Transformation of the Forecast Assessment of Expected Credit Losses in Monitoring and Assessment of Credit Risk in Commercial Banks

Elena V. Travkina[1,*], Yuliya N. Solnyshkova[2], Oksana A. Kazankina[2], Elena G. Azmanova[3] and Yuliya V. Morozova[3]

[1]*Department of Financial Markets and Banks, Financial University under the Government of the Russian Federation, Moscow, Russian Federation*

[2]*Department of Finance and Taxation, Saratov Socio-Economic Institute (Branch) of Plekhanov Russian University of Economics, Russian Federation*

[3]*Department of Banking, Money and Credit, Saratov Socio-Economic Institute (Branch) of Plekhanov Russian University of Economics, Russian Federation*

Abstract: The article presents the results of the systematization of issues arising in connection with the transformation of the banks forecast assessment of expected credit losses during the monitoring and evaluation of credit risk in commercial banks. Based on the data obtained on the introduction of IFRS 9 "Financial instruments" into the banking sector, it is concluded that in banking practice there is uncertainty regarding the long-term impact of credit risk, and there are significant difficulties with the use of a large amount of additional information, which creates certain difficulties in calculating future credit losses of banks. It is noted that the current use of the model of predictive assessment of expected credit losses of customers in the monitoring and evaluation of credit risk in the bank should take into account the selected collective or individual basis of assessment. The article presents a comprehensive approach to the use of the impairment model of expected losses in banking as a basic tool for modeling expected credit losses in order to form provisions for impairment with the allocation. The modification of this model will depend on the specifics of the bank's credit activities and portfolio, the types of its financial instruments, the sources of available information, as well as the IT systems used. Validation of this model will reduce the expected credit losses, reduce the amount of estimated reserves, as well as improve the efficiency of the Bank as a whole.

Keywords: Assessment of expected credit losses, credit risk, default, bank borrower, financial instruments.

INTRODUCTION

The study of the factors that lead to the bankruptcy of banks in the assessment and monitoring of their financial stability focused on the negative change in the performance of banks' balance sheets (Demyanyk and Hasan, 2010; Mayes and Stremmel, 2014). The analysis of scientific works showed that the high level of capital adequacy, profitability, liquidity and quality of assets have a negative correlation to bankruptcy. However, the results of the analysis of the sources of the crisis (1930 – Great depression), as well as the global crisis of 2007-2009 (Great recession) showed that there are other dangers (bubble formation, systematic underestimation and late identification of banking risks, increasing the fragility of the banking system), which may lead to bankruptcy of banks (Bernanke, 1983; Kaminsky and Reinhart, 1999; Schularick and Taylor, 2012; Dell'Ariccia, 2001; Rajan, 2005).

Despite some differences in the sources of banking crises – currency crises (Kaminsky and Reinhart, 1999; Domac and Martinez-Peria, 2003), deposit insurance (Demirgüç-Kunt and Detragiache, 2002), as well as the level of dynamics of the credit market (Schularick and Taylor, 2012) there is a general conclusion of the researchers – the main source of systemic banking crises in the future is the current dynamics of loans to the private and real sectors. This represents a view from the credit side (Bernanke (1983) and other) on the sources of initiating financial instability, which are, according to Schumpeter, «reckless lending».

Reforming the global financial and banking system, which is observed in modern conditions, aims to increase stability. A special role in this direction is assigned to improve the quality of banks' assessment and monitoring of bank risks. It is banking risks that are one of the fundamental factors in determining the financial stability of the banking sector. Qualitative risk diagnostics is very important in the assessment and monitoring of banks' financial stability. At the same time, special attention should be paid to credit risk, as the basis of the activities of credit institutions is lending.

