The Role of Net Interest Margin in Improving Banks’ Asset Structure and Assessing the Stability and Efficiency of their Operations

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Abstract

Against the background of the growing diversity of financial instruments, technological progress and increasing interconnectedness of financial institutions, ensuring the stability of the banking sector has become an important task for economic policy in every country. This paper shows that net interest margin is the most appropriate criterion for evaluating the effectiveness and stability of banks’ operations. It is superior to the return on assets in illustrating how successfully a bank manages its interest bearing assets. The author analyzes banking sectors in the Baltic countries, the Euro Area as well as the United States and their management strategies, as well as indicators of their operations to show that net interest margin is one of the most important criteria for asset structure optimization.

Keywords: Net interest margin; bank assets; asset management strategies;

1. Introduction

A banking system is closely linked with the management of monetary assets in every economy. Therefore the management and control of economic processes involving banks have become a necessity in every country over the last twenty years. Against the background of the growing diversity of financial instruments, technological development and increasing interconnectedness of financial institutions,
ensuring the stability of banks has become an important task for economic policy in every country. At the same time, investors are also interested in analyzing the riskiness and profitability of bank operations, especially after the 2008 financial crisis.

At first glance, bank share prices can be used as the basic indicator of the effectiveness of bank management. Clearly, shareholders are interested in increasing share prices, since otherwise their capital could have been deployed more effectively elsewhere. However, share prices themselves ideally have to be based on the analysis of the underlying state of the banking system or a particular bank. Where that analysis is faulty, share prices will sooner or later undergo a downward correction as was the case, for example, in 2008.

This paper studies one of the most important fundamental indicators for the analysis of bank operations - the net interest margin (NIM), that is the ratio of net interest income to the average earning assets (interest earning assets) or net interest profitability. This indicator is less frequently encountered in reports and statistics compared to returns on assets (ROA) or returns on equity (ROE). However, it does succinctly summarize the effectiveness of banks’ interest bearing assets. The larger the net interest margin, the more successfully does the bank manage its’ interest bearing assets.

In this paper, the author analyzes the net interest margin dynamics for the Baltic, European, and American banking sectors. It also shows that net interest margin is an important analytical indicator, which complements returns on assets as a useful signal of vulnerability. Section 2 of the paper provides a literature review, while Section 3 summarizes statistical analysis. Finally, Section 4 concludes.

2. Literature Review and Hypothesis

2.1. Asset Management Strategies

As the banking system becomes ever more important in its role of a financial intermediary, the modern concept of asset management and allocation continues to evolve. The main theories that underlie the accepted understanding of asset allocation and management can be split into three groups:

- modified neoclassical theory (developed among others by Bischoff (1971)) which described the dependence of investment and consequently asset formation not only on the lagged price of capital, but also on lagged output;
- portfolio theory of investment, which related asset portfolio optimization to the notion of portfolio returns (Markowitz, 1952);
- monetary theory, which emphasized the role of adjustment costs in determining the persistence of investment behavior (see e.g. Mussa (1977)).

Evaluating the quality of assets and adopting managerial measures aimed at improving it is the key to developing a successful asset management strategy. Some of the most popular strategies are focused on optimizing bank assets directly and controlling risks arising in the process, of which the primary example is credit risk. Dash and Pathak (2011) develop a linear programming model with profitability as the objective, and constraints based on liquidity and statutory requirements. Yang et. al. (2009) develop and evaluate a credit risk evaluation system for commercial banks.

In this framework policymakers and regulators are often seen as constraining elements for bank profitability and operations. For example, there is a substantial literature on credit ratings and the consequences of the Basel Regulatory framework for banks (see e.g. Catarineu-Rabell (2005)).
2.2. The Importance of Analyzing Net Interest Margin in Addition to ROA and ROE Indicators

The link between management strategy and net interest margin has been drawn out clearly in some of the earliest studies of net interest margin. In a seminal contribution Ho and Saunders (1981) showed that the existence of the interest margin was the result of the transactions uncertainty faced by the bank. It also depended on four other factors: the degree of managerial risk aversion; the size of transactions undertaken by the bank; market structure in which a given bank had to operate; and the variance of interest rates.

