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Asset and Liability Management. The Institutional Approach to ALM by Commercial Banks in Poland: a Special Focus on Risk Management

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Abstract

According to the early evidence, privatization and consolidation of banks have a strong favorable impact on the advancement of ALM and risk management methods. This paper examines various approaches to ALM by commercial banks in Poland. It elaborates results of the empirical survey of ALM and risk management techniques applied by banks in Poland. The survey was conducted in Spring 1999. The analysis shows that privatization of banks contributes to the improvement of efficiency and to better risk management. It creates a favorable climate for implementation of more advanced risk management and measurement techniques. The size of the Polish private banks has also a positive effect on diverse methodology and sophistication of risk management. The analysis implies the need for a further consolidation of Polish financial institutions. Therefore, this paper reinforces arguments in support of accelerated privatization and consolidation of the Polish banking system.

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Introduction

Asset/liability management (ALM) has been defined as "a planning procedure that accounts for all assets and liabilities of a financial institution by rate, amount, and maturity. Its intent is to qualify and control risk. It focuses on the risk management of the net interest margin for profit. ALM planning impacts directly on the volume, mix, maturity, rate sensitivity, quality, and liquidity of a bank's assets and liabilities" [Woelfel, 1994]. This includes setting integrated financial policy, structuring of loan repricing and maturity schedules, undertaking financial hedge positions, budgeting capital, and measuring internal profitability. It also involves contingency planning and the analysis of the impacts of unexpected changes in interest rates, competition, and economic growth. All this is in order to position a bank's portfolio of loans and investments to maximize flexibility and return of a bank.

ALM requires banks to secure funds at particular rate of interest and to employ these funds at a yield in excess of the cost for maturity identical with that of the source of fund. To increase earnings, the management shall maintain a positive spread between the lower cost and the higher use of funds while maintaining similar maturities.

Balance-sheet risk is an integral part of ALM. It includes interest rates sensitivity, credit risk, liquidity risk, capital adequacy, foreign exchange risk and cost of funds risk. ALM attempts to produce an acceptable risk/reward ratio for a bank because of increased competition and inflationary pressure on the pricing.

Since ALM plays a critical role in risk management, it is imperative that banks recognize the ALM importance and apply effective risk management procedures. Effective implementation of advanced ALM techniques allows banks to hedge the risk and to maximize profitability in today's highly competitive markets for banking services.

Asset/liability management is a bank-specific control mechanism. Banks may apply either standardized ALM techniques, or they may opt for using customized systems [Cole, Featherstone, 1997].

The main objective of this paper is to examine the ALM techniques used in commercial banks in Poland with special attention to risk management. The analysis allows for the assessment of safety, profitability and competitiveness of banking sector in Poland.

The paper consists of three main sections. Section I reviews theoretical foundations and practical implications of assets/liability management, risk measurement and management techniques. Section II examines the risk environment of commercial banks in Poland. The results of the survey of the Polish banking sector assessing ALM and risk

management are presented in Section III. The survey includes responses of 34 banks operating in Poland. It was conducted in the second quarter of 1999 and it focused on various ALM and risk management techniques currently used. The study is summarized with suggestions for appropriate policies with respect of ALM and risk management in the Polish banking sector.

I. Theoretical and Practical Framework of ALM

This section demonstrates an overview of techniques used in ALM and risk management. It presents classification of banking risk and defines various classes of risk. The analysis is aimed at providing a clear distinction between risk assessment and risk management.

I.1 Key Concepts of Asset/Liability Management

The concept of the ALM was developed as a hedging reaction against the risk of financial intermediation. As a discipline, ALM has been functioning since the beginning of 1970s. At the initial stage, the management was based on the simple gap model that analyzes risk in terms of cash flows and the gaps or mismatches between assets and liabilities. As the experiences of financial institutions with risk management evolved, the cash flow gap models gradually gave way to duration gap models, which look more at the market value of the bank's rate-sensitive assets and rate-sensitive liabilities (to changes in interest rates) rather than just at the difference between them. At present, the rapid development in the ALM field is driven by such forces like: recent growth in the capital markets, advancement in the theory and technology of risk analysis, education of financial intermediaries in the necessity as well as in implementation of ALM [Fabozzi, Konishi, 1998].

Fabozzi et al. (1998) identifies three requirements for a successful implementation of ALM. A thorough *understanding of the ALM concept* is the first among these requirements. It refers to a comprehensive recognition of the banking risk. Besides serving as a venue for understanding the scope of risk, ALM allows for the quantifiable assessment and effective management of various risk categories. Even in the absence of a formal ALM program, the understanding of these concepts provides a picture of the risk/reward trade-off in which the financial institutions are engaged. The second step or requirement for the implementation of ALM is the development of an *information system*. Risk

management involves gathering and monitoring relevant data. The set of data alone is likely to provide valuable information about the degree of financial risk affecting the institution. The third step involves a design and implementation of the *ALM decision making process*. The Asset Liability Committee (ALCO) usually carries out this process.

1.2 Banking Risk

Banking risk is an integral part of financial activities, and the management of risk is central to the bank financial management. As stated in the previous section, recognition of various classes of risk is the first fundamental requirement for an effective asset/liability management [Fabozzi, Konishi, 1998]. Therefore, this section demonstrates an overview of various risk categories encountered by banking institutions, along with approaches to bank risk management. It elaborates the banking risk structure and presents the main risk measurement and management techniques.

1.2.1. Banking Risk Classification

A useful definition of banking risk is provided by Saunders (1997). According to his view, „banking risk is a probability that the actual return on banking investment will differ from its expected return due to internal and/or external factors". The literature divides banking risk into six distinctively different categories: 1) Balance sheet risk, 2) Regulatory risk, 3) Technological risk, 4) Operational risk, 5) Strategic risk, and 6) Affiliation risk [Sinkey, 1998]. Only the balance sheet risk is scrutinized in this paper.

The balance sheet risk incorporates various types of portfolio risk recognition and assessment, which is particularly important to bank's management. The balance sheet risk (portfolio risk) in banking can be further classified into:

1) **Interest rate risk** – a risk resulting from changes in the level of interest rates incurred by financial institution when the maturity of its assets and liabilities are mismatched.

2) **Credit risk** – a potential delinquency or default by borrower.

3) **Liquidity risk** – inability to meet withdrawals and/or finance loans.

4) **Foreign exchange risk** – a risk that unexpected exchange rate changes can negatively affect the value of assets and liabilities.

5) **Insolvency risk** – a risk that a bank may not have enough capital to offset a sudden decline in the value of its assets relative to its liabilities.

6) **Costs of fund risk** – an unanticipated change in the costs of funds.

All these diverse types of portfolio risk require application of different tools and techniques for its measurement and management. They are examined in the next section.

I.2.2. Balance Sheet Risk Measurement and Management

Hedging and minimizing the risk are the main functions of risk management. In general terms, risk management techniques can be grouped into three categories [Saunders, 1997]:

1. *On-balance sheet matching* of assets and liabilities in terms of repricing. For that techniques such tools like GAP analysis and duration analysis are in use.

2. *Off-balance sheet hedging* of one or more risk categories. Among main tools here are derivatives, financial futures, etc.

3. *Securitization of assets.* This technique takes the risk out of balance sheet by exchanging the assets into securities and selling them to investors.

All those risk management and measurement techniques are described in the next sections with reference to particular types of risk.

Interest rate risk

Among the main tools used for interest rate risk measurement are *GAP analysis, duration analysis* and the combination of the two. ***GAP*** measures the difference between rate-sensitive assets (RSA) and rate-sensitive liabilities (RSL) over a particular time horizon. It provides a proxy measure of the bank interest income.

$$\Delta r[GAP] = \Delta \text{ Net Interest Income} = \Delta r\ [RSA\text{-}RSL]$$

The net interest income depends on the sign of the GAP, which is related to the direction of expected and unexpected interest rate changes. When the GAP is positive, the bank is protected from increasing interest rates. When the GAP is negative, the bank gains from decreasing interest rates, assuming that they unexpectedly fall below the expected level. Table 1.1 summarizes the effects of the interest rates changes on the net interest income.

Table 1.1. Changes in Net Interest Income Due to Interest Rates Changes

GAP	Interest rate changes	Net Interest Income
GAP positive	increase	increase
GAP positive	decrease	decrease
GAP negative	increase	decrease
GAP negative	decrease	increase
GAP = 0	increase	null
GAP = 0	decrease	null

Source: Świderski J. (1998)

Duration analysis is the second most commonly used technique of risk assessment. It examines the sensitivity of the market value of the bank's assets and liabilities to changes in interest rates. The technique is based on Maculay's concept of duration, which measures the average lifetime of a security's stream of cash payments. In technical terms, duration is the weighted-average time to maturity using the relative present values of cash payments as weights – see Table 1.2.

