{Value of Equity} = \sum_{t=1}^{t=n} \text{CF to Equity}_t / (1+k_e)^n \quad (1.2)$$

where,

CF to Equity_t = Expected Cash flow to Equity in period t

k_e = Cost of Equity

The dividend discount model is a specialized case of equity valuation, and the value of a stock is the present value of expected future dividends.

The value of the firm is obtained by discounting expected cash flows to the firm, i.e., the residual cash flows after meeting all operating expenses and taxes, but prior to debt payments, at the weighted average cost of capital, which is the cost of the different components of financing used by the firm, weighted by their market value proportions⁴:

$$\text{Value of Firm} = \sum_{t=1}^{t=n} \text{CF to Firm}_t / (1+WACC)^n \quad (1.3)$$

where,

CF to Firm_t = Expected Cash flow to Firm in period t

WACC = Weighted Average Cost of Capital

A publicly traded firm potentially has an infinite life. The value is therefore the present value of cash flows forever. Since we cannot estimate cash flows forever, we estimate cash flows for a growth period and then estimate a terminal value, to capture the value at the end of the period⁵:

³ Aswath Damodaran, (2006), "Valuation", Professor of Finance at the Stern School of Business, New York University, www.stern.nyu.edu/adamodaran/ch12.pdf, page 6

⁴ Tim Koller, Marc Goedhart, David Wessels, (2005), "Valuation measuring and managing the value of companies", 5th edition, McKinsey & Company, John Wiley & Sons Inc, page 697

⁵ Aswath Damodaran, (2006), "Valuation", Professor of Finance at the Stern School of Business, New York University, www.stern.nyu.edu/adamodaran/ch12.pdf, page 9

$$\text{Value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^n} \quad (1.4)$$

When firms' cash flows grow at a constant rate forever, the present value of those cash flows can be written as⁶:

$$\text{Value} = \frac{\text{Expected Cash Flow Next Period}}{(r - g)} \quad (1.5)$$

where,

r = Discount rate (Cost of Equity or Cost of Capital)

g = Expected growth rate

This constant growth rate is called a stable growth rate and cannot be higher than the growth rate of the economy in which the firm operates. While companies can maintain high growth rates for extended periods, they will all approach stable growth at some point in time. When they do approach stable growth, the valuation formula above can be used to estimate the terminal value of all future cash flows.

A key assumption in all discounted cash flow models is the period of high growth, and the pattern of growth during that period. In general, we can make one of three assumptions⁷:

- There is no high growth, in which case the firm is already in stable growth
- There will be high growth for a period, at the end of which the growth rate will drop to the stable growth rate (2-stage)
- There will be high growth for a period, at the end of which the growth rate will decline gradually to a stable growth rate (3-stage)

The assumption of how long high growth will continue will depend upon several factors including:

- The size of the firm (larger firm -> shorter high growth periods)
- Current growth rate (if high -> longer high growth period)
- Barriers to entry and differential advantages (if high -> longer growth period)

There are some critical ingredients in discounted cash flow valuation. Errors in estimating the discount rate or cash flows and discount rates can lead to serious errors in valuation. At an intuitive level, the discount rate used should be consistent with both the riskiness and the type of cash flow being discounted.

We tested our EBV model on Raiffaizenbank Aval (Ukraine) audit report for 2006-2007 obtained from the bank website. Taking in to account the global financial crises and the situation in the Ukrainian banking industry in 2008-2009, we assume that there is no high growth potential and the bank is already in a stable slow growth phase.

⁶ Tim Koller, Marc Goedhart, David Wessels, (2005), "Valuation measuring and managing the value of companies", 5th edition, McKinsey & Company, John Wiley & Sons Inc, page 56

⁷ Thomas Dangl, Otto Randl, (2009), "Business Valuation, Managing and Measuring Value of companies", EMBA Mergers & Acquisitions lecture slides, Vienna Technical University, page 11

1.1.2. Cost of Capital

As presented in Formula (1.3) Cost of Capital is an important component of a DCF valuation model. Calculation of cost of capital will depend upon the components of financing (debt, equity or preferred stock) and the cost of each component. In summary, the cost of capital is the cost of each component weighted by its relative market value⁸:

$$WACC = K_e * (E / (D + E)) + K_d * (D / (D + E)) * (1 - T_m) \quad (1.6)$$

Where

K_e – cost of equity

K_d – cost of debts

$E / (D + E)$ – portion of equity (market value)

$D / (D + E)$ – portion of debts (market value)

T_m – company marginal income tax rate

1.1.3. Cost of Equity

It is important component of Equity cash flow valuation model (see Formula (1.2)). The cost of equity is the rate of return that investors require to make an equity investment in a firm. There are two approaches to estimating the cost of equity:

- A risk and return model
- A dividend – growth model

Using the Capital asset pricing model (CAPM), for instance, gives us a cost of equity based up on the beta of the equity in the firm.

Having undeveloped capital market in Ukraine and, consequently, difficulties with estimations of beta for Raiffaisen Aval as well as with other market data needed for CAPM, we just provided below the example of estimating the Cost of Equity for Deutsche Bank presented by Aswath Damodaran, Professor of Finance at the Stern School of Business, in one of his presentations on Bank valuation⁹.

Deutsche Bank is in two different segments of business: commercial banking and investment banking. To estimate its commercial banking beta, we should use the average beta of commercial banks in Germany.

To estimate the investment banking beta, we will use the average beta of investment banks in the US and UK. According to Aswath Damodaran estimations:

Table 1.1¹⁰

Comparable Firms	Average Beta	Weight
Commercial Banks in Germany	0.90	90%
UK and US investment banks	1.30	10%

⁸ Thomas Dangl, Otto Randl, (2009), Lecture slides “Business Valuation, Managing and Measuring Value of companies”, EMBA Mergers & Acquisitions lecture slides, Vienna Technical University, page 128

⁹ Aswath Damodaran “Valuation”, Professor of Finance at the Stern School of Business, New York University, www.stern.nyu.edu/adamodaran/ch12.pdf, page 18

¹⁰ Aswath Damodaran “Valuation”, Professor of Finance at the Stern School of Business, New York University, www.stern.nyu.edu/adamodaran/ch12.pdf, page 19

The weight was estimated as proportion of commercial and investment assets in total assets of the Deutsche Bank.

Beta for Deutsche Bank = $0.9 \times (0.90) + 0.1 \times (1.30) = 0.94$

$$\text{Cost of Equity} = \text{Real Risk free Rate} + \text{Beta} \times \text{Premium}^{11} \quad (1.7)$$

Where,

Real Risk free Rate = 7.5% (Long term Growth rate in the economy)

Risk Premium = 5.5% (EU Premium + Country Risk (from rating))

Thus,

Cost of Equity for Deutsche Bank (in DM) = $7.5\% + 0.94 \times (5.5\%) = 12.67\%$

It should be also mentioned that when calculating the estimated beta for the Deutsche Bank we have to adjust it for the individual level of leverage of the bank before we can use it in the Cost of Equity formula¹².

1.1.4. Estimation of Free Cash Flow to Firm

Now we will consider the estimation of another important element of company valuation (Formula (1.3)).

Below is presented the approach for Company Free Cash Flow calculation¹³:

$$\begin{aligned} \text{Free Cash Flow to Firm} = \\ \text{Free Cash Flow to Equity} + \text{Interest Expenses} \times (1 - \text{tax rate}) + \text{Principal} \\ \text{Repayments} - \text{New Debt Issues} + \text{Preferred Dividends} \end{aligned} \quad (1.8)$$

$$\text{Cash Flow to Equity} = \text{Net income} - (\text{Capital Expenditure} - \text{Depreciation} - \text{Changes in working capital}) \times (1 - \text{Debt/ Capital ratio})$$

Or the simpler approach:

$$\begin{aligned} \text{Cash Flow to Firm} = \\ \text{EBIT} \times (1 - \text{tax rate}) + \text{Depreciation} - \text{Capital Spending} - \\ - \text{Change in Working Capital} \end{aligned} \quad (1.9)$$

However, banks borrow money (whether in the form of deposits or of loans from other financial institutions or markets) and then lend it out.

¹¹ Tim Koller, Marc Goedhart, David Wessels, (2005), "Valuation measuring and managing the value of companies", 5th edition, McKinsey & Company, John Wiley & Sons Inc, page 294

¹² Richard A. Brealey, Stewart C. Myers, Franklin Allen, (2008), "Principles of Corporate Finance", 7th edition, John Wiley & Sons Inc., pages 153-211

¹³ Anton Burger, (2009), "Accounting principles", EMBA Mergers & Acquisitions lecture slides, Vienna Technical University, pages 41-47

It follows that when we are valuing or analyzing a bank, we should distinguish between the bank's borrowing for the purpose of making loans and the bank's permanent debt.

One way of viewing valuation is through the use of the accounting approach, but using market values. We rewrite the balance sheet by moving the current liabilities from the liabilities/equity side to the asset side of the balance sheet:

Table 1.2¹⁴

Original balance sheet			
Assets		Liabilities	
Cash and marketable securities		Operating current liabilities	
Operating current assets		Debt	
Net fixed assets		Equity	
Goodwill			
Total assets		Total liabilities and equity	
The enterprise evaluation "balance sheet"			
Assets		Liabilities	
Cash and marketable securities			
Operating current assets		Debt	
- Operating current liabilities = Net Working capital			= PV (FCFs discounted at WACC)
Net fixed assets			
Goodwill		Equity	
Market value		Market value	

Thus to value a company, we set:

$$\text{Market value} = \text{Initial cash balances} + \sum FCF_t / (1+WACC)^t \quad (1.10)$$

If we are valuing the equity of the firm, we subtract the value of the debt:

$$\begin{aligned} \text{Equity value} &= \text{Market value} - \text{Debt} = \\ &= \text{Initial cash balances} + \sum FCF_t / (1+WACC)^t - \text{Debt} = \\ &= \sum FCF_t / (1+WACC)^t + (\text{Initial cash balances} - \text{Debt}) \end{aligned} \quad (1.11)$$

This means that we can write the enterprise balance sheet in a slightly different form:

¹⁴ Benninga Sarig, (2001), "Valuing financial institutions: Bank Valuation", benninga@wharton.upenn.edu, www.senverb.boun.edu.tr/pdf/Bank%20Valuation.pdf, page 2

Table 1.3¹⁵

The enterprise evaluation "balance sheet" a slight variation (cash netted out from debt)			
Assets		Liabilities	
Operating current assets	}	Debt - Cash and marketable securities = Net debt	
- Operating current liabilities = Net Working capital		= PV (FCFs discounted at WACC)	
Net fixed assets			
Goodwill		Equity	
Market value		Market value	

Both variations on the enterprise valuation "balance sheet" give the same equity value. A firm's permanent capital is usually valued by discounting the firm's free cash flows at its weighted average cost of capital. Thus for a firm which has only equity and debt:

$$\begin{aligned}
 \text{Enterprise value} &= \text{Value of firm's Equity} + \text{Debt} = \\
 &= \sum \text{Anticipated FCF}_t / (1 + \text{WACC})^t
 \end{aligned}
 \tag{1.12}$$

The FCF calculations for an industrial company have to be modified somewhat when considering a financial company. Recall that the standard FCF calculation for an industrial company is along the following lines:

Table 1.4¹⁶

Free Cash Flow Calculation for a Non-Financial Company	
Item	Explanation
Profit after taxes	The starting point for FCF
Add back depreciation	Depreciation is a non-cash expense
Add back after-tax interest expenses	FCF is an operating concept. Adding interest back after-tax interest costs neutralizes the effects of interest on the firm's Profits
Subtract out increases in operating Net Working Capital (NWC)	NWC is a financial burden on the Company which is not accounted for in the Profit; the emphasis on operating NWC comes because we include only items like Accounts Receivable, Accounts Payable, Inventories, etc. For purposes of calculating NWC, we do not include changes in Cash (assumed to be a store of value), Notes Payable, Current Portion of LTD, etc.
Subtract increases in Fixed Assets at Cost	This measures the cost of purchasing new productive assets for the company
=Free Cash Flow	

¹⁵ Benninga Sarig, (2001), "Valuing financial institutions: Bank Valuation", benninga@wharton.upenn.edu, www.senverb.boun.edu.tr/pdf/Bank%20Valuation.pdf, page 4

¹⁶ Benninga Sarig, (2001), "Valuing financial institutions: Bank Valuation", benninga@wharton.upenn.edu, www.senverb.boun.edu.tr/pdf/Bank%20Valuation.pdf, page 5

1.1.5. Estimation of Banks Free Cash Flow

The same logic we have used above can be applied to banks. However, there are some important differences between banks and ordinary companies¹⁷:

- On the asset side: for an ordinary company, cash and marketable securities usually constitute savings (like negative debt), whereas for a bank most marketable securities and some of the cash are operating current assets.
- On the liability side: for an ordinary company, we put all debt items together. For a bank, most short-term debt items are operating current liabilities and are therefore part of the banks working capital.

Thus, this FCF calculation has to be modified somewhat for a financial company. Since cash, loans, deposits, short-term borrowings, etc. are all part of a bank's productive working capital, we can not add back the net interest on these items. What complicates things for a bank is that its productive assets are debts and loans.

For an industrial company, cash is usually not part of operating working capital. For a bank, however, a significant part of the cash balances is clearly a part of working capital.

On the other hand, the bank's permanent capital includes both its equity and its long-term borrowing. Thus our calculation for a bank's Free Cash flow could be:

Table 1.5¹⁸

Free Cash Flow Calculation for a Financial Company	
Item	Explanation
Profit after taxes	The starting point for FCF
Add back depreciation	Depreciation is usually not a very significant item
Add back after-tax interest on permanent debt items (typically Long-Term debt)	This leaves the net interest income on the bank's productive activities – its financial intermediation
Subtract out increases in operating Net Working Capital (NWC)	Since we define the NWC to include deposits, etc., this effectively subtracts the self-funded part of the banks operations from the FCF.
Subtract increases in Fixed Assets at Cost	Note that Fixed Assets for banks are typically small relative to total assets
=Free Cash Flow	

¹⁷ Benninga Sarig, (2001), "Valuing financial institutions: Bank Valuation", benninga@wharton.upenn.edu, www.senverb.boun.edu.tr/pdf/Bank%20Valuation.pdf, page 7

¹⁸ Benninga Sarig, (2001), "Valuing financial institutions: Bank Valuation", benninga@wharton.upenn.edu, www.senverb.boun.edu.tr/pdf/Bank%20Valuation.pdf, page 8

1.1.6. Estimation of Bank Equity Cash Flow

In practice, however, to evaluate banks the Equity Cash Flow method is usually used. We can derive Equity Cash Flow from two starting points. First, equity cash flow is driven by net income minus the earnings retained in the business¹⁹:

$$\text{Cash Flow to Equity} = \text{Net income} - \text{Increase in Equity} + \text{Other Comprehensive Income} \quad (1.13)$$

Net income represents earnings theoretically available to shareholders after the bank has paid all expenses, including payments to debts holders. However, net income is not cash flow. A financial institution has to increase its equity if its assets are growing, otherwise regulators and public may worry about the bank's solvency. Increase in equity reduces the equity cash flow, because it means that the bank is setting aside earnings that could be paid out to shareholders.

Other comprehensive income consists of some non cash items that are added back or subtracted from the equity account according to IFRS or US GAAP such as:

- net unrealized gains / losses on certain debt and equity investments
- net unrealized gains / losses on hedging activities
- adjustments to the minimum pension liabilities
- some foreign currency translation items

All these non cash items should be eliminated from the equity. However, on Ukrainian banking market as well as on some other developing markets there are no significant hedging activities nor pension liabilities. Some adjustments could be made only for currency translations and some debt and equity investments.

Another way to calculate equity cash flow is to sum up all cash paid or received from shareholders, including dividends, share repurchases, new shares issuance.

In addition to these two relatively simple approaches we can calculate equity cash flow in the bank as the changes in all the balance sheet accounts. All approaches have to provide the same result.

The Equity cash flow method usually equates with the discounting dividends method. In a simplified world dividends are indeed the same as equity cash flow. However, in the real word banks are more complex. Dividends are the largest part of the equity cash flow, but other items such as share buybacks and issuances still have a material effect.

In our EBV model we use the second approach:

- dividends
- share repurchases
- new shares issuance

When we use the equity cash flow method, we also need to modify the continuing value formula and the estimation of economic profit. In doing so, we will use the cost of equity instead of the WACC. Moreover, for emerging markets we are going

¹⁹ Tim Koller, Marc Goedhart, David Wessels, (2005), "Valuation measuring and managing the value of companies", 5th edition, McKinsey & Company, John Wiley & Sons Inc, page 664

to use the bank shareholders estimation of expected return on equity that for our bank valuation model will be equal to the cost of equity.

To apply this formula we have to adjust net income by adding back goodwill amortization and should compare the return on incremental equity for the continuing value with ROE before goodwill. To estimate bank value we used in our model following formulas are recommended by McKinsey & Company publications²⁰:

$$\text{Bank Value} = \sum_{t=1}^{t=n} \text{CFE} / (1 + K_e)^t + \text{Continuing value} \quad (1.14)$$

where

CFE – cash flow to equity within the explicit forecast period

K_e – cost of equity

For continuing value we used a value driver formula:

$$\text{Continuing value} = (\text{NI} * (1 - g / \text{RONE})) / (K_e - g) \quad (1.15)$$

where

NI – Net income in the first year after the explicit forecast end

g – Net income growth in the continuing – valuing period

K_e – cost of equity

RONE – Incremental return on new equity in the continuing-value period

1.1.7. Estimation of Bank Economic Profit

The formula that we used for estimation financial company economic profit is also proposed by McKinsey & Company publications²¹:

$$\text{Economic profit} = (\text{ROE} - K_e) * \text{Equity}$$

or

$$\text{Economic profit} = \text{Net income} - (\text{Equity} * K_e) \quad (1.16)$$

where

K_e – cost of equity

ROE – return on equity

We can also value a financial company by discounting its economic profit.

$$\text{Bank Value} = \text{IC} + \sum_{t=1}^{t=n} \text{EP} / (1 + K_e)^t + \text{Continuing value} \quad (1.17)$$

where

IC – invested capital (shareholders' funds) at the beginning of the estimation period

²⁰ Tim Koller, Marc Goedhart, David Wessels, (2005), "Valuation measuring and managing the value of companies", 5th edition, McKinsey & Company, John Wiley & Sons Inc, page 126-127

²¹ Tim Koller, Marc Goedhart, David Wessels, (2005), "Valuation measuring and managing the value of companies", 5th edition, McKinsey & Company, John Wiley & Sons Inc, page 119

EP – economic profit of the bank in the explicit forecast period
and

$$\text{Continuing value} = \\ = \text{Current economic profits} + \text{Future economic profits}$$

$$\text{Current economic profits} = EP_{\text{terminal}} / (1+K_e)^n$$

$$\text{Future economic profits} = (NI * g / ROE * (ROE - K_e)) / ((K_e - g) * K_e)$$

(1.18)

where

EP_{terminal} - economic profit forecast for terminal period

NI – Net income in the first year after the explicit forecast end

K_e – cost of equity

ROE – return on equity

1.1.8. Forecasting Bank Future Equity Cash Flows

Forecasting bank equity is a more complex task than just the forecast based on historical data that is usually used for the companies. The reason is that as banks would like to growth and increase their earning assets they have to increase regulatory capital to make sure that they do not achieve high return simply by operating at an unsustainably high level of leverage.

