Analysis of Change Effect in the Market Interest Rate on Net Interest Income of Commercial Banks

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crossref http://dx.doi.org/10.5755/j01.ec.22.3.514

The article presents an analysis and description of the methods of an income gap analysis and a duration gap analysis that enable assessing an interest rate risk of commercial banks also their policy of assets and liabilities management in the view of concordance of terms. On the basis of gap analysis methods applied to make an assessment of an interest rate risk and annual financial statements of the banks “Šiauliai bankas” and “Medicinos bankas” for the period of 2006 – 2009, a theoretical simulation model of sensitivity of the net interest income to the changes in the market interest rate was developed and implemented in practice; the aim of the model – with the aid of gap methods and a sensitivity analysis to make quantitative assessment of the effect of the change in the interest rate on a net interest income, as hypothetically, there is a functional dependency between changes in the market interest rate and net interest income of commercial banks. Management of an interest rate risk in commercial banks is one of the “foundation stones” in management of banks assets and liabilities as it determines profitability of a bank. M. Jasiene (1998) describes in detail the interest rate risk and its potential effect on the structure of assets and liabilities. A. Lileikiene and J. Martinkiene (2004) in their research articles emphasise the importance of a choice of the strategy of assets and liabilities formation in commercial banks and tools for the management of an interest rate risk. Interest rate risk and its management tools are also described in N. Zaltauskiene’s (2005), A. Lileikiene and J. Martinkiene’s (2004) research works. There is a considerable body of research and studies on this topic by foreign authors. E. N. Murthy (2008), S. Priyank (2007) describe in detail methods of interest rate risk assessment, analysing values of assets and liabilities balance-sheet items of commercial banks. F. S. Mishkin (2007) provides mathematical methods for the assessment of the structure of assets and liabilities in commercial banks. Interest rate risk assessment methods and results of research are also described in specialised periodical publications that are publicly distributed, e.g. “GAP Analysis” bulletin published by the initiative of the US Central Bank.

Keywords: interest rate risk, net interest income, gap, sensitivity analysis.

Introduction

The analysis of the sources of economic research literature shows that the major part of research on the topic of interest rate risk management deals with the analysis of the measures for risk mitigation or neutralization – interest swap and future interest transaction, also interest options. By the authors’ opinion, beside the interest rate risk management, a separate area of research should be discerned – assessment of interest rate risk. Although the methods of interest rate risk assessment known in the research literature enable an accurate and comprehensive assessment of interest rate risk, it is difficult to find quantitative and qualitative models for an interest rate risk assessment that would relate changes in the market interest rate to financial performance indicators of banks. Interest income is the main source of income of commercial banks. Having other factors constant, the changes in the market interest rate can make a significant effect on the interest income of commercial banks. M. Jasiene (1998) emphasises that the level of the market interest rate and economic activity cycle are changing simultaneously. While Lithuanian economy is entering into the decline and recession stages of the economic cycle, the market interest rate level is likely to change. The dynamic analysis of an interbank interest rate shows significant changes in the interest rate level. It increases the interest rate risk and strengthens the effect of changes of the market interest rate on net interest income of commercial banks.

Object of research of the article is to develop the methods of the assessment of interest rate risk due to the changes in the market interest rate for commercial banks and to apply it in practice for the assessment and management of interest rate risk in the banks “Šiauliai bankas” and “Medicinos bankas”, thus increasing competitiveness of retail banks in the financial market.

The following tasks were set to achieve the objective of research:

1. to analyse and describe the analysis methods enabling the assessment of the interest rate risk of commercial banks and their policy of assets and liabilities management in a view of concordance of terms;
2. to define the effect of the market interest rate fluctuations on net interest income of commercial banks;
3. applying a gap analysis method to assess the interest rate risk and the principles of formation of assets and liabilities in the banks “Šiauliai bankas” and “Medicinos bankas” for the period of 2006 – 2009.
Research methods: the analysis of economic research and academic literature, comparison, generalisation, statistical and econometric methods, synthesis and extrapolation, graphical representation, the analysis of static and dynamic data, forecasting and simulation modelling.

Theoretical importance of the results is based on the systemic approach to the interest rate risk and assets and liabilities management, which is implemented in a theoretical model of sensitivity of net interest income to the market interest rate. This model is developed taking into account the possibilities for its wide application in practice, which virtually depend on the initial rationales of researchers and provide for possibilities to increase the competitiveness of regional commercial banks.

Aspects of interest rate risk assessment

Performing every commercial bank’ lending and borrowing operations faces the interest rate risk problem. This risk results from different revaluation terms of assets and liabilities balance sheet items. Upon the changes in the market interest rate, costs related to debt management incurred by a bank can increase more than income generated from assets used by a commercial bank. That’s why, as precise as possible methods for assessment and management of interest rate risk should be used; also advanced tools for forecasting of the market interest rate should be available. As Crouhy, M., Galai, D., Mark R., (2000) maintain, the interest rate risk level depends on the type of composition and structure of assets and liabilities of commercial bank and the type of pursued strategy for management of assets and liabilities. It means that the process of interest rate risk recognition in commercial banks is expressed through the pursued policy for management of assets and liabilities. According to N. Zaltauskiene (2005), an interest rate risk makes impact on the economic value of various bank assets, liabilities or out-balance-sheet items, that are derived by discounting all future cash flows. It can be concluded that a net current value of commercial banks is constantly changing upon the changes in the level of the market interest rate. As many national and foreign authors state, the interest rate risk is assessed by a gap method. Several methods of gap analysis are provided in research literature. However various methods of the analysis give different results that often are measured in different measurement units. In order to make a comprehensive evaluation of the results generated by the interest rate risk assessment methods and to relate them with the financial performance indicators of commercial banks, the authors combine several methods of interest rate risk assessment and financial analysis that make the theoretical model of sensitivity of net interest income to the market interest rate. Thus, a systematic approach to the market interest rate risk and management of assets and liabilities in commercial banks is provided. The authors maintain that the existence of the market interest rate risk is not a negative factor itself, as favourable policy of management of assets and liabilities in a bank and changes in the market interest rate can generate an additional value of assets for banks.