Table I.2. Duration analysis

Percent change in market value of security = – (percentage-point change in interest rate) * (Duration in years)

where: Duration is based on Maculay's formula,

$$D = \sum_{\tau=1}^{n} \tau [CP\tau/(1+i)^{\tau}] \; / \; \sum_{\tau=1}^{n} [CP\tau/(1+i)^{\tau}$$

τ = time until cash payment is made; $CP\tau$ = cash payment (interest plus principal) at time τ; i = interest rate; N = time to maturity of the security

Source: Mishkin (1989)

Duration is expressed in years. The larger the numerical value of duration for an asset or liability (bank's total assets or liabilities), the more sensitive the price of that asset or liability (total assets or liabilities market value) is to changes in interest rates. Duration analysis entails a comparison of the average duration of the bank assets to the average duration of its liabilities. If the average duration of the bank's assets is longer than the average duration of its liabilities then the increase in interest rates causes the greater fall in the market value of the assets than in the value of liabilities. Consequently, the net worth (assets minus liabilities) of the bank falls. By contrast, declining interest rates contribute to a higher net worth of the bank.

In sum, both the duration and the GAP analysis are useful for **the assessment** of the bank exposure to interest rate risk.

For the purpose of interest-rate risk **management**, banks commonly apply a variety of financial derivatives including **interest-rate swaps, financial futures** and **options**. Interest-rate swaps enable financial institutions that have a prevailing exposure to rate-sensitive assets rather than rate-sensitive liabilities to "swap" payment streams with financial institutions that have more rate-sensitive liabilities than rate-sensitive assets. Swaps do not require rearrangement of the banks' balance sheet, thus they reduce the interest-rate risk at relatively low cost. Financial futures and options may be preferred to

interest rate swaps since they normally entail lower transaction costs. However, they are standardized and cannot be tailored to individual needs of banks that makes them less flexible, thus disadvantageous in comparison to interest rate swaps.

Credit risk

Credit risk is the uncertainty associated with a borrower's loan repayment. If the expected probability of default is *d*, then the expected probability of receiving payment is (*1-d*) [Sinkey, 1998]. Abstracting from a bank's real resource costs such as salaries for loan officers, processing costs, and other non-interest expenses, a profitable loan contract rate, *r**, must compensate the lender for the time value of money, as reflected by the risk-free rate of interest, *r*, and the risk of default. The relationship can be presented in the form:

$$r^* = (1+r/\ 1-d) - 1.$$

The above equation captures the fundamental notion of a risk-return trade-off, namely, the bank profitable loan contract rate increases with its perception of the borrower's probability of default (risk).

Banks must protect their interests by monitoring closely potential and existing borrowers. In order to diminish the probability of default, banks must screen out the good credit risks from the bad ones. This reduces the danger of moral hazard [1], adverse selection [2] and asymmetric information [3] between the bank and the borrower. One way to accomplish effective screening is to collect reliable information from the prospective borrowers when they apply for a consumer or business loan. Other way of collecting and evaluating data on borrowers is by ***specialization in lending***. By concentrating its lending on firms in specific industries, the bank becomes more knowledgeable about these industries and is therefore better able to predict which firms will be able to make timely payments on their debt. Banks must apply caution with respect to specialization since there is a tradeoff between specialization and diversification. Diversification is a risk management technique that enables them to

[1] Moral hazard results from a deceptive behavior on the part of the borrower or from the change in his expected behavior. For example, the borrower may engage in risky activities, which make it less likely that the loan will be repaid to the bank.

[2] Adverse selection occurs when the bank makes wrong decision by granting a loan to a risky client. The risk is particularly increased when bank has too many high-risk borrowers.

[3] Asymmetric information – the information concerning a transaction which is unequally shared between the parties to the transaction [Bannock et al., 1992]. In banking market, the borrower knows better whether he is capable of paying the credit back or not.

eliminate the concentration of risk. In addition to screening prospective clients, banks also monitor the existing borrowers, especially because they usually limit their borrowers from engaging in risky activities by putting written restrictions called ***covenants*** into loans. By monitoring whether the borrowers are complying with the restrictive covenants, banks can make sure that borrowers are not taking on risk at the bank's expense.

An additional way to obtain information about their borrowers is through ***long-term customer relationships***. If a prospective borrower has had a checking account or savings accounts or other loans with the bank over a long period of time, the bank knows more about the borrower from his past activities and behavior.

Loan commitment is another way, which facilitates the long-term relationships and information gathering. It is a bank commitment to provide a firm, in specific period of time, with loans up to a given amount in exchange for a commitment fee from the borrower that secures the loan. Loans available under such arrangements typically are priced in one of two ways: 1) at a rate tied to the bank's prime rate with no set maturity or 2) at a rate linked to a money-market rate, such as LIBOR or CD rate, with a fixed maturity selected by borrower.

Among the main tools of credit **risk management** are ***collaterals, compensating balances and credit rationing***. Collateral is a property promised to the lender as a compensation if the borrower defaults. Compensating balances, a form of collateral, require that a firm receiving a loan keeps certain minimum amount of funds in a checking account at the bank. Credit rationing takes two forms. The first one occurs when a bank refuses to loan any amount to a borrower, even when he is willing to pay a higher interest rate. The second one takes place when a bank restricts the size of the loan to less than the borrower would like. Credit rationing practices prevent adverse selection and moral hazard.

Liquidity risk

Liquidity means the bank ability to meet withdrawals and to fund loans. Banks maintain liquidity by either holding highly liquid assets, or by accessing the marketplace in order to raise funds. Combination of these methods can be also applied. Raising funds in the money market by purchasing them or in the capital market by issuing banks own securities is not available to all banks since it requires that the bank has reputation, creditworthiness and market presence.

There are several ways to monitor and to evaluate bank liquidity. In day-to day operations banks manage liquidity by applying ***net liquidity statement***. A net liquidity position (the difference between sources and uses of liquidity) allows to monitor current

liquidity position closely [Saunders, 1997]. It provides a cash-flow measure of liquidity in terms of a surplus or a deficit. Although a surplus indicates a liquidity cushion, the bank must also consider the opportunity cost of such a position. Correspondingly, the bank must consider the risk of running a liquidity deficit. A surplus (as a percentage of total assets) of less than 3 to 5 percent is regarded as an early-warning signal [Sinkey, 1998].

Other ways of measuring liquidity exposure of the bank include: peer group comparison, application of liquidity index and measuring financing GAP and financing requirements [Saunders, 1997]. ***Peer group comparison*** allows comparing banks financial ratios, such as *current ratio* [4], *quick ratio* [5] or *cash ratio* [6] and key financial statement positions of the bank with banks of a similar size and geographical location. This analysis may signal inadequate liquidity position based on relative comparison. ***Liquidity index*** measures the potential losses from a sudden or fire-sale disposal of assets (premature sale) compared to a fair market value established under normal market sale. The greater the differences between immediate fire-sales asset price (*Pi*) and fair market price (*Pi**) the less liquid the portfolio of assets.

$$I = \sum_{i}^{n} [(wi)\ (Pi/Pi^*)],$$

where: *wi* = the percent of each asset in the bank's portfolio.

Financing GAP is the difference between a bank's average loans and average deposits:

Financing GAP = Average loans - Average deposits.

A positive gap indicates excess of fund uses over funds sources. It has to be financed by reducing the banks cash position and other liquid assets and/or by borrowing in the money market.

Thus:

Financing GAP = - Liquid assets + borrowed funds.

This allows determining the relationship between the financing gap, the liquid assets and the **financing requirements** (borrowed funds) as follows:

Financing GAP + Liquid assets = Financing Requirements.

[4] Current ratio = current assets/current liabilities.

[5] Quick assets like cash, marketable securities, etc.

[6] Cash ratio = cash/current liabilities.

A rising financing GAP can signal future liquidity problems for a bank since it may indicate increased deposit withdrawals and rising loans due to increased exercise of loan commitments [Saunders, 1997].

In order to manage properly liquidity risk, banks must engage in ***liquidity planning*** as an integral part of bank financial forecasting. A carefully designed liquidity plan should consists of the following components:

– specification of areas of managerial responsibility during the liquidity crisis;

– list of those funds providers who are most likely to withdraw as well as the seasonality schedule of fund withdrawals;

– identification of the size of potential deposit and fund runoffs over various time horizons in the future;

– internal limits for separate subsidiaries and branches borrowings as well as bounds for acceptable risk premiums to pay in each market;

– sequencing of assets for disposal in anticipation of various degrees or intensities of deposit/fund withdrawals.

A carefully chosen combination of various liquidity management techniques and their consistent application enable banks to diminish the overall liquidity risk.

