

Evaluation of Currency's Risk Control System Effectiveness

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Abstract

Relying on well-known domestic and foreign experience in the assessment of currency risk management, the article identifies approaches to the development and implementation of evaluation standards. Based on the author's definition of an effective system of risk management in credit institutions different levels of assessment, their common features and disadvantages, as well as general methodological approaches to the formation of the system are identified. These include the grading system for risk management by internal and external actors (Central Bank, auditing and rating organizations, internal control of the bank), its comparison with the optimal reference model and, finally, a change in the existing system to improve its effectiveness.

Keywords: bank, currency risk, control, risk management

1. Introduction

Evaluation of the effectiveness of the system of risk management can be defined in various ways. A significant role is played by different levels of assessment: evaluation of the effectiveness of the system of currency risk management can be carried out at the level of Central Bank of Russian Federation, at the level of auditing organizations, at the level of the rating agencies, Association of Russian Banks, correspondent banks, banking analysts and internal control of credit institutions. The difference in the results obtained will depend on the used methodologies and assessments techniques. (Bouteille & Coogan-Pushner, 2013; Lemieux, 2014). However, the general scheme for determining the effectiveness of the system of currency risk management from methodological point of view, in our opinion, looks the same (Table 1).

Table 1. Approaches to assessing effectiveness of bank's currency risk management system

The actual system of currency risk management in the Bank	The description of the state of the system and assessment of the actual system parameters	Certification of currency risk management system the by internal control service, or CB RF, or audit, etc.
Reference system for risk management	Characteristic of the system and its parameters	Comparison with reference values
Recommendations for improving the system of risk management		
The advanced control system of currency risk		

Signs of inefficiency of the bank risk management system include:

- failure of functions inherent to the system;
- failure of system elements;
- unreliable banking practice;
- lack of or breaking of the integrity of the system;
- deterioration of quantitative and qualitative indicators of currency risks;

- inability to execute a particular currency transactions;
- violation of prudential norms of activity, for example the limit on the open currency position;
- lack of monitoring system;
- inadequate monetary policy;
- wrong choice of strategy for risk management;
- error leadership and abuse and other.

At present there are several approaches to the assessment of bank's risk management system, which also fits currency risk management.

2. Critical Comparison of Different Approaches to Currency Risk Evaluation

2.1 The Approach Developed by the Association of Russian Banks (ARB)

In the Development's Strategy of the Russian banking sector for the period until 2015, developing common standards of banking activity was noted of particular relevance: the important question is the adoption by the banking associations the corporate governance standards required for use by members of the Association.

An important feature of the developed standards of currency risk management by the author is the necessity of its compliance with the general quality standards of bank's risk management, developed by the Association of Russian banks (ARB).

The standard quality of bank risk management, proposed by ARB, contains a description of the institutional (conceptual) model of an activity of credit institutions and the combination of requirements for specific aspects of banking risk management in the implementation of certain activities. Also a standardizing activity of credit institutions is seen as a primary or auxiliary business process that includes the following components:

- marketing (product);
- technological;
- organizational;
- managerial;
- informational;
- software and hardware;
- personnel;
- property-technical;
- client (disclosure of information about the process and its results).

Requirements for activities being standardized are set according to the basic components of a business process. Analysis of the standards of the overall risk management system, developed by ARB, allowed the author to specify each component of the business process with respect to an independent system of currency risk management Table 2.

Table 2. Requirements for standard currency activity of credit organization

Business process component	Types of requirements for business processes
1. Marketing (product)	<p>The definition of products of foreign exchange activity of the credit organization. The definition of the product range: foreign currency loans (overdraft, investment, mortgage, interbank loans, Forfaiting, innovation); the futures and spot transactions denominated in foreign currency; international payments for export-import transactions; transactions of the customers; transfers to and from Russia; identification and analysis of qualitative characteristics of banking product; development of systems for the assessment of their quality;</p>

