

Problems of Determining the Cost of Collateral in the Conditions of Implementation Basel II, III Standards in Russia

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Abstract: This paper analyzes the impact of the collateral value on the assessment of credit risk in the framework of the Advanced IRB approach and proves its impact on the LGD parameter and also provides a statistical analysis of the linear and multifactor models of the LGD score in order to detect a positive correlation. Based on the analysis, factors that influence the cost of collateral and the valuation of LGD are determined. The results of the research confirm the hypothesis put forward in the study that the valuation of collateral provides a significant influence on the measurement and management of the LGD indicator in conditions of building an Advanced IRB approach

Keywords: LGD, Advanced IRB approach, collateral value, collateral value change factors, linear and multifactor valuation models LGD.

1. INTRODUCTION

Banking activity is a form of investment activity aimed at extracting profits in conditions of uncertain market environment (risk) and is characterized by a constant search for a compromise "risk-return". At the same time, the banking sector is not only vulnerable to systemic risks, but also capable of transferring crisis phenomena to the non-financial sector.

The global financial and economic crisis, which served as the beginning of a chain of negative events in the Russian banking system in 2008, showed significant shortcomings in the methods used in domestic banking practice to assess financial performance and hedge banking risks.

The total amount of funds allocated to support the financial and banking sector during the acute phase of the crisis is estimated at 1.5 trillion rubles. There was a serious outflow of private capital, which in 2009 amounted to about \$ 60 billion. Significantly decreased liquidity indicators of credit institutions. Some banks began to delay payments and disbursement of funds on deposits of the population. The Central Bank of the Russian Federation (hereafter – CBRF) twice lowered the standards for mandatory reserves. In addition, there were changes in the legislation that allowed the CBRF to provide loans to banks without collateral, which, of course, entailed taking on serious credit risks.

In 2010, there were prerequisites to believe that the crisis entered a stagnating phase and soon there will

be a gradual growth of the economy, including in the banking sector. The outflow of capital from the Russian Federation in 2010, as shown in Figure 1, declined by almost 50% to \$ 30.8 billion.

However, the outflow of capital, which amounted to 2011-2013. a total of about \$ 200 billion showed that the crisis in the banking sector did not end, and only took a stagnant form for a time, with a new force in 2014.

The new wave of the crisis in the Russian banking system in 2014 was caused by a number of reasons, both economic and political. As a result of a new wave of crisis phenomena, capital outflows from the country totaling more than \$ 150 billion occurred.

Thus, in the current crisis conditions, the need for Russian banks to improve their credit policies and management decision-making strategies to hedge credit risks has become more acute than ever. And in this vein, the pledge and its value are a reliable tool for hedging credit risk. However, valuation of the collateral is a bottleneck in determining credit risk, especially in times of volatile market conditions. Therefore, a rethinking of existing practices in the valuation of collateral is an important factor in building an effective credit system.

The standards of the Basel Committee in assessing credit risks necessitate a structural change in the entire current credit policy of Russian banks, including in the sphere of collateral. However, many of them have not yet begun to work on this issue. In this connection, it is especially important to analyze the impact of the cost of collateral on the measurement of the bank's credit risks with the Advanced IRB approach in order to confirm or