One of the key crediting principles in commercial banks is the concordance of terms. It means that a bank must observe the “golden rule of banking” stipulating that the time-term of the loans a bank grants cannot be longer than the term when a bank has funds of its customers in its disposal. This coordination of terms is referred to in research literature as concordance. Theoretically, concordance is achieved when terms to the maturity of money received from debtors concur with the terms to maturity of money that a bank is bound to pay to creditors (Macerinskiene, 2000). But absolute concordance of time-terms is not beneficial in the view of profitability. The goal of a bank is to strive for maximum profit ensuring sufficient indicators of liquidity and security. D. S. Kidwell, R. L. Peterson & D. W. Blackwell (2000) provide liquidity, profitability and security as three fundamental principles of a commercial bank and represent them in a form of a triangle. Depending on the principle that a bank is more focused on, a credit policy is classified into aggressive, conservative and liberal. Kidwell, Peterson, Blackwell (2000), also Macerinskiene, Ivaskeviciute (2000) state that striving for the three fundamental principles, a commercial bank has to take contradicting decisions:

- to achieve high profitability, a bank must maximise the number of long-term loans (due to higher interest);
- to maintain required liquidity, a bank must optimise the number of short-term loans;
- to ensure security, a bank must make a detailed assessment of every bank customer.

If a commercial bank chooses an aggressive credit policy, a bank maximises profit at a liquidity account. In this case fixed-time short-term deposits and balances of current accounts are used for the financing of medium-term loans; and medium-term and long-term fixed-term deposits for long-term loans. Pursuing such a credit policy a bank not only increases liquidity (solvency) risk, but also an interest rate risk occurs due to non-concordance of terms.

A commercial bank seeking to maintain required liquidity optimises the number of short-term loans, but high liquidity ratios do not reduce the level of bank interest rate risk. In this case it should be emphasised that the interest rate risk is a specific type of financial performance risk for a commercial bank, which virtually is not directly dependent on credit policy pursued by a commercial bank. Interest rate risk can be an important factor pursuing both aggressive and conservative credit policy. Interest rate risk is minimised only in the case of total concordance of time-terms. However in practice a total concordance of time-terms in commercial banks does not exist. It means that the interest rate risk more or less in every commercial bank is a significant factor determining profitability.

On the contrary to the cases of other risk factors that make impact on a commercial bank, the interest rate risk is not a negative factor itself. Van Greuning and B. Bratanovic (2000) notice that the interest rate risk can have a twofold effect: the effect of changes in interest rates can be not only negative, but also a positive one. Depending on the structure of assets and liabilities of a commercial bank and trends for changes of the market interest rate level, the changes in interest rate can be financially useful. Exactly the policy of the formation of assets and liabilities structure
in regard of concordance of time-terms determines what level of interest rate risk a bank accepts.

**Policy and its importance for the management of assets and liabilities in banks**

According to M. Jasiene (1998), the aim of assets and liabilities management is to coordinate regulation of assets and liabilities of a bank in order to increase the market value of share capital of a bank. Management of interest rate risk is one of the most important obligations of the Committee of assets and liabilities management.

In research literature (Murthy, 2008), it is emphasised that assets and liabilities management in operations of commercial banks is required in the following stages of planning (20):

- making plans for Day-to-Day Decisions. In this case assets and liabilities management is performed analysing short-term reports and setting short-term goals of a bank;
- annual budget planning and control plan forming;
- strategic planning that includes setting of long-term goals of a bank performance.

Referring to the above, it can be stated that the management of assets and liabilities in operations of commercial banks includes making both running and strategic plans. This fact emphasises the importance of the management of assets and liabilities. One of the key task in the management of assets and liabilities is an interest income analysis and management. Net interest income is the difference between interest income earned by a bank granting credits and providing investing services, and interest expenditures that a bank incurs paying interest on deposits and other liabilities. Depending on various circumstances and economic factors, net interest income in every bank can change both in positive and negative direction, i.e. it can both increase and decrease. It depends on the change in the market interest rate and on bank’s approach to assets and liabilities. If a bank has a larger share of assets depending on interest rate than a share of liabilities depending on an interest rate, then this relative ratio of assets and liabilities will be higher than one. And vice versa, if a bank has a larger share of liabilities depending on an interest rate than a share of assets, then a relative ratio will be lower than one. Relative ratio of interest rate sensitive assets and liabilities is calculated under the following formula (Beck, 2000):

\[ \text{Relative ratio of interest rate sensitive assets and liabilities} = \frac{\text{RSA}}{\text{RSL}} \]  

where:

- \( \text{RSA} \) – Interest Rate Sensitive Assets;
- \( \text{RSL} \) – Interest Rate Sensitive Liabilities.

Changes in the market interest rate have direct impact on net interest income (Table 1). In the market, interest rate can increase, decrease or remain constant. Data provided in the table shows the directions of change in net interest income upon changes in the market interest rate. Gap (in other words - difference) is a value of difference between interest rate sensitive assets and interest rate sensitive liabilities.

<table>
<thead>
<tr>
<th>Gap</th>
<th>Interest rate</th>
<th>Net interest income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>increases</td>
<td>increases</td>
</tr>
<tr>
<td>Positive</td>
<td>decreases</td>
<td>decreases</td>
</tr>
<tr>
<td>Negative</td>
<td>increases</td>
<td>decreases</td>
</tr>
<tr>
<td>Negative</td>
<td>decreases</td>
<td>increases</td>
</tr>
<tr>
<td>Zero</td>
<td>increases</td>
<td>does not change</td>
</tr>
<tr>
<td>Zero</td>
<td>decreases</td>
<td>does not change</td>
</tr>
</tbody>
</table>

In order to perform a gap analysis, the balance-sheet items of a commercial bank are classified into sensitive to the market interest rate and insensitive to the interest rate. In other words, it can be said that to perform an analysis it is necessary to know the net present value of which assets and liabilities balance-sheet items depend on interest rate level and changes (sensitive to the changes in the market interest rates), and which assets and liabilities balance-sheet items do not depend on the market interest rate. The analysis of the values of these variables constitutes the essence of a gap analysis.