	<p>assessment of the Bank's strategy in the area of foreign exchange operations; the definition of currency risks, and their correlation with the relevant foreign exchange products; development of specialized products for the management of currency risks.</p>
2. Technological	<p>Description of system operation SWIFT and other similar systems of international payments; internal guidelines and methods for conducting a separate currency transactions; policy in respect of foreign currency risk in general, and according to type of the risk; rules of aggregate currency risk and its types management; methods of forecasting, analysis and evaluation of aggregate currency risk and of individual types of the risk; instructions for action in emergency situations; standards test test; standards FX operations</p>
3. Organizational	<p>Requirements for the organizational structure: rules of collegial organs and units, reflecting their rights and duties under the management system of foreign currency risk; rules on the organization of control over foreign exchange and risk management systems of currency risk; instructions for action in emergency situations; organisational procedures for the management of individual currency risk</p>
4. Managerial	<p>Rules on the organization of control over foreign exchange and risk management systems of currency risk; the control system efficiency; definition of control points and scenarios of decision making; management planning of currency business processes and recording of incidents; creation of special forms of management accounting and the use of forms for official reporting to management decisions to minimize currency risks</p>
5. Informational	<p>Elaboration of requirements to information flows and information systems that support the processes. Members of the Board of Directors on a regular basis must receive reports on the following topics:</p> <ul style="list-style-type: none"> • financial performance; • information about open currency position; • information about the management of liquidity risk; • for foreign currency operations; • information about the management of currency investment portfolio, financial derivatives and off-balance sheet foreign exchange activities; • information about audit of foreign exchange transactions and currency risks; • information about the management of foreign exchange assets; • information about administrative information systems; • banking on the Internet • details of the assessment CBR
6. Software & Hardware	<p>The functional requirements and information security software used to automate the foreign exchange operations, foreign exchange position and so on</p>
7. Personnel	<p>Development of requirements for the conduct, duties, education, staff development, training and motivation</p>
8. Property-technical	<p>Development of requirements for the equipment, which is used in currency transactions and minimize currency risk</p>

9. Client	At the client level activities of the bank's clients engaged in foreign operations are regulated: what documents are in any case shall be submitted by the customer, as issued, etc.
10. Client (disclosure of information about the process and its results)	On the level of information disclosure about the process and its results info about the currency risk management of the credit institution in accordance with the requirements of Russian accounting standards, and IFRS are disclosed.

For the use of materials of Table 1 in relation to the development of standardized system of risk management, we believe that one should work out each part of the business process.

Requirements to the definition of maturity level of standardized activities are specified in the basic components of a business process and are presented in the following Table 3.

Table 3. Determination of maturity levels of of business processes in a credit organization

Maturity Level	Characteristics of the processes on the levels of process maturity
Zero level (Level 1)	Awareness of the management upon the issues with the activities controlled is missing. The description of the processes is missing
Basic (Level 2)	Available is the documented evidence of awareness of management of organization problems of the activities reviewed. However, the processes used to control certain activities are not standardized, used sporadically and haphazardly. The general approach to the management of the activities reviewed is not developed
Repeated (Level 3)	The processes developed to the point where different people, the decisive ones, ensure their performance. However, there are no regular training and exercise according to standard procedures, and the responsibility of the contractor. Management relies heavily on the knowledge of the performers, which entails a high probability of possible errors
Standardized (Level 4)	Processes are standardized, documented and communicated to staff through training. However, the use of these processes is left to the discretion of the staff. This determines the probability of deviations from the standard procedures, which may not be detected. The applicable procedure is not optimal and not modern, but are a reflection of the practices used in the organization
Controlled (Level 5)	Monitoring and evaluation of compliance used in the organization's processes is provided. When detecting low effectiveness of the implemented management processes consider the activities provided by their optimization. The governance processes are under continuous improvement and are based on good practice. Automation management activities are partially limited.
Optimized (Level 6)	Management processes consider the activities developed to the level of best practice, based on results of continuous improvement and comparison of the level of maturity relative to other organizations. Organization capable of rapid adaptation processes with changes in the environment and business

Source: data of ARB.