From the perspective of regulators and risk managers, the amount of equity a financial institution should have depends on the risks in its portfolios. Basel I accord established rules for banks regarding how much capital they must have based on their level of risk-weighted assets (RWA).

RWA were defined as a bank's loan portfolio and other financial assets, weighted by the riskiness of different classes of borrowers. The same accord also specified how much of the capital had to consist of shareholders equity, and how much could consist of other forms of financing (for example subordinated debt instruments).

In our model we used regulatory National Bank of Ukraine capital adequacy ratios (equivalent to Basel I) to estimate regulatory equity needed in accordance with planned assets growth:

- Capital adequacy ratio²² as percentage of RWA: H2 = 9% * RWA
- Capital adequacy ratio as percentage of Total assets: H3 = 10% * Total Assets

The Basel II accord approved in 2004 provides banks with more flexibility in using internal risk models such as RAROC and VAR to assess their capital needs. According to Basel II banks can make internal calculations of the risk capital required to operate prudently using their own statistics on loan losses by product groups as well as losses related to currencies rates volatility and securities price volatility, etc. In more details this approach will be described further in Chapter 2 as we need to understand for our modeling purpose the basic idea on economic capital calculation and allocation for internal risk management needs of a bank.

²² Regulation of the National Bank of Ukraine № 315, (June 2009), Methodology for calculation of regulatory capital adequacy ratios

1.1.9. Bank Value from the Outside

In building a cash flow model of a bank from the outside, we cannot truly understand the contribution of mismatch profits²³ to overall net interest income, the quality of the loan portfolio, or whether a bank has excess of equity or not. However, giving these shortcomings, we can still use an equity cash flow model to understand a bank's economics and prospects.

We have created and tested our Excel model for the bank performance forecasting on the base of audited report of Raiffaisenbank Aval (Ukraine) available at the bank website. Unfortunately, we have found audited reports only for Y2006-2007. Bank audited reports prepared in accordance with IFRS standards for Y2008-2009 are still not available at the website.

We tested our EBV model using the balance sheet and income statement prepared in accordance with IFRS 8 disclosing the information on operational segments of the bank. It has allowed us to have some internal perspective on the bank performance and derive more detailed balance sheet and P&L with breakdown by corporate, retail and Interbank business lines' products (overdrafts, long-term loans, current accountants, deposits, provisions by segments) in all currencies translated in to UAH.

On the high level our forecast approach was as follows:

- In Appendix 1 presented the result of our BS forecast. We forecast bank total assets growth using as a driver of historical assets / liabilities growth in banking industry and made our adjustments for assets growth taking into account the crises situation in Ukraine in 2008-2010;
- We also calculated the percentage of each assets item to total assets (assets structure);
- Next we did calculations of some BS structural ratios (Appendix 4) on the historical information Y2006-2007 such as:
 - cash as a % of current accounts and deposits (National Bank reserve requirements to estimate minimum cash needed by the bank);
 - liquid assets to current accounts;
 - loans and investments to current accounts, deposits, own securities issued;
 - provisions to loans and investments by product group
 - etc
- Taking into account the global financial crises, we assume that there is no high growth potential and the bank is already in a stable slow growth phase. So, we did assets forecast for 2008-2009 by assuming slow growth of each assets item. We also increased portion of provisions in total assets
- After that we calculated "Total assets" and "Risk weighted assets" for forecasted Y2008-2010
- Multiplying RWA by 9% (H2 regulatory capital adequacy ratio) we received needed Tier I regulatory Equity for 2008-2010.
- Adding some other items such as goodwill, subordinated debts we can forecast Tier II Equity
- Assets minus Equity = Total Liabilities
- Having growth driver and structure of liabilities in 2006-2007 we projected growth and structure of liabilities by items for 2008-2010 (Appendix 1).

²³ Mismatch profit is an additional interest income that banks earn placing short-term deposits into long-term loans. In this case banks increase liquidity risks as well as earn additional interest profit due to difference between short-term and long-term market interest rates.

- We made adjustments to balance the projected balance sheets by increasing amount of cash from the assets side or increase balancing debt from the liabilities side
- As for P&L forecast we have calculated the following drivers on the basis of historical information for 2006-2007 (Appendix 2):
 - Interest received to average earning assets
 - Interest paid to average interest-bearing liabilities
 - Growth in commissions received
 - Growth in commissions paid
 - Growth in trading profit
 - Profit on investments to investments
 - Operating expenses to interest and commission income
 - Minority interest in profit
 - Other operating result to total assets
 - Operating expenses to number of employee
- Having this figures for 2007 we made projections of P&L items or 2008-2010
- We also split up interest received to average earning assets and interest paid to average interest-bearing liabilities by:
 - Interest received on short term earning assets to short term earning assets
 - Interest received on long term earning assets to long term earning assets
 - Interest paid on current interest-bearing liabilities to average current interest-bearing liabilities
 - Interest paid on deposits to average deposits interest-bearing liabilities
- To check our expected performance we calculated some important performance ratios and if needed adjusted our forecast
- To complete the valuation, we compute equity cash flow as presented in Appendix 3 and calculate continuing value using the formulas described earlier in this chapter
- To check our overall valuation we also calculated an annual economic profit forecast and economic profit continuing value. Discounting these items to the present and adding to the initial level of the equity we get the same results as for our equity cash flow model
- We discounted our equity cash flow and economic profits by cost of equity that was estimated as the similar bank shareholders expectations on return on equity invested. Having current consulting project in one of the Ukrainian banks, we discussed with key bank shareholders (EBRD and Ukrainian partner) their expectations on return on equity.

In emerging markets it is not always possible to obtain reliable stock market information to apply CAPM model described in this Chapter to evaluate cost of equity, because the market itself is not developed or illiquid. Thus, in our model we used shareholders expectations related to return on invested equity.

Moreover, some additional return that insiders can get from borrowing from the bank at interest rate below market, have to be taking in to account when we are estimating the cost of equity for the bank. However, this data is not easy to obtain from the financial reporting. This is why it is so important to do good bank valuation to get an access to internal management accounting data. In the next Chapter we will discuss the issues related to bank valuation from inside.

1.2. Economic value added (EVA™)

1.2.1. Main theory behind EVA™

This section presents the main theory about EVA and shows what the theory of EVA means in practice for banks.

EVA measures whether the operating profit of a company is enough compared to the total costs of capital employed. Stewart defined companies EVA as Net operating profit after taxes (NOPAT) minus a capital charge²⁴:

$$EVA = NOPAT - \text{Cost of Capital} * \text{Capital employed} \quad (1.19)$$

Or equivalently, if the rate of return is defined as NOPAT/CAPITAL, this turns into a perhaps more revealing formula:

$$EVA = (\text{Rate of Return} - \text{Cost of Capital}) * \text{Capital} \quad (1.20)$$

Where:

Rate of return = NOPAT/Capital

Capital = Total balance sheet minus non-interest bearing debt in the beginning of the year (or total assets minus total liabilities in case of banking organizations)

Cost of capital = Cost of Equity * Proportion of equity from capital + Cost of debt (or cost of equity for banks) * Proportion of debt from capital * (1-tax rate).

Cost of capital or weighted average cost of capital (WACC) is the average cost of both equity capital and interest bearing debts of a company. The estimation of cost of company debt is naturally more straightforward, since its cost is explicit. Cost of debt includes also the tax shield due to tax allowance on interest expenses.

However, as mentioned in previous sections analysts usually use for banking institutions cost of equity instead of cost of capital. Cost of equity is the opportunity return from an investment with the same risk as the bank has. Cost of equity is usually defined by the Capital asset pricing model (CAPM) as described in section 1.1.3. Having in mind all these considerations for banking institutions EVA can be presented as:

$$EVA = (\text{Return on Equity} - \text{Cost of Equity}) * \text{Equity} \quad (1.21)$$

The idea behind EVA is that shareholders must earn a return that compensates the risk taken²⁵. In other words, equity capital has to earn at least the same return as similarly risky investments in equity markets. If that is not the case, then there is no real profit made and actually the company operates at a loss from the viewpoint of shareholders.

On the other hand if EVA is zero, this should be treated as a sufficient achievement because the shareholders have earned a return that compensates the risk. This approach - using average risk-adjusted market return as a minimum requirement - is justified since that average return is easily obtained from diversified long-term

²⁴ Tim Koller, Marc Goedhart, David Wessels, (2005), "Valuation measuring and managing the value of companies", 5th edition, McKinsey & Company, John Wiley & Sons Inc, page 116

²⁵ Al Ehrbar, (1998), "Stern Stuart's Economic Value Added", John Wiley & Sons Inc

investments on stock markets. Average long-term stock market return reflects the average return that the public companies generate from their operations.

EVA is based on the common accounting based items like interest bearing debt, equity capital and net operating profit. It differs from the traditional measures mainly by including the cost of equity. Mathematically EVA gives exactly the same results in valuations as Discounted Cash Flow (DCF) or Net present value (NPV)²⁶, which are long since widely acknowledged as theoretically best analysis tools from the shareholders' perspective²⁷.

These both measures include the opportunity cost of equity, they take into account the time value of money and they do not suffer from any kind of accounting distortions. However, NPV and DCF do not suit in performance evaluation because they are based exclusively on cash flows. EVA in turn suits particularly well in performance measuring.

1.2.2. EVA and Capital Allocation

EVA sets the minimum acceptable performance level to the rate of return in the long run. This minimum rate of return is based on the average (risk-adjusted) return in the equity markets. The average return is a benchmark that should be reached. If a company can not achieve the average return, then the shareholders would be better off if they allocated their capital to other industries or to other companies²⁸.

Exactly the same considerations we can apply for different lines of businesses in side the bank. Managers can decide to eliminate some business lines or activities that are underperformed. Moreover, for each banking business in developed markets we can find relevant market indicators for expected return on capital. For example, we can find average return on capital for:

- Retail banks
- Corporate banks
- Investment banks

These benchmarks could not be directly applicable on emerging markets where stock market usually is not developed enough. Thus, as we mentioned above, in our model we will use bank shareholders expected return on invested capital as a base for the cost of equity estimation for EVA calculation.

1.3. EVA and Balanced Score Card

1.3.1. Key Value Drivers in Banking

In each organization a priority task for the Management Board and top managers is to establish a performance management system that allows them to track how their decisions affect value creation in the business.

²⁶ Tim Koller, Marc Goedhart, David Wessels, (2005), "Valuation measuring and managing the value of companies", 5th edition, McKinsey & Company, John Wiley & Sons Inc, page. 697

²⁷ Richard A. Brealey, Stewart C. Myers, Franklin Allen, (2008), "Principles of Corporate Finance", 7th edition, John Wiley & Sons Inc., pages 73-75

²⁸ Esa Mäkeläinen, (1998), "Economic Value Added as a management tool", Helsinki School of Economics and Business Administration, Department of Accounting and Finance, page 3, www.evanomics.com

This performance management system typically includes:

- Long term Strategic plans
- Tactical plans
- Budgets including capital expenditures budgeting
- Performance reporting and review
- Compensation system

Successful value creation requires that all components mentioned above are aligned to the company strategy so as to encourage decisions that maximize value. For example, if some products or services development is important from the strategic point of view, tactical plans, budgets, capital expenditures must include necessary actions and spending in the current year to develop the new products. Moreover, performance review must evaluate progress on new products, not just short term profit.

In the past more performance management systems focused on the company ability to generate Net income and on EPS estimation. Today many businesses accept the idea of Value Based Management (VBM) or Economic Value Added to link management compensation to shareholders value creation²⁹. Now many VBM incentive systems replaced Net income or EPS with metrics such as EVA or Economic profit.

However, successful and unsuccessful companies have seen that there are no magic bullets for creating a successful performance management system³⁰. The main questions still are whether the CEO adds value by understanding the economics of the business segments. Whether he is able to negotiate performance targets that are both challenging and achievable for the all units of the organization, whether he understands how non financial goals such as clients satisfaction or loyalty can influence financial results of the company, creating sustainable competitive advantage.

A useful and important tool to connect EVA with management decisions at the different organizational levels is the Balanced Scorecard (BSC) model developed by Norton and Kaplan in the 1990ies³¹.

The main idea of the BSC for banks could be presented as to set up and balance strategic key performance indicators (KPIs) by four main perspectives:

- Client or business perspective
- Financial and risk perspective
- Organization and processes perspective
- Learning and growth perspective

Thinking from these four perspectives, top managers can link non financial goals such as number of clients per relationship managers, back office and risk management staff to financial results of the business segment such as revenue per client, loan losses, economic capital needed and economic profit.

²⁹ Andrew Black, Philip Wright, John Bachman, (1998), "In search of Shareholder Value - managing the drivers of performance", Price Waterhouse, Financial Times/Pitman Publishing

³⁰ Tim Koller, Marc Goedhart, David Wessels, (2005), "Valuation measuring and managing the value of companies", 5th edition, McKinsey & Company, John Wiley & Sons Inc, pages 405-427

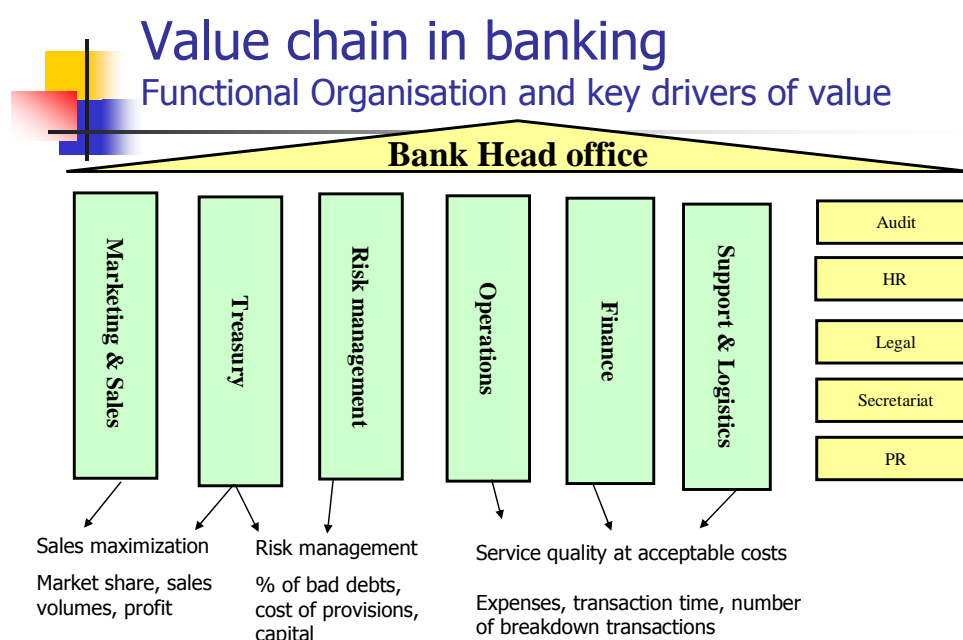
³¹ Robert S. Kaplan, David P. Norton (1996), "Balanced Scorecard: Translating Strategy into action", Harvard Business School Publishing Corporation

Making these scorecards available to all organizational levels (business lines and branches' managers as well as middle level employees at the head office) top managers can link employees' efforts across the organization to achieve strategic goals established by the Management Board.

Putting EVA as the key financial goal in Balanced Scorecards model³², bank top managers receive a powerful tool to significantly improve the performance management system in multi-business segment organizations such as banks are.

In Figure 1.1 we presented examples of KPIs that should be balanced across the bank within the strategic planning process:

Figure 1.1³³



These KPIs as well as BSC model itself were presented to Ukrainian and Russian banks within a number of consulting projects conducted by the author under EBRD projects dedicated to develop banking institutions on emerging markets.

Valuing the bank from the outside we have limited access to the needed internal data. Thus, in our EBV model we have performed simple analysis based on publicly available data.

We have connected some financial drivers such as operational expenses with non financial indicators such as number of employees in each business line. For the high level value modeling it is fairly acceptable approach. From our practical

³² Andrew Black, Philip Wright, John Bachman, (1998), "In search of Shareholder Value - managing the drivers of performance", Price Waterhouse, Financial Times/Pitman Publishing

³³ Irina Romanenko, (2007-2009), "Principals of banks organization structure", presentation materials for Bank Kazansky developed within EBRD Russian Regional Bank Institutional Building Program, slide 6

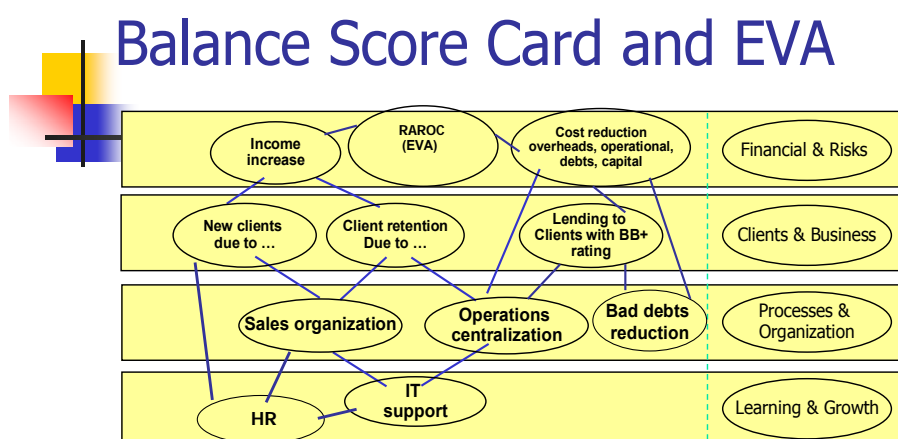
experience we realized that the main cost driver in banking for overheads and operational expenses is number of employees.