This model was subsequently extended to take bank costs into account, as well as by improving the measure of competition (see e.g. Maudos and de Guevar (2004) focusing on the EU and Zhou and Wong (2008) focusing on China). In another multi-country extension Saunders and Schumacher (2000) suggested an important policy trade-off between assuring bank solvency—high capital-to-asset ratios—and lowering the cost of financial services to consumers—low net interest margins.

A wide variety of other factors have been shown to be important determinants of net interest margin in addition to the quality of asset management strategy. Hawtrey and Liang (2008), relate net interest margin to market power, operational cost, risk aversion, interest rate volatility, credit risk, and volume of loans. Demirguc-Kunt and Huizinga (1998) show that differences in interest margins and bank profitability reflect various determinants: bank characteristics, macroeconomic conditions, explicit and implicit bank taxes, regulation of deposit insurance, general financial structure, and several underlying legal and institutional indicators.

Particular attention has been paid to relating interest margins to risks faced by the bank. For example, Angbazo (1997) shows that the net interest margins of commercial banks reflect both default and interest-rate risk premiums, while other classes of banks are more sensitive to one of these risks, but not the other. Delis and Kouretas (2011) show that that low-interest rates indeed increase bank risk-taking substantially.

Another approach has been to decompose changes in the net interest margin into price and weight changes, where price is the sum of annual changes in market-wide bank rates on different assets and liabilities weighted with the respective asset and liability positions in the previous year, while weight changes are the sum of the current market-wide bank rates on the different assets and liabilities weighted with the annual changes in the banks' balance sheet positions. Memmel and Schertler (2011) interpret price changes as strategic management decisions by the bank, while weight changes as tactical management decisions.

Interest rate margin also interacts with the other significant source of bank profitability – fee income. Lepetit et. al. (2008) find that higher income share from commissions and fees is associated with lower margins and loan spreads. The higher the commission and fee income share, moreover, the weaker the link between interest spreads and loan risk.

In Central and Eastern Europe interest margins have been investigated, for example, by Claeys and Vennet (2008), who studied to what extent the relatively high bank margins in CEEC can be attributed to low efficiency or non-competitive market conditions, controlling for the macroeconomic environment and the influence of foreign and state-owned banks. In contrast, focusing on Czech Republic, Horváth (2009) found that more efficient banks exhibit lower margins and do not compensate themselves with higher fees. Larger banks also tended to charge lower margins, while higher capital adequacy was associated with lower margins contributing to banking stability. In other emerging markets Villaroya and Solis (2009) study net interest margins in Mexico and show that high margins can be explained mainly by the magnitude of average operating costs and by market power. Chang et. al. (2013) take a broader perspective and examine net interest margin dynamics in 141 countries over the period 1987 – 2008,
finding that there exists an inverse relationship between net interest margin and change in globalization for each country, implying that globalization improves the efficiency of banking system.

Thus net interest margin can be linked to a variety of macroeconomic, and bank specific parameters – overall macroeconomic parameters, internal risk controls, management strategy, etc. This paper argues for the hypothesis that net interest margin should be considered in addition to other asset profitability indicators for evaluating the effectiveness and stability of a bank. Furthermore, there is evidence that this may be in some sense a superior indicator.

3. Asset Structure, Return on Assets, and Net Interest Margin in the Baltic, European and US Banks

Bank statistics are notoriously difficult to compare across countries because of different definitions, accounting approaches, regulatory requirements and data availability. In order to be able to draw conclusions across a variety of countries, it is important to have a source of comparable data. For the data on net interest margin and return on assets, this paper primarily relies on the updated version of the Financial Development and Structure Dataset (FDSD) originally compiled by Beck et. al. (2010), which contains a variety of comparable financial metrics, compiled to ensure consistency over time. In addition, this paper also uses ECB Consolidated Banking Statistics (CBS).