For credit organization to correctly identify the level of development and efficiency of the system for risk management, we believe that the bank must make a judgment about the level of maturity of the business process. With this aim, additionally, in our view, banks should be enhanced in the range of issues, respond to, and assess the content of the response in scoring (Table 4).

Table 4. Proposed terms of questions to assess the level of maturity of the business process management of foreign exchange risk

Evaluation criteria for risk management	Question
Does the bank evaluate and analyze currency risk level using the appropriate methods, or use a model, which is the estimate of var (or risky income) to whether they use the results when making management decisions?	Whether the Bank Regularly analyzes its open currency position (or risky income) to determine the sensitivity to changes in exchange rates?
Does the Bank have a collection system for analysis of the necessary data to assess currency risk and does the Bank fully understand its characteristics?	Is there a subsidiary system (Department) in the Banks for a comprehensive analysis of changes in exchange rates? Does senior management use the results of this analysis when making decisions on open currency positions or risk cost? Does the Bank use integrated system of currency risk, in which all the data can be downloaded directly from accounting systems?
Does the Bank measure risk reduction in those cases where the risks are quantitatively exceed the capital and income of the Bank?	Does the Bank stress test and use it results in strategic decision-making in the field of risk taking and risk control? Is the Bank familiar with the methods of hedging and whether it uses them when necessary? How adequately and timely currency risk is hedged through transactions with derivative instruments or other market transactions in accordance with the operating policy ALCO? Does the Bank set limits and directives on open positions and the size of the currency risk given their general limits on the adoption of risk capital?

2.2 Evaluation of the System of Currency Risk Management in Banks in the U.S

Evaluation of this system is actively used since 1995 (SR 95-51 (SUP), 14 November 1995) when ranking the quality of risk management in banks and bank holding companies that are members of the Federal Reserve System. The processes for risk management in large banking organizations typically include detailed provisions that establish specific limits on major types of currency risks related to their activities in different countries of the world, as well as an adequate set of reports that provide an appropriate level of data about exposure to foreign currency risk relating to the duties, executable by individual managers and directors.

The evaluation include activities of the Council and of the Board of the credit organization, the adequacy of monetary policy, procedures and system of monetary limits, the correct functioning of management information systems, care monitoring, calculation of predicted and actual values of currency risk, upon which credit institutions are assigned a rating.

A rating of 1 (Good) indicates that management effectively identifies and controls all major types of risks resulting from the activities of the organization, including those that arise from new products and changes in market conditions. The Board of Directors and the management of the Bank are actively involved in risk management and ensure appropriate policies and limits, and the Board of Directors understands, analyzes and approves. Policies and limits are supported by procedures for risk monitoring, reporting and management information systems that provide management and Directors with the required information and analysis for timely and appropriate responses to changing conditions.

Procedures of internal control and audit have a comprehensive approach in sufficient volume and correspond to the size and activities of the organization. There were a few exceptions set out in the organization's policies and procedures, but none of them has no materiality. The Board of the Bank effectively and accurately monitors the status of the organization in accordance with the standards of safe and reliable operation, as well as its internal policies and practices in the field of control. Risk management is considered fully effective for identifying, monitoring and controlling risks for the organization.

A rating of 2 (Satisfactory) indicates that risk management in the organization is effective in many respects, but has minor gaps. It shows the ability to react and to cope successfully with existing and foreseeable risks that may arise when executing their business plan. Although risk management in an organization may have some disadvantages, these problems are recognized and solved.

In general, the Board of Directors control the risks, have policies, limits, risk management procedures to cope with them; reports and management information systems are considered to be satisfactory and effective to maintain safe and reliable operation of the organization. In general, risks are controlled in such a way that it does not require additional or more than ordinary attention of the supervisory authorities. (Joseph, 2013)

In the system of internal control, there could be some problems or disadvantages, but they are correctable in working order. The inspector may have some recommendations for improvement, but the deficiencies noted should not result in significant impacts to maintain safe and reliable operation of the organization.