However, more detailed analysis of the cost behavior could be done from the inside and should be based on the bank's internal data such as number of employees by front, middle and back office as well as other cost drivers such as time spent on transaction, volume of transactions, numbers of clients, square meters allocated to business, etc. The technique of such analysis and cost allocation in banking institutions are described in Chapter 3.

Although cost control is an important driver for value creation, other drivers (including non-financial such as clients' satisfaction, number of client per account/relationship manager, decision time, number of failed transactions, etc) have to be considered when top managers developed their models for value creation from the inside³⁴.

The example of BSC with the high level value tree that the author developed for one of Ukrainian banks based on Kaplan and Norton Strategy Maps approach³⁵ is presented in Figure 1.2³⁶:

Figure 1.2



- Having approved Vision, Strategy and Financial Goals at the level of Board of Directors we can set up at each level of organization:
 - Targets: Reduce credit losses
 - Measures: % of bad loans in credit portfolio
 - KPIs: Reduce bad loans in credit portfolio up to **5%** at the end of this year due to ...

³⁴ Tim Koller, Marc Goedhart, David Wessels, (2005), "Valuation measuring and managing the value of companies", 5th edition, McKinsey & Company, John Wiley & Sons Inc, pages 405-427

³⁵ Robert S. Kaplan, David P. Norton (2004), "Strategy Maps: Converting Intangible Assets into Tangible Outcome", Harvard Business School Publishing Corporation

³⁶ Irina Romanenko, (2007-2009), "Strategic and tactical planning process in banks", presentation materials for Bank Kazansky developed within EBRD Russian Regional Bank Institutional Building Program, slide 22

Chapter 2 Economic profit and economic capital in banking

Summary

To better understand the model and valuation results presented in this master thesis we have explained the key management accounting and risk management methodologies that are used by banks across the world and that have been approved as the industry standards by Basel II since 2004.

Our Excel model, as well as bank valuation as a whole entity, includes generation of the three management accounting balance sheet, income statement as well as calculation of economic profit, economic capital and Risk Adjusted Return on (Risk Adjusted) Capital (RAROC) ratio for each main banking activity.

RAROC is the tool to compare performance by different business lines with different risks involved in their portfolios. Explanation of RAROC and VAR models and the approach to RAROC calculation on emerging markets is presented in this Chapter.

In this Chapter we also explain the model for economic capital calculation and allocation to cover unexpected credit, market and operational losses inherent in different activities of a bank as well as accounting and risk management models for provisions calculation to cover expected credit losses inherent in different activities of a bank.

However, taking into account data limitations typical for emerging markets we used a simplified approach for economic capital calculation, based on the owners' estimations for similar-sized bank of capital needed to cover unexpected credit, market and operational losses in each analyzed business segment.

We applied a simplified aggregated method where economic capital (unexpected losses) calculated as percentage of the relevant portfolio (see summary in Appendix 4). Expected losses we have estimated as equal to regulatory provisions accrued in the bank profit and losses accounts in relevant year.

2.1. Risk measurement and economic capital

Products or businesses with the equal profit may have different risks. The Risk adjusted performance measurement (RAPM) where profit earned by different banking businesses and products is compared with inherent risks became the industry standard approach to performance measurement approved by Basel II accord.

The economic capital calculation methodology is used by all modern banks to measure their performance, and is based upon the allocation of economic capital and risk costs to the bank's major activities. This will be very important later on for Ukrainian banks particularly when Basel II implementation becomes an issue.

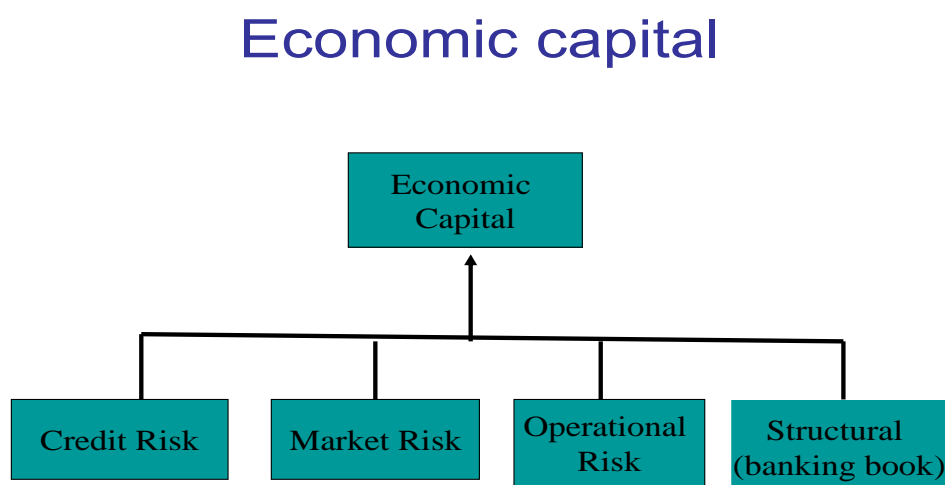
Economic capital allocation is also the model of risk measurement that allows banks to establish the capital requirements of the current bank-wide risk profile. Put simply, the economic capital is calculated for the bank according to its risk profile (credit, market, operational, structural) and should be compared with the

actual capital resources as well as with the capital required to achieve a target rating.

This model helps bank management to understand which areas, businesses, products, branches or units are over/under-performing and to take appropriate decisions. It allows the bank to centrally allocate resources to areas where it makes economic sense rather than surrender control to individual initiatives.

To summarize according to Basel II regulations³⁷, economic capital is the objectively measured *risk-based* capital needed to protect the bank against losses (credit, market, operational) arising from its business activities:

Figure 2.1³⁸



The main reason for economic capital calculation by different banking businesses and products is to:

- cover expected and unexpected risks attributed to business and products
- measure products and businesses performance at the common, comparable base
- identify the more profitable products and businesses
- make investment decisions
- develop incentive policy for business managers of a bank

2.2. Economic capital needed to cover Unexpected Credit Losses

Capital at risk or economic capital is the probabilistic, amount of value that can be lost due to volatility (at a defined confidence level) within a certain period of time. It is the economically needed capital, but not necessary equal to the available capital: nor the book capital, nor the market capital, nor the regulatory capital. It is

³⁷ Basel II, (June 2004), "International Convergence of Capital Measurement and Capital Standards: a Revised Framework", <http://www.bis.org/publ/bcbs107.htm>, pages 27-125

³⁸ Coopers & Lybrand, (January 1996), GARP: Generally Accepted Risk Principles, London: Coopers & Lybrand, principles 39-42

the amount of capital needed to cover unexpected losses arising from the bank's activities up to a pre-determined safety level.

The RAROC model was developed by Bankers Trust staff in 70ies³⁹. One of the authors of the idea was Charles Sanford, former dealer of Bankers Trust, who later became the CEO of the Bank. The model was widely accepted by banking industry in 1990ies when Bank of America, Barclay's and other big banks started to adopt it in their activity. In 1996 the model was approved by GARP and in 1999 by Basel Committee. In 2004 Basel II accord approved main ideas behind RAROC as industry standard.

A simplified approach for economic capital estimation was used in our EBV model and is briefly presented below.

2.2.1. Risk Adjusted Return on Capital at Risk (RAROC)

A generally accepted model for economic capital calculation covering the credit risk of a bank is *RAROC*. This model allows calculation of the expected and unexpected losses based on the bank's own statistical database on average (expected) losses and a deviation from average (unexpected) losses associated with each banking product.

The simple formula for RAROC is

$$\textbf{\textit{RAROC = Expected return / Economic Capital}} \quad (2.1)$$

where

Expected return (or "risk adjusted" return according to some authors⁴⁰) - profit after deduction of expected loan losses

Economic Capital – unexpected losses that bank is ready to accept according to its risk management policy or Management Board decisions

The nominator of the formula is *Return* that has to be adjusted by expected credit risks that covered by provisions for credit losses. The profitability of businesses and products has to be calculated taking in to account following components:

- Direct income including interest income, fees and commissions earned by different business or product

Minus

- Direct expenses allocated to business or product
- Allocated portion of overheads and portion of general administrative expenses
- Cost of financing calculated on the Transfer pricing model (TP)
- Part of allocated taxes

³⁹ Gene D. Guill, (2007), "Bankers Trust and the Birth of Modern Risk Management", the Wharton school, University of Pennsylvania, page 2

⁴⁰ Coopers & Lybrand, (January 1996), GARP: Generally Accepted Risk Principles, London: Coopers & Lybrand, principle 40

Transfer pricing and cost allocation models, problems with their implementation on emerging markets as well as the solutions that we put in our EBV model will be discussed in more details in Chapter 3 of this work.

To calculate RAROC the bank risk managers have to obtain the internal management accounting data by different assets products from a bank General ledger. Hypothetical example of needed data is presented in the following Table:

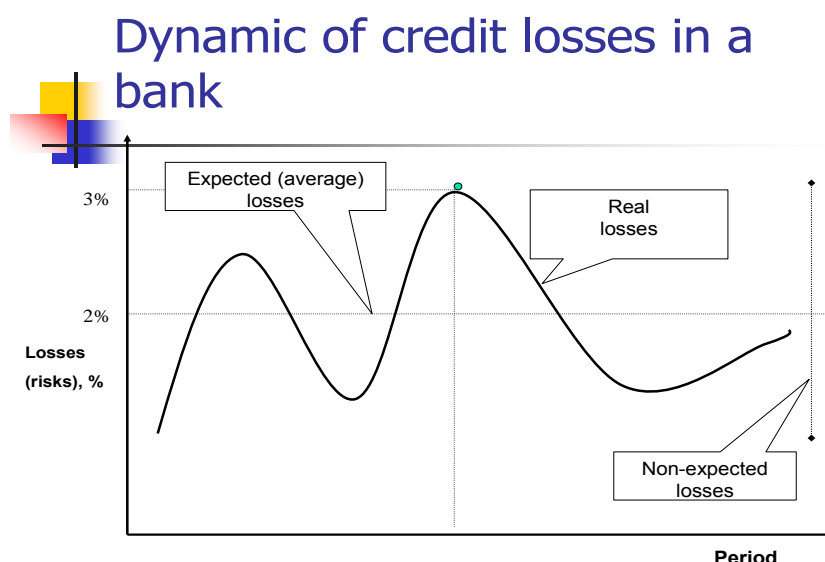
Table 2.1⁴¹

Date	Loan	Losses	Losses to Loan, %
...
1.01.97	120	7	5.8%
1.02.97	130	9	6.9%
1.03.97	125	5	4.0%
1.04.97	140	8	5.7%
1.05.97	145	6	4.1%
...

Expected losses are calculated as average losses per period by different types of credit products. In our example (see Table 2.1) average losses is equal to UAH 7ml. Or we can say that according to the bank internal statistic one client out of 10 on average did not repay the loan.

Unexpected losses are calculated as a deviation from the mean. For example, in some years the bank lost up to UAH 9 ml or 2 out of 10 clients did not repay their loans on average. Graphically we can present the chart above as follows:

Figure 2.2⁴²



⁴¹ Vladimir Kartavtsev, Irina Romanenko, (2002), "Risk-based performance measurement for Ukrainian banks", Extra Consulting Ltd., National Bank of Ukraine Training Center presentation materials, slide 11

⁴² Vladimir Kartavtsev, Irina Romanenko, (2002), "Risk-based performance measurement for Ukrainian banks", Extra Consulting Ltd., National Bank of Ukraine Training Center presentation materials, slide 14

This statistics data could be obtained from the bank General lager. According to Ukrainian Banks Chart of Accounts we used in our consulting practice the following accounts to estimate expected and unexpected losses of the Corporate business line of the bank:

- Loans volumes – accounts “Loans provided to legal entities for trading operations”,
- Credit losses – accounts for bad loans accounting: “Passed due loans to legal entities”, “Past due interests from legal entities”, “Doubtful debts of legal entities”, off balance sheet accounts related to write-offs,

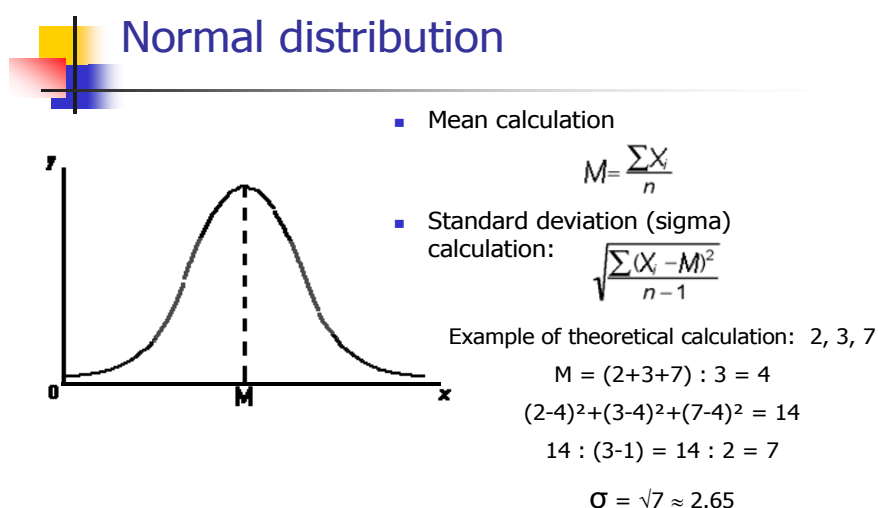
However, looking at the bank from outside, we can only use publicly available data such as audit reports, banks annual reports, etc. The good news for bank analysts is that the new IFRS standards, especially the segment reporting section with disclosures of financial performance by different business segments, let us conduct (with some simplifications and assumptions) more detailed examination of the bank’s different activities similar to the inside view. Having all these limitations we would like to make the short step to statistics for a better understanding of the whole process of expected and unexpected losses estimation that should be done inside the bank in emerging markets.

First of all, we will look at the normal distribution example. To better understand the model we will answer the questions:

- How to evaluate most probable amount of losses or mean amount
- How to calculate deviations
- How to measure needed coverage of losses

On the graph below is presented the formula for mean and standard deviation calculation for normal distribution⁴³:

Figure 2.3⁴⁴

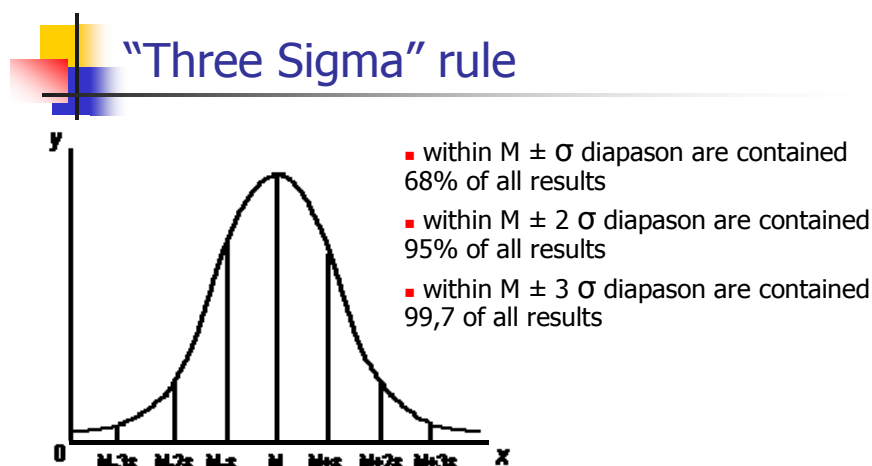


⁴³ Standard deviation, http://en.wikipedia.org/wiki/Standard_deviation

⁴⁴ Vladimir Kartavtsev, Irina Romanenko, (2002), “Risk-based performance measurement for Ukrainian banks”, Extra Consulting ltd., National Bank of Ukraine Training Center presentation materials, slide 22

The next important statistical rule is presented on the following chart:

Figure 2.4⁴⁵



The number of sigma needed to get appropriate level of protection form default according to S&P Rating system presented below:

Table 2.2⁴⁶

Level of protection	Number of sigma	Rating S&P
99,97%	3,4	AA
99,7%	3	BBB
99%	2,33	BB
95%	1,95	CC-CCC

If we want to have 99% protection from default we have to allocate capital for this portfolio equals to sigma multiplied by 2.33 times.

The distribution of credit losses usually is not normal. This creates severe problems for the calculation of expected and unexpected banking losses as well as economic capital allocations. Despite that some approximation can be made mathematically to calculate sigma for different types of distributions. The problems with the calculation of non covered risks (so called "thick tails") still have to be addressed by specialists.

Further investigations in this area could be done by banks' risk managers who have special mathematical background as well as good understanding of economics and banking business. That is why it is so important to have well educated risk managers at the level of bank risk management department.