Classification of sensitivity of assets and liabilities to interest rate is provided in Table 2 where assets and liabilities balance-sheet items are classified into sensitive and insensitive to the changes in the market interest rate.

<table>
<thead>
<tr>
<th>Assets</th>
<th>Classification</th>
<th>Liabilities</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>Insensitive</td>
<td>on call deposits</td>
<td>Insensitive</td>
</tr>
<tr>
<td>Short-term securities</td>
<td>Sensitive</td>
<td>Current accounts</td>
<td>Insensitive</td>
</tr>
<tr>
<td>Long-term securities</td>
<td>Insensitive</td>
<td>Money market deposits</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Fluctuating interest rate credits</td>
<td>Sensitive</td>
<td>Short-term deposits</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Short-term loans</td>
<td>Sensitive</td>
<td>Long-term liabilities</td>
<td>Insensitive</td>
</tr>
<tr>
<td>Long-term loans</td>
<td>Insensitive</td>
<td>Repo operations</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Other assets</td>
<td>Insensitive</td>
<td>Shareholder equity</td>
<td>Insensitive</td>
</tr>
</tbody>
</table>
Those assets and liabilities balance-sheet items, which interest income or costs are changing upon changes of the market interest rate during certain time period, are considered sensitive to the changes in interest rate. Those assets and liabilities balance-sheet items, which interest income or expenditure does not change, upon changes of the market interest rate during the same reporting period, are considered insensitive to changes in interest rate (Zeitlin, 2009). It is extremely important to emphasise that the period from which sensitive and insensitive to the changes in interest rate balance-sheet items differ, is one year. By Santomero (2009), extension or reduction of the reporting period may result in the situation when assets and liabilities balance-sheet items that had earlier been sensitive (insensitive) to changes in the market interest rate may become insensitive (sensitive).

A. Lileikiene (2008) emphasises that each balance-sheet item of assets or liabilities that matures within a selected time interval, can be re-valued, because a bank can re-invest with other interest rate or to set other interest rate for deposits. By M. Jasiene (1998), every credit or fixed-term deposit that matures within this time period, will be interest rate sensitive assets or liabilities. Even each payment of credit instalment is sensitive, if it is expected to be received within a certain time interval. This includes both final and intermediate payments of the principal amount.

Asset and liability is interest rate sensitive within a certain time interval, if (7):
- it’s term matures;
- it is intermediate or final payment of the principal amount;
- pursuant to agreement, interest rate on loan or deposit is changed within this interval;
- pursuant to agreement, the principal amount of loan or deposit may be re-valued, upon changes in certain basis rate, or index, and it is expected that basis rate (index) would change within that time period.

In a classic case, sensitive assets and liabilities balance-sheet items are considered sensitive to the changes in interest rate for the period of up to one year. However, the analysis of research literature shows that this reference time is not an approved theoretical standard, but rather more depending on economic rationales of a researcher and objectives of research. Having the aim to analyse the effect of interest rate risk on financial performance indicators of a bank within the period of several years, it is expedient to extend this term or to classify all the assets and liabilities balance-sheet structure into balance-sheet items that are in general sensitive or insensitive to changes in interest rate. In the simulation model of sensitivity of net interest income of a commercial bank, the assets and liabilities that are re-valued later than after one year period are considered sensitive to the changes in the market interest rate. Only assets and liabilities balance-sheet items that are absolutely independent from the market interest rate are discerned.

Assessment of interest rate risk by the gap method

GAP Analysis is applied to make an assessment of interest rate risk in commercial banks. Gap analysis includes the analysis of individual balance-sheet items of a commercial bank by potential re-valuation periods. It shows the amount of interest rate risk. Re-valuation period is a particular date, when the interest of certain financial instrument may be changed, thus making impact on bank’s profit (loss) generated from the interest (Lileikiene, 2008).

Having analysed the sources of foreign literature (Federal Reserve Bank bulletin “GAP Analysis”, 2004; F. S. Mishkin The Economics of Money, Banking, and Financial Markets, 8th edition), it can be maintained that the gap analysis of balance-sheet items of commercial banks can be performed in two methods: calculating the value of a gap in monetary terms by a particular re-valuation date or assessing average duration of the gap (e.g. in years) in average required to re-value assets and liabilities.

Due to this different initial reference position of the analysis, there are two different methods of gap analysis calculation (19):

1) Income Gap Analysis;
2) Duration Gap Analysis.

Making the assessment of the effect of both income gap and duration gap on the value of assets and liabilities of commercial banks, only interest rate sensitive balance-sheet items are analysed. It means, that performing a gap analysis, it has to be decided, which assets and liabilities balance-sheet items are sensitive to changes in the interest rate. In other words, it is important to discern such elements of assets and liabilities balance-sheet items that are likely to be revaluated upon changes in the market conditions (Makstutienė, 2009, Lukosevicius, 2003).

In the case of Income Gap Analysis, an absolute gap value is calculated as a difference between values of interest rate sensitive assets and interest rate sensitive liabilities by a particular selected re-valuation date. This difference in financial statements of Lithuanian commercial banks is referred to as a net position of balance-sheet items or just a gap. The following formula is used to calculate net position of balance-sheet items (to find a gap value) (7):

\[ GAP = RSA - RSL \]  (1);

where:
- \( GAP \) – net position of balance-sheet items or a gap;
- \( RSA \) – net position of interest rate sensitive assets;
- \( RSL \) – net position of interest rate sensitive liabilities.

Large difference (both in positive, and negative direction) means that changes in interest rate have a very big effect on interest income (Murthy, 2008). By M. Jasiene (1998), information on the value of a net position of balance-sheet items (gap) can be used to protect net interest income from changes in interest rate or for speculative purposes to change the value of difference trying to increase net interest income.