Foreign exchange risk

Foreign exchange risk is a financial risk related to unexpected exchange rate fluctuations. There are two sources of foreign-exchange risk: 1) holding long or short positions in foreign currencies and 2) holding assets and liabilities denominated in foreign currencies that are not equal [Sinkey, 1998].

Whether the bank gains or loses from unexpected changes in exchange rates depends on the value of its ***net exposure in a foreign currency***, which measures the difference in book assets and liabilities denominated in foreign currency corrected by the net trading position in foreign currency. Sinkey (1998) expresses it as:

$$NET = [A(FX) - L(FX)] + NTP(FX)$$

where:
NET = net exposure in a foreign currency
A(FX) = book assets denominated in foreign currency FX
L(FX) = book liabilities denominated in foreign currency FX
NTP(FX) = the net trading position in foreign currency *FX = FX bought - FX sold.*

When $NET = 0$, there is no foreign-exchange risk. When $NET > 0$, the position is described as "net long", which is vulnerable to unexpected depreciation in the value of the

foreign currency. When $NET<0$, the position is described as "net short", which is vulnerable to unexpected appreciation in the value of the foreign currency [Sinkey, 1998].

There are, in principle, two ways in which banks can manage the foreign risk exposure: on-balance-sheet hedging and off-balance-sheet hedging. ***Hedging on balance sheet*** consists of matching the bank's foreign asset and liability book. Banks can lock in a positive return or profit spread whichever direction exchange rates change over the investment period. ***Hedging with Forwards*** is an alternative method of hedging exchange rate risk (which allows for the balance sheet unchanged) by taking position in the forward market for foreign currencies. The role of the forward foreign exchange contracts is to offset the uncertainty regarding the future spot of rate on foreign currencies.

2. Balance Sheet Risk in the Polish Banking System

The previous section presented the concept of risk classification, measurement and management. This section is aimed at examining the changes in the balance-sheet risk in the Polish banking system over the last few years. The analysis is based on four balance-sheet risk categories: interest rate risk, credit risk, liquidity risk, and foreign exchange risk.

2.1. Interest Rate Risk

Interest rate risk, or risk stemming from volatility of interest rates, has become more pronounced in Poland since the end of 1996. It was exacerbated in 1997 by contagion effects of the Czech and the Asian currency crises in the presence of the National Bank of Poland (NBP) willingness to stem the credit expansion. The restrictive monetary policy led to rising real interest rates. As documented by Figure II.1, the levels of nominal short-term interest rates at the end of 1995 and at the end of 1997 were comparable, although the rate of inflation in 1997 was considerably lower than in 1995. The expanded volatility of nominal rates signified the end of the period when interest rates volatility was predictable. The large increase in real interest rates implied that the trend of interest rates became less predictable than before. Under these circumstances, banks and other financial institutions became encouraged to apply better risk measurement and management techniques [Konieczny, 1998].

Volatility of the interest rates has increased significantly since 1997. Particularly in 1997, it was further triggered by more intense sales of securities by the banks in contrast

to the previous years [NBP, 1997]. The higher risk premium was associated with the less liquid financial instruments (e.g. 5-year government securities) while more liquid shorter term instruments (e.g. 52-week T-bills) became less risky, as implied by Table II.1. The estimated loss from the investment of the amount of PLN 100 in 5-year government securities in 1998 reached PLN 21.6 (with the probability of 95 percent), while the estimated loss from the investment of the same amount in 2-year government securities was twice lower, reaching PLN 12.1. Foreign exchange loans, particularly those, whose repayment did not require the currency exchange, were the least risky. The risk associated with loans in foreign currencies that did require swaps to PLN, additionally corrected by foreign exchange risk, essentially exceeded the risk of PLN loans [Konieczny, 1998].

On the one hand, the significant increase in interest rate risk had a deteriorating impact on the credit risk. On the other hand, it also forced the bankers to grant loans to the most efficient recipients. Apart from that, rising interest rates enhanced the demand for risk hedging financial instruments that have been gradually introduced in Poland since mid-1990s.

2.2. Credit Risk

The share of non-performing assets (NPA) in gross *non-financial sector* assets in commercial banks in Poland has been decreasing between 1993 and 1997 as evidenced in Table II.2. It amounted to 10.5 percent in 1998 and it was roughly the same as in 1997. By comparison, the share of substandard and doubtful assets (subcategories of NPA) in total assets increased in 1998. Despite the unchanged share of non-performing assets in 1998, the notional value of assets that served as a basis for creating loan-loss reserves increased by PLN 1,281.0 million [NBP, 1999]. Their growth forced the banks to increase their reserves against loan losses, which in turn negatively affected profits.

The quality of foreign exchange assets relative to the PLN assets improved in 1998. The share of non-performing assets among foreign exchange assets was 7.1 percent while the share of non-performing assets in the amount of PLN assets was 11.5 percent. This reflects a decrease in the share of non-performing foreign exchange assets by 2.0 percentage points and the increase in the share of non-performing PLN assets by 0.7 percentage points comparing to 1997 – see Table II.2a.

As far as the quality of business assets are concerned, they showed a considerable improvement in 1998, as implied by the decline in the share of non-performing assets

by 0.1 percentage point in the business sector. By contrast, the quality of household assets worsened in the same year. The share of non-performing assets among households increased between 1997 and 1998 from 5.4 to 6.4 percent as evidenced in Table II.2a.

The asset quality indicators are somewhat skewed. The significant shares of non-performing assets and lost assets in all assets of commercial banks from non-financial sector are biased by the past agreements, especially those made at the end of 1993. The share of non-performing assets at the end of 1998 due to the agreements made up to the end of 1993 amounted to 23.4 percent of total assets from non-financial sector. The similar share for lost assets from non-financial sector amounted to 46.2 percent [NBP, 1999]. That implies that the deterioration in quality of assets due to the agreements made in recent years is alarming. With respect to non-financial sector, in 1997 the share of non-performing assets in total assets from the year 1997 was 5.8 percent and for lost assets the share was 1.2 percent. In 1998, the shares for the year 1997 increased to 13.7 and 3.4 percent respectively [NBP, 1999]. This drastic deterioration shows a strong, negative impact of rising real interest rates and expanding volatility of exchange rates and interest rates on asset quality in Poland.

Non-performing assets and lost assets from *financial sector* made up respectively 1.5 and 1.2 percent of gross assets of the commercial banks in 1998 as evidenced in Table II.2b. Non-performing assets rose slower than the total assets from that sector (13.9 versus 27.0 percent). However, due to the significant increase in lost assets, their share in gross assets increased from 0.8 in 1997 to 1.2 percent in 1998.

In sum, the deteriorating quality of credits and the slower income growth contributed to the higher credit risk in the recent period. The current difficult conditions require a much greater attention of banks in their credit risk management to the assessment of creditworthiness of borrowers, to monitoring the use of credit, and to the appropriate classification of assets [NBP, 1999].

2.3. Liquidity Risk

The Polish banking system experienced a situation of excess liquidity prior to 1994. It was related to high interest rates, which did not encourage people to take credits. But the demand for credit began to grow very fast in the environment of declining interest rates. In addition, lower rates contributed to expanding maturity of fixed income securities that began to appear in the Polish financial market. These factors contributed to the erasure of the excess liquidity in the banking system.

The fall in the liquidity between 1994 and 1996 is reflected by changes in the banks' liquidity ratios. Due to the growing demand for credit in 1996, some banks were not able to gather deposits from non-financial sector as quickly as they gave credits to that sector. These banks had to borrow funds from financial sector. Consequently, their liabilities to financial sector rose faster than assets in this sector. It is demonstrated by the decreasing ratio of financial sector net debt to total assets, which amounted to 11.5 percent in June 1994 and 3.9 percent in June 1996 – see Table II.3.

Decreasing liquidity is further reflected by the change in the credit-to-deposits ratio. In December 1994 this ratio was 45.1 percent and in June 1996 increased to 52.6 percent. Selected banks gave more credits than they accumulated deposits. In some extreme cases, their credit-to-deposits ratios exceeded 200 percent. In a sharp contrast, several banking institutions experienced a relatively faster growth of deposits, thus their credit-to-deposits ratios declined in the same period. The fast expansion of credit induced banks to invest in securities. This tendency contributed to a higher ratio of debt to total assets. The ratio increased from 26.7 to 34.2 percent between the end of 1994 and June 1996. Together with the fall in liquidity, the ratio of liquid assets to total assets also decreased, on average from 47.0 to 45.7 percent at the same time period [Żuławnik B., 1996].

The fall in liquidity forced banks to pay a more careful attention to the management of assets and liabilities. The new financial instruments and the development of information technology (IT) help the Polish banks to adjust the structure of assets and liabilities.