This paper focuses the analysis on the following variables (all data is on an annual basis):

- **The share of loans and receivables (including finance leases) in total assets** – this variable captures to what extent the activities of the banking system are devoted to lending. Lending is traditionally the main function of the financial system, and most of the assets of the banking system belong are loans and receivables. This variable is available from the ECB CBS from 2008 until 2012.

- **Net interest margin** – as defined above. Because the last update of the database on financial development and structure includes the series until 2011, the values of net interest margin for 2012 for the Baltic countries are obtained by assuming it grew at the same rate as net interest income to assets, which is available from the ECB CBS.

- **Return on assets** – defined as total income over total assets. This variable is obtained from the FDSD where it is only available until 2011. Values for 2012, are available from the ECB CBS, however, they are not strictly speaking comparable, in part because FDSD contains the average of returns on assets for individual banks, while CBS computes aggregate return on assets – that is the ratio of total profits of the banking sector to the total assets. In any case the lack of the data for 2012 does not present a substantial problem, because the primary focus of this section is on behavior of the indicators before the crisis.

Finally, it is also necessary to have some measure of efficiency of bank asset management. If one assumes that the sole purpose of asset management is maximizing profits, net interest margin and return on assets are in themselves efficiency indicators. However, from the viewpoint of the policymakers, profit maximization should not come at the expense of the stability of the banking sector. Similarly, bank investors should care about the risk-adjusted return on their investments. Hence, it is necessary to pick some indicators characterizing the stability of the banking system. This paper relies on **Bank Z-score** – computed as the ratio of the sum of return on assets and the capital–asset ratio to the standard deviation of return on assets. The z-score is equivalent to the inverse of the probability of insolvency if profits are assumed to follow a normal distribution. Specifically, z-score indicates the number of standard deviations below the expected value of a bank’s return on assets at which equity is depleted and the bank is insolvent (Beck, 2010). The higher the z-score the more stable is the bank.
3.1. Latvia and Other Baltic Countries

The last five years have been a tumultuous time for the banking sector in the Baltic countries, especially in Latvia and Lithuania. There have been insolvency proceedings for large (on local scale) banks, as well as consolidations, and the financial crisis of 2008, which had profoundly affected the economy showing up in both macroeconomic as well as bank operations’ indicators. During the crisis, the poor quality of previously issued loans became apparent as the ratios of non-performing loans have increased and the perceptions of asset quality have declined. Interest income from the issued loans fell, however interest income generating assets as well as the total assets have declined as well. There has been a general decline of activity on the interbank market, which threatened insolvency for many banks.

Figures 1 and 2 summarize banking sector development trends in the Baltic countries. Figure 1(a) focuses on the aftermath of the crisis and the ensuing reallocation of bank assets from loans to other types of financial instruments. Importantly, the reallocation did not occur in every country to the same extent: in Estonia and Lithuania, the share of loans and similar assets in total asset has stabilized around 2010, while in Latvia it continued to be on a downward trend and, as of 2012, was substantially lower than in Estonia or Lithuania (at 65.5, 77.1 and 82.6 percent respectively).

Figure 1(b) shows that the dynamics of the return on assets was fairly similar across all three Baltic countries with Estonian banks experiencing somewhat smaller decline during the crisis and somewhat faster recovery in its aftermath. Similarly, Figure 2(a) shows that the trends in the net interest margin have been similar across all three Baltic economies. Crucially, however, Figure 2(a) shows that net interest margins were on a declining trajectory throughout the 2000s. This is actually in line with the stylized facts documented by Beck et. al. (2010) for most of the advanced economies.
For the Baltic countries there may be several reasons for this trend, some benign and others giving rise to concern. For net interest margins to fall, interest bearing assets must grow faster (or decline slower) than net interest income. A benign reason for such a development may be increasing competition in the banking sector, with banks competing to offer cheaper rates to prospective borrowers. This is, of course, benign, only unless there is a clear credit boom, which was the case in the Baltic countries.