If a difference between values of interest rate sensitive assets and interest rate sensitive liabilities is positive, it shows that interest income will be changing in the same direction as the interest rate in the market. If interest rate is
If a difference between values of interest rate sensitive assets and interest rate sensitive liabilities is negative, then interest rate will be changing in opposite direction than interest income, i.e. if interest rate is increasing, the interest income is decreasing; if interest rate is decreasing, interest income is increasing.

Analysing in more detail the benefit provided by difference of the values of interest rate sensitive assets and interest rate sensitive liabilities, strategies for assets and liabilities management are discerned. Banks choosing a strategy for the management of assets and liabilities in such a way expect to earn additional income or to reduce potential loss.

**Duration gap analysis** is performed in order to evaluate what effect on the net position of balance-sheet items or gap can be made by a change in interest rate at certain value (Beck, 2000). The essential difference from the income gap analysis method is that in this case gap duration of an average revaluation time of both assets and liabilities is calculated, i.e. during calculations, every value of assets balance-sheet item is divided by total value of interest rate sensitive assets and a ratio is obtained, which shows what is a relative weight of a particular balance-sheet element in the total context of interest rate sensitive assets. An analogical operation is performed with liabilities: a ratio between the value of the element of a liabilities balance-sheet item and the total interest rate sensitive liabilities balance-sheet item is divided by total value of interest rate sensitive liabilities of a bank is calculated. Afterwards, this ratio is multiplied by a ratio of average duration gap of revaluation time of a particular balance-sheet item.

Having performed calculations, an assessment can be made of the structure of balance-sheet items of both assets and liabilities which shows at what average time-intervals are the elements of assets and liabilities balance-sheet items re-valued. Advantage of this method is an ability to make a single-method assessment of the total value of assets (liabilities) elements in regard of revaluation terms, taking into account relative values of balance-sheet items in the context of assets (liabilities). Having summed-up leveraged durations of revaluation time of individual assets and liabilities balance-sheet items, the following ratios are obtained: average leveraged duration of assets revaluation duration time and average leveraged duration of liabilities revaluation duration time.

In terms of assets, this ratio is calculated as following (Mishkin, 2007):

\[
\frac{A_i}{RSA} \times D_i = W_i, \text{ where } i = (1, n), i \in Z \quad (2);
\]

\[
\sum_{i=1}^{n} W_i = DUR_a, \text{ where } i = (1, n), i \in Z \quad (3);
\]

where:

- \(A_i\) – value of i-th assets balance-sheet item;
- \(D_i\) – duration of revaluation time of i-th assets balance-sheet item;
- \(W_i\) – leveraged duration of revaluation time of i-th assets balance-sheet item;
- \(DUR_a\) – average leveraged duration of assets revaluation time;
- \(n\) – number of interest rate sensitive assets balance-sheet items;

In terms of liabilities, this ratio is calculated as following (Mishkin, 2007):

\[
\frac{L_{z}}{RSL} \times D_{z} = W_{z}, \text{ where } z = (1, m), z \in Z \quad (4);
\]

\[
\sum_{z=1}^{m} W_{z} = DUR_l, \text{ where } z = (1, m), z \in Z \quad (5);
\]

where:

- \(L_{z}\) – value of z-th liabilities balance-sheet item;
- \(D_{z}\) – duration of revaluation time of z-th liabilities balance-sheet item;
- \(W_{z}\) – leveraged duration of revaluation time of z-th liabilities balance-sheet item;
- \(DUR_l\) – average leveraged duration of liabilities revaluation time;
- \(m\) – number of interest rate sensitive liabilities balance-sheet items;

The obtained results of average leveraged duration of assets revaluation time \(DUR_a\) and average leveraged duration of liabilities revaluation time \(DUR_l\), are used in further analysis for the following aims:

1) to define whether the structure of assets and liabilities of a commercial bank is balanced in regard of revaluation terms (results are compared with planned indicators of a bank);

2) to develop a model of sensitivity of net interest income of a bank to the market interest rate.

Changing the interest rate by a certain percentage, it is possible to make a model of changes in the bank’s assets and liabilities and to observe the effect of these changes on the gap value. The analysis of sensitivity of net interest income to the market income rate is performed calculating an average leveraged gap duration of revaluation time under the following formula (18):

\[
DUR_{gap} = DUR_a - \left(\frac{RSL}{RSA} \times DUR_l\right) \quad (6);
\]

where:

- \(DUR_{gap}\) – average leveraged gap duration of revaluation time;

Sensitivity ratio is calculated under the following equation (19):

\[
\frac{\Delta A}{A} = - DUR_{gap} \times \frac{\Delta i}{1 + i} \quad (7);
\]

where:

- \(\Delta A\) – sensitivity ratio;
- \(\Delta i\) – change in market interest rate;
- \(i\) – market interest rate before a change.

Sensitivity ratio \(\Delta A\), expressed as a percentage, shows gap change as a percentage of the amount of interest rate sensitive assets. Performing a sensitivity analysis to develop a model that would show absolute value of a gap at certain market interest rates.

The percentage value of change in interest sensitive assets and liabilities can be calculated under the following formulas (19):
Angela Lileikienė, Aurimas Likus. Analysis of Change Effect in the Market Interest Rate on Net Interest...

\[
\% \Delta P_a = -DUR_a \times \frac{\Delta i}{1 + i} \quad (8);
\]

\[
\% \Delta P_l = -DUR_l \times \frac{\Delta i}{1 + l} \quad (9);
\]

where:

\% ΔP_a - a percentage change in interest rate sensitive assets;

\% ΔP_l - a percentage change in interest rate sensitive liabilities.

Certain shortcomings of the model are approached when performing a gap analysis. Rational of the gap analysis is that the changes in the market interest rate equally change the values of assets and liabilities balance-sheet items. It is not always correct. Changes in interest rate can be different in regard of assets and liabilities. According to A. Lileikienė (2008), if the trend for drop (rise) of interest on issued credits and decrease (increase) of interest on deposits is constant, then such changes do not infringe an interest rate equilibrium in the financial market. Obviously, if such condition is violated, then the results of the gap analysis can not reflect the real situation in the market.