A rating of 3 (Acceptable) means that the practice of risk management has some significant gaps and, therefore, is the reason for more than the usual attention from the Supervisory authority. One or more of the four elements of sound risk management is considered acceptable, but does not allow the organization to fully solve problems with significant risks in their activities. Some aspects of risk management practices need to be improved to ensure the ability of management and the Board of Directors to identify monitor and control adequately substantially all the risks that exist within the organization.

Among the shortcomings one can point out permanent exceptions to the established rules of control or inability to follow written policies and procedures that may have adverse consequences for the organization (Colquitt, 2007). In the internal control system some important aspects may be missing, in particular, as already mentioned, the permanent exceptions to the established rules of control or inability to follow written policies and procedures. Risks associated with internal control system, could lead to adverse consequences for the safe and reliable operation of the organization, if management has not implemented corrective actions.

A rating of 4 (Marginal) indicates that the practice of risk management in general does not contribute to the identification, monitoring and control of significant risks in many aspects. In general, this situation reflects the lack of adequate direction and oversight on the part of the Bank's management and Board of Directors. (Sinn, 2001)

One or more of the four elements of sound risk management is considered marginal and immediately requires the implementation of agreed corrective actions on the part of Directors and management of the Bank.

A number of significant risks that exist within the organization does not receive adequate attention, and deficiencies in risk management require a lot of attention from the Supervisory authority.

The organization may have serious shortcomings, such as inadequate separation of duties, which requires a significant improvement of the system of internal control or accounting procedures or the organization's ability to meet standards or requirements established by the Supervisory body. If these deficiencies are not properly addressed, these conditions can lead to unreliability of financial accounting or operating losses, which can seriously affect the safety and reliability of the organization. (Burakov, 2014c)

Rating 5 (Unsatisfactory) indicates that the Bank does not have a good practice on risk management to identify, monitor and control significant risks. One or more of the four elements of sound risk management is considered to be completely unusable, and the management and the Board of Directors has not demonstrated its ability to resolve existing problems. Internal control can be so weak that it can even seriously threaten the viability of the organization. There is a concern relatew to the accuracy of accounting records and reports to regulators, as well as on the potential losses that the organization may face, if corrective actions are not immediately implemented. Deficiencies in risk management procedures and the internal control system require immediate and careful attention of the Supervisory authority.

As shown by the analysis of evaluation systems for risk management in credit institutions of U.S.A. approach to standards by ARB is based on the same criteria and varies more in a process orientation and in a large number of assessment levels of maturity (effective functioning) of the risk management system. Further examination of assessment practices has allowed the author to conclude that the system of management of foreign exchange risk of

banks of different countries may differ significantly from each other in their degree of sophistication depending on the size and complexity of the banking organization, the characteristics of the banking system, as well as the level of risk. However, the evaluation criteria of the system of risk management used by different countries differ not so much in substance as in the degree of detail and range of the used indicators.

We believe that relying on approaches of ARB and the experience of the U.S. banking system, the Russian commercial banks can develop its own standard for the evaluation of the effectiveness of the system of currency risk management.

2.3 Evaluation of the Risk Management System of Credit Institutions by Central Bank of Russian Federation (CBR)

CBR recommends its employees in the Statement dated August 25, 2003 N 105-And “On the procedure for conducting inspections of credit institutions and their branches by authorised representatives of the Central Bank of the Russian Federation” to evaluate the risk management aspects of verification:

- Compliance with the internal documents of the credit organizations, defining the risk management function, including taking into account the recommendations of the Basel Committee “Improving corporate governance in credit institutions”;
- The adequacy of the system of information provision, as well as procedures for making management decisions;
- Policy on attraction and placement of funds, and the use of different mechanisms of protection against risk (including insurance, reserve, hedging limitation, the collateral);
- The availability and compliance of documents defining the procedures of quantitative risk assessment and the indicators, as well as methods of mathematical processing;
- The results of the ongoing credit institutions analytical work in relation to risks and produced by its results recommendations;
- Quality of corporate governance, organizational structure, and qualifications of employees of credit institutions.
- Validation and evaluation of the system of risk management in the credit institution is conducted on typical banking risks, identified in the Letter of CBR of 23 June 2004 N 70-T “On typical banking risks”.