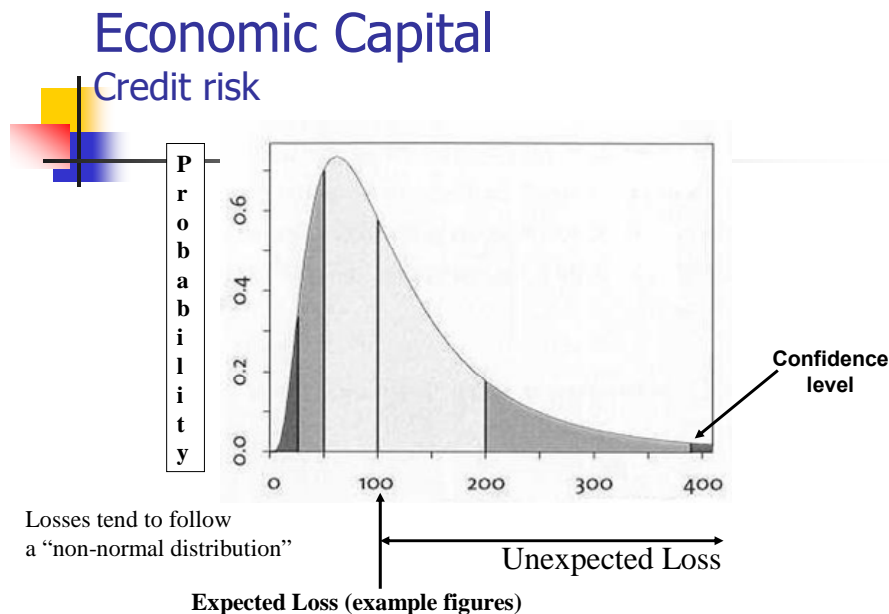
Looking at the cart below it is clear that not all losses or risks can be covered even by organizations with AAA rating. There is always a tiny possibility of default even

⁴⁵ Standard deviation, http://en.wikipedia.org/wiki/Standard_deviation

⁴⁶ Edward Altman, (1998), "Credit Risk, Company Ratings and Defaults", New York, Credit risk seminar materials

for them⁴⁷. Otherwise, all exposures of risky assets have to be equal to a bank capital.

Figure 2.5⁴⁸



Expected and unexpected losses can be calculated on an aggregated basis and/or can be calculated for each single transaction or credit contract. In our model we applied a simplified aggregated method where economic capital (unexpected losses) calculated as percentage of relevant portfolio set up by bank owners.

Expected losses we have estimated as equal to regulatory provisions accrued in the bank profit and losses accounts in relevant year.

The Aggregated method assumes that assets have to be grouped by different group of loans or credit products with the same risk profile: mortgages, car loans in Retail business; construction, agriculture, metallurgy loans, etc. in Corporate business. For each product portfolio expected and unexpected losses are calculated as described above using statistic data collected for each product type.

Under *transactional* method each transaction or credit contract is considered separately and results are aggregated later on.

The aggregated method assumes:

- data base for losses by each similar product group has been established
- probability distribution has been to analyzed (where it normal or not)

⁴⁷ Gene D. Guill, (2007), “Bankers Trust and the Birth of Modern Risk Management”, the Wharton school, University of Pennsylvania, page 13

⁴⁸ Peter Briggs, (2004), “Management accounting and profitability measurement in banks”, National Bank of Ukraine Training Center presentation materials, slide 101

- mean has been calculated to evaluate expected losses that can be equaled to the amount of needed provisions
- unexpected losses (deviation from mean) has been calculated to evaluate required economic capital to cover them

The formula of calculation of unexpected losses for the aggregated method is presented below⁴⁹:

$$\begin{aligned} \text{Unexpected losses} &= \\ &= \text{Economic capital to cover unexpected losses} = N * \sigma \end{aligned} \quad (2.2)$$

Where


σ – sigma, or standard deviation of losses

N – level of protection or number of sigmas needed to maintain approved level of protection from default.

For normal distribution “three sigma” rule states that to cover 95% of unexpected losses the number of sigmas has to be equal 2; to cover 99% of unexpected losses it has to be 2.33; to cover 99.7%, it has to be 3.

The theoretical example for economic capital and RAROC calculation by aggregated method is presented below in Figure 2.6. Similar calculations have been made in our EBV model using of Raiffaizenbank Aval annual report data:

Figure 2.6⁵⁰

 Aggregated method example			
1	Volume of portfolio		250,0
2	Average Interest rate		16%
3	Income	(1)x(2)	40,0
4	Expenses		22,0
5	Total position	(1)+(3)	290,0
6	Expected losses		8,0
7	Losses ratio (%)	(6)/(5)	2,8%
8	Standard deviation		17,0
9	Standard deviation (%)	(8)/(5)	5,9%
10	Level of protection (N* δ)		2,33
11	Net income	(3)-(4)	18,0
12	Net risk adjusted income	(11)-(6)	10,0
13	Capital at risk or economic capital	(8)x(10)	39,6
14	RARORAC	(12)/(13)	25,2%

⁴⁹ Basel II, (June 2004), “International Convergence of Capital Measurement and Capital Standards: a Revised Framework”, <http://www.bis.org/publ/bcbs107.htm>, pages 119-125

⁵⁰ Vladimir Kartavtsev, Irina Romanenko, (2002), “Risk-based performance measurement for Ukrainian banks”, Extra Consulting Ltd., National Bank of Ukraine Training Center presentation materials, slide 28

The formula for the calculation of expected losses for the transaction method is presented below⁵¹:

$$\text{Expected losses} = \text{Probability of Default} * \text{Exposure at Default} * \text{Loss Given Default} \quad (2.3)$$

Where

Probability of Default (PD), % - expected default frequency (EDF) of client that calculated on the base of the internal Rating system developed using the bank's default statistical data of the bank

Exposure at Default (EAD), UAH – expected amount that could be lost at default

Loss Given Default (LGD), 0-100% - expected losses taking in to account collateral and collateral sale expenses

If LGD = 0, it means that sale of collateral can compensate all our losses. And on the contrary, if LGD = 100%, it means that collateral is illiquid and the bank will lose 100% of the asset.

Unexpected losses for transaction method calculated as follows⁵²:

$$\text{Unexpected losses} = \text{Economic capital needed to cover unexpected losses} = N * \sigma$$

Where

$$\sigma = EAD \times LGD \times \sqrt{[EDF * (1 - EDF)]} \quad (2.4)$$

$\sqrt{[EDF * (1 - EDF)]}$ - the variance of a binominal distribution with probability is equal to EDF

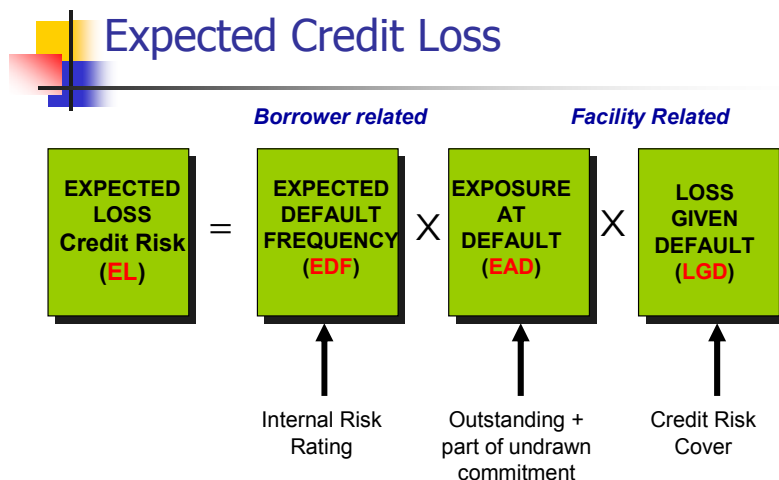
This is the similar formula to aggregated method, however σ is calculated differently. In this case, sigma is calculated as for binominal distribution where probability of default of the borrower is different from 50/50 as in case of coins.

The summary for expected losses calculation for transactional method is presented in Figure 2.7:

⁵¹ Basel II, (June 2004), "International Convergence of Capital Measurement and Capital Standards: a Revised Framework", <http://www.bis.org/publ/bcbs107.htm>, pages 74-93

⁵² Basel II, (June 2004), "International Convergence of Capital Measurement and Capital Standards: a Revised Framework", <http://www.bis.org/publ/bcbs107.htm>, pages 27-125

Figure 2.7⁵³



The next chart presents the example for economic capital and RAROC calculation for single transaction. Appendix 11 contains a table that presents ratings Moody's and S&P ratings as well as the level of protection and the probability of default⁵⁴.

Figure 2.8⁵⁵

Transaction method example

1	Volume of loan	100	
2	Interest rate	0,18	
3	Duration of loan	1	
4	Income	18	(1)x(2)
5	Expenses	9	
6	Probability of default (%)	0,02	0.02 - according to bank internal rating system
7	Position	118	(1)+(4)
8	LGD (loss given default rate)	0,5	0.5 - collateral cover up to 50% of losses
9	Expected losses	1,18	(6)x(7)x(8)
10	Standard deviation	8,26	(7) x (8) x SQRT((6) x (1 - (6)))
11	Level of protection	2,33	99% cases
12	Net income	9	(4)-(5)
13	Risk adjusted net income	7,82	(12)-(9)
14	Capital at risk or economic	19,2458	(10)x(11)
15	RARORAC	0,406322	(13)/(14)

⁵³ Peter Briggs, (2004), "Management accounting and profitability measurement in banks", National Bank of Ukraine Training Center presentation materials, slide 112

⁵⁴ Gene D. Guill, (2007), "Bankers Trust and the Birth of Modern Risk Management", the Wharton school, University of Pennsylvania, page 13

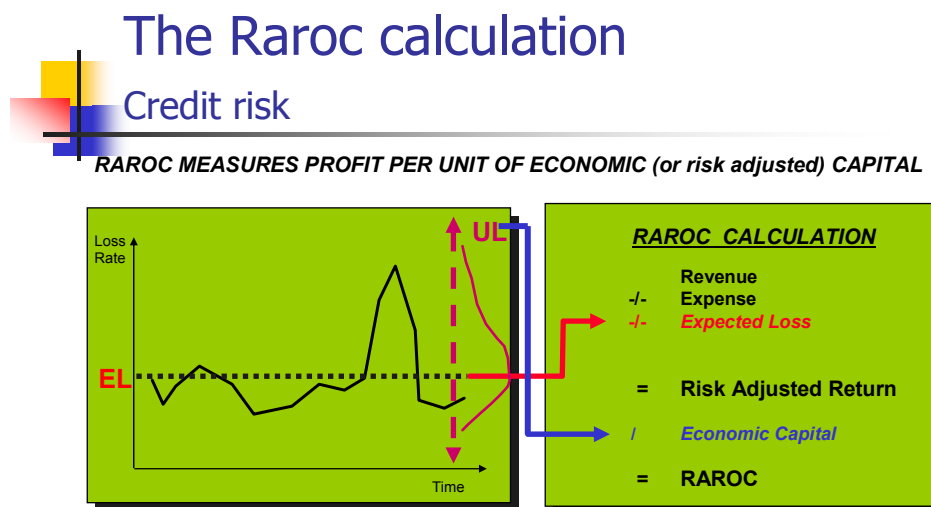
⁵⁵ Irina Romanenko, Vladimir Kartavtsev, (2002), "Risk based profitability measurement in for Ukrainian banks", Extra Consulting Ltd., National Bank of Ukraine Training Center presentation materials, slide 34

To summarize the information discussed in this section we can say that the main outcome of the RAROC model is:

- *Provisions* are covering expected losses. It means that each credit product requires part of provisions and provision for particular type of credit product has to be calculated as average losses per period of time as described above⁵⁶
- *Capital* is covering unexpected losses. It means that each credit product requires part of capital that covers deviation of losses from average

The summary of RAROC model is illustrated below:

Figure 2.9⁵⁷



We still have some questions to be answered in this model:

- How many standard deviations (σ) of market value volatility to use?
- Do all risk types require the same number of σ for equivalent risk coverage?
- At which horizon should σ be measured?
- Can historic volatilities be used as estimates of current risk capital?
- Which units should receive the benefit of risk diversification?

However, this risk measurement technique allows a bank to establish the capital requirements of its current bank-wide risk profile. This economic capital should be compared with the actual capital resources as well as with required capital to achieve a target rating.

⁵⁶It should be mentioned that the charge for expected loss is not the same as the expense shown in the financial accounts. The accounting figure is an end of period calculation and based on 'incurred loss' whereas for RAROC we need an average expected loss (for more details see section 2.3.)

⁵⁷ Peter Briggs, (2004), "Management accounting and profitability measurement in banks", National Bank of Ukraine Training Center presentation materials, slide 115

Bank top managers have to look which areas, businesses, branches or units are over/under-performing according to their RAROC and take appropriate management decisions. It allows banks to centrally allocate resources to areas where it makes economic sense rather than surrender control to individual initiatives.

To implement this model a bank has to establish:

- a statistic database about losses structured by different products for at least 3 years (5-7 years according to Basel II to cover full economic cycle)
- an internal rating system based on bank statistics to evaluate probability of default of a single client transaction or contract (especially for Large Corporate Business and Large Individuals / Private Business)
- a cost allocation system to evaluate direct and indirect costs attributed to each business, product group and single contract (especially for Large Corporate Business and Large Individual / Private Business)
- a transfer pricing system to make a correct calculation of the interest margin by each business, product group and single contract

Obviously, in emerging markets it will take some time to develop this type of IT infrastructure to implement the model described. However, there is a way around that allows us to use this model without a developed database. We can name this approach as simplified or expert economic capital valuation.

The main idea is to evaluate required economic capital on shareholders' expert valuations that are often based on existing National Bank of Ukraine (NBU) requirements for capital adequacy, as well as on the NBU client risk rating regulation that is in fact based on standard Basel II approach.

According to the NBU regulations each borrower has to belong to a particular risk group. To evaluate client probability of default without statistical data base we will use NBU requirements and ratios that allow us to allocate the borrower loan to a particular rating group such as:

- Standard loan - 2%
- Watch – 5%
- Substandard – 20%
- Doubtful – 50%
- Losses – 100%

According to the NBU regulation the minimal capital requirements calculated as⁵⁸:

$$\begin{aligned} &\textbf{Regulatory capital} = \\ &= \textbf{Exposure} * \textbf{Risk weight of loan} * \textbf{Capita adequacy ratio} \end{aligned} \quad (2.5)$$

Where

Risk weight of exposure (0-100%) - according to NBU regulation (100% for loans, 50% for fixed assets, 20% for Treasury bills, etc)
Capital adequacy ratio - NBU normative ratio H2=9%

⁵⁸ Regulation of the National Bank of Ukraine № 315, (June 2009), Methodology for calculation of regulatory capital adequacy ratios

It means that capital of the bank has to be more than $H2=9\%$ (NBU normative) of all assets weighted at risk. In other words, for each UAH 100 loan the bank needs to allocate UAH 9 of capital.

We also should not forget the risk adjusted profit as a part of RAROC formula. According to the original model we have to deduct expected losses from net income earned by business or products.

However, in case we have not database for average losses estimation we can make some approximation and use regulatory reserve requirements of NBU. We will use in our simplified model the following approach:

$$\text{Risk adjusted profit} = \text{Net income} - \text{Regulatory Provisions}$$

(2.6)

If we take as a theoretical example following figures, we can hypothetically calculate RAROC as follows:

Loan = UAH 100

Term of loan = 1 year

Client interest rate = 18%

Cost of financing = UAH 6

Other allocated costs = UAH 4

Probability of default = 5% (according to NBU regulation for this type of client for example)

Collateral coverage = 90%

Risk weight for loans = 100% (according to NBU regulation)

Capital adequacy ratio ($H2$) = 9%

Our theoretical RAROC calculation will be:

$$\text{Net income} = 100 * 18\% - (6+4) = \text{UAH } 8$$

$$\text{Exposure at default} = 100 + 100*18\% = \text{UAH } 118$$

$$\text{Capital at risks} = 118 * 100\% * 9\% = \text{UAH } 10.6$$

$$\text{Regulatory provisions (=expected losses in our assumption)} = 118 * 5\% * 90\% = \text{UAH } 5.3$$

$$\text{RAROC} = \text{Risk adjusted profit} / \text{Capital at risk} = (8 - 5,3) / 10,6 = 25,3\%$$

A similar aggregated approach we have been used in our EBV model.

2.2.2. RAROC and Economic Profit

Each bank has to set up an internal normative ratio for RAROC to evaluate and compare efficiency of its different businesses. In developed markets it can be a market hurdle rates or benchmarks based on an exchange market index for similar financial institutions that reflect industry average performance. In emerging markets there are not such reliable market indicators.

Thus, we can use as an indicators bank shareholders expectations on return on equity invested. In other words, RAROC is similar to ROE calculated by different businesses according to their risk profile and profit.

After calculation of RAROC for each business line, we can compare it with existing shareholders expected return⁵⁹. In case it exceeds expected return, we can distribute bonuses to business line employees.

For example, if we hypothetically assume that:

Risk adjusted profit = UAH 30 ml

Capital = UAH 100 ml

ROC = Expected shareholders return on capital = 20%

We can theoretically calculate economic profit as:

$$\text{Cost of capital} = \text{Capital} * \text{ROC} = 100 * 20\% = \text{UAH } 20 \text{ ml}$$

$$\text{Economic profit} = \text{Risk adjusted profit} - \text{Cost of Capital} = \text{UAH } 10 \text{ ml}$$

Economic value is added by bank businesses or products if return earned by them (adjusted on expected risks) is higher then cost of economic capital allocated to this business or product:

$$\text{EVA} = \text{Risk adjusted return} - \text{Cost of capital} * \text{Economic Capital}$$

Or for the all bank:

$$\text{If RAROC of the Bank} > \text{Expected shareholders return (ROE),} \\ \text{Economic profit} > 0$$

(2.7)

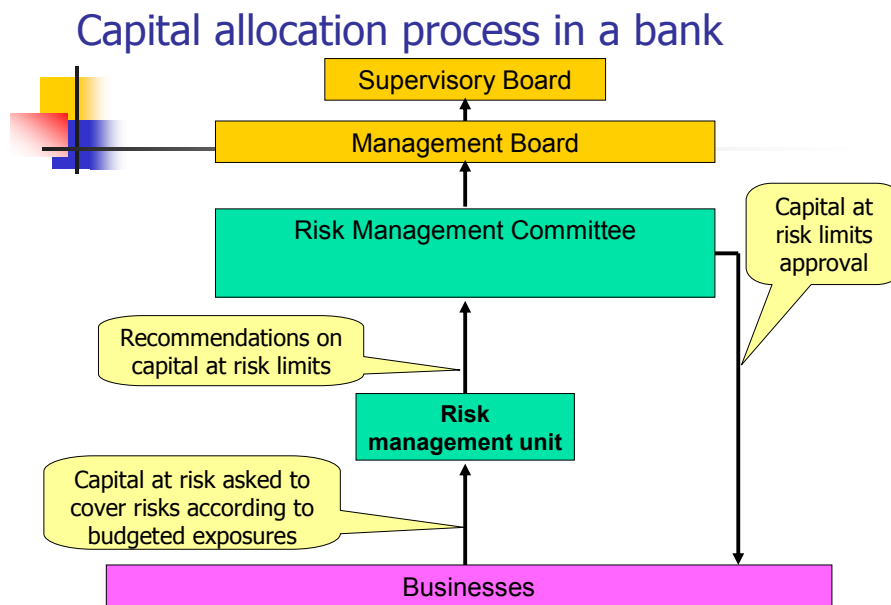
In our model we would like to test how the changes in the parameters such as economic capital, cost of economic capital, transfer rates, etc will influence on economic profit and value added by the bank business activities.