*Address correspondence to this author at the Department of Financial Markets and Banks, Financial University under the Government of the Russian Federation, 125993 (GSP-3), Moscow, Leningradsky Prospect 49, Russia; Tel: +7(495)615-72-75; Fax: +7(499) 157-7070; E-mail: evtravkina@fa.ru

1. REASONS, CONTENT, INNOVATIONS AND RESULTS OF IFRS 9 «FINANCIAL INSTRUMENTS IMPLEMENTATION»

The Financial Stability Board has a special role in the global financial market. This international organization monitors and develops recommendations for the sustainable functioning of the global financial system. The Financial Stability Board includes: countries G20; international financing institutions (BIS, IMF, OECD, World bank); international standard-setting institutions and other institutions (BCBS, CGFS, CPMI, IAIS, IASB, IOSCO).

In 2014 the Financial Stability Board released the version IFRS 9 «Financial instruments» and replaced thereby IAS 39 «Financial instruments: recognition and measurement». The new standard contains the following modified requirements:

1.   The recognition and valuation of assets - allocated to some category (measured at amortized cost (AC), at fair value through changes in other comprehensive approach (FVOCI), as well as its reflection in profit or loss (FVTPL). The basis of modern classification of assets is based on the business model, which is used to manage financial assets in the analysis of the flow of monetary assets reflected in the loan agreement.

2.   Accounting for impairment and derecognition of financial instruments – occurs on the basis of the loss model, with a dual approach of valuation: expected losses within 12 months (stage 1) and throughout the financial asset (stage 2 and stage 3) (see Figure **1**).

3.   When hedging is taken into account, there is a convergence with asset management.

According to the results of the fourth Ernst & Young Global Limited (EY) study (Ernst & Young «Research questions impairment according to IFRS 9, the characteristic for banking sector», 2018) on impairment according to IFRS 9 for the banking sector (this study was based on the experience of 20 leading world-class banks), the following results were justified:

-    the impact on impairment provisions is not as significant as expected;

-    when using multiple scenarios, there is convergence;

-    crystallization of the most effective practices in the context of stress testing;

-    uncertainty remains regarding the long-term impact of credit risk;

-    the programs of making changes were extended for a longer period of time than expected;
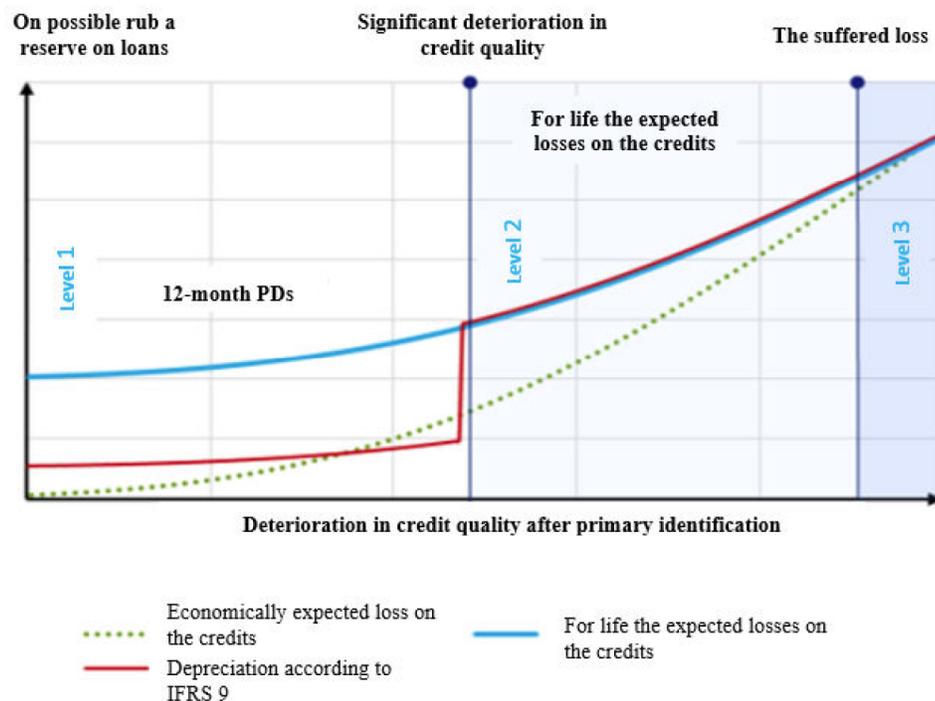
Figure 1: Model of expected losses in accordance with IFRS 9 «Financial instruments».