In 1998, the structure of assets and liabilities in the Polish banking system was characterized by the maturity mismatch between assets and liabilities that is a source of possible problems with liquidity. As demonstrated in Table III.4, the mismatch is in excess of liabilities with maturity up to one month, up to three month and up to one year over the assets with similar maturities. There is also a mismatch in the excess of one-year assets over one-year liabilities.

According to NBP (1999), the following factors contributed to the maturity mismatch of assets and liabilities in Poland:

– the term structure of liabilities, namely, the current and up to 1-year deposits from non-financial sector are excessive in relation to other deposits (less than one year deposits constitute 60.7 percent of net assets while long-term deposits are merely 1.2 percent):

– the structure of assets, that consists mainly of over 1-year assets from non-financial sector and long term securities (18.6 and 9.1 percent respectively);

– financing a part of long-term assets by short-term liabilities.

As shown in Table II.4, the GAP between assets and liabilities of maturity of up to one month fell down between the end of 1997 and the end of 1998 (from –8.2 to –3.6

percent of net assets). Adversely, the GAP between assets and liabilities over 1-month to 3-months, and over 3-moths to 1-year increased during the same time period. This happened mainly due to the increased role of debt among assets with the maturity of up to 1-month as a result of more active open market sales of 28-day T-bills by the NBP to banks [NBP, 1999].

The shortage of long-term deposits is likely to persist in the future. According to the NBP report [NBP, 1999], the limited scale of long term deposits is attributable to:

– the low levels of wealth and income per capita in Poland,

– the small interest rate spread between long-term and short-term deposits,

– the new banking products playing role of long term sources of financing, which are sometimes preferred to the long term deposits – this alternative actually offsets the deposit shortage thus there is no negative effect on liquidity,

– the competitive yields on government securities, which are more preferable by households than the long term deposits.

In sum, the Polish banking system has been experiencing a gradual decrease in liquidity parallel to the increase in the liquidity risk. Nevertheless, the National Bank of Poland [NBP, 1999] still claims the existence of structural excess liquidity in Poland, that is the presence of "the excess of free sources, which can be effectively invested".

2.4. Foreign Exchange Risk

Polish banks operate in a relatively unstable exchange rate environment. The movements of the PLN exchange rate directly affect foreign exchange risk exposure of Polish banks. An increase of the real interest rates in the beginning of 1997 coupled with restrictive monetary policy and more stable economic conditions encouraged foreign investment in PLN denominated fixed income securities. In order to weaken the real appreciation of zloty, the NBP has conducted several interventions in foreign exchange markets since the beginning of 1997. The exchange rate regime has been altered as well. Namely, in February 1998, the RPP (Monetary Policy Council) of the NBP reduced the monthly rate of crawling devaluation from 1 to 0.8 percent and, at the same time, widened the band of currency fluctuations from +/- 7 to +/- 10 percent. The move added flexibility to the Polish exchange rate system allowing the PLN to depreciate in nominal terms. In addition, there was a temporary shock of nominal PLN depreciation induced by the financial turmoil in Russia in August and September 1998. But the PLN began to quickly appreciate in real terms at the end of 1998.

According to NBP (1999) the banks have extended their exposure in a foreign currency at the time of the PLN depreciation in terms of the leading international currencies. Correspondingly, they made their exposure in a foreign currency shorter at times of the PLN appreciation. These adjustments appear to be highly sensitive and transparent in Poland. Yet, the banks incur large losses from foreign currency exposure at times of unanticipated nominal shocks in exchange rates. Such deep shocks have been triggered by the 1997/1998 Asian currency crisis and by the August/September 1998 Russian payments crisis. They were rather effectively weathered off by the NBP whose main operational committee (the RPP) decided to increase flexibility of the PLN exchange rate to weaken expectations of the future real appreciation and to increase the risk of short-term capital inflows. As a result, the stock of short-term portfolio capital was not significant enough to induce sudden reverse capital outflows at times of the Asian and the Russian financial crises.

3. Survey of ALM and Risk Management in the Polish Banking Sector

The preceding sections of the paper provide a theoretical background for the analysis of ALM in the Polish banking sector. The practical approach to the ALM and the risk management in the Polish banking sector is examined on the basis of the survey of 34 commercial banks conducted by the author in the second quarter of 1999. The survey is aimed at investigating the various ALM techniques currently applied by commercial banks. It enables to examine the existing institutional diversification among banks operating in Poland.

3.1. The Survey Design

The questionnaire consisted of five areas:
– bank characteristics and performance,
– basic functions of the ALM department and the ALCO (Asset/Liability Committee),
– risk measurement and management,
– asset and liability management (ALM) techniques,
– the bank's Strengths-Weaknesses-Opportunities-Threats – (SWOT) analysis.

The bank characteristics and performance section focused on such categories as the bank size, tradition in performing banking activities, the ownership structure, and the type of bank. In the section elaborating the ALM department and the ALCO, the survey emphasized the experience and the main functions of top management and CEOs (Chief Executive Officers). The section on risk identification and management dealt with bankers' perceptions of risk factors and their importance. This section examined various risk management techniques, including the scope of computer software applications for this purpose. The next section ascertained the use of specific ALM techniques. The analysis of bank performance was enriched in the last section by SWOT analysis conducted by surveyed bankers.

3.2. Empirical Results

The questionnaire was presented to all 83 commercial banks operating in Poland [7] as of February 1999, and 34 banks responded to it (final survey response rate was 40,9 percent). Among them, 28 were Polish [8] and 6 were foreign [9] banks. Among respondents, Polish private banks outnumbered state-chartered banks by three-to-one (7 state owned and 21 private) [10], consistently with the actual bank market structure in Poland.

3.2.1. Bank Characteristics and Performance

The average asset size for the 34 banks that responded to the survey was PLN 7,024.88 million, ranging from PLN 161.46 million to PLN 56,306.40 million [11] as indicated in Table III.1a. The mean asset size of the surveyed foreign banks amounted approximately to a half of the mean asset size of all surveyed Polish banks. It amounted to PLN 3,267.28 million (for top ten Polish banks it was PLN 8,338.84 million and for other Polish banks it was PLN 7,547.42 million) – see Table III.1a.

Survey results show a high diversification in the size of assets among banks, as measured by the standard deviation from the mean level of total assets. Among all

[7] The questionnaires were mailed to the Chief Executive Officers.

[8] Polish banks are defined as those with the share of the Polish capital exceeding 50%.

[9] Foreign banks are defined as the banks in which the share of foreign capital exceeds 50%.

[10] The ownership structure in all 83 commercial banks in Poland as of February 1999 was the following: 52 Polish banks (among them 13 state-owned and 39 private), and 31 foreign banks.

[11] The asset size for the whole banking sector in Poland (83 banks) ranged from 33.8 million to 65,706.4 million PLN with a median of 1,048.5 million [NBP, 1999; Gazeta Bankowa, 1999].

standard deviations of the banks' assets the highest was that for the group of "other Polish banks". It amounted to PLN 17,802.43 million, which is more than twice larger than the mean value of assets in that group. On the contrary, the groups of the foreign banks and of the ten largest private Polish banks are much more consolidated in terms of the size of assets (standard deviations are PLN 4,571.3 million and PLN 6,315.21 million respectively, which is less than mean values of assets in both groups).

The high standard deviation in the group of other Polish banks implies that there is a diversified oligopoly structure in the Polish banking sector, where few large banks co-exist with a large number of small, undercapitalized banks. The analysis of banks sorted by asset size seems to confirm this finding – the group of banks with the largest assets is much smaller than the group of banks with the smallest amount of assets. Among responding banks, 47 percent have total assets not exceeding PLN 1 billion, 24 percent have assets between PLN 1 and 10 billion, and 29 percent of the banks have assets exceeding PLN 10 billion [12].

Similarly, there is also a significant dispersion of profitability among the surveyed banks. The mean return on assets (ROA) for all surveyed banks was 1.82 percent and ranged from 0.30 to 11.50 percent. The mean return on equity (ROE) was 16.43 percent, ranging from 2.86 to 40.20 percent as evidenced in Table III.1a [13].

Wide ranges of both ROA and ROE indicate significant differences in efficiency among the banks. Moreover, the survey results imply that large private Polish banks are more efficient than the remaining Polish and foreign banks. As shown in Table III.1, both the mean values of the ROA and ROE for the ten largest, private, Polish banks in the survey were higher than for other Polish and for foreign banks. However, as measured by the median values, average ROA of large private Polish banks and other Polish banks were roughly equal, but the ROE for the other banks was larger than for the large Polish banks.