Having in mind that the main task for us is rather to point out main drivers for value creation and to evaluate their influences on the bank economic profit and performance, we are going to use the bank shareholders estimations on economic capital needed to cover inherent risks as well as their expectations on return on equity.

Overall process for economic capital allocation to the business lines could be presented as follows:

⁵⁹ Esa Mäkeläinen, (1998), "Economic Value Added as a management tool", Helsinki School of Economics and Business Administration, Department of Accounting and Finance, www.evanomics.com

Figure 2.11⁶⁰



2.3. Credit Risk and Provisioning

2.3.1. Basel II and IAS 39

There is a contradiction between Basel II accord described above and new IAS 39 International Accounting Standards (IAS). The new introduction of this standard in 2004 made life for the bank risk managers and finance specialists more complicated.

According to IAS 39, provisions for loan losses have to be based on objective evidence of impairment. First has to be conducted *individual assessment* of the loans. The second approach is a *collective assessment* of the loan portfolio⁶¹.

According to IAS 39 individual assessment of impairment applied to both *individually significant* and *individually not significant* financial assets based on pre-defined 'loss events'.

Impairment loss is the difference between carrying value and present value of estimated future cash flows of the loan. Reduction of asset's carrying amount has to be done through the use of specific provisions if there is a deterioration of present value of estimated future cash flows of the loan.

⁶⁰ Coopers & Lybrand, (January 1996), GARP: Generally Accepted Risk Principles, London: Coopers & Lybrand, principle 39-40

⁶¹ International Accounting Standards Board, (2004), International Accounting Standard 39, www.iasb.org

According to IAS 39 banks can define *individually significant* assets based on the size of assets as well as other factors. For example, ING Bank has been identified *individually significant* assets as follows⁶²:

- All financial investments held-to-maturity
- Loans to corporate customers with total committed limits or outstanding amounts more than the amount specified by a bank risk management
- All other customers, not being private individuals
- Private individuals that are managed on a name-by-name basis (Private banking business)

All other financial assets are considered *individually not significant*, mainly private individuals managed on a pooled basis.

IAS 39 states objective evidence that a financial asset is impaired includes observable data about the following *loss events*:

- Significant financial difficulty of the issuer or obligor
- A breach of contract, such as a default or delinquency in interest or principal payments
- Granting to the borrower a concession for economic or legal reasons relating to the borrower's financial difficulty that a bank would not otherwise consider
- There is a considerable probability that the borrower will enter bankruptcy or other financial reorganization
- The disappearance of an active market for the asset because of financial difficulties

2.3.2 Individual Specific Provisioning

If objective evidence of impairment exists *individually*, the bank reduces the carrying amount of asset through specific provisions:

- For individually significant financial assets a *Discounted Expected Future Cash Flow* method is applied
- For individually not significant financial assets *Collective Provisioning* methodology is applied

The formula for provisions calculation according to the Discounted Expected Future Cash Flow method is provided below⁶³:

$$\text{Impairment Loss} = \text{Carrying Amount} - \sum \text{Expected Future Cash Flow} / (1 + R_{\text{eff}})^a \quad (2.8)$$

where

R_{eff} – effective interest rate of the loan

Expected Future Cash Flow from the loan

The carrying amount includes exposure at the impairment date plus payments and accrued interest received since impairment, minus disbursement since impairment and cumulative provisions.

⁶² Peter Briggs, (2006), "IAS for Ukrainian banks", National Bank of Ukraine Training Center presentation materials, slide 7

⁶³ International Accounting Standards Board, (2004), International Accounting Standard 39, www.iasb.org

2.3.3 Collective Provisioning

Collective Provisioning of impairment has to be provided if no objective evidence exists individually. In this case the asset must be included in a group of financial assets with similar risk characteristics.

Provisions have to be accrued if there is a measurable decrease in the estimated future cash flows from a group of financial assets, however, the decrease cannot yet be identified with individual assets.

IAS 39 states that objective evidence that a *group of financial assets* is impaired includes observable data indicating that there is a measurable decrease in the estimated future cash flows from a group of financial assets since the initial recognition of those assets. However, the decrease cannot yet be identified with the individual financial assets in the group.

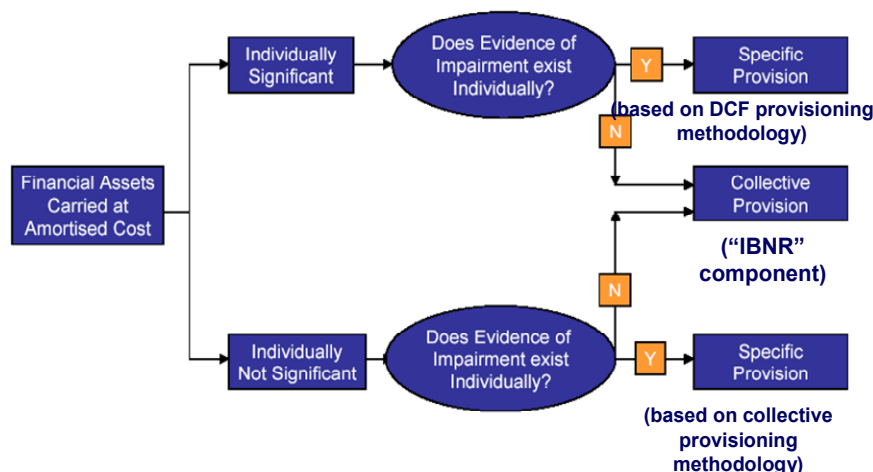
This data include:

- Adverse changes in the payment status of borrowers in the group; or
- Economic conditions that correlate with defaults on the assets in the group.

Figure 2.12⁶⁴

Summary

Overall approach



The good news for risk managers is that IAS 39 permits the use of statistical methods to determine impairment losses in a group of assets. This statement allowed bank risk managers to combine two different models for provisioning in one.

Collective provisioning methodology could be based on the Basel II implementation efforts. ING bank, for example, applies the same notions that we considered in the section above⁶⁵:

⁶⁴ Peter Briggs, (2006), "International Accounting Standards and Basel II for Ukrainian banks", National Bank of Ukraine Training Center presentation materials, slide 5

- A borrower's risk rating and Probability of Default (PD)
- A facility's Loss Given Default (LGD)
- A facility's Outstanding Amount or Exposure at Default (EAD)

Formula for calculation of loan provisions for individually *not impaired* financial assets (IBNR) is⁶⁶:

$$\begin{aligned}
 &\textbf{Collective Provision amount=} \\
 &= \textbf{PD (6months) * LGD (adjusted) * Outstanding Amount} \\
 &\textbf{Impairment Loss (or Gain)=} \\
 &= \textbf{Collective Provision(t) -/- Collective Provision(t-1)}
 \end{aligned}
 \tag{2.9}$$

Provisions for individually impaired not significant financial assets calculated as:

$$\begin{aligned}
 &\textbf{Specific Provision amount =} \\
 &= \textbf{100% * LGD (adjusted) * Outstanding Amount} \\
 &\textbf{Impairment Loss (or Gain) =} \\
 &= \textbf{Specific Provision (t) -/- Specific Provision (t-1)}
 \end{aligned}
 \tag{2.10}$$

To summarize, having IAS 39 permits the use of statistical methods to determine impairment losses in a group of financial assets, the concept from Basel II framework can be used in determining collective provisions under IAS 39, such as:

- The concept of “default” and the process of risk rating assignment;
- The use of the risk components: Probability of Default (PD), Loss Given Default (LGD) and Exposure at Default (EAD).

However, the bank internal estimation of the Basel II risk components PD, LGD and EAD for borrower is usually based on historical loss experience and expected losses can be calculated as:

Basel II:

$$\textbf{PD * LGD * EAD = Expected Losses}
 \tag{2.11}$$

This is the anticipated average loss expected over a time horizon of one year. Under IAS 39, however, impairment losses are recognized only if incurred. Therefore the Basel II expected losses concept needs to be adjusted in some way.

IAS 39:

$$\textbf{PD (Adjusted) * LGD (Adjusted) * EAD (Adjusted) = Incurred loss}
 \tag{2.12}$$

Needed adjustments for the Basel II model to be complied with IAS 39 could be summarized as follows:

⁶⁵ Peter Briggs, (2006), “International Accounting Standards and Basel II for Ukrainian banks”, National Bank of Ukraine Training Center presentation materials, slide 16

⁶⁶ Peter Briggs, (2006), “International Accounting Standards and Basel II for Ukrainian banks”, National Bank of Ukraine Training Center presentation materials, slide 17-24

- PD – banks can use 6 month horizon instead of 12 months
- LGD – adjustments to be made:
 - Basel II based on 5 – 7 years average historical loss experience, IAS 39 requires current conditions, so average weighted coefficients have to be adjusted to increase influence of present statistical data (last 2 years – 50%, 40%; remainder – 10%).
 - Costs included in LGD estimation also have to be adjusted for IAS 39. According to Basel II it is required to include all material direct and indirect costs of recovery. Under IAS 39 LGD estimates may only include direct costs. Thus indirect costs, like salaries of problem loan officers, need to be excluded from LGD estimates used for IAS 39 purposes.
- EAD - Under Basel II, EAD is a prediction at reporting date of the outstanding amount at the default moment of the borrower. Usually, this is higher than the outstanding amount at reporting date. For IAS 39 the outstanding amount is used, as only incurred, not future losses are considered.

In spite all the complications, discussions and contradictions risk managers and accountants in developed markets have to follow IAS and Basel II regulations and manage to combine two approaches for provisions calculation using adjusted Basel II approach.

In emerging markets problems with the implementation of IAS 39 and Basel II have a different nature. Basic accounting systems do not allow us to make calculations either according to Basel II or according to IAS 39:

- Accounting and Risk management systems cannot clearly identify provisions *by product and businesses*
- General provisions cannot be established to cover expected losses on statistical basis for at least 3 years
- Risk management systems cannot categorize loans and record migration patterns and write-offs

Thus, in our EBV model we used available audited accounting data from Income statement and allocated accrued provisions by size of loans and investment portfolio of corporate, retail and other business lines. These simplifications allows us to make rough estimations of regulatory provisions accrued to each portfolio.

2.4. VaR and Economic Capital to cover Unexpected Loses

The popular model recommended by the Basel II in order to evaluate economic capital needed to cover unexpected market risks is Value at Risk (VaR).

Based on its own statistical database, a bank can evaluate the potential negative impact of changes in market prices and other market parameters on its performance.

Market risk is specified as the potential negative impact on bank P&L due to assets revaluation because of negative changes in market prices and/or market parameters⁶⁷. Main market parameters are:

⁶⁷ Alvin Y. Lee, (1999), "Corporate Metrics Technical Document", RiskMetrics™ group

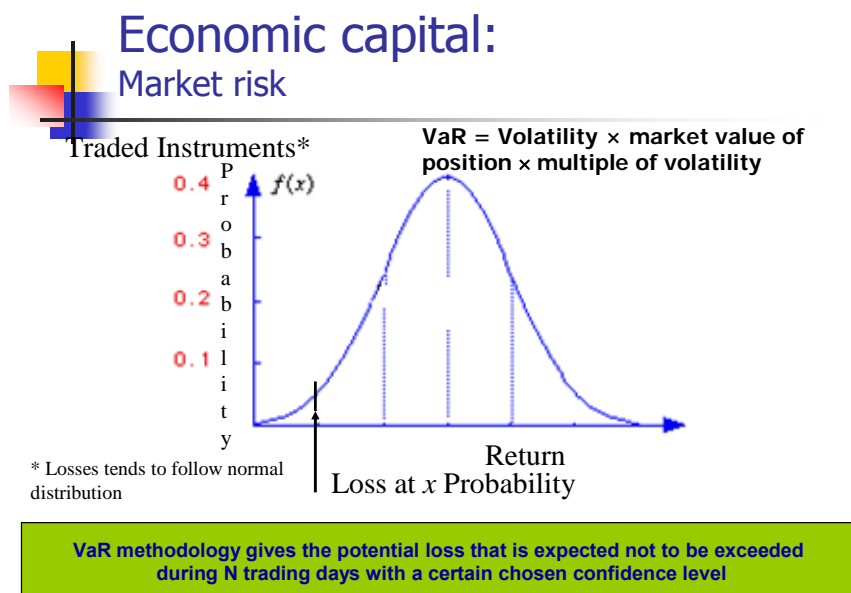
- Equity prices
- Yield curves
- Foreign exchange rates,
- Commodity prices,
- Volatilities
- Correlations.

Market risk in banking is sub-divided by:

- Interest Rate Risk
- Equity / Securities Risk
- Foreign Exchange (including Gold/Bullion)
- Commodity Risk

The summary of economic capital calculation needed to cover market risk is presented below.

Figure 2.13⁶⁸



Economic capital needed to cover unexpected market losses is equal to VaR amount that is the potential loss during the N trading days with a chosen confidential level.

Formula for VaR calculation⁶⁹ is:

$$\begin{aligned}
 VaR &= \text{Economic capital to cover Unexpected market losses} = \\
 &= \text{Volatility} * \text{market value of position} * \text{multiple}
 \end{aligned}
 \tag{2.13}$$

where,

Multiple – is a multiple of sigma that insures chosen confidential level

⁶⁸ Peter Briggs, (2004), "Management accounting and profitability measurement in banks", National Bank of Ukraine Training Center presentation materials, slide 124

⁶⁹ Alvin Y. Lee, (1999), "Corporate Metrics Technical Document", RiskMetrics™ group

In banking market risk is usually evaluated for:

- Trading activity by different sub-books (securities, currencies, commodities, etc)
- and for
- ALCO liquidity / market risk management in the Banking Book to cover structural market risk in the balance sheet

In our model we roughly estimated the amount of economic capital needed to cover structural market risks as 12% of mismatch between loans and deposits. Economic capital needed to cover market risk in the Trading book was estimated as 12% of balance sheet positions (see Appendix 4).

2.5. Economic Capital to cover Operational Losses

Figure 2.14 presents Basel II approach to economic capital estimation⁷⁰:

- Basic Indicator approach
- Standardized approach
- Advanced Measurement approach

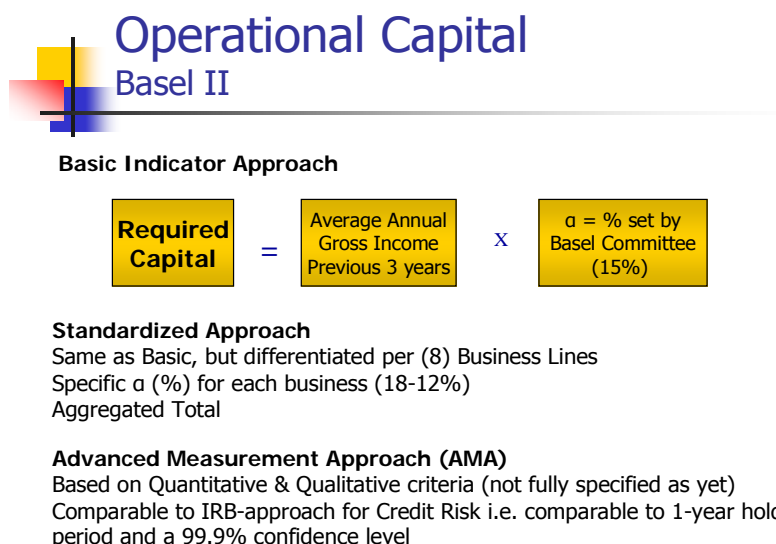
We used in our model basic indicator approach where:

$$\text{Economic capital to cover operational losses} = \text{Average gross income} * 15\% \quad (2.14)$$

where

Average gross income - is average gross income for last 3 year (in our model for last 2 year)

Figure 2.14⁷¹



⁷⁰ Basel II, (June 2004), "International Convergence of Capital Measurement and Capital Standards: a Revised Framework", <http://www.bis.org/publ/bcbs107.htm>, pages 149-161

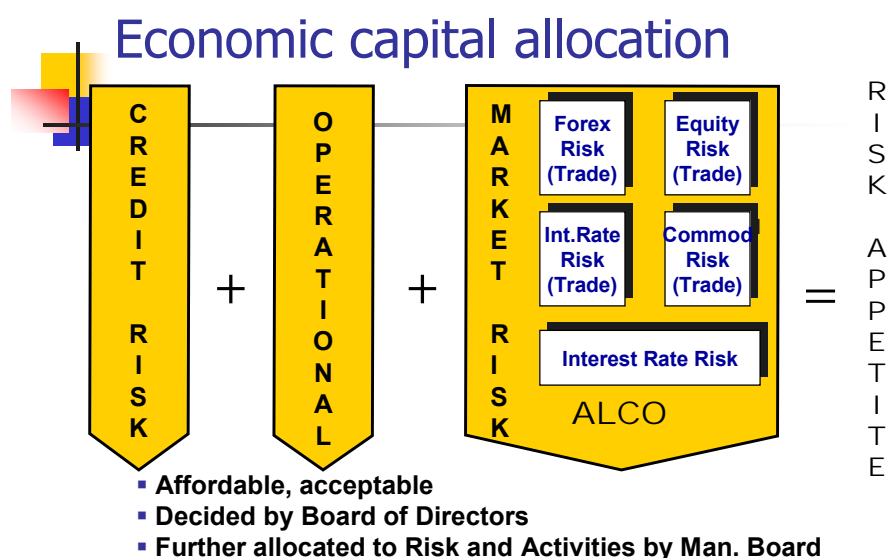
⁷¹ Vladimir Kartavtsev, Irina Romanenko, (2002), "Risk-based performance measurement for Ukrainian banks", Extra Consulting Ltd., National Bank of Ukraine Training Center presentation materials, slide 38

After rough estimations of economic capital needed to cover unexpected credit, market and operational risks inherent in each banking activity that we have specified according to bank audit report, we have allocated total economic capital to each internal book, such as:

- Corporate business
- Retail business
- Trading activity
- ALCO liquidity and market risk management
- ALCO investments

Appendix 4 presents the results of economic capital estimation according to the above-described models. Total economic capital was calculated as the sum of economic capitals needed by each activity⁷² as illustrated below in Figure 2.15:

Figure 2.15⁷³



⁷² Coopers & Lybrand, (January 1996), GARP: Generally Accepted Risk Principles, London: Coopers & Lybrand, principles 39-44

⁷³ Irina Romanenko, Vladimir Kartavtsev, (2002), "Risk based profitability measurement in for Ukrainian banks", National Bank of Ukraine Training Center presentation materials, slide 43

Chapter 3 Banking business profitability calculation models

Summary

Usually the bank management wants to know which business segments or products' groups create or destroy value in the bank to make appropriate strategic decisions or motivate managers. For this purpose many banks analyze their different business activities separately using the transfer pricing methodology to allocate interest margin to these activities.

