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PECULIARITIES OF CREDIT RISK MANAGEMENT IN CREDIT UNIONS

Introduction

Currently, economic downturn and financial markets instability activates discussions about the difficulties in banking sector. Though, credit unions are acting in the same retail banking sector as the banks, they often remain "unnoticed".

Most of the scientists describe credit unions as cooperative — autonomous and voluntary organizations of people, functioning to fulfill the financial needs of its members. Credit unions are financial-social institutions trying to strive financial and common bond goals. These organizations are spread all over the world and serve to communities in various regions of different economic development level. In year 2008 there were about 50 thousands credit unions active in 97 world countries, uniting more than 186 million members [1, p.2]. One of the main activities of credit union is lending, so credit risk management becomes the primarily problem of every credit union. Besides, due to peculiarity of credit union functions, it is necessary to analyze credit risk in details and to have a sound mechanism of credit risk management.

Though variuos authors discuss issues of credit union management the problem of credit risk management are not the object of their research.

The object of this research paper is credit risk management of credit unions investment portfolios.

The goal of the research paper is to analyze the peculiarities of credit risk management in credit unions and suggest a model for effective portfolio management.

The methods of the research: analysing the specialties of the credit risk management in credit unions were applied methods of sistematical analysis and synthesis of scientifical references and empirical investigations.

The research in the field of the credit risk management in credit unions is significant as a background for the futher academic and practical researches, also it would be ensured to the possibility to shape future perspectives of the sound credit risk management mechanism in the context of social aspects.

Conception of the Credit Risk in Credit Unions

World Council of Credit Unions (WOCCU) compiled PEARLS[1] monitoring system. This system measures assets, liabilities and capital, and recommends an „ideal" structure for credit unions. The following ideal targets are promoted: 95% productive assets composed of loans (70-80%), and liquid investments (10-20%); 5% unproductive assets composed of primarily fixed assets (land, buildings, equipment etc.) [2, p.6]. The philosophy of credit union (lot.per se — in itself) prescribe the direction, how the credit union should conduct. By depending and giving an opportunity to borrow, the credit union gets its clients loyalty. Considering the unique form of such organizations, there also should be active "credere" (trust) principle that determines confidence from both (client and credit union) sides.

Scientists distinguish 3 main principles of rational crediting: profitability, liquidity and security [3, p.13], [4, p.266]. It must be pointed out that simultaneous observing of all 3 basic principles is impossible, because they contradict and form "triangle" among themselves. It is shown in figure 1.

The triangle reflects the basic directions of the commercial bank crediting policy, however, credit unions are social-financial institucions that do not require maximum profit, so this triangle could be transformed. Greater attention should be paid to security and liquidity dimentions. Crediting activities are not oriented to the capital gains only. Despite of that in the competitive environment of financing system aim for minimal profit is the basis for the survival and the stable functioning. Credit union should provide liberal credit policy that meets its mission and goals. So, this enables to draw a conclusion that credit union should function in a socially and financially optimal way. However at this point credit risk becomes the main risk aspect that must be particularly analyzed.

Usually the conception of credit risk is described as stochastic dimension, emphasizing the possibility of potential loss and also paying attention at the point

[1] Protection, Effective financial structure, Asset quality, Rates on returns & costs, Liquidity, Signs of growth

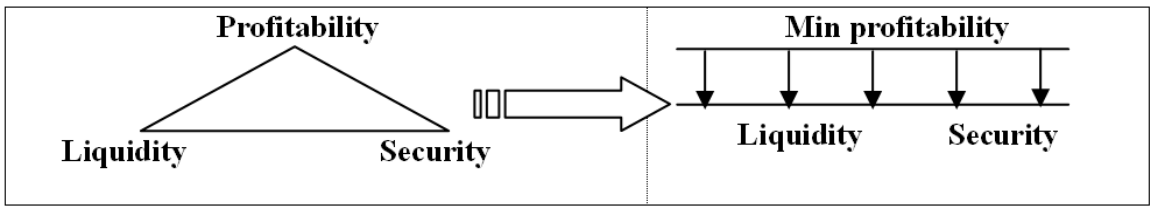

Fig. 1. Crediting principles for credit unions.
Source: extended by authors based on [3 p.13], [4 p.266].