The mean capital ratio [14] for all banks was 19.77 percent and the ratio ranged from the extremely low 2.89 percent to the unreasonably high 48.33 percent. It can be further noted that only one among all surveyed banks did not satisfy the required minimum 8 percent level of the capital ratio, and it was a Polish state owned bank [15]. The average

[12] This fact is even more visible in the whole Polish banking sector where in the group of commercial banks with assets less than PLN 1 billion is 48.6 percent of banks, in the group of banks with assets between PLN 1 and 10 billion is 35.7 percent of the banks, and in the group of banks with the assets exceeding PLN 10 billion is 15.7 percent of all commercial banks [Gazeta Bankowa, 1999].

[13] This compares to mean ROA of 1.52 percent and mean ROE of 17.65 for all commercial banks in Poland [Raport GB,1999].

[14] A ratio of capital to risk weighted assets is set by the Basle Committee at the level of 8%. This is also a required minimum level in the Polish banking system.

[15] In the whole banking sector in 1998, five banks had the capital ratio below the required 8 percent.

capital ratio for the ten biggest private Polish banks was lower than the average for all banks in the survey – see Table III.1a.

Since there is a trade-off between profitability and solvency, the lower but satisfactory level of the capital ratio implies higher efficiency of the large private Polish banks. In general terms, the data prove a large diversification of Poland's banks in terms of their size, profitability and solvency, making it very difficult to find a common denominator for the general assessment of the current state of the banking system.

A similar diversity exists in terms of the market concentration and the scale of operations. The number of branches among the surveyed banks ranges from 1 to 704, with the average of 70 among the Polish banks and 41 among foreign banks. Approximately half of the banks have from 1 to 10 branches, 35 percent have from 10 to 100 branches, and 15 percent have 100 or more branches. Again, the data imply a coexistence of several national banks with a fairly large number of regional or local institutions in the Polish market.

3.2.2. Basic Functions of ALM Departments and Asset/Liability Committees

The survey shows that almost all banks have ALM departments. Among the surveyed banks, only one bank reports having no formal ALM department, and it is a Polish bank. However, it is customary among the Polish banks that ALM functions are carried by a variety of departments ranging from Asset/Liability Departments, Economic Departments, Departments of Financial Policy, Treasury Departments, Capital Management Departments, Risk Management Departments to Credit Departments. There is clearly no uniformity in the organizational setting of ALM functions. In some banks, several departments are involved in ALM. For example, in one bank four such departments perform this task: the Credit Department, the Department of Development, the Department of Monetary Policy, and the Department of Financial Transactions.

Most of the banks have both a formal ALM policy and an ALCO (Asset/Liability Committee) as presented by data in Table III.1b. Nevertheless three or 9 percent of the surveyed banks have no formal ALM policy, and only two have no ALCO. It is perplexing that 10 percent of the largest private Polish banks report in the survey having no formal ALM policy. However, all big private Polish banks as well as all the foreign banks reported having ALCO. It seems puzzling that two banks that have ALCO report having no formal ALM policy. There is also one small private Polish bank that reports having neither ALM policy nor ALCO.

In the prevailing number of cases, ALCO meets either once a week or twice a month. On average, this meeting frequency is higher than for example the one practiced by

American banks, where ALCO meets once a month for making strategic decisions. However, pricing committees meet more frequently there, at least on a weekly basis. In the case of Polish banks, more frequent meetings of ALCO may indicate either less strategic and more operational focus of ALCO or the lack of pricing and other similar committees.

The most important ALCO functions listed by the surveyed bankers include: *liquidity requirement management* (in 97 percent of surveyed banks), *risk management* (94 percent), followed by *loan pricing* (85 percent) and *official statements on interest rates forecasts* (82 percent). Additional functions include: *managing balance sheet structure, and strategic decisions on capital, earnings, and solvency; reviewing financial plans, strategies and performance; pricing the bank's products, setting limits and fees; preparing economic and financial forecasts, budget plans, and financial analysis; controlling and reviewing investment policy, security transactions and portfolios*. The survey shows that ALCO concentrate on a combination of strategic decisions and, in the majority of cases, also on pricing decisions. A more operational approach is certainly consistent with a higher frequency of meetings.

The scope of ALCO functions is somewhat related to the experience of chief executive officers and other top managers. The average experience of a CEO (measured by a number of years of experience for chief executive officers involved with ALM Department or ALCO) was 4.09 years and ranged from 1 to 10 years. The most experienced, on average, were CEOs in foreign banks (5.33 years) and CEOs in the big private Polish banks (4.64 years). The CEOs of the other surveyed, Polish banks are by far less experienced, on average (3.55 years) as shown by the data in Table III.1b. All in all, these ranges imply that top executives of Poland's banks do not have long seniority or experience record [16]. They might be still engaged in the process of learning and organizing their strategic and operational activities. One of their key responsibilities is the management of financial risk.

3.2.3. Risk Measurement and Management

The first area of inquiry in this section was the risk perception by bankers. As evidenced by the survey, the banks perceived the *liquidity risk* as the most important category of risk. The liquidity risk is defined in the survey as a potential loss of liquidity due to sudden withdrawals. It received a mean ranking of 1.53 [17]. As many as 59 percent of the responding bankers ranked the liquidity risk as having the greatest

[16] The same is true for other officers in ALM Departments of the surveyed banks, where a mean experience averaged three years and ranged from null to five years.

[17] All categories of risk were ranked on the scale from 1 to 5, where 1 indicates the most important risk and 5 the least important.

influence on the decisions of their bank. The *credit risk* was considered as the second most important risk factor by 54 percent of the surveyed banks. This risk was defined as a potential delinquency or default by borrowers and received the mean of 1.70. The third most important risk was the interest rate risk, defined as the risk resulting from changes in the level of interest rates incurred by financial institution when the maturity of assets and liabilities are mismatched. This risk scored on average 1.97 points from banks. Further ranks were obtained by the *insolvency risk* (2.12), cost of *funds risk* (2.85) and *exchange rate risk* (2.97) [18]. The ranking of risk factors by their relative importance is not surprising under the current financial conditions in Poland. As discussed in the first part of the paper, both liquidity and interest rate risks have been increasing significantly since 1996, thus they have become more critical for bankers. Credit risk is particularly important for Polish banks since they are still burdened by old non-performing loans and credits in their portfolios.

The second types of questions referred to the rating of factors contributing to the risk evaluation. The factors identified as dominant include interest volatility (listed by 53 percent of the banks), and the state of the economy (listed by 35 percent of the banks). The competitive environment, changes in the banking law and the quality of personnel were assigned a relatively lower importance, although they were viewed as critical to the risk position of the banks. Volatility of exchange rates was perceived as having a moderate importance.

The third broad area of inquiry analyzed in this section refers to risk management and measurement. The survey implies that the foreign banks and the large private Polish banks are more advanced in the use of the risk management and measurement techniques than small private and big state owned banks are. Among the techniques and tools reported by surveyed banks the most popular were diversification of portfolio (94 percent), followed by GAP analysis (88 percent) and simulation models (65 percent) – as shown in Table III.2. While all the foreign banks use the *diversification* and GAP analysis, respectively 93 percent and 86 percent of the Polish banks use these techniques.

The differences are even deeper when comparing the more advanced techniques of risk measurement and management. Thirty eight percent of all banks, mostly foreign banks, use hedging with interest rate swaps and currency swaps. Half of foreign banks use the interest rate swaps and 83 percent use currency swaps. Polish banks use these techniques less often. Interest rate swaps are used by 36 percent of all Polish banks and currency swaps are used by 29 percent of Polish banks. However, these techniques are applied almost exclusively by large private Polish banks (67 percent of them use interest

[18] For definitions of the categories of balance-sheet risk see section I.

rate swaps while 56 percent use currency swaps comparing with 29 percent in case of other Polish banks).

Further techniques are used by all surveyed banks in the following proportions: duration analysis (35 percent), hedging with financial futures (32 percent) and other types of swaps (18 percent) (such as asset swaps, CIRS – interest rate-currency swaps, security swaps, interest rate forwards, Fx. swaps). But again, the usage of the advanced techniques varies among banks. In the group of the large private Polish banks, duration analysis is used by 86 percent of respondents, simulation model is used by 89 percent, and 45 percent apply hedging with financial futures. Other Polish banks use these techniques to a lesser extent: duration analysis is applied by 25 percent of the banks, model is used in 58 percent of the banks and 18 percent of respondents hedge risk with financial futures. It is apparent that the big private Polish banks are able to apply advanced techniques for risk management more often than the other Polish banks. Therefore they are also better equipped to compete with foreign banks.

Foreign banks apply additional sophisticated techniques of risk management. They include such off-balance sheet products as hedging with interest swaps (reported by 50 percent of foreign banks versus 36 percent of Polish banks), hedging with financial futures (50 percent versus 29 percent), and currency swaps (83 percent versus 29 percent), as evidenced in Table III.2.