- there are difficulties with the introduction of a large amount of additional data on risks and financial data, processes and controls in the business;

- there is an underestimation of the volume of changes for data, systems, quantitative models, processes and control systems in financial institutions in the calculation of future credit losses.

Under modern conditions, one of the important features of the new standard IFRS 9 in assessing the expected credit losses of customers is to take into account the forecast macroeconomic information on its activities. Risk assessment by banks point in time based on the current level of losses, it is ineffective. In this case, the possible future deterioration of the financial condition of the borrower in the implementation of negative risk factors is not taken into account. The implementation of IFRS 9 «Financial instrument» c 1 January 2018 partially solves this problem. According to the new standard, the probability of default of the borrower is calculated taking into account the macroeconomic forecast when assessing the expected credit losses of customers. Let us consider in more detail the transformation in the assessment and monitoring of credit risks.

2. THE MODEL OF PREDICTIVE ASSESSMENT OF EXPECTED CREDIT LOSSES OF CUSTOMERS IN THE MONITORING AND EVALUATION OF CREDIT RISK

The very idea of forward-looking expected credit losses of customers in the monitoring and evaluation of the credit risk was embedded by the Financial Stability Board in 2014. This was a response to the global financial crisis in 2008.

In order to When account for impairment and derecognition of financial instruments under modern conditions, banks should use an impairment model that is based not on losses incurred, but on expected losses.

An independent estimate of expected credit losses should include a probability-weighted amount that, when accounting for the time value of money, is determined based on an estimate of the range of all possible outcomes.

In addition, when assessing expected credit losses, banks should use reasonable and reliable information on past, current and future risk factors.

According to the content of the standard IFRS 9 expected credit losses are the weighted average of

credit losses, which is calculated by using the respective risks of default as weighting factors. At the same time, it is not mandatory to evaluate each possible forecast scenario. It is necessary to assess the risk and probability of credit losses, even if this probability is insignificant.

The content of the model will vary depending on whether the assessment is carried out on a collective or individual basis.

2.1. Impairment Model of Expected Losses on a Collective Basis

The use of collective assessment by banks in the impairment model of expected losses implies the following basic conditions:

1. Financial instruments should be combined in accordance with the principle of homogeneity of credit risk in order to model the expected credit losses, as well as to distribute loans by stages of issuance.

2. The inability to carry out risk revaluation for each financial instrument that is included in a homogeneous portfolio.

3. Implementation of risk management for homogeneous loans is carried out on an aggregate basis.

4. Financial assets should be assessed on a collective basis, with insufficient information for evaluation on a case-by-case basis.

The expected loss impairment model should be a fundamental tool for banks to model expected credit losses in the event of default for the formation of impairment reserves on a collective basis in accordance with the requirements of IFRS 9 and at the same time contain the following main elements:

- assessment and monitoring of the risk structure of the loan portfolio depending on the level of credit risk since its initial detection;

- assessment of the risk of default (PD-Probability of default);

- determining the level of loss in case of default (LGD-Loss Given Default);

- modeling of the measure of credit requirements, is subject to the risk of default (EAD-Exposure at default);

- determination of expected credit losses (ECL-Expected credit losses).

2.2. Impairment Model of Expected Losses on an Individual Basis

Banks' use of individual valuation in the impairment model of expected losses implies the presence of atypical instruments that cannot be attributed to a certain homogeneous portfolio.