of deliberate default. On the other hand credit risk may be characterized as "loss category", determined by the quality of debtor creditworthiness, however generally it is risk of loss that is necessitated by possibility of default. The significance of loss might be measured by interest rate and evaluated by future cash flow. But adapting this credit risk conception for credit unions should be taken into consideration the social — reliance perspective and then the risk of loss might be evaluated with lower interest rate, because of two reasons; firstly the profit of crediting is not the premier purpose, secondly there should be rejected assumptions of deliberate default. In addition credit unions usually charge lower interest rates on loans, and this conditionally decreases the possibility of delinquency. Besides intercommunication inside the common bond creates social responsibility and therefore this should determine better credit repayment rate. Consequently, analyzing creditworthiness of credit union member's, must be paid attention at the features of credit risk and the uniqueness of credit union as social-financial institution.

Overview of the Level of the Problem Investigation

The credit risk of credit's unions is different because of several reasons: size, geographical concentration, liquidity needs and extension of credit only to their members [5, p.19].

As we have mentioned above credit risk management for credit unions is topical. Investment issues of credit unions require qualified decisions and are complicated enough, because it needs to combine different aims: maximization of shareholder's wealth, minimization of risk and staying social organization that distributes resources in order to satisfy the different needs of credit union's members. Analyst deal with large amount of data, complex policy guidelines, and several other historical factors that need to be considered for making future investment decisions. They are required to weight all the data and information and make the recommendation that puts the credit in the best spot — balancing the upside opportunity with minimum possible risk. To accomplish this task, analysts need flexible professional tools and techniques for construction of efficient portfolio from available loan products.

Most of the studies have identified the credit risk management system development needs of commercial banks. There are a few studies which have focused on credit unions.

There were analyzed credit risk management of variuous countries from the legal side, that regards regulatory institutions designated requirements [6, p.151]. Researches of credit unions risk management made in Ireland, Lithuania, Poland, USA and Britain showed that credit risk regulation depends on economical situation of particular country as well as credit unions development stage [7, p.71-73]. The higher stage of development of credit unions system it was in particular country, the lower juridical and legitimate regulation influence manifested on credit risk management of credit unions. For example credit union systems in Ireland or USA operate in upper development stage, so there are lower capital adequacy requirements. In addition, in more advanced credit union systems there are more liberal requirements of loan collaterals and loan provisioning/charge schedules are more flexible [8, p.184-187].

In year 2009 Australian scientists support the hypothesis that credit unions manage their capital position by setting a short term target profit rate (return on assets) which is positively related to asset growth and which is aimed at gradually removing discrepancies between the actual and desired capital ratio. Desired capital ratios vary significantly across credit unions. There is little evidence of short run adjustments to the risk of the asset portfolio to achieve a desired capital position. [9, p.448-450].

However, another research revealed [10, p.271-279] that credit unions are not useful to pursue short-term goals. The latter authors applied statistical-regression analysis and studied changes in Australian credit union crediting policies. It was observed the following patterns:

1) Credit unions with a higher proportion of total revenue in the form of interest on residential loan and

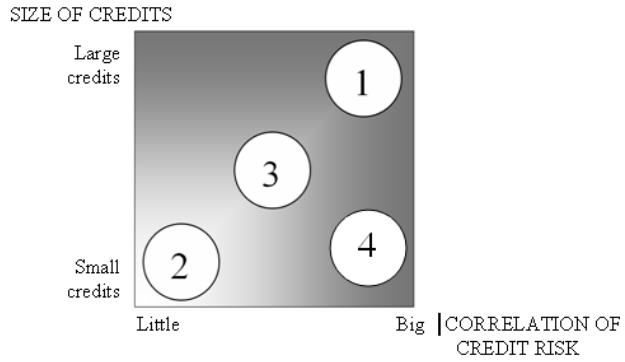

Fig. 2. Credit concentration risk

Source: compiled by authors based on [12 p.96]

lower proportion of revenues in interest on personal loans have significantly lower risk and returns.