The gap analysis is one of the methods to manage market interest rate risk. It is also a tool to create models for alternative operations, changing the market interest rate. Income gap analysis allows for the evaluation, whether assets and liabilities balance-sheet items are in concordance with each other in a view of revaluation terms. A duration gap analysis enables the comparison of an average leveraged duration of assets and liabilities revaluation time. With the aid of these ratios, having calculated an average leveraged gap duration of revaluation time, it is possible to make further calculations of the ratio of sensitivity of net interest income to the changes in the market interest rate. This ratio shows changes in the gap (difference), when the market interest rate is changing by certain percentage value.

Simulation model of sensitivity of net interest income to the changes in the market interest rate in the banks “Šiauliai bankas” and “Medicinos bankas”

To make calculations of net interest income it is necessary to know the estimates of the total interest income and income cost. They can be calculated knowing values of all interest generating assets and interest cost incurring liabilities. In addition to this, the total interest income and total interest costs can be calculated having the values of interest rate sensitive assets and interest rate sensitive liabilities, and also all potential estimates of basis interest rate.

The estimates of the bank “Šiauliai bankas” basis interest rate are provided in Table 3.

<table>
<thead>
<tr>
<th>Potential estimates of “Šiauliai bankas” basis interest rate upon the changes in the market interest rate (%)</th>
<th>Δi</th>
<th>(i(a)) (2006)</th>
<th>(i(l)) (2006)</th>
<th>(i(a)) (2007)</th>
<th>(i(l)) (2007)</th>
<th>(i(a)) (2008)</th>
<th>(i(l)) (2008)</th>
<th>(i(a)) (2009)</th>
<th>(i(l)) (2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- .7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.22%</td>
<td>0.12%</td>
<td>1.78%</td>
<td>1.37%</td>
</tr>
<tr>
<td>- .6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2.22%</td>
<td>1.12%</td>
<td>2.78%</td>
<td>2.37%</td>
</tr>
<tr>
<td>- .5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.22%</td>
<td>2.12%</td>
<td>3.78%</td>
<td>3.37%</td>
</tr>
<tr>
<td>- .4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4.22%</td>
<td>2.12%</td>
<td>4.78%</td>
<td>4.37%</td>
</tr>
<tr>
<td>- .3</td>
<td>2.15%</td>
<td>0.45%</td>
<td>2.47%</td>
<td>0.94%</td>
<td>4.22%</td>
<td>3.12%</td>
<td>4.78%</td>
<td>4.37%</td>
<td></td>
</tr>
<tr>
<td>- .2</td>
<td>3.15%</td>
<td>1.45%</td>
<td>3.47%</td>
<td>1.94%</td>
<td>5.22%</td>
<td>4.12%</td>
<td>5.78%</td>
<td>5.37%</td>
<td></td>
</tr>
<tr>
<td>- .1</td>
<td>4.15%</td>
<td>2.45%</td>
<td>4.47%</td>
<td>2.94%</td>
<td>6.22%</td>
<td>5.12%</td>
<td>6.78%</td>
<td>6.37%</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>5.15%</td>
<td>3.45%</td>
<td>5.47%</td>
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<td>6.15%</td>
<td>4.45%</td>
<td>6.47%</td>
<td>4.94%</td>
<td>8.22%</td>
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<td>8.78%</td>
<td>8.37%</td>
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<td>5.94%</td>
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<td>8.12%</td>
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<td>8.15%</td>
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<td>9.15%</td>
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<td>8.94%</td>
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<td>12.15%</td>
<td>10.45%</td>
<td>12.47%</td>
<td>10.94%</td>
<td>14.22%</td>
<td>13.12%</td>
<td>14.78%</td>
<td>14.37%</td>
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</tr>
</tbody>
</table>

The essential feature of simulation model – equal change in the market interest rate Δi , applied to revaluate interest rate sensitive assets and sensitive liabilities, also to calculate the total interest income and total interest costs. Due to this reason, the interest margin of a bank is considered as a constant value. But in the simulation model this condition can be changed, i.e. Δi interest rate change within the same time interval can vary in regard of assets.
and liabilities. This provides a possibility for the fluctuation of an interest margin of a bank. In order to find and forecast how interest margin of a bank will be changing, it is necessary to evaluate how the value of assets and liabilities will be changed also subjected to other factors than the change in interest rate. Let’s say, the value of assets of commercial bank can change as the result of increase in the number of insolvent customers, or upon the decrease of the market interest rate, the value of liabilities is decreasing, if customers decide not to keep deposits in the bank but invest into real estate instead, etc.

The estimates of the bank “Medicinos bankas” basis interest rate are provided in Table 4.

The estimates of the basis interest rate calculated in Tables 3-4 are used to make calculations of the total interest income and total interest costs, the results whereof in terms of Litas are provided in Tables 5-6.

Interest income and interest costs are calculated taking into account the changes in the market interest rate, also the effect of such changes on interest rate sensitive assets and liabilities (Table 5).

### Table 4

Potential estimates of “Medicinos bankas” basis interest rate upon the changes in the market interest rate (%)

