QUANTITATIVE INDICATORS
OF THE SECURITIZATION OF ASSETS

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Securitization is instrumental in return on capital increment through the withdrawal from the balance of lending activities being accompanied by off-balance incomes flow from fees, which are less capital-intensive. The purpose of this paper is to analyze the quantitative indicators characterizing the securitization of assets. For drafting this article, the method of analysis, synthesis method, logic and dialectic method, normative method, the study of statistical sampling and time series of expert evaluations (Standard and Poor's), personal observations, and monographic studies have been used. The main difference between the securitization of assets from traditional ways of financing is related to the achievement of a plenty of secondary goals in attracting financial resources, which can play a significant role in choosing to favour the securitization's of assets or other types of financing. In particular, it gives a possibility to write off the assets from the balance sheet along with the relevant obligations under the securities, to expand the range of potential investors accompanied by the reducing of credit risk, interest rate and liquidity risk, as well as to improve the management quality of assets, liabilities and risks. All of these secondary effects are achieved by the isolation of selected assets from the total credit risk of the enterprise, raising its funds, which forms the pivotal actuality and significance of asset securitization. The article contains demonstrations of quantitative and qualitative indicators characterizing the securitization of assets.

Keywords: *securitization, assets securitization, structured finance, quantitative indicators, collateralized debt instruments, pool of assets, securities.*

Securitizarea are un rol esenţial în creşterea rentabilităţii capitalului prin retragerea din bilanţ a activităţilor de creditare, fiind însoţită de obţinerea veniturilor din afara bilanţului din comisioane, care sunt mai puţin intensive din punctul de vedere al capitalului. Scopul acestui studiu constă în analiza indicatorilor cantitativi care caracterizează securitizarea activelor. Pentru perfectarea acestui articol au fost folosite metoda analizei, sintezei, metoda logică şi dialectică, normativă, studiul seriilor statistice şi seriilor de timp a evaluărilor experţilor (Standard and Poor's), observaţiile personale şi studiile monografice. Principala diferenţă dintre securitizarea activelor de celelalte modalităţi tradiţionale de finanţare este legată de atingerea unui număr mare de obiective secundare în atragerea de resurse financiare care pot juca un rol semnificativ la alegerea în favoarea securitizării activelor sau a altor tipuri de finanţare. În special, aceasta oferă posibilitatea de a anula activele din bilanţ împreună cu obligaţiile relevante prin transformarea acestora în valori mobiliare, de a extinde gama potenţialilor investitori, însoţită de reducerea riscului de credit, de rată a dobânzii şi a riscului de lichiditate, precum şi de a îmbunătăţi calitatea managementului activelor, pasivelor şi riscurilor. Toate aceste efecte secundare sunt atinse prin izolarea activelor selectate de la riscul total de credit al întreprinderii, majorarea fondurilor sale, care reprezintă actualitatea şi importanţa cheie a securitizării activelor. Articolul conţine demonstrări ale indicatorilor cantitativi şi calitativi care caracterizează securitizarea activelor.

Cuvinte-cheie: *securitizare, securitizarea activelor, titlurizare, indicatori cantitativi, titluri colaterale de creanţă, pool de active, valori mobiliare.*

Секьюритизация играет существенную роль в увеличении возврата капитала за счет выхода за баланс кредитной деятельности, сопровождающегося получением внебалансовых доходов от сборов, что является менее капиталоемким. Целью настоящей статьи является анализ количественных показателей, характеризующих секьюритизацию активов. Для подготовки данной статьи были использованы: метод анализа, синтеза, логический и диалектический метод, нормативный метод, изучение статистической выборки и временных рядов экспертных оценок (Standard and Poor's), личные наблюдения и монографические исследования. Основное различие между секьюритизацией активов от традиционных способов финансирования связано с достижением множества вторичных целей в привлечении финансовых ресурсов,

