

Risk management for securitization of bank assets

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Abstract. Bank transactions with securitization use represent a new approach in activity as regards the bank operating credit risks and the borrower pursuing the aim to minimize a payment for credit recourses and to provide necessary inflow of money. In this work the problems of traditional ways of financing are considered, the mechanism of securitization of bank assets is offered as solution to the problem and analyzed from the point of view of profitable approach. Existing ways of quantitative assessment of securitization risks are defined, a new approach on the basis of Wang transformation is offered. Ways and mechanisms of risk management of securitization are analyzed.

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Introduction

Liquidity maintenance at the present time is an objective need of banking sector [1]. It is possible to note fairly that the need for long-term resources is especially essential. The problem is that holdings, deposits, interbank credits and other classical sources of financing are limited. It causes the necessity of use of innovative instruments in the sphere of attraction of financial resources [2].

According to the provisions stated in [3], securitization of bank assets (SBA) is considered to be one of the ways allowing a bank to maintain liquidity and having a high potential to distribution in practice of use. SBA is a modern financial mechanism of multidimensional character, and securitization should be considered as the process allowing to increase efficiency of bank activity and to reduce inherent risks by means of optimization of bank assets on the basis of use of special financial instruments [4, 5]. Due to the high appeal of worldwide use of securitization instruments by bank institutions, there is a need of an assessment and the risk analysis with emergence is possible due to the securitizing relations and also the ways of their decrease and management [6].

Methods

Domestic and foreign researches and basic concepts in the field of risk management at securitization of assets, legislative acts and regulations, methodological and legislative documents defining the strategy of market transformations of bank activity formed a theoretical and methodological basis of research.

During the development and solution of assignment tasks were used the achievements of economic science in the field of macro-and microeconomics, methods of system analysis, the

theory of dynamic systems (generally theories of automatic control), methods of economic-mathematical modeling, the theory and decision-making methods, recursive methods of forecasting.

The results

Securitization transactions represent a new approach in activity as regards the bank operating credit risks and the borrower pursuing the aim to minimize a payment for credit resources and to provide necessary inflow of money.

In the work on the basis of modern mathematical apparatus it is proved that securitization of assets increases assets and thereby is a financial instrument on the growth of profits.

The most advanced mathematically supported and flexible instrument for quantitative assessment of risks, arising at securitization is a method based on Wang Transformation.

At risk management of securitization and the growth of financial reliability of this mechanism modern banks should use instruments of external support, in particular, attracting insurance companies.

Discussion

Scientific researches in the field of securitization actively began to be engaged at the end of the last century. In the provisions stated in [7] it is noted that for the first time in the history the term "securitization" was used by Lewis Raniyeri, the head of mortgage department "Salomon Brothers" in 1977.

According to the approach of the International Finance Corporation (IFC) there are three main types of securitization: classical securitization by means of "the valid sale", synthetic securitization and business securitization. In case of

consideration of SBA question, it is the question of the first two types only.

1. According to the provisions stated in [8], in conformity with the international approaches, and also the definition formulated by the well-known Swiss banker, the Doctor of Economics of University of Zurich, Hans Peter Ber, by the transaction (Classical) of securitization is understood the innovative technology (way) of financing, at which the diversified pool of assets (a portfolio of the credits or mortgages):

- It is allocated and is written off from the balance of an originator – the credit organization;
- Gains legal independence by the sale to the buyer – to specially created legal entity (to Special Purpose Vehicle, SPV) who carries out its refinancing in the market of the capitals or the monetary market by means of capital issue (Asset-Backed Securities, ASS).

In the provisions stated in [9] it is noted that there is an opinion that transfer of assets is necessary for their separation from risks which can be connected with an originator, including for separation of the rights of the requirement from the competitive mass of on originator which can be formed in case of its default.

2. At the same time at securitization there is not always a direct sale of an asset by an originator. At *synthetic securitization* the straight or the postponed cession of the rights by an originator of monetary receipts of SPV without transfer of property rights to an asset i.e. when instead of sale of an asset its transfer as a deposit is carried out, and thus redirected cash flow will be an ensuring issue.

The following investigation phase is **the assessment of a role of securitization** in management of bank assets. In this part on the basis of the provisions stated in [10], it is substantiated that the level of growth of assets is a positive function from securitization coefficient.