<table>
<thead>
<tr>
<th>Ratio</th>
<th>( i(a) ) (2006)</th>
<th>( i(l) ) (2006)</th>
<th>( i(a) ) (2007)</th>
<th>( i(l) ) (2007)</th>
<th>( i(a) ) (2008)</th>
<th>( i(l) ) (2008)</th>
<th>( i(a) ) (2009)</th>
<th>( i(l) ) (2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta i = -7 )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = -6 )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4.23 %</td>
<td>0.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = -5 )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5.23 %</td>
<td>1.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = -4 )</td>
<td>-</td>
<td>-</td>
<td>3.16 %</td>
<td>0.79 %</td>
<td>6.23 %</td>
<td>2.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = -3 )</td>
<td>-</td>
<td>-</td>
<td>4.23 %</td>
<td>0.69 %</td>
<td>7.23 %</td>
<td>3.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = -2 )</td>
<td>2.71 %</td>
<td>0.91 %</td>
<td>4.16 %</td>
<td>1.79 %</td>
<td>8.23 %</td>
<td>4.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = -1 )</td>
<td>3.71 %</td>
<td>1.91 %</td>
<td>5.16 %</td>
<td>2.79 %</td>
<td>9.23 %</td>
<td>5.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = 0 )</td>
<td>4.71 %</td>
<td>2.91 %</td>
<td>6.16 %</td>
<td>3.79 %</td>
<td>10.23 %</td>
<td>6.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = 1 )</td>
<td>5.71 %</td>
<td>3.91 %</td>
<td>7.16 %</td>
<td>4.79 %</td>
<td>11.23 %</td>
<td>7.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = 2 )</td>
<td>6.71 %</td>
<td>4.91 %</td>
<td>8.16 %</td>
<td>5.79 %</td>
<td>12.23 %</td>
<td>8.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = 3 )</td>
<td>7.71 %</td>
<td>5.91 %</td>
<td>9.16 %</td>
<td>6.79 %</td>
<td>13.23 %</td>
<td>9.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = 4 )</td>
<td>8.71 %</td>
<td>6.91 %</td>
<td>10.16 %</td>
<td>7.79 %</td>
<td>14.23 %</td>
<td>10.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = 5 )</td>
<td>9.71 %</td>
<td>7.91 %</td>
<td>11.16 %</td>
<td>8.79 %</td>
<td>15.23 %</td>
<td>11.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = 6 )</td>
<td>10.71 %</td>
<td>8.91 %</td>
<td>12.16 %</td>
<td>9.79 %</td>
<td>16.23 %</td>
<td>12.69 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta i = 7 )</td>
<td>11.71 %</td>
<td>9.91 %</td>
<td>13.16 %</td>
<td>10.79 %</td>
<td>17.23 %</td>
<td>13.69 %</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Table 5

The total “Šiauliai bankas” interest income and costs upon changes in the market interest rate (in thousand LTL)

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta i = -7 )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>14639</td>
</tr>
<tr>
<td>( \Delta i = -6 )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>23483</td>
</tr>
<tr>
<td>( \Delta i = -5 )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>42498</td>
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<tr>
<td>( \Delta i = -4 )</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>61303</td>
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<tr>
<td>( \Delta i = -3 )</td>
<td>25568</td>
<td>3924</td>
<td>43583</td>
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<td>47216</td>
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<td>( \Delta i = -1 )</td>
<td>48609</td>
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<td>77833</td>
<td>38968</td>
<td>116458</td>
<td>87760</td>
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<td>29547</td>
<td>95450</td>
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<td>134457</td>
<td>51607</td>
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<tr>
<td>( \Delta i = 1 )</td>
<td>70936</td>
<td>37883</td>
<td>111153</td>
<td>64954</td>
<td>152177</td>
<td>3225</td>
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<tr>
<td>( \Delta i = 2 )</td>
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<tr>
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<tr>
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<td>186293</td>
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<td>200670</td>
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<td>133624</td>
<td>85700</td>
<td>205531</td>
<td>140368</td>
<td>254295</td>
<td>214946</td>
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</table>
Angele Lileikiene, Aurimas Likus. Analysis of Change Effect in the Market Interest Rate on Net Interest...

Table 6 provides absolute estimates of “Medicinos bankas” interest income and the total interest costs in Litas, taking into account possible changes in the market interest rate shown in previous table no. 4.

Table 6

<table>
<thead>
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<td>-</td>
<td>-</td>
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<td>25238</td>
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<td>40726</td>
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<td>54182</td>
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<td>80399</td>
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<td>103685</td>
<td>70847</td>
<td>104660</td>
<td>80021</td>
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The difference between the total interest income and the total interest cost equals to the net interest income that is the result of simulation model. The results of simulation model of sensitivity of the bank “Šiauliai bankas” net interest income to the market interest rate for the year period of 2006 – 2009 in graphical form are provided in Figure 1.

Figure 1. Graph of “Šiauliai bankas” net interest income under conditions of the simulation model

Information provided in Table 1 shows that subject to changes in the market interest rate level and other conditions remaining constant, the net interest income is changing. As interest margin of a bank in the simulation model is considered as constant value, increasing market interest rate increases net interest income and vice versa – decreasing market interest rate decreases interest income. It means that there is dependency between the changes in the market interest rate and net interest income of a commercial bank.

The results of the simulation model show that the form of graphs of “Šiauliai bankas” net interest income in each analysed year is negatively curved against abscise axis. This allows noticing that upon increase of the market interest rate, boundary value of net interest income is decreasing.
Simulation model shows that elasticity of graphs of “Šiauliai bankas” net interest income is unfavourable to growth of the market interest rate during the period of 2006/2009.

The results of simulation model of sensitivity of AB “Medicinos bankas” net interest income to the market interest rate for the years 2006/2009 in graphical form are provided in Figure 2.

The effect of interest rate change to the net interest income of "Medicinos bankas" in period of Y2006 - Y2009

Figure 2. Graph of “Medicinos bankas” net interest income under conditions of the simulation model

The results of the simulation model provided in Figure 2 show that the form of graphs of “Medicinos bankas” net interest income in the period of the years 2007 – 2008 is positively curved against abscise axis, and in 2009 – negatively. In 2006, the graph of net interest income is not curved and has linear form. Graph forms in the period of 2007 – 2008 show that upon the increase of the market interest rate, the boundary values of net interest income is increasing. Subject to other conditions remaining constant, the structure of “Medicinos bankas” assets and liabilities is favourable to the market interest rate growth in 2007 – 2008 period, unfavourable in 2009, and having no effect in the year 2006.

In order to make unprejudiced assessment and the comparison of the elasticity of a net interest income, it is necessary to find a functional relation between independent and dependent variables in the net interest income provided in the model. Mathematical functional relation and elasticity of this relation allow the assessment of the level of the market interest rate risk using net interest income graphs of the simulation model. Functional dependency of net interest income on the changes in the market interest rate enable calculating boundary values of net interest income, having changed the market interest rate by a forecasted value. In other words, simulation modelling allows forecasting of the boundary values of net interest income, upon changes in income rate (Figure 3).