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которые могут играть значительную роль при выборе в пользу секьюритизации активов или других видов финансирования. В частности, она дает возможность списывать активы с баланса вместе с соответствующими обязательствами под ценные бумаги, расширять круг потенциальных инвесторов, сопровождающийся снижением кредитного риска, риска процентной ставки и риска ликвидности, а также разрешений для улучшения качества управления активами, пассивами и рисками. Все эти вторичные эффекты достигаются за счет выделения выбранных активов из общего кредитного риска предприятия, увеличения его средств, что составляет основную актуальность и значимость, а также секьюритизацию активов. В статье представлены демонстрации количественных и качественных показателей, характеризующих секьюритизацию активов.

Ключевые слова: секьюритизация, секьюритизация активов, структурированное финансирование, количественные показатели, залоговые долговые инструменты, пул активов, ценные бумаги.

The actuality and relevance of the researched topic is explained by the fact, that, currently, securitization is on the way to international recognition as an innovative financing technique. Despite the fact that the first mention of securitization, as an innovation on the financial market, has appeared in the 18th century, even now its capacity is not fully disclosed, securitization appearing as a revolutionized method of borrowing between companies and their customers.

The growing international importance of assets securitization stimulates intense increase of importance of this phenomenon on a national scale. Because of the novelty and complexity of this funding technology in banking and financial environments it is revealed not only a lack of practical experience, but also the lack of theoretical concepts of securitization. In order to estimate correctly the efficiency, the paper sets and describes the quantitative indicators characterizing the securitization of assets.

In order to demonstrate the fundamental relationship between the mechanisms of improving the reliability and ratings, the technique of determining the amount of additional collateral required for obtaining the desired rating is presented below. The scientific novelty of this particular research article lays down in the examination and adaptation of indicators reflecting the quantitative characteristics of the securitization.

Having examined the case study, it will be clearly demonstrated how various scenarios are simulated and possible losses are calculated, by analyzing individual group of risks related to the securitization of assets. Simulation using the Monte Carlo method makes possible to calculate the expected loss. It is based on certain governing laws of distributing the probability of default in time, losses and changes in the cost of housing.

Addressing science referenced on securitization is to mention that these are carried out by the works of foreign authors such as Jeremy Carter, Rick Watson, Andrew Davidson, Janet Tavakoli, Moorad Choudhry, Alper Kara, Steven Ongena, Maia Melnikas, Ekaterina Demiushkina, Mihail Makovetski etc. The fact that Moldovan scientist' works do not deeply cover the topic of securitization was an additional predetermination for choosing this subject for research.

While elaborating this paper, the primary and secondary legislative framework of the National Bank of Moldova, the National Commission on Financial Markets and other relevant national and international authorities were analysed. Togehter with the legislation, official statistics and reference materials were used.

Before proceeding to the calculations, we note that many of the considerations set out below are based on a common philosophy of the two rating agencies Moody's Investors Service and Standard and Poor's concerning securities rating provided by a pool of residential mortgages. Generally, the requirements for the volume of the collateral, which is considered necessary in order to obtain a certain rating depends on the asset class.

In order to determine the value of expected losses on loans included in the pool of assets, it is used an approach based on the theory of probability. In this case two indicators (factors) are studied firstly:

- The probability of default of the asset from the pool:

$$p\,(d1, \ldots , n)$$

- Ratio of loss given default

$$s\,(d1, \ldots , n)$$

The first indicator expresses the probability of default of certain loans. The second value shows the size of the expected losses if borrower defaults. It expresses the total losses as a percentage of the size of the granted loan. The probability of loss issued by credit funds depends primarily on the ratio of the loan and collateral amount, the borrower's age and the specific conditions of the real estate collateral agreement. In essence, the loss coefficient is determined by the time, which would be required by the forced sale of assets and the time related to collateral commercialization, as well as the costs associated with this process. In addition, there are taken into account features related to the legal field and the loan agreement conditions, which directly affect the value of the losses.