There are other techniques, which are used rarely and only by a few surveyed banks operating in Poland. Among them are various types of options (security options, exchange rate options), FRA, transactions Netta, buy-sell back, and sell-buyback [19]. The fact that the use of such techniques is not very popular may be explained to some extent by their high costs and some institutional limits for their use.

In terms of on-balance sheet matching of assets and liabilities, the survey indicates that 88 percent of the banks apply gap analysis. The matching is accomplished by either repricing interest rates on certificates of deposits (CD's), by attracting new depositors, or by providing additional types of loans from outside of the current geographical market. Ninety four percent of all banks diversify their lending portfolio by providing additional types of loans inside the current geographical market.

In terms of the loan structure of the surveyed banks, variable and adjustable loans prevail over the fixed rate loans (on average, 86.36 percent versus 13.64). Twenty seven banks (or 79 percent) claimed to have their own loan-pricing systems. It was usually based on reviewing the risk of creditor and of transaction. Creditor is analyzed in terms of the history of his previous credits, his current situation and his prospects for the future.

[19] Detailed description of these techniques goes beyond the scope of this paper and can be found in "The New Polgrave Dictionary of Money and Finance", The Macmillan Press Ltd., London, 1992.

Transactions are viewed in terms of sector risk structure, the duration of credit, total costs, total interests, and the net profit. The most usual loan-pricing method is called a *method of points*. This method serves as basis for designing databases on creditors, e.g. RING (system of information on creditors).

Among all the banks, which use the GAP analysis, 93 percent measure 3-month gap, 80 percent measure also 6-month gap and 67 percent measure 12-month gap. All three measured gaps had mostly negative signs, which means that the banks are protected from interest rate decrease [20]. Duration analysis, which results from the GAP analysis, is however much less popular and used merely by 35 percent of surveyed banks. Banks, which measure the duration GAP do it usually for 3-month period (92 percent), fewer of them measure 6-month and 12-month duration GAP (67 percent). Most banks reported a negative duration [21].

The reported most advanced risk management techniques include also simulation risk management models. They are used by approximately two-third of the responding banks. Half of the banks uses one model, one-third uses two models, and two banks have more than three models. Half of all respondents designed in-house models while 14 percent purchased them (the rest of banks apply a combination of models designed in-house and purchased).

There are some interesting relationships between the use of the risk management models and bank characteristics. Results of the binary Probit model, presented in Table III.3, indicate significant and positive relationship between the years of experience of the CEO and the use of risk management models. It suggests that the longer the CEO tenure, the more likely it be for a bank to use risk management software. A significant positive relationship exists also between the use of risk management models and ROA, suggesting that the banks which were able to apply risk management models (and generally advanced risk management techniques) achieved higher return on assets (as evidenced in Table III.3).

The application of risk models is directly related to risk awareness and the ability to evaluate it. The surveyed banks, which assigned higher ranking to all six categories of risk, were also more likely to have risk management models in place [22]. A significant negative relationship exists between the asset size and the use of the models suggesting that smaller banks are more likely to use the models (see Table III.3). However, due to

[20] But this statement is of limited significance, since many of banks did not answer the question about the gap's sign.

[21] Same as stated in the previous footnote.

[22] Note that the closer to 1, the more important risk was (on the scale from 1 to 5), therefore the averisk 6 coefficient in the Probit model has a negative sign.

positive correlation coefficient of 0.37 for Polish banks, this relationship can not be confirmed.

A negative relationship between interest rate spread and the use of the risk management models suggests that banks with active risk management techniques in place experience narrower interest rate spread between loans and deposit. The relationship between ROE, ownership type, the age of bank, the years of experience of the CEO, the bank operating costs, the number of branches, and the use of the risk management models were also examined. However, since the results did not indicate any significant relationship between any of these variables and the use of risk management models, they are omitted in this paper.

Further analysis of the survey pertains to interest rate margin between assets and liabilities, a major concern related to interest rate risk for financial institutions. The mean spread between deposits and loans for all banks was 7.9 percent, ranging from 4.4 to 10.87 percent. Such a wide range indicates significant differences in pricing policies among banks. Usually foreign banks in transition economies experience a lower spread due to the absence of non-performing loans from their balance sheet, however the surveyed foreign banks reported higher spread, 8.76 percent on average, ranging from 7 to 10.1 percent. The spread at the Polish banks is on average approximately one percentage point lower, i.e. 7.69 percent, but the range is wider (from 4.4 to 10.87 percent). This suggests that there are more significant differences among Polish banks than in the group of foreign banks. Large private Polish banks have lower spread than other Polish banks, and also a narrower range of the spread. This means that the large private Polish banks can more easily narrow their interest rate spread. This may be linked to better asset quality at big private Polish banks.

Banks were also asked to identify techniques used for lowering the costs of their operations. The most frequently listed included: budgeting (i.e. planning of costs for each unit of the bank), increasing the productivity, rearrangements of workers, lowering the cost of funds, lowering fixed costs, monitoring and analyzing costs, implementation of new technologies, and personnel reductions.

3.2.4. Asset/Liability Management

Asset/Liability Management was treated separately from the risk management. Additionally, asset management techniques were distinguished from liability management techniques. In the questionnaire, the bankers were given the choice of ALM techniques and they were asked to list the ones used in their banks.

The most commonly applied asset management techniques were *loan product pricing and marketing*, used by 85 percent of the banks. Further asset management techniques

ranked by the frequency of their use are *investment techniques* (59 percent), *fees and penalties* (47 percent) and *asset securitization and participation* (29 percent) – as evidenced in Table III.4.

Generally, *loan product pricing and marketing, fees and penalties, and investment techniques* were more frequently mentioned by the foreign banks than by the Polish banks (reported by 100, 67 and 83 percent of foreign banks respectively versus 82, 43, and 54 percent reported by Polish banks). *Asset securitization and participation* were more common among the Polish banks than among the foreign banks (32 versus 17 percent). The survey results for asset management techniques are summarized in Table III.4.

Most frequently mentioned liability management techniques included: *match-funded lending programs, analysis of the liability structure, analysis of fund use, analysis and forecast of costs of interests*. The liability structure analysis was the most popular technique, used by 94 percent of the banks followed by the *analysis of fund use* (59 percent) and match-funded lending program (32 percent). Foreign banks reported more frequent application of the above techniques than Polish banks did except for the analysis of fund use, which is utilized by 33 percent of the foreign banks (versus 64 percent by the Polish banks). The survey results for liability management techniques are summarized in Table III.5.

3.2.5. Bank SWOT Analysis

The SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis was added to the questionnaire in order to enrich the examination of the Polish banking sector by the surveyed bankers evaluation of their own institutions.

The results of SWOT analysis indicated some additional differences between the foreign banks and the Polish banks, as well as between big private Polish banks compared with other Polish banks. Most of the Polish banks listed as their *strengths* a well-developed network of branches, quality of the personnel, and recognizable name of the bank. The biggest Polish banks named also IT, high efficiency and good quality of assets. The foreign banks listed a good credit quality, high liquidity and flexibility, IT, marketing and a good quality of service.

Banks were somewhat reluctant to name their *weaknesses*. The largest private Polish banks most frequently identified: a lack of central information system, lower profits from the exchange rate transactions, and lack of separation between retail and investment activities. Other Polish banks enumerated: lack of own funds, decreasing profits, high costs, low quality of an old credit portfolio, underdevelopment of IT, risk management, insufficient diversification of deposit products. Foreign banks named: limited offer of banking products for the companies operating in the Polish market, limited scale of banking activities, and increasing competition from other foreign banks.

The large private Polish banks see their *opportunities* primarily in: retail banking, expected increasing demand for the financial services, mortgage lending, high and stable economic growth, the improvement of operating conditions for companies, and higher diversification of the distribution channels for banking activities. Other Polish banks see their opportunities in: possible consolidation or merger with another bank, finding the strategic investor, finding new clients, development of a better and broader product offer, focus on particular sectors benefiting from favorable economic conditions, economic stability, and the development of IT. Foreign banks see opportunities in their flexibility, servicing foreign exchange transactions, and specialization abilities.

Among the *threats* recognized by the biggest private Polish banks are: decreasing of profit margins, increased competition from foreign banks, mergers and acquisitions, an increasing role of the new financial intermediaries, possibility of introduction of the Tobin tax, lower profits from the exchange rate transactions. Other Polish banks are also afraid of the increasing competition from foreign banks and other financial intermediaries. They see threats in bad risk management, in decreasing profit margins, in bad conditions of particular sectors struggling to survive, in lower economic growth and also in the introduction of the Tobin tax. Foreign banks are afraid mainly of decreasing profit margin, and of competition from other financial intermediaries in the Polish market.