Let's suppose that securitizing assets $[\alpha]S_t$ exist in the form of liquid assets or funds. Therefore, according to the provisions stated in [4], this part of assets will conform to the requirement of sufficiency of the capital. It should be noted that requirements to the capital can be lowered to $[\epsilon](1-[\alpha])S_t$. Thus, if the requirement to sufficiency of the capital is higher than a share of the capital in bank, injections of the capital are necessary, in other way there can't be a capital accumulation. X in the equation (1) determines conditions for injections and capital accumulation.

$$X_t = [\epsilon](1-[\alpha])S_t - (S_t - L_t) = [\epsilon](1-[\alpha])S_t - E_t \quad (1)$$

Where t – time, S_t – assets, $[\alpha]$ – a share of securitizing assets in assets, $S_t[\alpha]$ – securitizing

assets, $(1-[\alpha])S_t$ – non- securitizing assets, $[\epsilon]$ – the correction coefficient established legislatively depending on the volume $[\alpha]$ of S_t , L – liabilities, E – the capital. Therefore, if $X > 0$, so the capital injections are necessary, and if $X < 0$ – the capital is sufficient.

The process of accumulation of assets in the securitization can be presented by the following equation:

$$S_{t+1} = [\gamma](1-[\alpha])S_t + [\alpha]S_t + r^A[\gamma]S_t - X_t - C([\alpha])S_t \quad (2)$$

Where $[\gamma]$ – a share of non-securitizing assets, $C([\alpha])S_t$ – securitization cost.

Therefore $[\gamma](1-[\alpha])S_t$ is the sum of assets which are kept from t period to $t+1$ period. At the same time, a bank keeps $S_t[\alpha]$ in the form of liquid assets which have been received by securitization. Moreover, the bank will receive return on investments of the kept assets which is designated as $r^A S_t$ in the equation (2).

It is necessary to consider that even if the bank securitizes assets, return on assets will be kept. In addition to it, it should be noted that if the share of the capital falls below requirements to the capital, it will be necessary the bank to sell assets for the sum of X to load the account. Therefore, X value has to be subtracted from the equation (2). $C([\alpha])S_t$ – the cost of securitization which has to be subtracted from the general profit.

Substituting the equation (1) in the equation (2), we have:

$$\begin{aligned} S_{t+1} &= [\gamma](1-[\alpha])S_t + [\alpha]S_t + r[\gamma]S_t - \\ &- [\epsilon](1-[\alpha])S_t + (S_t - L_t) - C([\alpha])S_t = \\ &= (([\gamma] - [\epsilon])(1-[\alpha]) + [\alpha] + r - C([\alpha]))S_t + E_t = \\ &= qS_t + E_t \end{aligned} \quad (3)$$

Where q – accrued assets:

$$\begin{aligned} q &= (([\gamma] - [\epsilon])(1-[\alpha]) + [\alpha] + r[\gamma] - C([\alpha])) = \\ &= [\omega]_1 + [\alpha][\omega]_2 \\ [\omega]_1 &= ([\gamma] - [\epsilon]) + [\gamma]r^A \\ [\omega]_2 &= (1 - ([\gamma] - [\epsilon])) - [\beta] \end{aligned} \quad (4)$$

Where $[\omega]_1$ – accumulation of assets at the expense of intensive factors – the survived assets and return on investments of the survived assets, $[\omega]_2$ – accumulation of assets at the expense of extensive factors – not survived assets corrected on expenses. The cost of process of securitization can be presented and as $C([\alpha]) = [\alpha][\beta]$, where $[\beta]$ – the level of expenses.

In the equation (3), q can be the store of assets that leads to growth of assets – q (level of growth of assets). As $[\omega]_2$ usually is more, than 0; q is a positive function $[\alpha]$. If $[\alpha]$ increases, increases both q , and assets start collecting. But, if the

indicator [epsilon] is too high, accumulation of assets will stop.

Recursively solving the equation (3), we receive:

$$S_{t+1} = q^{t+1} S_0 + \sum_{i=0}^t q^i E_{t-i} \quad (5)$$

Therefore, the equation can be rewritten as:

$$S_t = q^t S_0 + \sum_{i=1}^t q^i E_t - i \quad (6)$$

Where q – level of growth of assets, E – the bank capital.

The equation (3) proves that q is positive function of $[\alpha]$. At increase of $[\alpha]$, the cost of assets grows. Therefore, securitization of assets increases assets and, thereby, is a financial instrument on increase in profits.

Proceeding from the theses formulated above, it is possible to define that the main objective of SBA – attraction of financial resources of investors, the interaction scheme at which consists not simply in purchase of securitizing value documents (ABS) by investors, but in financing of an originator of securitization and acceptance on itself the risks arising in the course of securitization, for a certain remuneration. It is obvious that in this case, it is a question of distribution of risks of securitization between the main participants of the transaction with the purpose of their minimization.

Thus, it is possible to pass to consideration of a problem of risk management at securitization.

Management of risks begins with classification of risks of a securitization. The analysis of securitizing risks is based on the use of various classifications. Classification of risks can be considered as means of systematization of a set of risks on the basis of certain signs and the criteria, allowing to group subsets of risks.