The impairment model for expected impairment losses on a case-by-case basis depends on the characteristics of individual borrowers (or selected groups of borrowers) that need to be assessed and monitored on a case-by-case basis when deciding which model to use. In this case, when you select a model, you can use:

- the model for calculating the internal rating, which is based on the construction of internal credit rating to assess the probability of bankruptcy of the borrower;

- model for calculating the external rating, which is based on an assessment of the probability of default of the borrower on the basis of external credit ratings;

- cash flow analysis model, which is based on the analysis of the borrower's cash flow forecast to assess its creditworthiness;

- Black-Cox model, which is based on a forecast assessment of market quotations of shares of the borrower, which reflect its financial condition and risks.

2.3. Algorithm of Accounting for Forecast Macroeconomic Information when using Models of Impairment of Expected Losses in the Bank

When commercial banks use impairment models for expected impairment losses on a collective or individual basis, it is very important to take into account forecast macroeconomic information.

In this direction, we can distinguish the following algorithm for accounting for forecast macroeconomic information when using models of impairment of expected losses in the bank:

1. To determine the number of macroeconomic indicators which have a significant impact on the valuation of a financial instrument, and these indicators should be consistent for all portfolios, the modelling steps and internal processes of the bank.

2. Assess the adequacy of the macroeconomic forecast information used.

3. To use in the implementation of predictive macroeconomic data weighted by the likelihood of macroeconomic scenario. Their number and probability of evaluation will vary depending on the dynamics of financial stability of the bank, as well as on internal and external macroeconomic forecasts.

3. RISK ASSESSMENT OF DEFAULT

There are two types of PD to calculate the expected credit losses (ECL):

Table 1:   Basic Approaches of Modeling the Probability of Defaults

Model name	Content	Application possibility
New complex models	- includes all sources of key risks; - take into account the forecasted potential of key risks; - risk indicators, they are identified in the implementation of their calibration using historical information throughout the period of time; - coefficients which are necessary for carrying out monitoring and an assessment of credit are applied risk.	In case there is sufficient historical information during the corresponding period of time.
Comparative analysis	- internal benchmarking to a similar portfolio is used; - the level of segmentation is reduced; - external ratings and external bench- marking are used.	In case there is insufficient historical data for a certain portfolio.
Modification of collective assessment models	- component loss methods (vintage analysis and Markov chains) are used; - loss factors are used.	Compliance of these models with the basic requirements of IFRS 9 must be justified.

- 12-month PDs – this is the estimated probability of default occurring during the 12-month period following the reporting date or during the remaining period of validity of financial instruments, if it is less than 12-month;

- lifetime PDs - this is the estimated probability of default during the remaining term of the financial instrument, which is used to calculate the expected credit losses for financial instruments classified in stages 2 and 3 as at the reporting date.

The main approaches of modeling the probability of defaults are reflected in Table **1**.

It should be noted that special attention in the use of impairment models of expected losses in banks is paid to the assessment of the risk of default (PD-Probability of default). According to IFRS 9, this assessment should be objective.

4. CALCULATION OF LOSSES IN CASE OF DEFAULT

The indicator Loss Given Default reflects the amount of losses incurred by the bank in case of default. This indicator is supposed to be a constant and the following basic methods are used for its calculation:

- modeling is used to calculate the LGD indicator expected cash flows;

- for calculating the LGD used statistical regression-based on historical LGD and its object characteristics;

- for estimating Implied LGD used market prices of non-default loans or bonds.

5. MODELING OF THE MEASURE OF CREDIT REQUIREMENTS, WHICH IS EXPOSED TO THE RISK OF DEFAULT AND THE CALCULATION OF EXPECTED CREDIT LOSSES

Exposure at default represents the total amount of debt that is exposed to the risk of an impairment event. This indicator can be calculated using the migration matrix method or the Roll Rate.