On the one hand, ten largest private Polish banks outperform the other Polish banks (in opinion of the surveyed bankers) especially in the area of IT development, credit quality and risk management (which is also listed as threat by other banks). On the other hand, foreign banks feel stronger than Polish banks in the similar areas i.e. credit quality, the development of IT and foreign exchange transactions. The threats of decreasing profit margins and of the increasing competition from other financial intermediaries are common for all the surveyed banks.

3.3. Summary of the Survey Results

The sample of 34 banks that responded to the questionnaire seems to be an adequate representation since its main characteristics are consistent with those of the whole Polish banking sector composed of 83 commercial bank. However, due to some limitations such as the small representation of foreign banks in the survey, the author applied caution while comparing the Polish banks with the foreign banks. Nevertheless, the survey results are statistically valid and significant.

The survey results show a high diversification in the size of assets among banks. On average, the foreign banks are smaller and less diversified (as for size of assets) than Polish

banks. The asset size of the Polish banks shows a huge spread. This may imply that there is a diversified oligopoly structure in the Polish banking sector where few large banks co-exist with a fairly large number of small, vulnerable banks.

As the survey indicates, the large private Polish banks seem to be more efficient than other Polish banks. The mean values of the ROA and ROE for the top ten private Polish banks were higher than for the other Polish banks. Surprisingly, the ten largest private Polish banks in the survey outperformed the foreign banks by ROA and ROE.

The survey demonstrates that the presence of ALCO has become a rule for most Polish banks, with exception of some state-owned banks. By contrast, all top ten private Polish banks as well as all foreign banks have ALCO. A high frequency of ALCO meetings (once a week or twice a month) may indicate either less strategic or more operational focus of the committee or the lack of pricing and other committees, which make decisions on a more frequent basis. The most important ALCO functions include *liquidity management* and *risk management* followed by *loan pricing* and by formal *interest rate forecasts*.

The analysis of risk awareness and management yields interesting conclusions. The *liquidity risk* was the most important category of risk perceived by bankers. This risk was also indicated as having the greatest influence on the bank's pricing decisions. The *credit risk* was considered as the second most important risk factor. Such ranking of risks can be attributed to the significant increase in both liquidity risk and interest rates risk between 1996 and 1999 hence their significance to bankers. The reason that the credit risk is especially important to Polish banks may be explained by the fact that many of them are still burdened by old non-performing or lost loans in their portfolios.

The most frequently used risk management techniques reported in the survey are portfolio diversification, GAP analysis and simulation models.

Generally, the survey implies that foreign banks and large private Polish banks are much more advanced in the use of advanced risk management and measurement techniques than small private and big state owned banks are. Above all, foreign banks use more often off-balance sheet products hedging risk with interest swaps, financial futures and currency swaps. Large private Polish banks are also likely to apply these advanced techniques.

The survey revealed some interesting relationships among the use of advanced risk management techniques (as e.g. risk management models) and bank activities. There is a significant and positive relationship between CEO years of experience and the use of risk management models. Positive significant relationship exists also between ROA and use the of risk management models suggesting that their use positively affects profitability. Banks that demonstrated the risk awareness and the ability to evaluate risk were more likely to apply risk management models. In the survey, the banks, which evaluated all six

categories of risk higher than other banks were also more likely to have risk management models. In addition, the length of experience of the CEO in ALM and in ALCO activities seems to have a direct effect on the quality of risk management. In terms of this experience, foreign banks and large private Polish banks outranked other surveyed Polish banks whose CEOs were less experienced.

A crucial part of the survey concerned ALM. Asset management techniques were investigated separately from liability management techniques. Among asset management techniques *loan product pricing and marketing* was the most common one. Techniques used for liability management include *match-funded lending program, liability structure analysis, analysis of fund use, and analysis and forecast of interest rates*.

Results of SWOT analysis indicated some additional differences between the Polish and the foreign banks as well as between large private Polish banks versus other Polish banks. The top ten private Polish banks consider themselves superior to the other Polish banks in the development of IT, credit quality and risk management while foreign banks outperform all Polish banks in not only in these areas but also in foreign exchange transactions.

The fear of decreasing profit margins and increased competition from other financial intermediaries is a common threat among banks.

4. Conclusions and Policy Implications

The main conclusion from the paper is that only the strongest, the most solvent and best-managed banks will survive the competitive environment of the increasingly open financial system in Poland. Big private Polish banks seam to be better equipped to face competition than small private and big state-owned ones for several reasons. Large private Polish banks can more easily apply technology-based cost savings in order to improve net interest margins. Generally, the falling interest rates are favorable for the improvement in net interest margins since banks reduce the interest rate that it pays for deposits before the average rate of return earned on loans and investments declines. Adversely, rising interest rates contribute to net interest margin deterioration.

The large private Polish banks are also better managed. They have more experienced personnel thus they can afford to implement IT and more advanced ALM techniques. Therefore, this paper provides yet another argument in support of accelerated privatization and consolidation of the Polish banking system.

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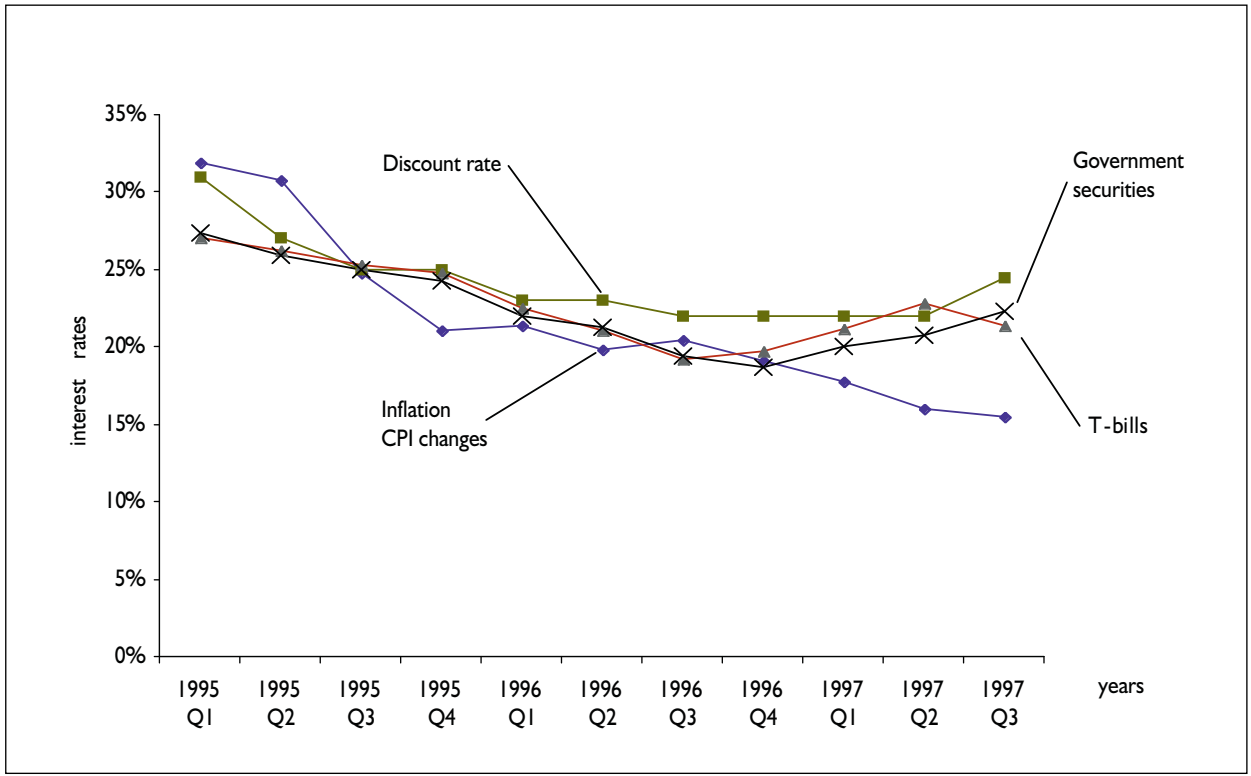
Figure II.1. Short term interest rates in Poland between 1995 and 1997



Source: IFS

Table II.1. Approximation of risk premium of the main financial instruments during one year in 1998

Financial instruments	Risk evaluation in % per PLN 100 (confidence level 95%)
WIBOR 1M	6.46
52-weeks T-Bills	4.40
2-year government securities	12.10
5-year government securities	21.60
exchange rate USD/PLN	13.59
exchange rate DEM/PLN	18.91
LIBOR 1 M	0.11
FIBOR 1M	0.90

Source: Konieczny P. (1998)

Table II.2 The share of non-performing assets in gross non-financial sector assets in commercial banks in Poland (end-year)