Rating should ensure international comparability of reliability (credit quality) of debt. This means, that an investor who invests in different securities with the same rating, has the right to account on the same probability of default during the entire investment period. However, he cannot ignore the type of securities he has to do. This implies that the probability of default on the securities issued as a result of the securitization of assets and relying on assignment of the AAA/Aaa rating, should be equal to the probability of default on corporate bonds with the same rating or probability of default of a certain reference pool of asset (for a given rating level) which is calculated based on the accumulated statistics.

The reference pool is a well-structured, including country-specific pool of assets.

In calculating the expected loss of the reference pool for each rating value, its probability of default is taken. The higher the rating, the higher the value of this indicator.

For example, assume the following values: the probability of default for the AAA rating is 12%, for the rating of AA - 9%, for the rating A – 7%, and for the BBB rating – 5%. As well as the loss factor – 37.6%, 32.3%, 28.3% and 22.9% respectively.

Table 1

The calculation of the expected loss of the reference pool

	Probability of default (%)		Loss Factor (%)		Expected losses (%)
AAA Rating	12	x	37,6	=	4,5
AA Rating	9	x	32,3	=	2,9
A Rating	7	x	28,3	=	2,0
BBB Rating	5	x	22,9	=	1,1

Source: Elaborated by the author based on the Standrad & Poors data. [online][accesed on 20.02.2017] Available: http://www.spratings.com/en_US/understanding-ratings

The increase in the probability of default with increasing values ranking brings to this model element of the additional load. Securitization of assets with a higher rating must withstand higher levels of expected losses. The values adopted for the probability of default, can be changed depending on the composition of the test portfolio. Here we apply the so-called varying magnitude, which allows to take into account in the calculation of the estimated quality difference and the reference pool assets.

Calculation of the collateral value is usually based on the following assumptions and simplifications: the calculation of the collateral volume required first is the case of one or two assets (loans). In other words, in the first step of the transaction, consisting of a single asset. In the second step, the calculations are made for a pool consisting of two assets. Asset quality is taken accordingly as speculative rating BB+. Assume that the default probability is 30%, and the loss factor for both asset is 70%. Probability of default by the reference pool is assumed to be 5% and the loss factor – 70%. In these initial data, the volume of collateral is calculated as follows:

$$E(L1) = p(d1)x\, s(d1) = 30\%\, x\, 70\% = 21\% \tag{1}$$

where: E(L1) – expected loss 1
p(d1) – probability of default 1
s(d1) – coefficient of losses 1

$$E(LBM) = p(dBM)x\, s(dBM) = 5\%\, x\, 70\% = 3,5\% \tag{2}$$

where: E(LBM) – expected loss AAA – reference pool
p(d1) – probability of default AAA – reference pool
s(d1) – coefficient of losses AAA – reference pool

As follows from 1, it shows that the amount of expected losses in this operation is 21%.

Calculations made for the reference pool of AAA-rated given the magnitude of losses equal to 3.5% of the portfolio. It is possible to calculate the amount of collateral required to expected losses, which are on the speculative rating level, down to an average of losses, which is a reference pool of AAA-rated. Due to the fact that the financial instrument has received the AAA rating, the rate of expected loss on the transaction should be reduced from 21% to 3.5%. In other words, you must provide the backup media, the presence of which would make it possible to reduce the size of expected losses to the level of the reference pool. This provision should ensure that the expected loss on the transaction under any circumstances will not exceed the value of the reference pool losses. Thus, we get the following equation:

$$E(L1\ with\ CE) = p(d1)x\ [s(d1)-\ CE] => 3.5\% = 30\%\ x\ [70\% - CE] \tag{3}$$

where: E(L1 with CE) – expected losses 1 with compensation
p(d1) – probability of default 1
CE – necessary compensation of losses by asset 1

Resolving the equation with unknown CE, we receive:

$$CE = 70\% - 3,5\%/30\% = 58,3\% \tag{4}$$

In the case of a structure with a single asset (credit) of the originator, it is required to provide additional security, covering 58.3% of the transaction amount. Only under this condition, quantitative finance options allow to assign AAA rating.