In this work [11] there is a comparative and critical analysis of various classifications of risks of the securitization offered by domestic (A. Selivanovsky, OJSC “AHML”) and foreign (H.P. Berom, Klair Hill, Harrell, Yulia Dvorak) scientists and gives the model of classification based on the use of system approach. According to this approach, classification of risks is built on the basis of the principle that allows rather fully fixing their feature and communication with object of protection, with another – to allow possibility of the subsequent divisions into elements according to practical requirements.

Classification of securitizing risks, based on works of foreign scientists [12-14] and generalized in work [15] has the essential shortcoming: in group "on the sphere of an origin of risks" – risks were considered only as financial. Existing objects of consideration of risks that was the reason of omission of risks regarding an economic component were thus narrowed.

Table 1. Classification of risks of securitization

Group	Risks	Characteristics
On level of arising risks	1. Standard 2. Abnormal 3. Marginal	1. Default risk calculated on the basis of historical data on number of obligations not fulfilled by the borrowers (originator). 2. At occurrence of negative circumstances when there is a repeated excess of historical frequency of defaults (credit and liquidity enhancers). 3. The risks which are repeatedly exceeding standard, and abnormal.
On the realization mechanism	1. Actions 2. circumstances	1. The risks connected with inadequate execution and non-execution of obligations. 2. Circumstances for which no one is responsible
On participation in realization of risks	1. Main participants 2. participants 3. Third parties	1. Risks of an originator, mortgage agent, trust, depository of a mortgage covering, borrowers. 2. The risks connected with the third party on the transaction of securitization.
On the sphere of an origin of risks	1. Financial and economic 2. The legal	1. Risk of halfway return, risk of reinvestment, risk of liquidity, percentage risk, risk of depreciation of real estate. 2. Badly developed legislation, the contradictions containing in the legislation, absence of the legislative norms governing the arising relations.

Authors suggest complementing the group "on the sphere of an origin of risks" – risks: financial and economic that will allow considering the risk, not considered to any group, namely risk of depreciation of real estate. The result received by the authors of classification of securitizing risks, is presented in table 1.

From table 1, follows that the main parties of the majority of transactions of securitization are: the investor, an originator and the serving company (servicer). It should be noted that risk management in securitizations is directed on definition of all risks

which are assumed by an originator (bank) and which can arise in the course of the transaction. All parties of risk can be predicted proceeding from contents of the transaction, having allocated those functions which the bank undertakes to execute.

Further, for risk management it is necessary to execute quantitative estimates of supposed size of risks of non-execution on a pool of securitizing assets.

Traditional method of an assessment of possible risk is the method that assumes comparison of an initial pool with “a reference pool” of securitizing assets. The idea of a reference pool is

formed on the basis of the statistical analysis of the market of the corresponding type of assets as a whole. Characteristics of a reference pool of the assets received thus form the basis of an assessment of size of alleged losses with use of coefficients of WAFF (Weighted Average Foreclosure Frequency) and WALS (Weighted Average Loss Severity). The first coefficient – Weighted Average Foreclosure Frequency – shows the share of assets expressed as a percentage in a covering on which the default is possible. The second coefficient shows Weighted Average Loss Severity– the average size of losses which is expected in case of a default of one asset after enforcement of a security over assets. Work of coefficients will reflect the expected size of losses in this pool.

Authors offer a new mechanism of an assessment of possible risk on the basis of calculation of "market price of risk".

Proceeding from the provisions stated in [15], it is possible to note that there is an accurate ratio defining the income on unit of investments which is used for measurement and correction of risks of assets in the market. This ratio is called "market price of risk". In the economic theory there is a method of pricing of risks which united financial and insurance theories of pricing that allowed to apply it to securitizing transactions. This method was offered by Sean S. Wang in 2000-2001 and received the name of Wang transformation (Wang Transform).

Peculiarity of this method is that Wang transformation possesses not only various properties as a method of accounting of the prices, but also has powerful economic interpretation. For example, Wang transformation is the only function of change, in the list of other changes which can restore pricing model on capital assets (CAPM).

Preceding from situation that F – function of distribution of probability of loss of the investor, its transformed function of distribution according to Van's method is described as follows [15]:

$$F_{[\lambda]}(x) = [\Phi]([\Phi]^{-1}(F(x)) - [\lambda]) \quad (7)$$

Where F – standard normal function of distribution, x – losses of the investor, $[\lambda]$ – market price of a product insurance risk, $[\Phi]$ – cumulative curve of standard normal distribution, function of calculation of probability of the fact that observed value of standard normal a random variable will be less or equally to argument of function (in MS Excel – NORMSDIST), and $[\Phi]^{-1}$ – inverse function from function $[\Phi]$.