The CBR shall oversee:

- Internal documents of the credit institution, containing the basic principles, rules and procedures used within the risk management system;
- The current risk management based on practical implementation and compliance with the standards established by the internal documents;
- The system of internal control.

The methodical recommendations of the inspection system of banking risk management in the credit institution (its branch) (notified by Letter of the Bank of Russia dated 23.03.2007 N 26-T) assume the use of scoring:

point 1—the management risk corresponds to the scale of operations of the audited activity of the credit institution; the governing bodies aware of the exposure of credit organizations at risk and take action on risk management systems; provide sufficient information to make informed management decisions; tendency toward deterioration of the quality of risk management not identified;

point 2—risk management corresponds to the scale of operations of the audited activity of the credit organization or has some minor flaws that in the near future cannot cause the occurrence of serious problems in a credit institution; the authorities are aware of the exposure of credit organizations at risk and take action on risk management; information systems mostly sufficient for making informed management decisions and (or) are in the process of improvement (setting specific targets and timing of the work); trends in the quality of risk management are not identified;

point 3—the management of risk has not matched the scale of operations of the audited activity of the credit organization; the deficiencies can lead to serious complications in the credit institution, unless immediate measures to improve the quality of risk management; however, the authorities aware of the need to remedy the situation and have already carried out the relevant work;

point 4—the management of risk has not matched the scale of operations of the audited activity of the credit organization; controls ignore existing hazard and do not take action to correct the situation.

All of the above applies to the overall assessment of the whole system of banking risk management. In the

evaluation system of currency risk management the Central Bank of the Russian Federation recommends checking the following issues (Table 5).

Table 5. Currency risk management aspects of control

No.	Question	Factors, included in the process of risk assessment; brief justification of motivated judgement	Weight	Score
1	Does credit organization have a unit (employee) responsible for the assessment of the level of accepted currency risk?			
2	Whether this division (clerk) is an independent structural unit of the credit institution carrying out transactions, bearing currency risk?			
3	Does the credit institution have internal documents on the management of foreign exchange risk?			
4	Are these documents authorized in accordance with the constituent documents of the management body of the credit organization?			
5	Are ways of hedging the currency risk and accounting principles described?			
6	Whether these internal documents defining the procedure of control by the head office for the sub-limits of open currency positions of the branches are authorized (in the absence of a credit institution branches question is not included)?			
7	Are limits on currency positions opened during the operating day identified?			
8	Are there limits on currency positions, which are allowed to open to employees dealing units depending on their position (dealer senior dealer, head of division)?			
9	Is the level of losses at which occurs the closing of foreign exchange position determined?			
10	Are there limits on the operations for employees of the credit organization on their qualifications and awareness of the management bodies of the credit institution in matters of currency risk?			
11	Are the limits established by the credit institution on currency positions opened during the operating day are fully closed?			
12	Whether workers of dealing units are deprived the opportunity to make deals with communication equipment outside the dealing room?			

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- 13 Whether currency positions opened by the credit institution during the operational day, are valid from the point of view of currency risk?
 - 14 Is there a monitoring of the value of the currency position on an ongoing basis by the Bank?
 - 15 Does the Bank comply with the limits set on the currency position?
 - 16 Does credit organization assess currency risk?
 - 17 Is the assessment of the exchange risk of a permanent nature?
 - 18 whether the credit institution's net position separately for each foreign currency and precious metal is calculated?
 - 19 Is definition of net position and open currency positions properly made by the credit institution, in accordance with the requirements of the Bank of Russia?
 - 20 How reasonable is a professional judgment of the credit organization concerning the likelihood of a presentation by the beneficiary of the requirements issued by the credit institution guarantees in foreign currency (in the absence issued guarantees question is not included) ?
 - 21 Does credit organization assess the situation on the currency market (market of precious metals) with providing recommendations to dealers?
 - 22 Has the credit organization a plan in case of sudden changes of the foreign exchange market?
 - 23 Does credit organization management have a report on the value of the currency risk?
 - 24 whether these financial statements are provided to the management bodies of the credit institution on a permanent basis?
 - 25 Are internal documents on the management of currency risk fulfilled?
 - 26 Does the credit institution have internal documents on assessment of the exchange risk?
 - 27 Whether these documents are authorized in accordance with the constituent documents of the management body of the credit organization?
 - 28 Is assessing foreign exchange risk in accordance with the approved internal documents?
 - 29 Is there any internal documents of the procedure for
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self-assessment of currency risk management?