The expected credit losses indicator reflects the value of all amounts of cash shortage in case of default during the entire period of use of the financial instrument. The calculation of this indicator will depend on the choice of methods of calculation of indicators PD, LGD and EAD.

6. VALIDATION OF THE EXPECTED LOSS IMPAIRMENT MODEL AND OPTIMIZATION OF THE EXPECTED CREDIT LOSS CALCULATION

Under current conditions, the main activity of banks to implement IFRS 9 is completed. At the same time, banks should know exactly how well their model of impairment of expected losses works and how correctly it determines the expected credit losses.

Among the main tools that allow to optimize the volume of estimated reserves for expected credit losses can be identified validation. The use of this instrument is a mandatory condition that guarantees the bank maximum efficiency. Moreover, validation should be independent, which can be provided by the bank itself (internal validation) or by independent experts (external validation) (see Table **2**).

For internal validation of the expected loss impairment model, we can propose a generalizing algorithm for its implementation, which banks can use in their practice (see Figure **2**).

Table 2: Types of Validation of the Expected Loss Impairment Model

Types of validation	Subjects of validation	Advantage
Internal validation	- validation department created in the bank; - monitoring and validation group IFRS 9, which is not linked to other units and reports directly to the head of the bank or his deputy.	- complexity, which involves the analysis of the methodology underlying the model, quality assessment and testing of the model, as well as evaluation of the results obtained by validation; - timeliness of macroeconomic forecasts and information.
External validation	- consulting company; - independent auditor; - other independent experts.	- high speed in obtaining the desired result; - use of the entire spectrum of accumulated external expertise; - receiving targeted recommendations not only from the position of all the control procedures, but also taking into account the optimization of the approach used.
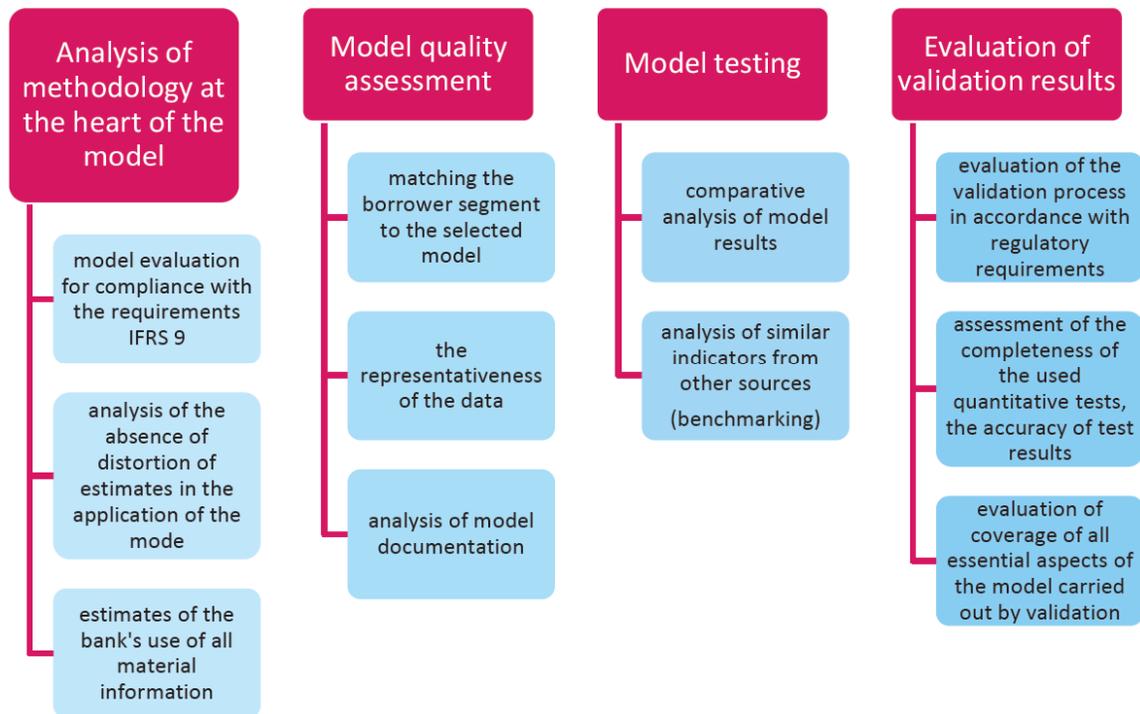
Figure 2: Algorithm of key stages of internal validation of the expected loss impairment model.