Banks have usually specified the three main banking activities. Performance of these activities or business segments have to be analyzed and evaluated separately:

- Commercial banking (core loans and deposits activity),
- Trading activity (proprietary trading and trading on behalf of bank clients),
- Funds management books (the management of the overall liquidity position and funding requirements on behalf of Assets and Liabilities Committee (ALCO))

So, in this Chapter we are presenting transfer pricing and cost allocation methodology that we used (with some simplifications) in our EVB model when performed profitability analysis by different business lines such as:

- Commercial banking (Corporate and Retail sub-books),
- Trading book (we not subdivided this books by different trading assets, because this activity is quite limited in Ukraine)
- ALCO (Liquidity, Investments, Transfers sub-books).

This approach is quite similar to the analysis of the bank business performance from the inside. In our model we made a rough estimation of profitability by different business activities of Raiffaisenbank Aval on publicly available data from their website. We used segment reporting section from audit report of the bank for Y2006-2007. Results of bank businesses' performance are presented in Appendix 6-10.

3.1. Transformation (mismatch) and commercial margin

The problem with the traditional accounting presentation is that gains from maturity mismatching assets and liabilities are mixed up with the real commercial margin earned by the business units.

Thus a business which takes short term deposits and makes longer term loans will generally show a higher margin than a branch which is "matched" (i.e. which funds long term loans from long term deposits), because long-term rates tend to be higher than short-term rates.

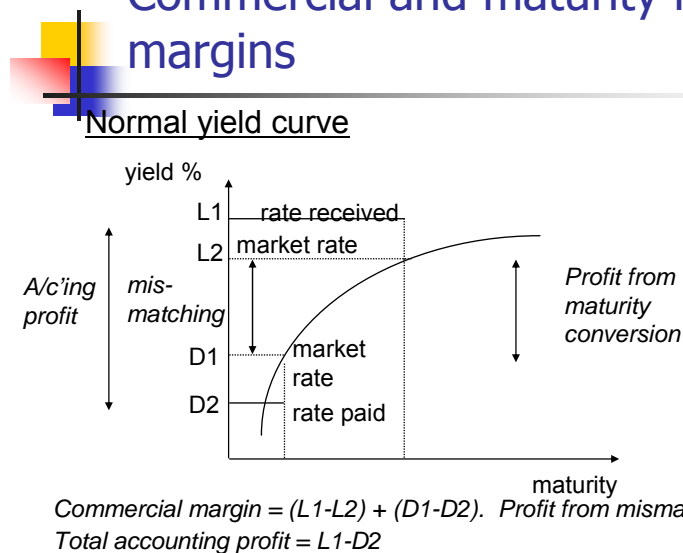
However, the bank management does not want business lines or branches to take interest rate risks, these should be managed by ALCO, and they want to know what margin each business makes on each product/activity⁷⁴.

⁷⁴ Peter Briggs, Irina Romanenko, (2006), "Recommendations on Management Accounting methodology implementation in Ukrainian banks", the National Bank of Ukraine Regulation Letter, approved by NBU and Ministry of Justice, issued in November 2006

The conversion from the accounting presentation to the management accounting view is illustrated in the example below.

Figure 3.1.⁷⁵

Commercial and maturity mismatch margins



The following theoretical example is intended to illustrate differences between management accounting and financial accounting.

Accounting presentation

Balance sheets

<u>Business A</u>	
<u>Assets</u>	<u>Liabilities</u>
1,000	1,000
12 month loan at 15%	1 month deposit at 5%
<u>Business B</u>	
<u>Assets</u>	<u>Liabilities</u>
1,000	1,000
3 month loan at 10%	3 month deposit at 6%

Profit and loss accounts (annual basis)

	<u>Business A</u>	<u>Business B</u>
Interest on loans	150	100
Interest on deposits	<u>50</u>	<u>60</u>
Interest margin	100	40
Branch expenses	<u>20</u>	<u>20</u>
'Profit'	80	20

⁷⁵ Peter Briggs, (2004), "Management accounting and profitability measurement in banks", National Bank of Ukraine Training Center presentation materials, slide 35

On a traditional accounting approach business A will appear the most profitable, however when we take into consideration the margin above market rates achieved by each we get a different picture:

We can assume market rates (yield curve)	1 month	4%
	3 months	7%
	12 months	14%

The management accounting methodology corrects for the mismatch by matching each asset/liability with the appropriate reference rate, based on market interest rates shown above.

Profitability on a matched-funded basis:

Business A

Margin on loans (15% - 14%)	10
Margin on deposits (4% - 5%)	<u>(10)</u>
Total Commercial margin	0
Business expenses	<u>20</u>
Commercial performance/loss	(20)

Reconciliation of accounting profit:

Profit from mismatching (funds maturity conversion): (14% - 4%)	<u>100</u>
Accounting profit	80

Business B

Margin on loans (10% - 7%)	30
Margin on deposits (7% - 6%)	<u>10</u>
Total Commercial margin	40
Business expenses	<u>20</u>
Commercial performance/profit	20

Reconciliation of accounting profit:

Profit from mismatching (funds maturity conversion: 7% - 7%)	<u>0</u>
Accounting profit	20

In order to judge the commercial effectiveness of business we need a mechanism that strips out the mismatching profit and shows us the commercial margin.

Most banks make a policy decision to take out of from the commercial banking books the part of interest margin associated with the exposures to liquidity, foreign exchange and interest rate risks.

This can be achieved by an internal Funds transfer pricing (FTP) mechanism that funds the business units on a matched maturity/currency basis with the *Funding Book*, as follows:

Business A

12 month loans
1,000

1-month loan to Funding Book
1,000

1-month deposits
1,000

12-month loan from Funding Book
1,000

Funding Book:

12-month internal loans Business A
1,000

1-month internal deposits Business A
1,000

In our hypothetical example has been generated two pairs of internal transfers:

- transfer the 1-month deposit
- borrow 12-month funds

Most banks and the Basel Committee use the term 'Banking Book' for the internal balance sheet⁷⁶, which 'collects' and represents all *interest based internal deals* – and associated interest rate risk – transferred from commercial and other *non-risk taking activities* as a result of the FTP system.

The Banking Book may contain other (non-trading) activities such as liquidity management and assets/liabilities held for ALCO, so the term "Funds Transfer (sub) book" or Funds pricing (sub) book" may be used to separately group the assets/liabilities funded for commercial banking units.

In addition, the relevant profit and loss account adjustments will be made to credit the business at the market rate for funds supplied and debit the business with the cost of matched maturity funds received. This will allow us to achieve a P & L which corresponds to the analysis made above, i.e.

Interest received on loan	150
<i>Interest paid</i>	<u>140</u>
Margin on loan	10
Interest paid on deposit	-50
<i>Credit received</i>	<u>40</u>
Margin on deposit	<u>-10</u>
Commercial margin	<u>0</u>

Items in italics refer to notional internal transactions, not necessarily booked in the financial accounting system.

3.2. The Bank's Book Structure

In order to calculate the profitability of its activities, a bank needs to install a management accounting system which will enable it to allocate assets, liabilities, income and expense to the various pre-defined "books" which represent its profit centers⁷⁷.

⁷⁶ Basel II, (June 2004), "International Convergence of Capital Measurement and Capital Standards: a Revised Framework", <http://www.bis.org/publ/bcbs107.htm>, pages 162-169

⁷⁷ Peter Briggs, Irina Romanenko, (2006), "Recommendations on Management Accounting methodology implementation in Ukrainian banks", the National Bank of Ukraine Regulation Letter, approved by NBU and Ministry of Justice, issued in November 2006

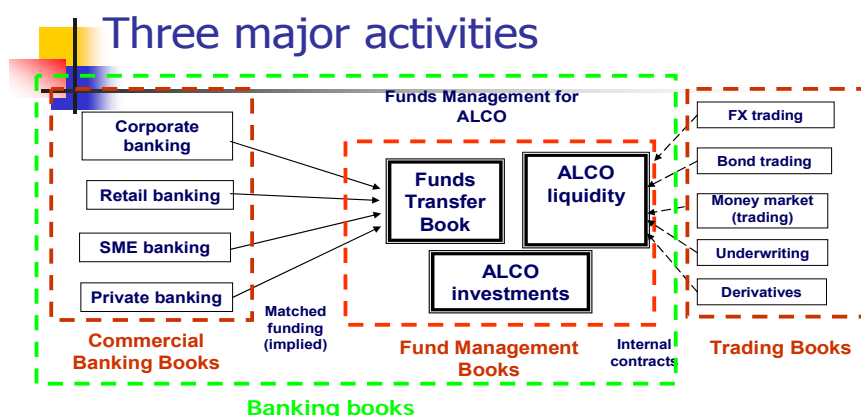
Central to the calculation of commercial banking profitability is the concept of “matched funding” which enables a bank to correctly calculate the margins on its non-trading activities and transfer the interest rate, liquidity and foreign currency risk to the Banking Book.

There, the risks can be managed according to policies set out by ALCO. The activities of a bank can be split into three broad areas:

- **Commercial banking (Banking books):** activities where market or liquidity risks are transferred out to Fund management books, but other (non-tradable) risks (e.g. credit risk) are being taken. Examples are corporate banking, retail banking, international payments, cards etc. In the bank’s accounting system these activities are normally valued at (adjusted) cost and income taken according to the accrual method.
- **Trading activities (Trading Books):** where market or price risk is actively pursued for the bank’s own account through tradable instruments with the objective of making profit, e.g. FX trading; money market (arbitrage); securities trading. These books are valued according to the mark to market method.
- **Funds management (Banking books):** activities within the Treasury which are performed on behalf of ALCO and have a major service-providing character e.g. Money market for liquidity management; securities for liquidity management... These activities are usually accounted for on an accrual basis.

The relationship between the different banking activities and books is illustrated below.

Figure 3.2⁷⁸



Trading activities involve interest/market risk-taking
Treasury/ALCO manages liquidity and centralizes interest rate risk
Commercial banking does not take interest rate or other market risks

⁷⁸ Peter Briggs, (2004), “Management accounting and profitability measurement in banks”, National Bank of Ukraine Training Center presentation materials, slide 24

A book has one manager who is fully accountable and responsible for all transactions in the book, e.g. the chief FX dealer for the foreign exchange book, the chief fixed income dealer for the fixed income book, the head of corporate banking for the corporate banking book(s), etc.

It is usually a profit centre, i.e. a book has its own profit and loss account and B/S for *management accounting* purposes. A book is a *business-driven* concept, that is, it contains all related transactions.

For example, a bond trading book which sometimes hedges (part of) the positions with futures not only contains the bonds, but also the related instruments, in this case the futures, which are part of the same business. A book therefore covers a specific activity and may contain a variety of related instruments.

In our EBV model we allocated all trading assets, liabilities as well as P&L accounts to *Trading activity* without deviation by sub books, because this information is not available from the audit report of the bank.

Treasury manages the bank's liquidity via the money market and securities sub-books, but under the guidelines set out by ALCO. Note that liquidity management is part of the banking book (accrual basis) but is managed on a consolidated basis for the whole bank.

It would not be efficient for Treasury to fund the Banking and Trading books separately on the money market so Treasury deals for one single liquidity position. However, the only transactions allowed between the Funding and Trading books are for funding/receiving the latter's short term liquidity deficits/surpluses.

Each book has to have market risk limits on its positions directly connected to the economic capital needed to cover the risks involved⁷⁹. The market risk limits (economic capital) of non-trading books (e.g. commercial banking) are usually zero (or very low to accommodate frictional positions).

The market risk limits of trading books are usually not zero, because without risk it is difficult to make trading profits. If positions of a book are higher than or close to the limits, the dealer has to enter an external or internal contract with maturity/re-pricing/currency characteristics designed to reduce the risk position.

In some banks there is an additional book called the "ALCO book" which has a very special nature; it comprises the bank's investment portfolio, the capital, fixed assets and any structural positions or assets/liabilities taken under the responsibility of senior management.

The day-to-day management of the investments is often delegated to the Treasury department, but this does not imply that Treasury is responsible for this book.

Treasury is only responsible for executing the policies, guidelines and instructions of ALCO. It is the duty of ALCO to establish policy and guidelines and to give appropriate instructions to the Treasury department.

⁷⁹ Coopers & Lybrand, (January 1996), "GARP: Generally Accepted Risk Principles", London, Coopers & Lybrand, principles 44-49

3.2.1. Internal Funding

Internal transactions for funding purposes can be grouped into two classifications⁸⁰:

1) Internal dealing (explicit):

Internal dealing, also called specific funding, involves one reporting unit buying from or selling to another reporting unit. It is mainly applicable to the treasury trading and capital markets areas, and to large corporate transactions.

Some large (corporate) transactions may be separately identified by business unit and funded by Treasury on an actual basis (via the banking book) in order to individually cover the market & liquidity risk.

The internal dealing mechanism is always used for those trading business units that manage their own market risk exposures. It is carried out by dealing formally with the money market liquidity book (using an internal deal ticket).

Each trading book has a financing arrangement with the money market (liquidity management) book, as financing cannot be obtained directly via the *nostro* accounts, but only through internal contracts with the money market (liquidity) desk.

The framework for internal dealing and related prices should be fixed by ALCO, which determines: what risks are to be carried by each book; the limits for each risk; and the price at which internal dealing is carried out.

2) Internal Funding (implicit):

Internal or implicit funding is where one business unit needs to price the transfer of assets or liabilities notionally in order to achieve the matched funding required to calculate profitability and transfer market and liquidity risk. The approach to funds transfer pricing is based on four basic principles.

All assets and liabilities are to be funded through the Banking Book (via the Funds Transfer sub-book). As each banking product should stand on its own feet (i.e. contribute to profit) we need to adopt an approach that considers both asset and liability products.

Thus deposits are a product, or more accurately a group of products, and their profitability is calculated independently of loans. Funding transactions are on a 'notional' basis i.e. there are no internal deals with the banking book, but the notional transfer is made purely for pricing purposes.

Certain assets and liabilities are grouped into pools so that they may be funded and priced in such a way as to transfer liquidity & interest rate risk from the business units. This mainly concerns the commercial banking area. Examples are: retail term deposits; current accounts; small value loans (e.g. retail credit).

⁸⁰ Peter Briggs, Irina Romanenko, (2006), "Recommendations on Management Accounting methodology implementation in Ukrainian banks", the National Bank of Ukraine Regulation Letter, approved by NBU and Ministry of Justice, issued in November 2006

The transfer pricing rate should reflect the re-pricing maturity of the asset/liability. All books together (with elimination of the internal contracts) are of course equal again to the initial balance sheet of the bank *and must be reconciled back to it*.

The split into books makes it possible to calculate risk positions and results per book and assign profit responsibility. For trading risk management this is essential, as both income at risk and stop-loss procedures rely on some measure of earnings; if there is no internal contracts structure dealers will probably start their own spreadsheet bookkeeping to keep track of limits and results.

Modern banking software has provision for recording and identifying internal deals, keeping the relevant “shadow accounts,” allocating “pool” funding and producing management accounts with profit/loss and BS statements by book.

3.2.2 Centralizing Interest rate, liquidity and FX Risks

As an example of this point, let us suppose the bank has just two branches and the bank’s management has decided (quite reasonably) that they do not want to take interest rate or liquidity risk.

Branch A has a 1-month term deposit of UAH 1m and a customer that requires a 6 month fixed rate loan. Branch B has a 6 month term deposit of UAH 1m and a customer that requires a 1 month loan. Based on the bank’s policy of avoiding interest rate and liquidity risk, both branches will refuse the loan, although on a consolidated basis the assets and liabilities can be matched.

Similarly, branch A may have deposits in USD, but customers requiring loans in UAH, whereas branch B may have deposits in UAH but customers requiring loans in USD. Individually, the branches cannot take the FX risk, but again on a consolidated basis the positions can be matched.

With only two branches it is simple to see how the situation can be resolved, but with a large number of branches the only practical solution (and the most efficient for the bank) is to match the branch positions by (notionally) paying the branch for its deposits and providing funding for its assets, at the appropriate maturity and in the relevant currency. The mismatch positions will then be centralized within the Funds Transfer Book which will offset all the individual branch positions so that ALCO can manage the resulting consolidated net position.

As a general principle, commercial banking business units should not carry market or liquidity risk; this does not mean that they should carry no risk (no banking transaction is entirely without risk, and it is our business to manage it), but the specific components of market risk i.e. interest rate risk, FX risk and (market) price risk, as well, as liquidity risk are best managed centrally.

Additionally, we cannot measure commercial profitability adequately unless the market risk elements are isolated from commercial margins, and they are correctly priced by the unit managing them. Other elements of risk (credit risk, operating risk, cost management etc.) are dealt with by the operating units.