Net interest income dependency from interest rate change of "Šiauliai bankas" in period of Y2006 - Y2009

Figure 3. Net interest income dependency from interest rate change of “Šiauliai bankas”
In the course of the research it was found that the functional relation of the simulation model is statistically reliable as the determination coefficient of net interest income function in every analysed year is equal to one. The determination coefficient shows the level of dependency between a result characteristic and its determinant factors. In the calculations of the simulation model it was shown that there is a functional dependency between net interest income of a commercial bank and the change in the market interest rate.

The graphs of “Šiaulii bankas” net interest income mathematically are defined in the form of parabolic function. coefficients of all parabolic functions – negative.

In the case of the increase of interest rate level it shows the decreasing boundary values of net interest income.

Having sufficiently accurate forecasts of changes in the market interest rate, the structure of assets and liabilities can be reorganised in such a way that boundary values of interest income would increase upon changes in the market interest rate. Thus, interest rate risk factors through simulation modelling and the market interest rate forecasting tools can make positive impact on net value and net interest income of a bank.

Figure 4 shows algebraic functions of the dependence of “Medicinos bankas” net interest income from the changes in the market interest rate.

The results of the bank “Medicinos bankas” simulation model for the years 2006 – 2009 also show mathematical functional correlation, with its determination coefficient being also equal to one. Contrary to “Šiaulii bankas” case, the dependence of “Medicinos bankas” the net interest income in 2007 – 2009 shows functional relation in the form of parabola, while in 2006 – linear dependence. Functional relation of “Medicinos bankas” net interest income in the year 2006 shows minimisation of interest rate risk. In this case, commercial bank distributes the structure of assets and liabilities in such a way that boundary values of net interest income would be constant.

A parabolic function characterising the dependency of “Medicinos bankas” net interest income in the years 2007 and 2008 has positive sign. In case of increase of the market interest rate, it shows increasing boundary values of net interest income. The trend for increase of the market interest rate is observed both in 2006 – 2008 historical data analysis of VILIBOR and EURIBOR interest rate, and in analysis of “Šiaulii bankas” and “Medicinos bankas” basis interest rate in regard of assets and liabilities. It means that the structure of “Medicinos bankas” interest sensitive assets and interest sensitive liabilities is balanced for growth of the market interest rate, expecting to earn additional income from changes in the interest rate (policy focused on speculative purposes). The graph of “Medicinos bankas” net interest income in the year 2009 has negative function sign. However, in the end of 2009 and beginning of 2010 decrease in interbank interest rate is observed. In this case the structure of “Medicinos bankas” assets and liabilities is favourable for the decrease of the market interest rate.

If net interest income function has a linear form, then the first-order derivative of this function is a constant. In that case, the graph of the boundary values of net interest income – is a horizontal line against abscise axis. It shows that boundary values of net interest income is changing in equal proportions, notwithstanding whether the market interest rate is increasing or decreasing (Figure 5. Graph of “Medicinos bankas” RGPP (2006)).

If a net interest income function has a form of parabola, then the first-order derivative of this function is a linear function. The coefficient of this derivative at a variable shows the inclination of the function. The bigger inclination, the higher level of the market interest rate risk is for the structure of assets and liabilities of a commercial bank.
In this case, much attention should be paid to the sign of coefficient of boundary values of net interest income function. If it is positive, the increase in the market interest rate is favourable to a bank, if it is negative, the decrease in the market interest rate is favourable.

The provided results of the simulation model of the sensitivity of net interest income to the changes in the market interest rate closely correlate with results of revaluation duration gap analysis. The inclination of the graph of boundary values of net interest income correlates with a ratio of average leveraged duration gap of revaluation. But in the simulation model the ratios of revaluation duration are mathematically correlated with net interest income and become a tool for assessment of the level of the market interest rate risk.

Conclusions

The methods of an income gap and a duration gap of an average revaluation term, also the methods of the sensitivity analysis and simulation modelling are combined making the basis for the theoretical model of sensitivity of net interest income to the changes in the market interest rate.

Simulation modelling provides a possibility to define the effect of the market interest rate fluctuations on net interest income of commercial banks, in other words, it is possible to assess the value of net interest income risk, i.e. a certain change in income due to the changes in the market interest rate within the selected period.

Gap analysis calculations allow to conclude: in the period of 2006 - 2009 “Medicinos bankas” gave the priority to short-term credits and investments, reserving a possibility to make more often revaluation of interest rate sensitive assets. Such principles of the formation of assets and liabilities were favourable during the period of the market interest rate growth. On the contrary, long-term credits and investments prevailed in “Šiaulių bankas” assets and liabilities structure. As a consequence average leveraged duration of “Medicinos bankas” assets revaluation was shorter than average leveraged duration of liabilities revaluation, while the principles of the formation of “Šiaulių bankas” assets and liabilities were opposite: an average leveraged duration of assets revaluation was longer than an average leveraged duration of liabilities revaluation. Such policy of assets and liabilities management is not favourable during the period of the market interest rate growth.

The calculations and applied model of sensitivity of net interest income to the changes in interest rate established the possibility to prove that there exists a mathematical functional dependency of net interest income from the market interest rate. The graphic form of this dependency is a parabolic or linear dependency functions. An independent variable in these specific functions shows a change in the market interest rate. A dependent variable stands for net interest income. The first-order derivative of a net interest income function shows the dependency of boundary values of interest income from the changes in the market interest rate. In the case of increasing interest rate level, when the function of parabola is negative, boundary values of interest income of a bank are decreasing. When the function of parabola is positive, the boundary values of interest income are increasing.

The bigger inclination of net interest income function, the higher level of market interest rate risk is to the structure of assets and liabilities of a commercial bank. If the function sign is positive, increase in the market interest rate is favourable to a bank, if negative, the decrease in the market interest rate is favourable.

In the simulation model of the sensitivity of net interest income to the market interest rate, the revaluation duration ratios are mathematically correlated with net interest income. This correlative link is a tool for the quantitative assessment of the effect of the market interest rate risk on profitability ratios of commercial banks.