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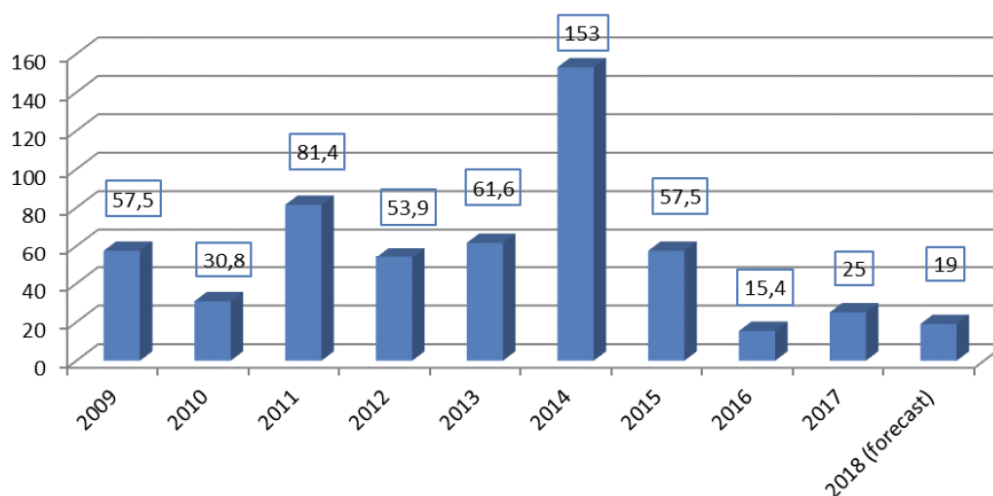


Figure 1: Dynamics of capital outflow from the Russian Federation for 2009 – 2017.

Source: compiled by the author.

disprove the hypothesis of the existence of an interconnection, and, if this relationship is confirmed, to determine by the statistical analysis the existence of correlation dependence for various LGD valuation models. This statistical analysis will reveal the factors that influence the measurement of collateral value and the LGD index in order to integrate them into the models for measuring and measuring these indicators.

In the domestic scientific literature, the contributions of the following Russian scientists made a significant contribution to the study of the theoretical and practical foundations of the methodology for assessing the value of collateral: A.G. Gryaznova, M.A. Fedotova, T.V. Tazikhina, V.V. Bocharov, N.G. Ivanova, V.E. Leontiev, L. F. Netishinskaya, V.Y. Roslov, A.A. Savvin, I.P. Skobeleva, O. N. Shcherbakova and V.M. Yuzhelevsky.

In the foreign scientific literature, the issues of the dependence of the cost of collateral and credit risks are devoted to the work of E. Altman, B. Brady, J. Bigus, K. Dulmann, L. Baruch, J. Brogaard, M. Gertler, K. McConnell, S. Hall and etc.

Based on the above studies, we can conclude that collateral value is one of the main instruments for hedging credit risks of banks. However, in none of the studies on this topic was an analysis of the nature of this influence on the measurement of the bank's credit risk in the framework of the Advanced IRB approach. In this paper, the authors prove that the collateral and its value have a direct impact on measuring the bank's credit risk through the LGD parameter when using the Advanced IRB approach.

2. MAIN COURSES OF IRB APPROACH

According to the standards, Basel II, III, the IRB approach is subdivided into Basic (Foundation, F-IRB) and Advanced (Advanced, A-IRB). The F-IRB approach is based on the definition by banks of the probability of default, other parameters are determined by the mega-regulator. The advanced IRB approach is based on the independent determination by banks of all risk parameters. In this study, we are more interested in the Advanced IRB approach, based on flexibility in determining the risk component, which is more in line with the rapidly changing market conditions of the Russian economy.

The IRB approach is based on two risk parameters: unforeseen (UL - expected losses) and expected losses (EL - unexpected losses). Unforeseen losses are the difference between the maximum possible and the expected losses. In its economic essence, unforeseen losses arise as a result of the volatility and unpredictability of the market environment. To hedge the risk of unforeseen losses, the bank must have a "safety cushion". Such insurance allows you to cover these losses without causing significant harm to capital.

The expected losses (hereinafter - EL) are not a risk, but a probable level of expenses that will affect the final annual indicators of banking activities. The expected losses are more susceptible to forecasting and hedging through various risk management tools. The analysis showed that it is EL parameter that can be predicted and modeled, which allowed to limit the direction of further analysis by this parameter.

EL is the result of the product of the following risk indicators: probability of default of the borrower (PD - probability of default), share of losses in case of default (LGD - loss given default) and cost under default risk (EAD - exposure at default). PD is the probability of default, which is calculated on the basis of internal ratings of borrowers and expressed in percent. In essence, PD is the probability that the creditor will not be able to fulfill its obligations, which will lead to a default. Each bank has its own methodology for calculating PD, based on experience, portfolio structure and available information.