If we look at the pool, consisting of several assets (loans), it takes into account the presence of the diversification effect – just as in the case for the stock portfolio. Due to this effect the amount of collateral required can decline. The degree of manifestation of the diversification effect depends, in particular, on the probability distribution and coefficient covariance probability of defaults on both assets included in the pool. Using the above formula, we can also calculate the amount of collateral required to obtain the desired rating pool, consisting of two assets:

$$E(LPool\ with\ CE) = p(d1\ or\ d2)x\ [sPool(d1\ or\ d1)-\ CE] +$$
$$p(d1\ and\ d2)x\ [sPool(d1\ and\ d1)-\ CE] \tag{5}$$

where: E(LPool with CE) – expected losses (compensation is taken into consideration)
p(d1 or d2) – probability of default
sPool(d1 or d2) – coefficient of losses in case of default for each asset
p(d1 and d2) – probability of default of both assets
sPool(d1 and d2) – coefficient of losses in case of default for both assets

Substituting the values and solving the equation for the unknown CE, we get the following result:

$$3,5\% = (2\ x\ 30\%\ x\ 70\%)x\ (35\% - CE) + (30\%\ x\ 30\%)x\ (70\% - CE)$$
$$=> CE = 34,5\% \tag{6}$$

Calculations show that the inclusion of the second asset in the pool can reduce the required amount of collateral from 58.5% to 34.5%. Reducing the amount of collateral required is the result of reducing the variance of expected losses. Having a pool consisting of a single asset (loan), you can only talk about two possible perspectives – default or avoiding default. If you have multiple assets (loans), the number of possible options is increasing. In general, there is the following rule: the greater the number of assets included in the pool, the less deviation from the expected performance of the resulting averages.

Quintessence of presented approach can be summarized as follows: a quantitative analysis of the cash flows generated by the asset is reduced to its testing resistance in stressful situations and to check how the

various factors affect the solvency of the issuer's securities. Development for this model is based on methods used in mathematical statistics. They allow you to cover a wide range of economic phenomena and calculate their impact on the solvency of the assets included in the pool. To determine the amount of interim measures for the pool, consisting of a large number of assets, it is sufficient to determine the value of the following four factors necessary to obtain the desired rating:

- rating a pool of assets, expressed in the form of probability of default of its constituent assets;
- data loss rate and their distribution;
- correlation of losses in a diversified and non-diversified pool, which in the first stage are taken into account through the assumption of a higher probability of default, and then refined with the help of the so-called variable parameters or "weighing risks";
- the desired value of the securities rating, expressed in terms of the maximum size of the expected loss on the transaction.

With the use of these values is calculated the expected size of losses on loans, which is part of the pool. This value is compared with the expected loss of the reference pool, their difference gives the amount of additional security (protection against credit risk) required for this transaction. During the assignment procedure of the final rankings, along with the above quantitative indicators take into account the results of the qualitative analysis.

Conclusions and recommendations

Calculations of indicators, performed in this paper work, provide a quantitative characteristic of asset securitization. They allow assessing the capital structure subject of securitization, the amount and direction of the cash flows issued from a securitization result, as well as the rate of capital adequacy, which is a necessary factor in the securitization of assets.

Identification and calculation of these quantitative indicators are urgently needed during the securitization process, which allows evaluating the possibility of securitization, and as a result, allows investors to take the right decision.

In addition, in this paper work it is suggested to use the multiplier coefficient, in order to increase the efficiency of the process of asset securitization. The essence of securitization lies in the capitalization of assets through borrowing money. The result of multiplier application allows with certainty to predict future cash flows generated by securitization. Moreover, this forecast can be done taking into account the time lag and, as a consequence, the effects of inflation. Thus, the application of a multiplier in the securitization process makes it more predictable, manageable and therefore safer for all involved.

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