On the other hand, more ominous reasons for such a trend could include an increase in non-performing loans, which would lower net interest income even with lending and deposit rates being unaffected. Alternatively, a decline in the net profit margin may suggest a rapid growth of interest bearing assets, which is not compensated by growth in interest income due to a compression in spreads (the difference between lending and borrowing rates). This raises risks that asset quality is being compromised, which appears to be one of the likely factors explaining the credit boom in the Baltic countries.

Thus, the Baltic countries provide a clear example, of how monitoring trends in the net interest margin (Figure 2(a)) can raise signals, which would be unobserved, were the analysts focused just on return on assets (Figure 1(b)).

Finally, Figure 2(b) shows that Z-score for banks in the Baltics remained relatively constant before the crisis and behaved in much the same way as return on assets, which is not surprising, since these measures are closely related. Thus, before the crisis, only the net interest margin would have raised a signal of growing vulnerabilities.

3.2. Europe and the United States

The aftermath of the 2008 financial crisis, as well as the 2010 debt crisis has been a serious test for the stability and viability of the European monetary union. The GIPS countries in particular, have been heavily affected by the crisis and experienced prolonged recessions, from which they are only now beginning to tentatively recover. The crisis also brought about a whole series of structural changes in the regulation and the supervision of European banks – specifically, the creation of the Banking Union, consisting of the single supervisory and resolution mechanisms (the latter still not finalized).
In the US, the recovery from the 2008 crisis has been more durable. The recovery of the banking system, in particular, is often credited by commentators to successful policy actions such as the Troubled Asset Relief Program (TARP). Undoubtedly, the resolution of the crisis has been easier in the US because of the single fiscal and regulatory authority backing up the banking system, contrary to the European Union, where an integrated monetary union, lacked a single resolution or supervision authority that would have been able to rectify a crisis situation. These policy shortcomings are being addressed at the EU level now. In this section, however, the author will focus on the dynamics of net interest margins in these countries and their possible role in signaling crisis vulnerabilities. This section will limit itself to the FDSD dataset with the last year of observation in 2011. The lack of availability of later data is not relevant for our purposes, since our object of concern is the behavior of net interest margins and return on assets before the crisis (before 2008).

Figure 3(a) shows the dynamics of the net interest margin for Germany and the United States, which can be considered to have more resilient banking systems and for Spain and Greece, which can be considered to have less resilient banking systems ex post.

![Net Interest Margin Comparison](image1)

Fig. 3. (a) Net Interest margin, for select Euro Area countries and the US. Source: Financial Development and Structure Database, (b) Return on Assets for select Euro Area countries and the US. Source: Financial Development and Structure Database

Figure 3(a) clearly shows that net interest rate margin has been more volatile for Spain and Greece, than for Germany and the United States. In particular, in the years before the crisis (2005 – 2007), there is a clear tendency for net interest margin to decline in Greece and Spain, while remaining constant in the United States and Germans. Average returns on assets shown in Figure 3(b), on the other hand, do not demonstrate a similar tendency and decline only during the crisis. Once again, therefore, one can see that net interest margin appears to carry a useful signal of growing vulnerabilities in the banking sector.

The reader might object that the crisis is considered to have originated in the US, where net interest margin has been stable (and also higher than in the European countries). The reason is that subprime lending boom was driven primarily by non-bank (or shadow bank) entities, which were not captured by the banking sector statistics. A full elaboration of this, however, is beyond the scope of this paper.
The evidence above therefore suggests that a greater volatility of net interest margin (especially a trend towards decline) can be seen as a negative signal. Figure 4 makes a slightly more formal analysis, relating the standard deviation of net interest margin to the average bank Z-score. A clear negative association is observed, the higher the volatility of net interest margin the lower the average Z-score for the banking sector. The data also indicates an even stronger positive relationship between the volatility of the net interest margin and return on assets, suggesting that net interest margin is one of the important drivers of the overall return on assets.