On the basis of the transformed distribution, an award for risk for the investors dealing with risk during certain time, are considered to expect losses

therefore the discount on a risk-free interest rate usually becomes and the reinsurance award pays off.

It is important to note the ability of Wang transformation method to work at probability models which can be expressed only by modeling on the Monte-Carlo method, instead of in an analytical form that promoted a wide circulation of application of this method in insurance. Authors note that this method of the pricing using a method of distribution of transformed probability can be considered as the principle of forecasting in modern conditions. This method is applied and in the sphere of finance, in particular in pricing problems under the conditions of imperfection of the market.

All risks arising at securitization of assets, can pose threat to regular transfer of money from debtors to investors [1, 2, 16, 17].

Therefore for risk mitigation arising at securitization of assets, various ways of credit support are used to which it is possible to carry the following:

1. By the form of covered risks ("mechanisms of increase of reliability"):

- 1.1. Reliability increase of securitizing assets;
- 1.2. Increase of monetary liquidity;

2. On the providing volume (extent of reliability increase);

3. By category of persons assuming risk.

Three called approaches, in its turn, can be divided on direct and indirect or into internal and external mechanisms of increase of reliability [18].

Internal credit support – the support provided with the organizer of securitization or put in structure of transaction [19]. The most widespread types of internal support are:

- presentation of high requirements to assets;
- formation of a pool of assets, diversified geographically, on "age" of assets and in other parameters;
- formation of a special reserve fund from receipts from the securitizing assets;
- delivery of a guarantee of the organizer of securitization;
- Surplus cover (overcollateralisation);
- restriction of the minimum DSCR value (debt service coverage ratio)
- the relation of the size of the income from assets for a certain period to the sum of necessary payments on bonds for the same period;
- definition of events triggers [20];
- structuring issue in some trenches (Subordination);
- and others, including spread accounts and reserve accounts.

External credit support is the support provided with the third-party organizations to which it is possible to carry:

- insurance of a continuity of percentage payments on securitizing value documents (payment interruption insurance) – the insurer starts paying instead of the borrower percentage part up to pledge realization;
- additional guarantees of and/or the insurance which are usually provided by specialized insurance companies;
- insurance covering of bonds (surety bonds) – the obligation of insurance company to cover 100% of all types of losses on bonds irrespective of the reason of such losses;
- the letter of credit (Letter of credit), or firm credit lines, – the obligation of the third-party financial organization (bank) to pay in parts or completely the main amount of debt and percent in case of a default of the issuer;
- accounts of cash security and others.

The scheme of insurance of expected risk is represented on fig. 1, proceeding from which it is possible to describe the interaction mechanism as follows:

1. The insurer pays an annual award (P) of the company of a special purpose (SPV) and buys from it reinsurance (L_r). It is similar to a default swap (CDS) between two contractors;
2. SPV issues bonds with a different rating;
3. SPV sells securities to investors;
4. SPV puts revenue in the bond of very high level and distributes the awards paid by the insurer, between investors in the form of coupon payments (Dt) by the cost of LIBOR+5bp, LIBOR+10bp, and LIBOR+15bp respectively. In this case all liability for damages of insurers is born by SPV.

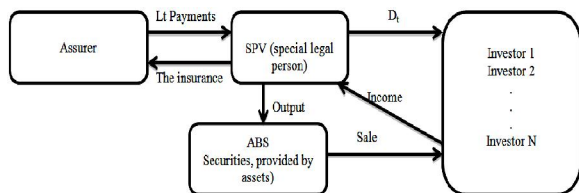


Fig. 1. The scheme of insurance of expected risk

Conclusion

Credit support is used in all transactions of securitization of assets, its concrete types and the sizes get out depending on risks of the concrete transaction, the purposes of the organizer of securitization and requirements of rating agencies.

Securitization process is the structured financial process which spreads risk of investors by aggregation of debt tools through issue of the

securities, thus opening new sources for financing of consumers.

By means of carrying out securitization, on the one hand, risks which are connected with traditional crediting separate and transferred to a turned form, and with another – in the course of implementation of securitization new risks are created.

All called risks constitute danger to regular transfer of money from debtors to investors. For a quantitative assessment of risks of securitization use one of two methods – on the basis on an alignment with "a reference pool" assets and on the basis of Wang transformation. For minimization of the risks arising at securitization of assets, use quantitative restrictions, and also mechanisms of external and internal credit support.

Inference

Now the combination of internal and external ways of increase of reliability is applied. Sometimes two mechanisms of increase of reliability are combined in such a way that the new form of providing possessing unique characteristics is created.

In the work practical examples of using the methods of an assessment and the risk management, arising at securitization of bank assets weren't captured. For more detailed studying of the problem put in the work, it is expedient to make calculations and to analyze experience of use of the listed methods of an assessment and risk management by modern banks.

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