30 Is there in a credit institution self-esteem currency risk management?

After scoring, an assessment is made of the management of currency risks in the credit institution according to the formula:

$$PUR = \text{SUMM} (I_n, \text{MON}, J)$$

where:

UR—rate estimates of risk management in the i-th;

I—the activity of the credit organization;

n is the number of Bank risks inherent in the i-th direction i activity of the credit organization;

MON—rate of the j-th Bank risk on the i-th;

J-direction of activity of the credit organization.

And finally, an overall assessment of currency risk management in the credit institution according to the scale (Table 6):

Table 6. Rating scale management of individual Bank risk and Bank risk management on specific areas of activity of the credit organization

Good	Satisfactory	Ambiguous	Unsatisfactory
≤ 1.3	$> 1.3 \text{ и } \leq 2.3$	$> 2.3 \text{ и } \leq 3.3$	> 3.3

In the analysis and comparison of the considered approaches (ARB, the U.S. and the Central Bank of the Russian Federation) to the development and use of standards for evaluating the effectiveness of risk management in banks it can be argued that they all share common traits:

—The use of a scoring or rating;

—Assessment of control by the internal control service of the Bank and of the Board of Directors and management Board;

—Assessment of internal documents, the adequacy of monetary policies, procedures and limits, of the order of conducting and monitoring of open currency position;

—Determination of the correctness of the calculation of the value of currency risks, monitoring and of management information systems.

At the same time, there are also differences. The ARB standards in more detail cover all aspects of the risk management system as a whole. The lack of standards of U.S. banks, the CBR is that they are more focused on specific identification of deviations from established foreign exchange procedures, internal documents of the credit institutions and the supervision and regulation of their open currency positions. (Burakov, 2014a)

The lack of ARB standards for the purpose of our study is the general nature of the assessment system related to all risks in general, as a system. In contrast to the ARB evaluation standards, CBR standards are more complex and, in addition to the evaluation of the management of all banking risks, review and assess of each risk separately.

In general, the above evaluation standards of the Bank risk management system can be used for self-assessment by banks of the status and effectiveness of the system of risk management, which, however, in our opinion, must be supplemented with special internal standard.

3. Currency Risk Management Models' Overview

3.1 Internal Models for the Assessment of the Effectiveness of the System of Risk Management

The stability and solvency of the Bank depend primarily on how the management of the Bank corresponds to the real conditions of its business, and in case of change of these conditions can change so quickly and adequately. One must admit that the crisis or the failure of an individual Bank, in fact, the proof of the inadequacy of the risk management system the nature and extent of its activities. (Hull, 2012; Joseph, 2013)

The degree of risk be it realized in the form of a bankruptcy of a Bank, depending on the extent of its activity and development of relationships with other entities of the banking market or in the real economy, and determine the depth of shocks that can fall on the banking sector or the economy. However, the general approach to assessing the effectiveness of the system of currency risk management is not enough. (Sokolinskaya, 2014)

We need more detailed and specific self-esteem Bank's foreign exchange activities and the associated risks management system. In connection with the task is the search of different ways that complement the overall assessment system for risk management and to more accurately determine the quality and effectiveness of the system of currency risk management in credit institutions.

The technique involves the use of various models to assess the effectiveness of the system of currency risk management in credit institutions (Table 7).