When the market interest rate is increasing, commercial banks should focus on maximisation of short-term loans and long-term liabilities. When the market interest rate decreases, commercial banks have to focus on maximisation of long-term loans and short-term liabilities. Such modelling of the processes would enable commercial banks, especially smaller ones, working with small customers, to gain more competitive advantage.
under the market conditions, as due to the changes in interest rate sensitive items and rapid response to the changes in the market interest rate, banks would maximise their net interest income, thus increasing competitiveness of retail banks in the financial market.

References


Rinkos paliktų normos pokyčio įtakos komercinių bankų grynosioms palikantų pajamoms analizė

Santrauka


1. Išanalizuoti ir aprašyti analizės metodus, galėjusius įvertinti komercinių bankų palikantų normos riziką ir vykdomą aktyvų ir pasyvų valdymo politiką termių suderinamumą.

2. Nustatyti palikantų normos pokyčių atžvilgiu įtaką komercinių bankų grynosioms palikantų pajamoms.


Tyrimo tyčiai

- ekonominės mokslo ir akademinės literatūros analizė, palyginimas, apibendrinimas, statistinės ir ekonometrijos metodai, sintezė ir ekstrapoliacija, grafinis vaizdavimas, statiniai ir dinamiški duomenų analizė, prognozinimas ir imatinis modeliavimas.

Teorinis ir praktinis tyrimo rezultatų reikšminimas

Griždžiamas sisteminiu požiūriu į palikantų normos riziką ir aktyvų bei pasyvų valdymą, kuris realizuojamas teorinių grynųjų palikantų įvertinimo jautrumo rinkos palikantų normų modeliui. Šis modelis projektuojamas atsižvelgiant į plačias praktinius pritaikymus galimybes, kuriuos iš esmės priklauso nuo pradinės įtvirtinimo ir sudaro galimybes didinti regioninius komercinių bankų veiklos pelningumą, nes mažmenių bankui baigtis didesnes gryniosios palikantų pajamas, atsižvelgiant į jautrų rinkos palikantų normas, mažėja banko rizikos laipsnis, didėja pelningumas. Praktinis modelio reikšminimas pasižymi galimybe kiek vekdaikiškai įvertinti palikantų normos riziką ir įtaką komercinių bankų grynosioms palikantų pajamoms. Taigi imatinčiame modeliu, siekiama įvertinti grynųjų palikantų pajamų riziką – tam tikrų pajamų pokytį dėl rinkos palikantų normų pasikeitimo per pasirinktų laiko terminą, kai kitos sąlygos neįtvarkomos. Kuriamas modelis ir aprašomas metodas visiškai sutampa su mažmeninių bankų veiklos modeliu. Modelis įvertina grynųjų palikantų pajamų pokytį, skirtą į banko veiklos pelningumą, likvidumą ir saugumą. Modelis aprašomas metodas ir kuriamas kuriamos teorinis modelis netinka analizuoti grynųjų pajamų svyravimus, priklausanties nuo banko sugebėjimo kontroliuoti ir steigti palikantų išlašas ir gauti pajamų ne įtakos komercinių bankų grynosioms palikantų pajamoms.

Rinkos paliktų normos pokyčius taikant įstatymų struktūros pokyčių įvertinimo įtaką įvertinti, taip didinant mažmeninių bankų konkurenciją finansų rinkoje.

Analizuojant 2006–2009 metų AB Šiaulių bankas ir AB Medicinos bankas finansinės atskaitomybės duomenų analizė ir realizuotas grynųjų pašlakų paminėjimas modelis leido įrodyti, kad egzistuoja grynųjų pašlakų pajamų matematinė funkcijos priklausomybė nuo rinkos palūkanų normos lygio. Šios priklausomybės grafikas pavidalas – parabolės arba tiesinės priklausomybės kreivė, AB Šiaulių bankas grynųjų palūkanų pajamų matematinė priklausomybė nuo rinkos palūkanų normos lygio aprašoma šiomis matematinėmis funkcijomis:

\[ y_{\text{2006}} = -376487 \cdot x^2 + 277801 \cdot x + 30319 \] ; \[ y_{\text{2007}} = -634160 \cdot x^2 + 366735 \cdot x + 42598 \] ; \[ y_{\text{2008}} = -591888 \cdot x^2 + 314870 \cdot x + 42669 \] ; \[ y_{\text{2009}} = -508802 \cdot x^2 + 232251 \cdot x + 27590 \]

AB Medicinos bankas grynųjų palūkanų pajamų matematinė priklausomybė nuo rinkos palūkanų normos lygio aprašoma šiomis matematinėmis funkcijomis:

\[ y_{\text{2006}} = 86868 \cdot x^2 + 9456 \] ; \[ y_{\text{2007}} = 47841 \cdot x^2 + 111358 \cdot x + 18658 \] ; \[ y_{\text{2008}} = 124980 \cdot x^2 + 70825 \cdot x + 27268 \] ; \[ y_{\text{2009}} = -67278 \cdot x^2 + 61040 \cdot x + 20694 \]


Imitaciniai grynųjų palūkanų pajamų įtraukimo rinkos palūkanų normai modelyje perkainojimo laiko trukmės rodikliai matematiškai susiejami su gryniosios palūkanų pajamomis. Štai sąsają yra priemonė kiekybęs įvertinti rinkos palūkanų normos rizikos įtaką komercinių bankų pelningumo rodikliams.

Klyant rinkos palūkanų normai, komerciniai bankai turi orientuotis į trumpalaikių paskolų ir ilgalaikių įsipareigojimų maksimizavimą. Mažėjant rinkos palūkanų normų, komerciniai bankai turi orientuotis į ilgalaikių paskolų ir trumpalaikių įsipareigojimų maksimizavimą.

Raktažodžiai: palūkanų normos rizika, gryniosios palūkanų pajamos, spraga, įtraukimo analizė.

The article has been reviewed.

Received in January, 2011; accepted in June, 2011.