Typically, business units/areas which do not carry market risk are: branches; corporate banking; retail banking; international operations; private banking, etc. Units which carry market risk are: trading books; proprietary trading, and ALCO.

3.2.3 Margin on different products

Even if the branch or business had a perfectly matched balance sheet (most unusual) we would still need to use transfer pricing in order to determine the contribution to profit of each product. Consider the following situation:

Table 3.1⁸¹

Branch A Balance sheet (UAH m)			
Corporate loan (6 months)	1000	Savings deposits (retail-6months)	1000
Retail loans (3 months)	500	Term deposit (corporate-3 months)	500
Total	1,500	Total	1,500

The customer rates (annual) were as follows:

Corporate loan:	20%
Retail loan	25%
Savings deposits	13%
Term deposit	19%

On an annual basis, the branch's accounting P & L would be:

Table 3.2⁸²

Branch A P&L (UAH m)	
Interest on loans	325
Interest paid on deposits	225
Interest margin	100
Costs	40
Operating profit	60

The branch is making a profit, but which product is contributing most and has the branch applied the right pricing. In order to answer these important questions, we have to use the transfer pricing method and calculate the interest margin on individual products.

3.2.4 Use of reference rates

In order to remove risk and calculate the interest margins of all balance sheet products, we make use of reference rates, which are risk-free rates at the appropriate maturity. This is the (assumed) risk-free rate that represents what the bank could earn if it did not make the loan (i.e. the opportunity cost).

We would not normally make a loan with the bank's own funds at an interest rate equal or less than the inter-bank rate, as lending involves risk and administrative costs which have to be covered by the margin above the inter-bank rate.

Similarly, we would not pay a depositor more than this rate because we would make a loss if the funds were placed in the market, particularly as there is a

⁸¹ Peter Briggs, (2004), "Management accounting and profitability measurement in banks", National Bank of Ukraine Training Center presentation materials, slide 31

⁸² Peter Briggs, (2004), "Management accounting and profitability measurement in banks", National Bank of Ukraine Training Center presentation materials, slide 32

reserve requirement of 6% - 7%, which means that only 94%/93% of the deposits can be used productively.

In Western Europe it is relatively easy to establish the reference rates for all maturities as there are market rates based on money/capital markets which are very liquid and provide a reliable basis.

In Ukraine the markets are not liquid, and we will have to adopt a less than ideal approach in order to apply the FTP methodology. In our EBV model we have calculated FTP rates by using the cost-based model. FTP rates were derived as the mid points between retail deposits rates and corporate loans rates. However, the best solution for the bank could be to take into account also rates of deposits and loans of the main competitors. For the purpose of this example we have assumed 3 and 6 month reference rates. The rates used for assets and liabilities in our hypothetical example are then determined as follows:

For Deposits (and other liabilities):	3 months	6 months
Assumed 3 & 6 month ref. rates	18.0%	19%
Less:		
Reserve requirement of NBU (7% remunerated at 0%)	(1.26)	(1.33)
Treasury margin ⁸³	(0.15)	(0.15)
Net rate for deposits	16.59%	17.52%
For loans (and other assets):	18.0%	19.0%

We can now recalculate as in Table 3.3:

Table 3.3⁸⁴

Management Accounting P & L (UAH m)-annual basis	
Margin on corporate loans (20% - 19%)	10.00
Margin on retail loans (25% - 18%)	35.00
Interest margin on loans	45.00
Margin on savings deposits (17.52 - 13%)	45.20
Margin on term corporate deposit (16.59% - 19%)	(12.05)
Interest margin on deposits	33.15
Total Interest margin	78.15
Costs	40.00
Profit	38.15

Now we can see that the lending activity contributes most of the interest margin and that the branch has paid too much for its term deposit. In this case it is not disastrous, as the branch has profitable loan business to off-set the low margin on deposits, but if the funds are invested only on the money market the mistake on the deposits pricing is more serious.

⁸³ A small margin has been allowed for Treasury funds management to cover costs and some occasional loss of value due to lags in placing funds. This margin should be reviewed from time to time; the objective is for funds management of the banking book to be a break-even activity.

⁸⁴ Peter Briggs, (2004), "Management accounting and profitability measurement in banks", National Bank of Ukraine Training Center presentation materials, slide 33

We can also see what contribution each business line has made to the overall interest margin, i.e.

Corporate banking	(2.05)
Retail banking	<u>80.20</u>
Interest margin	78.15

Perhaps it is an extreme example, but often the corporate banking market is highly competitive.

3.3. Cost allocation in banking

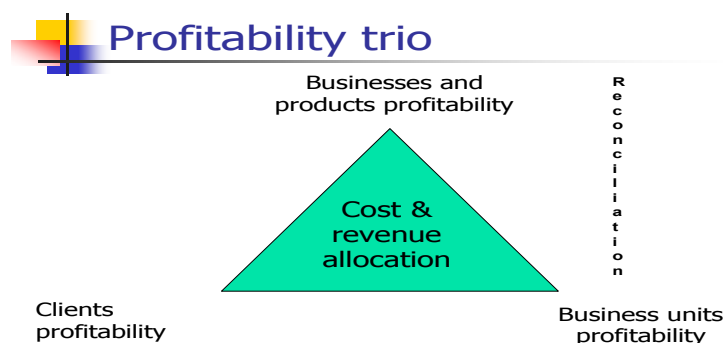
3.3.1. Cost centers definition

Especially for head office costs, it is essential to establish budgetary control and business unit profitability. In fact, all business units are cost centers (they all have expenses!), but some are revenue earners as well because they sell the bank's products to customers, or deal with financial market counterparties. These revenue earners we refer to as "Commercial" and some of the different business units that make up the commercial block may be designated as profit centers.

However, in modern banking there is a tendency to move away from reporting on the basis of the "profit centre" but to link performance reporting to the bank's "business lines" – which are the most important element in our commercial strategy. Business lines are groups of products which serve particular markets⁸⁵.

These products may be distributed through a physical location (e.g. branch), or, increasingly through other channels such as: the internet; call centers; ATM's. Because the same product may be distributed through different channels, the emphasis is less on the distribution channel itself (e.g. the branches) and more on the products and business lines. However, most banks have continued to report profitability in several dimensions and because of the importance of branches as distribution centers, they are often covered by the "business unit" dimension and treated as profit centers when reporting on that basis. Basically, our costing system has to cover the three common dimensions of profitability measurement:

Figure 3.3⁸⁶



⁸⁵ Peter Briggs, Irina Romanenko, (2006), "Recommendations on Management Accounting methodology implementation in Ukrainian banks", the National Bank of Ukraine Regulation Letter, approved by NBU and Ministry of Justice, issued in November 2006

⁸⁶ Vladimir Kartavtsev, Irina Romanenko, (2002), "Risk-based performance measurement for Ukrainian banks", Extra Consulting Ltd., National Bank of Ukraine Training Center presentation materials, slide 3

The first step is to define responsibility for all expenses, this will then determine who is the “budget owner” i.e. the manager responsible for budgeting and controlling this expense.

This allocation of costs by responsibility will normally follow the organization chart and the functional descriptions of each department; thus the IT department will be responsible for managing all costs related to computer hardware and software, Property department will be responsible for all building-related costs (including electricity, water etc.) and Operations will manage SWIFT charges.

The second step is to classify the organizational units into categories:

- Profit centers (revenue-generating units such as Branches, Treasury, Financial Institutions etc.)
- Support departments that provide administrative back-up (e.g. back office and operations)
- Service departments that provide services for all other areas (e.g. HR; Property dept. IT)
- Head office administration, which covers the costs of centralized functions of head office which cannot be logically allocated to anywhere else, e.g. general management, public relations, legal, internal audit.

Based on the organizational structure of the typical Ukrainian bank the following classification is shown as an example:

Figure 3.4⁸⁷

Type	Profit Centres	Support	Service	HO Admin.
O R G A N I S A T I O N A L U N I T S	Branches	Marketing	IT	General Management
	Treasury-trading	Product management	General services	HO financial accounting
	Securities	Channel management	Security	Mgt. reporting & fin. planning
	Financial Institutions	Impaired asset management	HR & training	Internal audit
	Cards	Risk management	Internal control unit	Public relations
		Operations	Inspection	PR
		Legal dep		

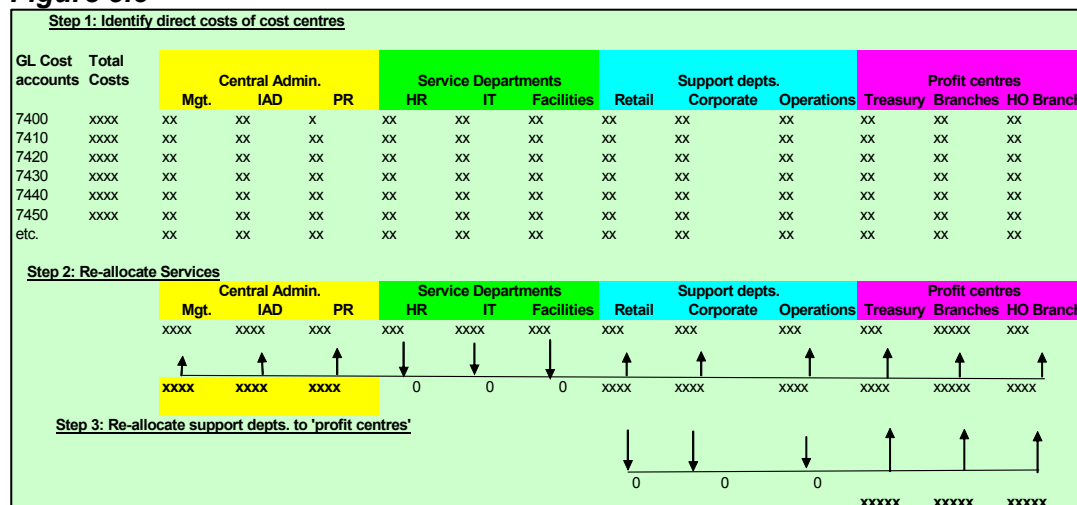
As mentioned above, all business units are “cost centers” and the definition of “profit centers” will depend on the book structure (i.e. what revenues are booked where), and on whether we measure performance based on business units or (better) based on business lines.

⁸⁷ Peter Briggs, (2004), “Management accounting and profitability measurement in banks”, National Bank of Ukraine Training Center presentation materials, slide 54

3.3.2 Costs Allocation model

Having defined the cost owners and cost centers, the next step is to allocate costs from the chart of accounts to the relevant cost centers, as illustrated below:

Figure 3.5⁸⁸



We then proceed on a step by step basis to allocate, firstly the service departments to the 'users' and then the support departments to the profit centers. The implementation of this cost allocation analysis will enable us to:

- Determine the direct cost of each head office department
- Allocate the costs of services to other head office depts. and branches
- Calculate the indirect costs attributable to each profit centre that give us important component for fair economic profit estimation

The attached spreadsheet in Appendix 12 illustrates the summary of three-step process of allocating costs in banks. However, from our practical experience we can say that the operational cost in banking is significantly correlated to the number of employees. Thus, when we analyze the bank from the outside we can simplify our approach. We can use the number of employees as the main driver for all operational cost allocation to business segments that we are going to analyze.

In our EBV model we used transfer pricing and cost allocation methodology with some simplifications described in this Chapter. We performed profitability analysis by following business lines:

- Corporate business
- Retail business
- Trading activity
- ALCO liquidity management
- ALCO investment
- ALCO transfer book

As mentioned in previous Chapters we did a simplified estimation of profitability by different business activities of Raiffaisenbank Aval on publicly available data from the bank website. We used segment reporting section from the audit report of the bank for Y2006-2007. Results of bank business lines performance are presented in Appendix 6-10.

⁸⁸ Peter Briggs, (2004), "Management accounting and profitability measurement in banks", National Bank of Ukraine Training Center presentation materials, slide 55

Results and Conclusions

The developed model is designed to help the bank top managers to concentrate on value creation for the bank shareholders during the strategic planning process rather than on the simple financial performance planning and measurement.

Having an unchanged Balance Sheet structure (loans to deposits ratio is high and equals to 130%) and assuming low stable growth forecast for three following years, we have obtained 0,20 UAH as the fair share price for Raiffaizenbank Aval (Ukraine). At the date of our valuation the market share price was equaled to 0,26 UAH.

We can see that the Retail business line destroyed shareholders value in the bank having negative economic profit due to low income related to retail loans. At the same time the bank compensates losses by economic profit earned by Corporate business and Treasury.

We tested how the changes in the parameters influenced economic profit and value added by the bank's main business activities. At the end of our analysis we have identified the list of main parameters that are the most important ones for value creation in banking institutions:

External or Market drivers:

- Banking industry annual assets growth
- Net interest rate margin on the market
- Market interest rates growth / decline (transfer rates level)
- Tax rate

Bank internal drivers:

- Sales Volumes (volume of loans, deposits, etc)
- Balance Sheet structural funding GAP (loans to deposit ratio)
- Bad debts (impaired loans to total loans and investments portfolio)
- Non earning assets (to total assets)
- Capital adequacy (capital to RWA and capital to total assets)
- Economic capital to cover unexpected losses
- Interest income on earning assets
- Cost of interest bearing liabilities
- Fees and commissions growth
- Net gain or losses on trading assets
- Provisions expenses
- Operating expenses

Bank non-financial drivers:

- Number of employees

We can conclude that apart of internal drivers that managers directly can influence, there are number of important external (or market) drivers that also significantly influence share price and shareholders value and have to be taken into account in future valuation models. In addition to above-mentioned market drivers we should also take into account following:

- Information flow (publications, clearly presented bank strategy, annual reports, brand, franchise, etc)
- Stocks liquidity (time to entry/ to exit, cost of transactions)
- Market expectations (overall economic growth, foreign investments growth in the country)
- Macroeconomic indicators (volume of money in circulation in the economy, level of savings, inflation rate, currency rates)
- etc

Further investigation in this field could be done to make more reliable projections of share prices. However, we hope that the developed model could help the bank top managers to concentrate on value creation for the bank shareholders during their strategic planning process rather than on the simple financial performance planning and measurement.

The risk management department of one Ukrainian regional bank, where the author works currently as Risk Management/MIS Expert under an EBRD project, recently started to use this EBV model to test capital allocation and risk-based performance planning and reporting concepts.

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Appendix 1 Balance Sheet Forecast⁸⁹

Bank: Raiffaizen Aval	Historical data		Forecast		
UAH, million	2006	2007	2008	2009	2010
Assets					
Cash and cash equivalent	796	779	1210	1379	1564
Trading securities at the fair-value through P	74	198	202	230	261
Trading assets at the fair-value through P&L	0	38	101	115	130
Positive fair values from derivative hedging in	0	0	0	0	0
Nostro accounts	6	35	101	115	130
Long-term loans to banks	2	10	101	115	130
Corporate overdrafts	71	8	101	115	130
Corporate long-term loans	2558	4632	5040	5744	6517
Retail overdrafts	23	67	101	115	130
Retail long term loans	1671	2825	3024	3446	3910
Securities available for sale	0	0	101	115	130
Securities held to maturity	11	29	101	115	130
Provisions for amounts due from credit institu	0	0	0	0	0
Provisions for corporate loans	-160	-183	-504	-574	-652
Provisions for retail loans	-71	-100	-494	-563	-639
Provisions for investment securities	-10	-28	0	0	0
Goodwill	0	0	0	0	0
Other intangible assets	17	25	48	55	62
Property and equipment	315	388	526	549	623
Differed taxes	0	0	88	100	113
Other assets	37	43	145	165	187
Total assets	5340	8766	9990	11334	12860
RWA	4319	7622	8244	9370	10631
Liabilities					
Amounts due to the National Bank	1	0	78	90	102
Loro accounts	135	105	179	207	235
Banks long-term deposits	1170	2757	2771	3205	3637
Corporate current accounts	712	994	1162	1344	1525
Corporate deposits	301	349	536	620	704
Retail current account	618	931	1073	1241	1408
Retail deposits	1688	2178	2771	3205	3637
Liabilities from dealing activities	0	0	0	0	0
Negative fair values from derivative hedging	0	12	0	0	0
Debt securities issued	0	279	155	180	204
Subordinated debt	71	68	85	99	112
Current income tax liabilities	6	0	4	4	5
Differed tax liabilities	22	18	0	0	0
Minority interests	0	2	1	2	2
Other liabilities	42	79	72	83	94
Total liabilities	4766	7772	8991	10201	11574
Balancing debt/Interbank liquidity mng			105	-79	-89
Shareholders funds	574	994	999	1133	1286
Share capital	445	749	649	680	772
Retained earnings	20	152	200	283	321
Revaluation and other reserves	109	93	150	170	193
Total liabilities and shareholders funds	5340	8766	9990	11334	12860
Reconciliation of BS	0	0	0	0	0
Bad debt provisions					
Opening provision for loans and investments		-311	-998	-1138	-1291
Provision for year		-75	-85	-97	-111
Amounts utilized and other changes		-612	-54	-56	17
Closing provision for loans and investments		-998	-1138	-1291	-1384
Provisions / loans to banks, customers, inves	-7,2%	-13,1%	-13,1%	-13,1%	-13,1%
Annual provision / loans to banks, customers	-1,8%	-1,0%	-1,0%	-1,0%	-1,0%

⁸⁹ Explanations of the steps for BS forecast are presented in section 1.1.9., pages 18-19