2) Credit unions that diversify by increasing the revenue share of transaction fees on loans and deposits, matched by the reduction in the revenue share of interests on personal loans, will increase their risk while reducing returns.

These statements have asymmetric effects: lower risk and lower returns due to increased interests of residential loan have a lower decline rate than the increased risk and reduced returns due to increased transaction fees[10 p.280].

The results [6, p.155] provide some support (regression coefficient of the Herfindahl concentration index is positive and statistically significant) to the traditional view that diversified credit unions have lower risk exposure. Besides, credit unions that offer wide range of loans attracts more members

Credit unions face to geografical concentration risk that limits the need for evaluation of relative financial strengths and ability to assess and adequatelly monitors the risk of the investments [5. p.19]. Concentration of credit risk can be divided [11, p.36] in following groups:

• A few large credits or big correlation of credit-related borrower;

• Loans related common risk factors (economic activity, type of a loan, currency, members etc.)

If the credit portfolio consists of a number of large and correlated credits (fig. 2, ball 1) then both credit concentration groups are significant. Conversely, if there is a large amount of non-correlated loans — credit concentration risk disappears (fig. 2, ball 2). Credit institutions try to manage this risk combining amount of the credit and reliance of credit risk (fig. 2, ball 3) [12, p.97]. Credit unions provide large amount of small credits and they have high correlation level (fig. 2, ball 4), therefore credit concentrations risk management in credit unions becomes very complicated. Scientists [13, p.2] offer to analyze and estimate correlation level between the borrowers. Managing concentration risk it is also necessary to analyze such concentration sources as: duration and collateral of the credit [14, p.21].

Credit risk managers in credit unions should also take into account the unemployment trends and business infrastructure in the region. The study [15, p.93-94] based on the business activity of the employer/parent organizations, two subgroups of occupational credit unions were examined — one with parent organizations in relatively stable industries and other with parent organizations in relatively unstable industries:

• Credit unions with relatively unstable parent organizations invested about 68 percent of their assets in various types of loans. By comparison, credit unions with relatively stable parent organizations invested a higher share of their assets (over 72 percent) in their loan portfolio. If the loan portfolio is a credit union's riskiest way to hold assets, these relative proportions suggest that credit unions with relatively unstable parent organizations appear to be adjusting appropriately for increased risk by being less "loaned up".

• Credit unions with relatively unstable parent organizations allocated smaller shares of their loan portfolios to unsecured loans. This appears to be a prudent decision given the employment volatility of the parent organization and the greater potential for members to become unemployed or employed elsewhere. Since the management and directors of the credit union are likely to have less information about the "creditworthiness" of members no longer employed by the credit union's parent organization, obtaining collateral for loans is one way of reducing risks.

• Finally, credit unions with relatively unstable parent organizations allocated a smaller share of their loan portfolios to real estate loans. This too appears to be a risk reducing lending strategy. Credit unions (particularly small ones) generally have less experience with this type of loan. Not only do these types of loans tend to be more costly to administer, they also have figured prominently in recent credit union insolvency problems.

Credit union credit risk management problems involve estimation of desired target levels which cannot be precisely defined because a condition with a strictly binding condition has no practical value. Therefore assigning imprecise target levels to some or all objectives rather than fixed targets is more reasonable and is possible in modeling using Fuzzy Goal Programming techniques (FGP) [5 p.20].

FGP is based on fuzzy logic, not on traditional logic.