EAD - value at the risk of default, represents the amount of unsecured liabilities, and therefore, the risk of loss in the event of default of the borrower. When calculating this indicator, many factors are taken into account, such as, for example, the amount of debt on the loan (especially for complex loans with multiple credit lines and issuance limits). Calculating the probability of default on such complex credit products is especially important in order to predict the possible default in time and have time to make a stop-loss for the issuance of funds of the next line of credit. And in this vein, the presence of collateral plays a significant role, since it allows to reduce the magnitude of the expected losses.

LGD is the weighted average share of expected losses in case of default. LGD is the part of the loan that will be for free lost. When calculating LGD, the key factor is the availability of additional collateral, the value of the collateral for the client and the current financial condition of the borrower. The issue of correctly determining the cost of collateral, its liquidity and the implementation scenario is a key component of LGD's definition.

The analysis showed that when using the Basic IRB approach, banks define only approaches to calculating the PD indicator. The methodology for calculating the remaining indicators is governed by the requirements of the Central Bank of the Russian Federation. The advanced IRB approach allows banks to independently determine the methodology for calculating all risk components, including the share of losses in case of borrower default (hereinafter - LDG).

The basic IRB approach determines in advance the LGD level depending on the collateral class. So, regardless of the type of collateral and its value, within the framework of the Basic IRB approach, the senior requirements for companies, states and banks not

provided with recognized pledges are assigned a LGD of 45%, secured by recognized pledges - 75%. All subordinated claims to corporations, states and banks will also receive LGD 75%. The term Advanced IRB or A-IRB is an abbreviation of advanced internal ratings-based approach, and it refers to a set of credit risk measurement techniques proposed under Basel II capital adequacy rules for banking institutions. Under this approach the banks are allowed to develop their own empirical model to quantify required capital for credit risk (includes PD, LGD and EAD).

Thus, the analysis made it possible to prove that when using the Basic IRB approach, banks define only approaches to calculating the PD indicator. The methodology for calculating the remaining indicators is governed by the requirements of the Central Bank of the Russian Federation. The advanced IRB approach allows banks to independently determine the methodology for calculating all risk indicators, including the share of losses in case of borrower default (hereinafter - LDG).

The existing methods of calculating LGD are individual in each bank and in the framework of this article there is no need to describe them all, but the task is to propose a method of calculating the collateral value in these conditions. Because the paper proves that when calculating LGD, the key factor is the availability of collateral and its value, as well as the value of collateral for the borrower. The issue of correctly determining the cost of collateral, its liquidity and the implementation scenario is a key component of LGD's definition.

The analysis made it possible to develop the main recommendations regarding the quality standards and requirements that the approach to the LGD calculation should meet in the framework of the Advanced IRB approach:

- Assets pledged as collateral must meet the general quality standards defined in Basel II, III;
- Due to the potentially very long property price cycles that may be inadequately reflected in the data in a short period of time, LGD for retail requirements secured by residential real estate can not be set below 10% for any sub-segment requirements. At the same time, the lower threshold of LGD of 10% will not, however, be applied to sub-segments that are subject to state guarantees or use them;

- LGD estimates should be based on historic reimbursement levels and, if applicable, should not be based solely on the estimated market value of collateral.
- In its analysis, the bank must consider the likelihood of any relationship between the risk of the borrower and the risk of a pledge or collateral provider. It is necessary to approach conservatively the cases when there is a significant degree of dependence;
- Any discrepancy between currencies in which obligations and pledges are denominated must also be taken into account and conservatively interpreted in the banking evaluation of LGD.

3. STATISTICAL RESULTS

The analysis, the developed recommendations and conclusions allowed us to put forward a hypothesis that when implementing the Advanced IRB approach it is advisable to develop a multifactor approach to the LGD evaluation, which should be determined depending on the quality, type and size of the collateral.