Despite the type of validation used in the bank, the main results of its implementation should be:

- compliance of the bank's impairment model of expected losses with the impairment model of expected losses with all IFRS 9 requirements established in this area;

- qualitative and quantitative assessment of the composition, characteristics and quality of the model used for its predictive ability;

- if necessary, recommendations for adjusting the model used in the bank, as well as detailed conclusions about the correctness of its initial construction, which arise when using it.

7. OPTIMIZATION OF THE USE OF THE EXPECTED LOSS IMPAIRMENT MODEL AND CALCULATION OF EXPECTED CREDIT LOSSES

After validation of the impairment models of expected losses and optimization of the calculation of expected credit losses, banks need to optimize it. At the same time, it is necessary to use the best international practices, advanced expert statistical tools and developed methodology. However, this optimization should meet the requirements of the regulator of the banking system of the respective country. The result of successful optimization of the models will be demonstrated in reducing the expected

credit losses, reducing the volume of formed estimated reserves, which will increase the efficiency of the bank as a whole. Also, optimization of expected loss impairment models and optimization of expected credit loss calculation will help to improve its quality and turn it into a transparent, flexible and most effective tool for credit risk assessment and business development.

CONCLUSION

In the global financial market, the banking community pays special attention to the quality of assessment and monitoring of bank risks. Since 1 January 2018 in the activities of banks that use in practice the standard IFRS 9 "Financial instruments" in the area of evaluation and calculation of the impairment expected credit losses, have been significant transformation processes. The main concern is the problem of practical assessment and calculation of impairment of expected credit losses.

The effectiveness of the bank's credit assessment and monitoring will depend to a large extent on the quality of the impairment model used, on the methods of calculation of PD, LGD and EAD, as well as on timely and adequate forecast macroeconomic information in assessing the expected credit losses of customers. The chosen modification of the model in the bank will depend on the specifics of the bank's credit activities and portfolio, the types of its financial

instruments, the sources of available information, as well as the it systems used.

When using expected loss impairment models, each bank must validate and optimize the calculation of expected credit losses.

We also discuss that the bank must use a specific algorithm of key validation steps to achieve maximum effect which can be very important in the assessment. All above creates a new base for forecast assessment of expected credit losses in monitoring and assessment of credit risk in commercial banks methodologies.

This is the first paper in series of papers devoted to predictive assessment of expected credit losses when monitoring and evaluating credit risk in commercial banks. In next ones we'll consider the application of the modern estimates of expected credit losses.

REFERENCES

Bernanke B.S. Nonmonetary Efects of the Financial Crisis in the Propagation of the Great Depression. American Economic Review. – 1983. – Vol. 73(3). – Pages 257–276.

Caroline Roulet Basel III: Effects of capital and liquidity regulations on European bank lending, Journal of Economics and Business, Volume 95, January–February 2018, Pages 26-46
https://doi.org/10.1016/j.jeconbus.2017.10.001

Chunping Liu, Patrick Minford How important is the credit channel? Journal of Banking & Finance, Volume 41, April 2014, Pages 119-134
https://doi.org/10.1016/j.jbankfin.2013.12.017

Cipullo Nadia, Vinciguerra Rosa The Impact of IFRS 9 and IFRS 7 on Liquidity in Banks: Theoretical Aspects, Procedia - Social and Behavioral Sciences, Volume 164, 31 December 2014, Pages 91-97.
https://doi.org/10.1016/j.sbspro.2014.11.055

Cuiqing Jiang, Zhao Wang, Huimin Zhao, A prediction-driven mixture cure model and its application in credit scoring, European Journal of Operational Research, Volume 277, Issue 1, 16 August 2019, Pages 20-31.
https://doi.org/10.1016/j.ejor.2019.01.072

Dell'Ariccia G. Asymmetric Information and the Structure of the Banking Industry. European Economic Review. – 2001. – Vol. 45(10). – Pages 1957–1980.