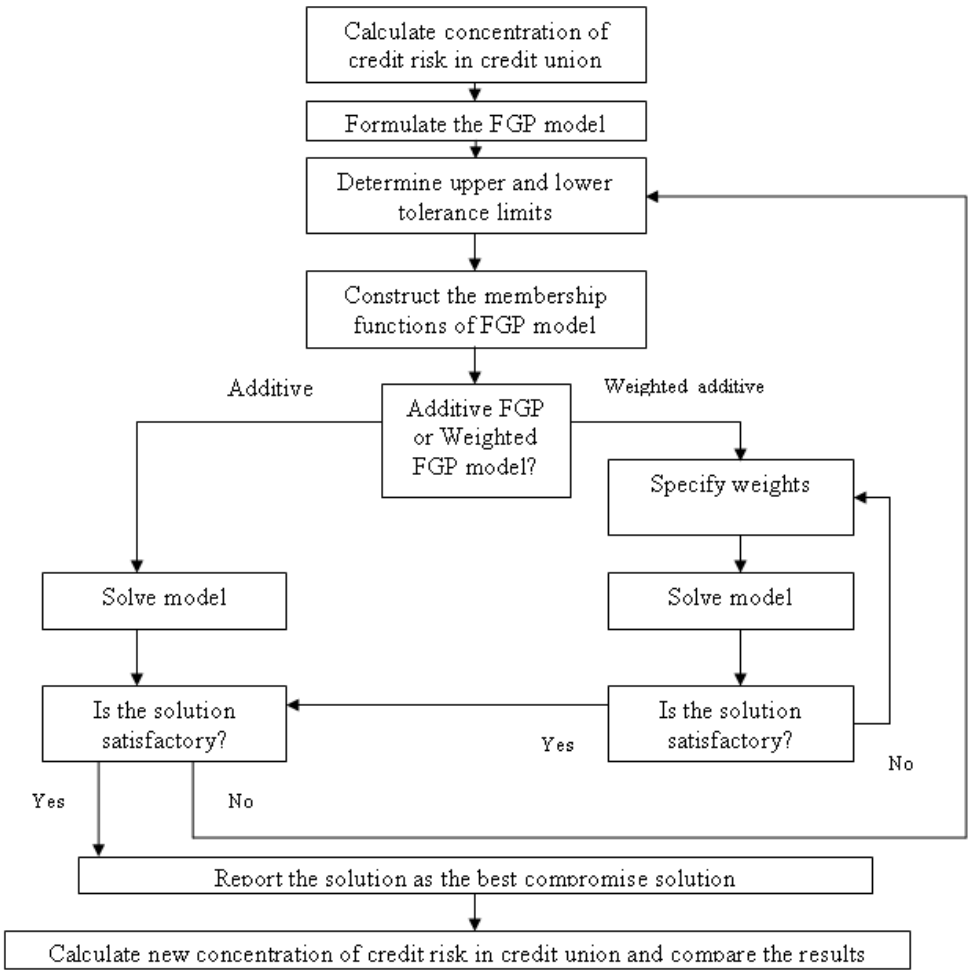

Fig. 3. Solution procedure
Source: compiled by authors based on [5 p.18-20]

Traditional logic makes decisions "yes" or "no", there is no third resolution. But real world problems have both quantitative and qualitative assessment, so there is some kind of uncertainty, to solve these problems helps fuzzy logic [16 p.81]. FGP applications can provide better solutions in creating efficient portfolios for credit unions, it is proposed simple and weighted additive FGP models for creating and rebalancing efficient portfolios for credit union portfolio management considering multiple and conflicting fuzzy objectives.

Fuzzy Goal Programming Model as the Tool of Credit Risk Management

Fuzzy goal programming model development requires estimation of the fuzziness in variables such as resource availability, annual return, and operating costs related to investment decision problems. Although associated goals with the variables are defined based on the best estimation of management, yet they are in fuzzy sense [5 p.21].

The steps and flowchart (see figure 3) of the solution procedure for both models can be presented as follows:

Step 0: calculate credit risk concentration level in credit union (Herfindahl index);

Step 1: formulate FGP model;

Step 2: to identify the direction of fuzzy type of goals and specify lower tolerance limits for „$\gtrsim$" type goals and upper tolerance limit for „$\lesssim$" type goals.

Step 3: construct the membership function of the fuzzy goalsbased on the desired tolerance limits.

Step 4: apply the model. For the simple additive model go to Step 4.1 or for weighted additive model go to Step 4.2.

Step 4.1: solve problem, go to Step 5.

Step 4.2: solve problem according to weights for different goals. If the results do not serve, then solve the problem using different weighting structure. Go to Step 5. Continue until the solution is satisfactory.

Step 5: if the solution is satisfactory then report the solution as the best compromised solution in the

current decision aking context. Otherwise, go to Step 2 and specify different lower and upper tollerance limits and continue.