In order to confirm this hypothesis, a multifactorial scenario dynamic model for assessing the collateral value was constructed by highlighting the following main factors:

- systematic: macroeconomic indicators (exchange rate, key rate, inflation level), economic situation and growth rate of the industry, regulatory legal regulation, political situation;
- non-systematic: approaches and methods to determine the quality of the borrower, the cost of credit, the reliability of the borrower, approaches to determining the borrower's rating, the type of collateral, the industry in which the collateral is located, the bank's associated business / borrowers in the same industry, the depth and quality of the data used in calculating the cost of collateral, approaches and methods for its evaluation.

Further, in order to approbate the hypothesis, a statistical analysis was made of the degree of dependence of the LGD calculated on the basis of the linear model and the total amount of loan losses; the degree of dependence of the LGD calculated using the multi-factor model of the appraised value of collateral

and the total amount of loan losses. A statistical sample was conducted for 30 collateral objects.

The analysis is based on the following basic assumptions: the object of the pledge is the current business and income-producing real estate; the loan was granted to borrowers for the development of this business; the borrower was not deemed default at the time of valuation, but was in the pre-default situation; the sample is taken over a three-year period in one bank; all objects were pledged in the range of 3-5 years ago from the valuation date.

This statistical analysis was carried out in two stages. At the first stage, the value of the collateral objects was calculated using the classical method (A1), implying the use of a typical discount factor calculated by the expert, and using the factors identified in this paper (A2). The results showed an average deviation in the value of A2 from A1 in the range [-12%, + 22%] for the active business group and [-26%, + 28%] for the group producing income.

In the second stage, the "tightness of the relationship" between the LGD linear model based on the classical collateral valuation method (A1) and the LGD multi-factor model based on the A2 collateral valuation method was determined. The results of this analysis are presented in Table 1.

Pearson's correlation coefficient for assessing collaterals using A2 was 0.805, which confirms the strong relationship between the LGD parameter and the total loss value using the LGD multi-factor valuation model. The low value of the correlation coefficient when A1 is used indicates the possible static nature of the methods used to assess the collateral value and low correlation dependence. The graphical representation is shown in Figure 2.

The coefficient R² for A2 is 0.648, which allows us to conclude that the model is of sufficient statistical significance. At the same time, the author assumes that this indicator can be improved as a result of improving the bank's methodology for calculating LGD.

Consequently, the results obtained make it possible to assert that the use of the multifactor model of LGD valuation, based on the valuation of collateral with the introduction of the systematic and non-systematic factors proposed in the work, gives more accurate results in forecasting the magnitude of the probable losses for the purpose of LGD calculation.