Table 7. Types of evaluation models of currency risk management system

Types of model		
Statistic	Hybrid	Expert
Statistical models are based on the recognized relationship between the usual factors the of currency risk occurrence and assessments of its parameters. Such models require large amounts of and high quality statistics.	Hybrid models combine as statistical methods so as expert judgment.	Models of expert assessments are based on quantitative evaluations carried out by the experts. These models are used for currency portfolios, in which the factors of risk are not expressed in quantitative form or do not obtain original data (portfolios with low probability of default).

At the same time, all statistical, hybrid and expert assessment of effectiveness of the system of currency risk management are based on mathematical calculations. Therefore, we propose to assess the effectiveness of the system of currency risk management by the logical and/or expert mathematical models, as well as using the requirements of the Basel Committee. The proposed options can be an effective tool for comprehensive assessment of the existing system of the Bank, currency risk management. For the formation and improvement of any of these models, one should create a decision-making algorithm on the riskiness of foreign exchange transactions in their separate directions (Bernanke & Gertler, 1989; Bernanke et al., 1996; Van Deventer, et al., 2013).

To navigate to the tasks of determining the effectiveness of the system of currency risk management, one must complete the preparatory phase: perform a selection of types of currency transactions made by the Bank, as well as to carry out the structural analysis of business processes for these operations to identify the factors and risk indicators. (Burakov, 2014b)

- 1) The logical model. The logical model of the determination of the effectiveness of the system of currency risk management requires consistent solution of the five main tasks.
- 2) The selection of the list of take into account factors that affect the riskiness of each component currency transactions.
- 3) The definition of membership functions for each qualifying factor.
- 4) Building rules of logical operations that transforms the characteristics of the selected factors in characteristics of currency risks.
- 5) The construction algorithm of the calculation of the currency risk of each factor.

6) Calculation of aggregate indicators of currency risk on its values for the individual currency transactions in accordance with the adopted methodology.

To do this, one should select the main risk groups:

- external risk (it corresponds to the group of factors BP);
- the risk of accidental events (it corresponds to the group of factors SS);
- customer risk on foreign currency transactions (it corresponds to the group of factors RK);
- the risk limits of the open currency position (ROWP);
- risk organization monetary business process (it corresponds to the group of factors ROBP).

This covers all the risk factors affecting: incoming information outgoing information; currency risk management; the mechanism of realization of foreign exchange risks (Table 8).

Table 8. The logical model of determination of the effectiveness of currency risk management system

The effectiveness of the risk management system	
The group of factors	
External risk	Client's risk on foreign currency transactions
The risk of accidental events	Risk of breaking the limits of open currency position
	Risk of organizing the exchange of business process

The logical model of a system effectiveness of risk management converts the linguistic characteristics of the input factors to the output value of the performance indicator system of currency risk management. Using a logic model one can determine the influence of various factors (respectively external risk, the risk of accidental events, risk, client risk, the AFP and the organization's risk foreign exchange business process) on aggregate foreign currency exposure of the individual foreign exchange transactions in dynamics, as well as to build a forecast model for the next reporting period (Baesens & van Gestel, 2009).

All input values and a common currency risk is proposed to evaluate with a different degree of uncertainty. For example, for factors with a high degree of uncertainty, one can use only three parameters: the risk is low, medium or high.

For the calculation of the currency risk, the logical model can be applied the following algorithm. Evaluation of selected factors in selected linguistic terms based on the selected features. The calculation of indicators of the impact of various factors on total foreign currency risk on a 10-point scale. Obtaining results in accordance with the scale of currency risks (low, medium, high). Aggregation results in accordance with the rules of logical operations. The reflection of the results of aggregation in the selected format system assessment of currency risk management (numerical or percentage). Calculation of aggregate indicators of currency risk on the values of i for all $i = 1, 2, \dots, k$ is made in accordance with the formula:

$$BP = w_1 \times BP_1 + w_2 \times BP_2 + \dots + w_k \times BP_k$$

where:

w_i —weight of the i -th currency risk on the scale of assessments;

BP_i is an indicator of currency risk the i -th factors affecting incoming information, then on output information; to manage currency risks; on the organization of foreign exchange business process.