Step 6: calculate newly formed credit risk concentration level and compare the results.

The following notations will be used in the general model of the credit union investment problem:

Index: i — index for the loan $i \in \{1,2, \ldots I\}$;

Variables and parameters:

X_i :amount of the money invested in produc (loan) type i;

T : total available funds for the investment;

I_i : interest income from product (loan) type i;

II : total interest income from all products;

O_i : average loan operating cost per product (loan) i;

O : total operating cost for all products (loans).

Fuzzy goal constraints. Fuzzy goal constraints are defined in the formulations of the general mathematical model of the credit union portfolio investment problem as follows:

1. **Total Investment:** The fuzzy goal equation for available funds can be expressed as:

$$\sum_{i=1}^{I} X_i \lesssim T;$$

2. **Investment Income:** The fuzzy goal equation for investment income can be defined as:

$$\sum_{i=1}^{I} I_i X_i \gtrsim II;$$

3. **Operating Costs:** the goal equation for operating costs of investment can be defined as:

$$\sum_{i=1}^{I} O_i X_i \lesssim O;$$

4. Management of Limits of variuos investment products:continious monitoring of the limits of different investment types is one of the most challenging task for credit unions. These limits for product types can be defined mathematically as follows:

a) Cash and Money Market Securities (Products): to ensure liquidity, a minimum amount is required to be invested in short term sequrities such as Fed funds or money market funds. The goal equation can be defined as follows:

$$\sum_{c=c_1}^{c_n} X_c \geq a\%T;$$

Where $\{c_1, c_2, ..., c_n\}$ are the cash and money market fund investments and $\{c_1, c_2, ..., c_n\} \subseteq \{1,2, \ldots I\}$.

b) Home Mortgages products: Historically, home mortgage loan products have been the safest investment in comparison to other secured loans because the value of a house appreciate and loan balance decreases with the passage of time. Therefore, the total investment in this category must be at least certain percentage af all available funds. The goal constraints can be expressed as:

$$\sum_{h=h_1}^{h_n} X_h \geq b\% \sum_{i=1}^{I} X_i;$$

Where $\{h_1, h_2, ..., h_n\}$ are the home mortgage loans and $\{h_1, h_2, ..., h_n\} \subseteq \{1,2, \ldots I\}$.

c) Personal Loan Products: Personal loan products are usually unsecured loans with a higher interest rate to compansate for higher risk, and therefore, shuold have strict limits on this category of loans to minimize risk. The goal constraints can be expressed as:

$$\sum_{p=p_1}^{p_n} X_p \leq c\% \sum_{i=1}^{I} X_i;$$

Where $\{p_1, p_2, ..., p_n\}$ are the personal loans and $\{p_1, p_2, ..., p_n\} \subseteq \{1,2, \ldots I\}$.

c) Small Bussiness Loan Products: small business loans usually are medium terms (3-5 years). The goal constraints can be expressed as:

$$\sum_{s=s_1}^{s_n} X_s \geq d\% \sum_{i=1}^{I} X_i;$$

Where $\{s_1, s_2, ..., s_n\}$ are the small business loans and $\{s_1, s_2, ..., s_n\} \subseteq \{1,2, \ldots I\}$.

e) Agricultural Loan Products: agricultural loans have parallel risk as small business risk. The goal constraints can be expressed as:

$$\sum_{z=z_1}^{z_n} X_z \geq e\% \sum_{i=1}^{I} X_i;$$

Where $\{z_1, z_2, ..., z_n\}$ are agricultural loans and $\{z_1, z_2, ..., z_n\} \subseteq \{1,2, \ldots I\}$.

e) Other Loan Products: this group of the loans include loans for education, loans for work trips etc. The goal constraints can be expressed as:

f) $$\sum_{k=k_1}^{k_n} X_k \leq f\% \sum_{i=1}^{I} X_i;$$

where $\{k_1, k_2, ..., k_n\}$ other loans and $\{k_1, k_2, ..., k_n\} \subseteq \{1,2, \ldots I\}$.