	1993	1994	1995	1996	1997	1998
Share of non-performing assets in gross assets:	31.0	28.5	20.9	13.2	10.5	10.5
substandard	7.5	5.9	5.4	4.1	3.9	4.0
doubtful	6.4	5.7	5.4	1.7	1.2	1.8
lost	17.1	16.9	12.0	7.4	5.4	4.7

Source: NBP (1999)

Table II.2a. The share of non-performing assets in gross non-financial sector assets in commercial banks in Poland

Share of non-performing … in gross assets:	12.1997	12.1998
assets	10.5	10.5
foreign exchange assets	9.1	7.1
PLN assets	10.8	11.5
household assets	5.4	6.4
business assets	11.6	11.5

Source: NBP (1999)

Table II.2b. Gross assets from financial sector in commercial banks in Poland

	Structure in % 1998	**Nominal change in 1998 (%)**	**Real change in 1998 (%)**
Gross assets from financial sector	100	27.0	16.9
Share of non-performing assets in gross assets:	1.5	13.9	4.9
lost assets	1.2	104.3	88.1

Source: NBP (1999)

Table II.3. Liquidity in 35 banks with the largest own capital

	Net debt in financial sector in total assets		**Credits/Deposits**	
35 Banks with the largest own capital	XII 1994	VI 1996	XII 1994	VI 1996
SUM	11.5%	3.9%	45.1%	52.6%
	Dept instruments in total assets		**Liquid assets / Total assets**	
35 Banks with the largest own capital	XII 1994	VI 1996	XII 1994	VI 1996
SUM	26.7%	34.2%	47.0%	45.7%

Source: Żuławnik B. (1996)

Table II.4. Structure of Assets and Liabilities maturity

	12.1997			6.1998			12.1998		
	Assets*	**Liabilities***	**GAP***	**Assets***	**Liabilities***	**GAP***	**Assets***	**Liabilities***	**GAP***
Up to 1-month	32,9%	41,1%	-8,2%	35,5%	41,0%	-5,5%	40,1%	43,7%	-3,6%
Between 1-moth and 3-month	7,5%	12,7%	-5,2%	6,6%	13,0%	-6,4%	5,0%	12,7%	-7,7%
Between 3-month and 1-year	16,0%	17,8%	-1,8%	14,1%	17,7%	-6,4%	13,4%	17,2%	-3,8%
Over 1-year	31,0%	6,7%	24,3%	29,8%	6,1%	23,7%	28,9%	6,9%	22,0 %
Others	12,6%	21,7%	-9,1%	14,0%	22,2%	-8,2%	12,6%	19,5%	-6,9%

*Assets = Assets as % of net assets, Liabilities = Liabilities as % of net assets, GAP = GAP as % of net assets

Source: NBP, (1999)

Table III.1a. Comparison of selected indicators of 34 surveyed banks

	Assets				Capital ratio			
	All surveyed banks	10 BPP* banks	Other** Polish banks	Foreign*** banks	All surveyed banks	10 BPP* banks	Other** Polish banks	Foreign*** banks
Mean	7 024.88	8 338.84	7 547.42	3 267.28	19.77	14.65	23.41	17.39
Std. Err.	2 304.39	1 997.04	4 196.07	1 866.23	1.82	1.82	2.96	2.55
Median	1 166.10	10 889.50	512.46	1 553.00	15.32	13.95	20.19	13.99
St..Dev.	13 436.80	6 315.21	17 802.43	4 571.30	10.60	5.76	12.56	6.24
Min.	161.46	549.00	161.46	564.00	2.89	8.13	2.89	11.90
Max.	56 306.40	17744.4	56306.4	12530.4	48.33	28.7	48.33	26.2
	ROA				**ROE**			
	All surveyed banks	10 BPP* banks	Other** Polish banks	Foreign*** banks	All surveyed banks	10 BPP* banks	Other** Polish banks	Foreign*** banks
Mean	1.82	2.52	1.47	1.28	16.43	18.17	15.88	12.23
Std. Err.	0.35	1.02	0.23	0.12	1.71	3.15	2.71	2.66
Median	1.41	1.55	1.54	1.30	15.77	15.80	15.85	10.28
St..Dev.	1.94	3.24	0.93	0.30	9.55	9.97	10.83	6.51
Min.	0.30	0.30	0.00	0.87	2.86	6.22	0.00	6.48
Max.	11.5	11.5	3.6	1.6	40.2	40.2	36.66	23

* Ten biggest private Polish banks in the survey

** Other Polish banks in the survey

*** Foreign banks in the survey

Source: Survey

Table III.1b. Comparison of selected indicators of 34 surveyed banks

	CEO expir				Costs			
	All surveyed banks	10 BPP* banks	Other** Polish banks	Foreign*** banks	All surveyed banks	10 BPP* banks	Other** Polish banks	Foreign*** banks
Mean	4.09	4.64	3.55	5.33	246.78	257.27	270.89	145.89
Std. Err.	0.54	0.90	0.67	2.40	87.13	69.95	154.03	98.03
Median	3.50	4.00	3.00	4.00	33.00	317.50	16.47	57.00
St..Dev.	2.66	2.39	2.52	4.16	485.11	209.86	635.10	219.21
Min.	1	2	0	2	3.22	17.50	3.22	28.50
Max.	10	8	9	10	2102.40	531.90	2102.40	536.40
	Spread				**ALM (in % of banks)**			
	All surveyed banks	**10 BPP* banks**	**Other** Polish banks**	**Foreign*** banks**	**All surveyed banks**	**10 BPP* banks**	**Other** Polish banks**	**Foreign*** banks**
Mean	7.90	7.21	7.88	8.76	91%	90%	89%	100%
Std. Err.	0.42	1.17	0.53	0.72	**ALCO (in % of banks)**			
Median	8.08	7.35	7.00	9.70	**All surveyed banks**	**10 BPP* banks**	**Other** Polish banks**	**Foreign*** banks**
St..Dev.	2.16	2.86	2.04	1.61	94%	100%	89%	100%
Min.	4.40	4.40	5.00	7.00				
Max.	10.87	10.00	10.87	10.10				

* Ten biggest private Polish banks in the survey

** Other Polish banks in the survey

*** Foreign banks in the survey

Source: Survey

Table III.2. Techniques Used for Risk Measurement and Management

	All surveyed banks		Ten biggest private Polish banks		Other Polish banks		All surveyed Polish banks		Foreign banks	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Dyverisfication of portfolio	32	94%	9	90%	17	94%	26	93%	6	100 %
GAP analysis	30	88%	7	70%	17	94%	24	86%	6	100 %
Duration analysis	12	35%	10	86%	4	25%	10	36%	2	33%
Simulation models	22	65%	20	89%	10	58%	20	71%	2	33%
Hedging with interest rates swaps	13	38%	10	67%	5	29%	10	36%	3	50%
Hedging with financial futures	11	32%	8	45%	3	18%	8	29%	3	50%
Currency SWAPS	13	38%	8	56%	5	29%	8	29%	5	83%
Other SWAPS	6	18%	6	18%			6%	18%		

1. Asset swaps
2. CIRS – interest rate – currency swaps
3. Securuty swaps
4. Interest rate Forward
5. Fx swaps

Source: Survey

Table III.3. Binary probit model for Use of the Risk Management Models

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	366.5687	155.5051	2.357278	0.0184
ASSETSLOG	-38.76718	17.58434	-2.204642	0.0275
CEOEXPIR	40.71437	17.61193	2.311750	0.0208
ROA	15.38490	6.261303	2.457139	0.0140
SPREAD	-23.35799	9.236879	-2.528775	0.0114
AVERISK6	-127.1889	34.92881	-3.641377	0.0003

Mean dependent var	0.631579	Restr. log likelihood	-12.50409
S.E. of regression	0.097569	LR statistic (5 df)	23.56881
Sum squared resid	0.123757	Probability(LR stat)	0.000263
Log likelihood	-0.719685	McFadden R-squared	0.942444

Source: Survey

Table III.4. Techniques Used for Asset

Type	All banks		Polish banks		Foreign banks	
	Frequency	%	Frequency	%	Frequency	%
Loean pricing	29	85%	23	82%	6	100%
Fees and penalties	16	47%	12	43%	4	67%
Investments	20	59%	15	54%	5	83%
Assets securitization and participation	10	29%	9	32%	1	17%
Other	2	6%				
1. Analysis and Pricing of Investment Portfolios 2. Analysis of Assets due to sources of financing						

Source: Survey

Table III.5. Techniques Used for Liability Management

Type	All banks		Polish banks		Foreign banks	
	Frequency	%	Frequency	%	Frequency	%
Match Funded Lending Program	11	32%	9	32%	2	33%
Structure Analysis	32	94%	26	93%	6	100%
Analysis of Funds Use	20	59%	18	64%	2	33%
Other:	2	6%	2	7%		
1. Analysis and forcast of costs of interests						

Source: Survey

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