![Net Interest Margin and Bank Z-score](image)

Fig. 4. The relationship between standard deviation of net interest margin from 1999 to 2011 and the average Z-score over the same period. The sample consists of 17 euro area countries (Ireland is excluded as an outlier, but including it would not change the direction of the relationship and only lower R-squared to 0.32), Lithuania, Denmark, Norway, Sweden and the United States. Source: Authors calculations based on the Financial Development and Structure Database

4. Conclusions

This paper studied the dynamics of net interest margin, as well as other banking sector indicators in the Baltic countries, Europe and the United States. It suggests that net interest margin can be an important complement to an overall profitability indicator such as return on assets. A simple examination of the dynamics of net interest margin and the return on assets shows that net interest margin had a tendency to decline prior to the difficulties in the banking sector, while return on assets remained more stable during that time. This suggests that net interest margin can serve as an important indicator of growing tensions or vulnerabilities in the banking sector.

It is important, however, to recognize that the tendency towards a declining net interest margin can be seen as a positive development as well since it suggests greater efficiency of the banking system in redistributing resources. Net interest margin can decline due to greater competition or financial and technological innovations that increase productivity. A full analysis must therefore carefully take into account such considerations. Another caveat is that the paper largely abstracts from the growing interdependence between the financial stability of the banking sector and the solvency of the government.
This link has been particularly important in the Euro Area, however, current policy measures are aimed at weakening it, by mutualizing funds available for resolution to some extent.

Asset profitability, which, besides the return on assets, can also be characterized by the net interest margin, remains one of the most important criteria for evaluating the stability and efficiency of bank operations.

What measures have to be taken in order to adjust asset structure optimally, according to this criterion? According to the author, in Latvia as well as in other countries, banks can adapt to the trend of declining profitability of financial instruments in two ways:

- **Minimizing the speed of the decline in profitability.** Declining profitability of the banking system may be an inevitable process for the moment, not least due to regulatory changes brought about by the crisis. One can therefore aspire merely to soften somewhat the direction of the trend rather than alter it radically. This can be achieved by lowering expenses and creating a resource base (increasing the amount of equity, lowering the price of attracted resources, as well as administrative overheads). In addition, increasing the efficiency of asset utilization by rapidly deploying them towards opportunities which can provide an acceptable return at an acceptable level of risk can also help.

- **Maximizing profits** – banks have to evaluate the maximum possible level of profits from active operations for a given bank development strategy, taking into the account the limitations that are related to:
  - The need to fulfill normative requirements of bank supervisors, including quantitative limits on exposures to different kinds of risk.
  - The need to maintain an acceptable level of solvency throughout the year,
  - The need to maintain a necessary level of financial stability for the year.

The author believes that profit maximization – or more precisely – the maximization of net interest margin is the most appropriate optimization criterion in the model of asset structure optimization (as suggested by Saksonova (2003) on the possibilities for improving asset structure in Latvian banks) and that net interest margin can be the main measure of efficiency for commercial banks.

The inevitability of the decline in profitability determines the need to increase the volume of profit generating activities. In order to achieve this, commercial banks have to:

- Accelerate the growth rate of profitable assets,
- Increase the share of “working” (income generating) assets,
- Increase the amount of non-operational income, while simultaneously slowing down the growth of operational and non-operational expenses. This can be achieved not only by expanding and changing the traditional structure of utilization of financial instruments but also by actively looking for other forms and methods of attracting and deploying resources, mostly by diversifying profitable operations.

The author believes that the question on the efficiency of this method remains open – because the search for sources of income is associated with significant expense and dispersion of resources, including by extracting them from the use of traditional, profitable operations. Besides, it is not clear that the new areas of business will be profitable and, oftentimes, it is difficult to find economic justifications for them. Substantial measures can be performed, in order to ensure the readiness to fulfill a host of new and progressive services, which may be beneficial for the bank as well as the client. However, it may be the case that this readiness turns out to be unnecessary due to lack of demand.
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