Table 1: Analysis Results

Results	LGD (A1)	LGD (A2)	Total loss amount	Ranking A1 and Total loss amount		Ranking A2 and Total loss amount	
				A1	Total loss amount	A2	Total loss amount
n/a	0,65	0,55	0,59	0,25	0,42	0,23	0,24
	0,37	0,57	0,46	0,28	0,25	0,27	0,25
	0,5	0,43	0,47	0,31	0,38	0,32	0,31
	0,43	0,5	0,66	0,33	0,35	0,33	0,37
	0,48	0,49	0,51	0,34	0,24	0,34	0,35
	0,76	0,53	0,6	0,35	0,37	0,34	0,43
	0,97	0,5	0,61	0,37	0,46	0,34	0,47
	0,63	0,47	0,51	0,37	0,47	0,35	0,39
	0,51	0,54	0,6	0,41	0,39	0,37	0,4
	0,44	0,49	0,5	0,42	0,48	0,4	0,46
	0,65	0,45	0,5	0,43	0,66	0,4	0,51
	0,75	0,55	0,55	0,43	0,4	0,41	0,4
	0,47	0,45	0,46	0,44	0,5	0,43	0,38
	0,63	0,4	0,46	0,45	0,6	0,43	0,47
	0,41	0,35	0,39	0,46	0,31	0,45	0,46
	0,52	0,34	0,43	0,47	0,46	0,45	0,5
	0,35	0,33	0,37	0,47	0,4	0,46	0,6
	0,33	0,34	0,35	0,48	0,51	0,47	0,51
	0,25	0,5	0,42	0,5	0,47	0,49	0,5
	0,43	0,37	0,4	0,51	0,6	0,49	0,51
	0,31	0,43	0,38	0,52	0,43	0,49	0,51
	0,47	0,41	0,4	0,53	0,51	0,5	0,42
	0,42	0,52	0,48	0,63	0,51	0,5	0,61
	0,45	0,46	0,6	0,63	0,46	0,5	0,66
	0,65	0,49	0,51	0,65	0,59	0,52	0,48
	0,37	0,34	0,47	0,65	0,5	0,53	0,6
	0,28	0,27	0,25	0,65	0,51	0,54	0,6
	0,34	0,23	0,24	0,75	0,55	0,55	0,55
0,53	0,4	0,51	0,76	0,6	0,55	0,59	
0,46	0,32	0,31	0,97	0,61	0,57	0,46	
Pearson's correlation coefficient	0,623944509	0,806488257	n/a	n/a	n/a	n/a	n/a
CoefficientofDetermination R2	0,3893	0,6483	n/a	n/a	n/a	n/a	n/a
CoefficientofSpearman	n/a	n/a	n/a	0,641815	n/a	0,765910832	n/a

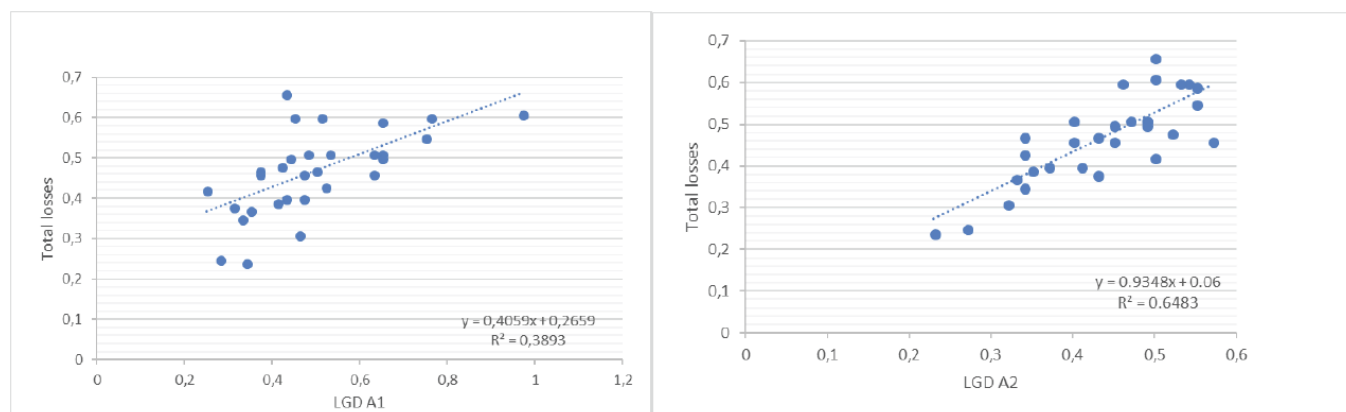


Figure 2: Dependence of LGD and total loan loss.

Source: compiled by the author.

4. CONCLUSION

Thus, the work reveals that the availability of collateral, its type, quality, and value have a direct influence on the choice of approach to the calculation of LGD and, consequently, its magnitude, since this indicator in the economic sense is part of the credit obligations not secured by collateral. The pledge is a qualitative and quantitative tool that allows the bank to adjust the amount of LGD depending on the business cycle and the adopted strategy. The paper suggests a group of factors (systematic and non-systematic) that it is advisable to implement in the model of assessing the cost of providing business and income-producing real estate in order to build a multifactorial model of LGD's valuation and on the basis of statistical analysis it is confirmed the relevance and usefulness of these proposals and recommendations.

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