Demirgüç-Kunt A., Feyen E., Levine R. The Evolving Importance of Banks and Securities Markets. World Bank Economic Review. – 2013. – Vol. 27(3). – Pages 476–490.

Demyanyk, Y. and Hasan, I. (2010). Financial crises and bank failures: a review of prediction methods. Omega, 38(5), Pages 315–324.

Domac I., Martinez-Peria M.S. Banking Crises and Exchange Rate Regimes: is Tere a Link? Journal of International Economics. – 2003. – Vol. 61. – Pages 41–72.

Fan Liu, Zhongsheng Hua, Andrew Lim, Identifying future defaulters: A hierarchical Bayesian method, European Journal of Operational Research, Volume 241, Issue 1, 2015, Pages 202-211.
https://doi.org/10.1016/j.ejor.2014.08.008

Kaminsky G., Reinhart C., The Twin Crises: The Causes of Banking and Balance-of-Payments Problems. American Economic Review. – 1999. – Vol. 89(3). – Pages 473–500.

Kjartan Kloster Osmundsen, Using expected shortfall for credit risk regulation, Journal of International Financial Markets, Institutions and Money, Volume 57, November 2018, Pages 80-93.
https://doi.org/10.1016/j.intfin.2018.07.001

Landini S., Uberti M., Casellina S., Credit risk migration rates modelling as open systems II: A simulation model and IFRS9-baseline principles, Structural Change and Economic Dynamics, Volume 50, September 2019, Pages 175-189.
https://doi.org/10.1016/j.strueco.2019.06.013

Mayes, D. and Stremmel, H. (2014). The effectiveness of capital adequacy measures in predicting bank distress. SUERF Studies, 1. Vienna, Pages 1-54.

Nandana P. W. Pathiranage, Christine A. Jubb, Does IFRS make analysts more efficient in using fundamental information included in financial statements? Journal of Contemporary Accounting & Economics, Volume 53, Issue 2, Pages 77-101.
https://doi.org/10.1016/j.jcae.2018.10.004

Rajan R.G. Has Financial Development Made the World Riskier? Proceedings - Economic Policy Symposium. – Jackson Hole Issue. – 2005. Pages 313-369.

Schularick M., Taylor A. Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870–2008. American Economic Review. – 2012. – Vol. 102. – Pages 1029–1061.

Schumpeter J.A. A Theory of Economic Development – Cambridge, MA: Harvard University Press. – 1911.

Sriya Anbil, Alessio Saretto, Heather Tookes How does hedge designation impact the market's perception of credit risk? Journal of Financial Stability, Volume 41, April 2019, Pages 25-42.
https://doi.org/10.1016/j.jfs.2019.01.001

Yuta Tanoue, Akihiro Kawada, Satoshi Yamashita, Forecasting loss given default of bank loans with multi-stage model, International Journal of Forecasting, Volume 33, Issue 2, April–June 2017, Pages 513-522.
https://doi.org/10.1016/j.ijforecast.2016.11.005

Ernst & Young Global Limited (EY), Research questions impairment according to IFRS (IFRS) 9, the characteristic for banking sector https://www.ey.com/Publication/vwLUAssets/ey-ifrs-9-impairment-banking-survey-2018-ru/$FILE/ey-ifrs-9-impairment-banking-survey-2018-ru.pdf