Similar to the above constraints or limitations, other limitations can be included for the model formulation. At this moment this model is in the stage of testing . The LINGO (version 10) software has been used to run these models.

We may conclude, that credit risk management

depends on the goals and the strategy of the credit union, crediting policy aspects, macroekonomic situation, regulation and social environment. Therefore, dealing with problems of the credit risk, decision maker should rely not only on traditional credit risk management models, bul also integrate other areas of science and rely on new methodologies.

Conclusions

• Credit unions as financial intermediation provides both financial and social functions, therefore, credit risk management becomes complex and complicated process. At this pont of view credit risk management becomes unique- balansing needs of the credit unions members with minimum posible risk.

• The analysis of theoretical and empirical literature seeking to reveal the pecularities oc credit risk mangement enabled to draw the following conclutions; Firstly, level of the credit risk depends on the single credit union policy guidelines (lending policy and priorities, composition of the credit portfolio, amounts of the operating income etc). Secoundly, credit unions making investment decisions should involve the estimation the concentration of credit risk in order to escape high delinquencies and foreclosure of loans. Thirdly, funds allocating process are very sophisticated and risk mangement systems should take into consideration a wide range of features related to liquidity needs, geografic concentrations, unemployment trends and business infrastructure in the region etc. All these aspect should be stated in the corporate risks management strategies.

• Quality of the credit portfolio and the level of the delinquent loans depend on economical, political, legal and social environment as well as the credit union prudence in lending activities and loan allocating process. So, credit unions in decision making process should rely not only on traditional credit risk management models, bul also integrate other areas of science and rely on new methodologies.

• Fuzzy goal programming techniques can be efficiently applied in developing sophisticated investment decision making models to provide feasible solutions for credit union portfolio management problems for constructing efficient portfolios regarding specific credit union credit risk and social environment.

• FGP models have considerably promise in terms of control, flexibility and real world applicability over the traditional models, providing investment planning and management tools and techniques for credit unions. FGP models can be easily integrated to the existing risk analysis and management models available for credit unions for rebalancing of investment portfolio based on economic conditions, demand of products and risk factors more often. These models are flexible enough to be extended to handle large sizes of portfolio for example portfolio of whole credit unions sector.

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Freitakas, E., Rimšienė, V. Peculiarities of Credit Risk Management in Credit Unions

This artical examines credit risk management with the view based on theoretical and practical aspects in credit unions. The analysis of the scientifical references and empirical investigations showed that quality of the credit portfolio and the level of the delinquent loans depend on economical, legal and social environment as well as the credit union prudence in lending activities and loan allocating process. Fuzzy goal programming techniques can be efficiently applied in developing sophisticated investment decision making models to provide feasible solutions for credit union portfolio management and credit risk problems.

Key words: credin union, credit risk management, fuzzy goal programming.

Фрайтакас Е., Рімшиєне В. Особливості управління кредитним ризиком у кредитних спілках

У статті досліджено теоретичні й практичні аспекти управління кредитним ризиком в кредитних спілках. На основі теоретичних і практичних досліджень обґрунтовано, що якість кредитного портфелю і кількість прострочених кредитів залежать і від економічного, юридичного та соціального середовища, і від обережності та обачності кредитної спілки у процесі надання кредитів. Методи fuzzy goal програмування можуть бути успішно використані при створенні складних моделей управління портфелем кредитів і вирішенні проблем управління кредитними ризиками в кредитних спілках.

Ключові слова: кредитна спілка, управління кредитним ризиком, fuzzy goal програмування.

Фрайтакас Э., Римшиене В. Особенности управления кредитным риском в кредитных союзах

В статье исследуются теоретические и практические аспекты управления кредитным риском в кредитных союзах. На основе теоретических и практических исследований обосновывается, что качество кредитного портфеля и количество просроченных кредитов зависят как от экономической, юридической и социальной среды, так и осторожности и осмотрительности кредитного союза в процессе предоставления кредитов. Методы fuzzy goal програмирования могут быть успешно использованы в создании сложных моделей управления портфелем кредитов и решении проблем управления кредитными рисками в кредитных союзах.

Ключевые слова: кредитный союз, управление кредитным риском, fuzzy goal програмирование.

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