Appendix 2 Profit & Losses Forecast⁹⁰

Bank: Raiffaizen Aval	Historical data		Forecast		
UAH, million	2006	2007	2008	2009	2010
Interest received from	540	844	1411	1643	1903
Nostro accounts	1	6	50	57	65
Long-term bank loans	6	4	66	75	85
Corporate overdrafts	16	15	35	40	46
Corporate long-term loans	260	670	1008	1149	1303
Retail overdrafts	15	10	20	23	26
Retail long term loans	235	127	181	241	313
Securities available for sale	1	0	0	0	0
Securities held to maturity	6	12	50	57	65
Interest paid on	-233	-394	-426	-523	-605
Loro accounts	-20	-65	-26	-45	-52
Long-term bank deposits	-23	-55	-83	-83	-96
Corporate current accounts	-63	-89	-99	-116	-134
Corporate deposits	-10	-25	-28	-43	-50
Retail current account	-18	-27	-33	-38	-43
Retail deposits	-90	-125	-152	-194	-224
Subordinated debt	-8	-8	-4	-5	-6
Due to the National Bank	-1	0	0	0	0
Net interest income	307	450	986	1119	1298
Provisions for possible loan/investments losses	-80	-75	-85	-97	-111
Net interest income after provisioning	227	375	900	1022	1187
Commissions received	157	205	235	286	339
Commissions paid	-15	-18	-20	-23	-25
Net commission income	142	187	216	264	313
Net result on hedge accounting	0	0	0	0	0
Net gain/losses from foreign currencies translation	2	-1	1	1	1
Net gain/losses from foreign currencies trading	28	41	50	66	84
Net gain from trading securities	1	1	1	1	1
Net result on available for sale investments	4	0	20,2	23,0	26,1
Other income	0	0	0	0	0
Non interest income	35	41	72	91	112
Personnel expenses	-148	-209	-359	-403	-451
Depreciation	-29	-35	-49	-52	-59
Other operating and administrative expenses	-114	-137	-269	-326	-399
Operating expenses	-291	-381	-678	-780	-909
Other non interest expenses	-4	-18	-41	-48	-56
Profit before taxation	109	204	469	548	648
Tax expense	-29	-53	-117	-137	-162
Taxation rate (%)	26,6%	26,0%	25,0%	25,0%	25,0%
Profit after taxation	80	151	351	411	486
Minority interest in profit	0	1	0,5	0,6	0,7
Profit attributable to ordinary shares	80	150	351	411	485
Ordinary dividends payable	0	-22	-35	-41	-49
Retained profit/loss	80	128	316	370	437
Payout ratio	0	14,7%	10%	10%	10%
Year end shares outstanding, million	20999	22799	22730	22730	22730
Weighted average shares outstanding, million	20999	22799	22730	22730	22730
Earnings per share	0,4%	0,7%	1,54%	1,81%	2,14%
Dividends per share	0,0%	0,1%	0,15%	0,18%	0,21%

⁹⁰ Explanations of P&L forecasts are presented in section 1.1.9., pages 18-19

Appendix 3 Equity Cash Flow Forecast

Bank: Raiffaizen Aval	Historical data	Forecast			
UAH, million	2006	2007	2008	2009	2010
Changes in Equity					
Total book assets	5340	8766	9990	11334	12860
Risk weighted assets (RWA)	4319	7622	8244	9370	10631
Risk weighted assets/total assets	80,9%	87,0%	83,9%	83,9%	83,9%
Regulatory minimum Tier 1 ratio	9,0%	9,0%	9,0%	9,0%	9,0%
Estimation of min regulatory Tier I capital					
	389	686	742	843	957
Core capital					
Equity capital in balance sheet	574	994	1142	1298	1473
Minority interests	0	2	1	2	2
Goodwill	0	0	0	0	0
Adjustments			0	0	0
Tier I capital	574	996	1144	1300	1475
Core capital ratio	13,3%	13,1%	13,9%	13,9%	13,9%
Target capital ratio		13,9%	13,9%	13,9%	13,9%
Target capital		1058	1144	1300	1475
Surplus capital		-62	0	0	0
Supplementary capital					
Core capital	574	996	1144	1300	1475
Subordinated capital	71	68	85	99	112
Adjustments	0	0	0	0	0
Tier II capital	645	1064	1229	1399	1587
Tier III capital	0	0	0	0	0
Total capital	645	1064	1229	1399	1587
Total capital ratio	14,9%	14,0%	14,9%	14,9%	14,9%
Share price, UAH		0,26			
Par value, UAH		0,03			
Equity issued		0	0	0	0
Equity bought back		0	(181)	(76)	(104)
Shares issued		0	0	0	0
Shares bought back		0	(694)	(293)	(402)

Appendix 4.1 Economic capital estimation

Bank: Raiffaizen Aval		
Economic capital		2007
Tier I capital		996
Risk wauted assets (RWA)		7622
Credit risk (Corporate)	9%	401
Credit risk (Retail)	9%	251
Credit risk (Trading)	9%	21
Credit risk (ALCO / Liquidity mng)	9%	4
Market risk (Trading)	10%	24
Market risk (ALCO/Liquidity mng/BS structural)	10%	187
Opetational risk (Corporate)	15%	52
Operational risk (Retail)	15%	32
Operational risk (Trading)	15%	3
Business risk (ALCO / Investments)	9%	41
Total economic capital needed		1016
Diversification effects		0
Economic capital after diversification effects		1016
Implied surplus		-20
Economic capital/RWA (%)		13,3%

Appendix 4.2 Key performance indicators

Bank: Raiffaizen Aval	Historical data		Forecast	
%	2007	2008	2009	2010
Structural BS Ratios				
Cash needed to maintain National Bank of Ukraine (NBU) r	5,3%	6,0%	7,0%	7,9%
Short-term liquidity position (cash & cash equivalents / curr	40,1%	54,3%	53,5%	53,5%
Current liquidity position (all assets with maturity < 1 year / l	89,0%	80,3%	79,9%	160,2%
Loans to deposits, usually <85%	133,1%	130,8%	128,9%	128,9%
Bad debts to loan and investment portfolio = all provisions t	-4,1%	-11,5%	-11,5%	-11,5%
Bad debts to credit institution	0,0%	0,0%	0,0%	0,0%
Bad debts to corporate customers	-6,3%	-16,1%	-16,1%	-16,1%
Bad debts to retaile customers	-3,5%	-15,8%	-15,8%	-15,8%
Bad debts from investments	-96,6%	0,0%	0,0%	0,0%
Property and equipment to equity	39,0%	52,7%	48,5%	48,5%
Performance Ratios				
Income margin	17,8%	23,5%	29,2%	29,7%
Income/total assets	7,3%	12,0%	12,2%	12,5%
Return on total assets	1,29%	2,8%	3,6%	3,7%
Opening shareholders' funds/total assets	10,7%	11,3%	10,0%	10,0%
Return on equity	12,0%	25,0%	35,7%	37,2%
Operating expenses/interest and commission income	-59,8%	-56,4%	-56,4%	-56,4%

Appendix 5 Summary of bank valuation

Terminus assumptions:				
Assumed long term growth rate		1,5%		
Assumed long term ROE		33,7%		
Bank: Raiffaizen Aval	Forecast			Terminal
UAH, million	2008	2009	2010	
Profit after taxation	351	411	485	493
Cash flow to/(from) equity	203	111	146	471
Retained earnings	148	299	340	
Shareholders' funds	994	1 142	1 442	1 782
Return on opening shareholders' funds	35,3%	36,0%	33,7%	33,7%
Cost of equity	10,0%	10,0%	10,0%	10,0%
Economic profit	252	296	341	314
Discounted cash to equity value:				
NPV 3 year free cash flow	385	8,5%		
NPV terminal value	4 160	91,5%		
Value of shareholders' funds	4 546	100,0%		
Shares issued	22 799			
Value per share	0,20			
Share price	0,26			
Premium/(discount)	-23,3%			
Economic profit value:				
Shareholders' funds	994	21,9%		
PV 3 year residual income	730	16,1%		
PV terminal value (ex incremental investment)	2 363	52,0%		
PV terminal value (incremental investment)	459	10,1%		
Value of shareholders' funds	4 546	100,0%		
Shares issued	22 799			
Value per share (Eur)	0,20			
Share price	0,26			
Premium/(discount)	-23,3%			

Appendix 6 Corporate business valuation

Bank: Raiffaizen Aval
UAH, million

Corporate business
2007

Credit products	Balance	Interest income/ expenses		Transfers		Interest margin	
all currencies	UAH	UAH	%	UAH	%	UAH	%
Corporate overdrafts	39,5	15,0	38,0%	0,8	2,0%	14,2	36,0%
Corporate long-term loans	3423,5	670,0	19,6%	427,9	12,5%	242,1	7,1%
Total credit products	3463,0	685,0	19,8%	428,7	12,4%	256,3	7,4%
Deposit products	Balance	Interest income/ expenses		Transfers		Interest margin	
	UAH	UAH	%	UAH	%	UAH	%
Corporate current accounts	853,0	89,0	10,4%	16,0	1,9%	-73,0	-9%
Corporate deposits	325,0	25,0	7,7%	38,2	11,8%	13,2	4%
Total deposits product	1178,0	114,0	9,7%	54,2	4,6%	-59,8	-5,1%
Total interest margin	196,5	4,2%					
Fee and commission	114,1						
Total income	310,6						
Provisions	-45,8						
Operation expenses	-79,7						
Other	-3,8						
Profit before taxes	181,3						
Taxation rate	26,0%						
Taxes	47,1						
Profit after taxes	134,2						
Cost of capital	10,0%						
Capital allocated	453						
Economic profit	88,9						
RAROC	19,6%						

Appendix 7 Retail business valuation

Bank: Raiffaizen Aval

Retail business

UAH, million

2007

Credit products	Balance	Interest income/ expenses		Transfers		Interest margin	
all currencies	UAH	UAH	%	UAH	%	UAH	%
Retail overdrafts	45,0	10,0	22,2%	0,9	2,0%	9,1	20,2%
Retail long-term loans	2162,5	127,0	5,9%	270,3	12,5%	-143,3	-6,6%
Total credit products	2207,5	137,0	6,2%	271,2	12,3%	-134,2	-6,1%
Deposit products	Balance	Interest income/ expenses		Transfers		Interest margin	
	UAH	UAH	%	UAH	%	UAH	%
Retail current accounts	774,5	27,0	3,5%	14,6	1,9%	-12,4	-2%
Retail deposits	1933,0	125,0	6,5%	227,1	11,8%	102,1	5%
Total deposits product	2707,5	152,0	5,6%	241,7	8,9%	89,7	3,3%
Total interest margin	-44,5	-0,9%					
Fee and commission	71,1						
Total income	26,6						
Provisions	-28,5						
Operation expenses	-265,8						
Other	-12,6						
Profit before taxes	-280,3						
Taxation rate	26,0%						
Taxes	-72,8						
Profit after taxes	-207,5						
Cost of capital	10,0%						
Capital allocated	284						
Economic profit	-235,8						
RAROC	-83,2%						

Appendix 8 Trading activity valuation

Bank: Raiffaizen Aval

UAH, million

Banking book - Treasury Trading

2007

Credit products	Balance	Interest income/ expenses		Transfers		Interest margin	
all currencies	UAH	UAH	%	UAH	%	UAH	%
Trading securities at the fair-value through P&L	136,0						
Trading assets at the fair-value through P&L	19,0						
Positive fair values from derivative hedging instruments	0,0						
Loans to Treasury liquidity management book	0,0	0,0	2,0%			0,0	
Total credit products	155,0	0,0	0,0%				
Deposit products	Balance	Interest income/ expenses		Transfers		Interest margin	
	UAH	UAH	%	UAH	%	UAH	%
Liabilities from dealing activities	0,0						
Negative fair values from derivative hedging instruments	6,0						
Loans from Treasury liquidity management book	149,0	2,8	1,9%			2,8	1,9%
Total deposit products	155,0	2,8	1,8%				
Total interest margin	2,8						
Fee and commission	41,0						
Net result on hedge accounting	0,0						
Net gain/losses from foreign currencies translation	-1,0						
Net gain/losses from foreign currencies trading	41,0						
Net gain from trading securities	1,0						
Total income	43,8						
Provisions	0,0						
Operation expenses	-14,2						
Other	-0,7						
Profit before taxes	29,0						
Taxation rate	26,0%						
Taxes	7,5						
Profit after taxes	21,5						
Cost of capital	10,0%						
Capital allocated	52,3						
Economic profit	16,2						
RAROC	31,0%						

Appendix 9 ALCO liquidity management valuation

Bank: Raiffaizen

Aval

UAH, million

Banking book - ALCO liquidity management

2007

Credit products	Balance	Interest income/ expenses		Transfers		Interest margin	
all currencies	UAH	UAH	%	UAH	%	UAH	%
Cash and cash equivalent	787,5	0,0	0,0%	15,8	2,0%	15,8	2,0%
Nostro accounts	20,5	6,0	29,3%	0,4	2,0%	6,4	31,3%
Long-term loans to banks	6,0	4,0	66,7%	0,8	12,5%	4,8	79,2%
Securities available for sale	0,0	0,0	0	0,0	12,5%	0,0	0
Securities held to maturity	1,0	12,0	1200,0%	0,1	12,5%	11,9	1187,5%
Loan to Treasury trading book	149,0	2,8	1,9%			2,8	
Total credit products	964,0	22,0	2,3%	17,0	1,8%	14,7	1,5%
Deposit products	Balance	Interest income/ expenses		Transfers		Interest margin	
	UAH	UAH	%	UAH	%	UAH	%
Amounts due to the National Bank	0,5	0,0	0,0%	0,0	1,9%	0,0	1,9%
Loro accounts	120,0	65,0	54,2%	2,3	1,9%	-62,7	-52,3%
Banks long-term deposits	1963,5	55,0	2,8%	230,7	11,8%	285,7	14,6%
Transfer from Treasury trading book	0,0	0,0	2,0%			0,0	
Total deposit products	2084,0	120,0	5,8%	233,0	11,2%	223,0	10,7%
Total interest margin	300,4	10,3%					
Fee and commission	1,8						
Total income	302,2						
Provisions	-0,7						
Operation expenses	-7,1						
Other	-0,3						
Profit before taxes	294,1						
Taxation rate	26,0%						
Taxes	76,4						
Profit after taxes	217,7						
Cost of capital	10,0%						
Capital allocated	223,8						
Economic profit	195,3						
RAROC	87,3%						

Appendix 10 ALCO investments valuation

Bank: Raiffaizen Aval

UAH, million

Banking book - ALCO investments


2007

Credit products	Balance	Interest income/ expenses		Transfers		Interest margin	
all currencies	UAH	UAH	%	UAH	%	UAH	%
Goodwill	0,0	0	0	0	12,5%	0	0
Other intangible assets	21,0	0	0,0%	2,6	12,5%	-2,6	-12,5%
Property and equipment	351,5	0	0,0%	43,9	12,5%	-43,9	-12,5%
Differed taxes	0,0	0	0	0	12,5%	0	0
Other assets	40,0	0	0,0%	5	12,5%	-5	-12,5%
Investments own	0,0	0	0	0	12,5%	0	0
Total credit products	412,5	0,0	0,0%	51,6	12,5%	-51,6	-12,5%
Deposit products	Balance	Interest income/ expenses		Transfers		Interest margin	
	UAH	UAH	%	UAH	%	UAH	%
Debt securities issued	139,5	0	0,0%	16,4	11,8%	16,4	11,8%
Subordinated debt	69,5	8,0	11,5%	8,2	11,8%	0,2	0,2%
Current income tax liabilities	3,0	0	0,0%	0,4	11,8%	0,4	11,8%
Differed tax liabilities	20,0	0	0,0%	2,4	11,8%	2,4	11,8%
Minority interests	1,2	0	0,0%	0,1	11,8%	0,1	11,8%
Other liabilities	60,5	0	0,0%	7,1	11,8%	7,1	11,8%
Shareholders funds	784,0	0,0	0,0%	92,1	11,8%	92,1	11,8%
Total deposit products	1077,7	8,0	0,7%	126,6	11,8%	118,6	11,0%
Total interest margin	67,1	4,5%					
Fee and commission	0,0						
Total income	67,1						
Provisions	0,0						
Operation expenses	-14,2						
Other	-0,7						
Profit before taxes	52,2						
Taxation rate	26,0%						
Taxes	13,6						
Profit after taxes	38,6						
Cost of capital	10,0%						
Capital allocated	41,0						
Economic profit	34,5						
RAROC	84,2%						

Appendix 11 Ratings, Default rates, Level of protection⁹¹

Ratings, Default rates, and Level of coverage/protection

Sours: Bank of America



Rating S&P	Rating Moody's	Probability of default	Level of coverage/protection
AAA	Aaa	0,01%	99,99%
AA	Aa3/A1	0,03%	99,97%
A	A2/A3	0,11%	99,89%
BBB	Baa2	0,30%	99,70%
BB	Ba1/Ba2	0,81%	99,19%
B	Ba3/B1	2,21%	97,79%
CCC	B2/B3	6,00%	94,00%
CC	B3/Caa	11,68%	88,32%
C	Caa/Ca	16,29%	83,71%

⁹¹ Altman, Edward (1998). "Bankruptcy, Credit Risk and Company Ratings", New York, Credit risk seminar materials

Appendix 12 Summary of cost allocation

Step 1: Identify direct costs of cost centres

GL Cost accounts		Central Admin.						Service Departments				Support depts.					Profit centres					PRODUCTS	
Total Costs				Accounting & Finance		Secretariat etc.	Strategy						Business devt.							Venture Investments			
		Gen. Mgt.	IAD	PR				HR	IT	Administrative	Legal		Investment	Operations	Cards	Others	Treasury	Branches	Securities	Micro-credits			
7400	xxxx	xx	xx	x	x	x	x	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx		
7410	xxxx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx		
7420	xxxx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx		
7430	xxxx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx		
7440	xxxx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx		
7450	xxxx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx		
etc.		xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx		
Total Direct costs		xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx		
Step 2: Re-allocate Services																							
		Central Admin.						Service Departments				Support depts.					Profit centres						
				Accounting & Finance		Secretariat etc.	Strategy						Business devt.							Venture Investments			
		Mgt.	IAD	PR				HR	IT	Administrative	Legal		Investment	Operations	Cards	Others	Treasury	Branches	Securities	Micro-credits			
Services Direct costs		xxxx	xxxx	xxx	xx	xx	xx	xxx	xxxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxxxx	xxx	xxx	xx		
		↑	↑	↑	↑	↑	↑	↓	↓	↓	↓	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Total direct + services		xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	0	0	0	0	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxxx	xxxx	xxx	xxx		
Step 3: Re-allocate support depts. to 'profit centres'																							
								↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
								0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total allocated to profit centres																							
(central admin. Not allocated)																							