Calculated aggregate index will characterize the effectiveness of the system of currency risk management in credit institutions.

3.2 Expert Model for Evaluating the Effectiveness of the System of Risk Management and Forecast

Step 1

Select the number of experts $N > q(\alpha) \times (D/F)$ (7).

N is the number of experts; $q(\alpha)$ - quantile of the normal distribution; for error: $\alpha = 5\%$ - $q(\alpha) = 1,96$;

D is the variance of the estimates;

F—admissible deviation of the obtained evaluation values (values from when $N \rightarrow \infty$). For $D / F = 1 / N > 1 / 3.84 \sim 4$ people.

Step 2

The score of currency risk by risk factors (Table 9).

Table 9. Matrix of expert assessments

Score	Exogenous Risk	Risk CC	Client Risk	ROVP	ROBP	Summ
Expert 1	3	5	4	12		
Expert 2	2	4	4	10		
Expert 3	3	4	5	12		
Expert 4	2	5	4	11		
Score/Summ						
Expert 1	0.25	0.42	0.33	1.0		
Expert 2	0.20	0.40	0.40	1.0		
Expert 3	0.25	0.33	0.42	1.0		
Expert 4	0.18	0.45	0.36	1.0		
Summ	0.88	1.60	1.51	4.0		
Wi = Summ / N	0.22	0.40	0.38	1.0		

Step 3. The calculation of expected losses

Financial losses are estimated on the basis of cost-benefit analysis of risk factors and calculated aggregate credit risk. The present value of the expected loss EL is calculated by the formula:

$$EL = \sum (w \times BP \times C)$$

where:

w is the weight of j-th currency risk;

BP is an indicator of the currency risk of the j-th risk factor;

C—costs (direct and indirect costs foreign exchange transaction) and j-percentage, or Commission, profit on foreign exchange transactions.

Step 4. Forecast of the required amount of capital for foreign exchange risk

Reserve capital (RCVR) under the exchange risks within the Bank is calculated by the formula: $RCVR = \sum DIF$.

where:

the summation over the index i is for all currency transactions of the Bank. Estimated base capital reserves can serve as equity against currency risk, which is determined by the formula:

$$DIF = \gamma \times EL$$

where EL_i - expected loss for the analyzed currency risk factors i, γ —coefficient of unexpected losses; $EL_i = VR \times C_i$.

Model calculation and forecast of currency risk, proposed by the Basel Committee can be used in part of a universal normative method - on the basis of its own estimates by the Bank of fluctuations in the currency market.

Alternatively, you can apply the model Value at Risk (VaR).

The calculation of the claim amount when using a generic method is based on the following formula

$$E^* = \max \{O, [E \times (1 + He) - C \times (1 - Hc - Hfx)]\}$$

where:

E^* is the sum of the requirements after the reduction of currency risk;

E —the current amount of the claim;

He —correction requirements (haircut);

C —the current value of the guarantee (the guarantee currency transactions);

Hc —correction guarantee;

Hfx —amendment guarantees to exchange the difference between the cost of the guarantee and the requirement on the basis of market value fluctuations and exchange rate fluctuations.

When using the Bank's internal ratings to calculate the level of currency risk are calculated we asses: the probability of default for individual foreign exchange transactions or their peer group (PD), loss in case of default (LGD), the risk at default (EAD) (the expected value of the foreign currency requirements at the time of bankruptcy) and the deadline currency liabilities (M). The probability of default (PD) and loss in case of default (LGD) are numeric values, the risk at default (EAD) is defined in monetary terms.

Only by applying and comparing with each other all the variants of the proposed methods, it is possible with some degree of accuracy to analyze the efficiency of the current Bank model of currency risk management, as well as to carry out forecasting of currency risks at various stages of the currency of the business process: at the stage of decision-making on foreign currency transaction, at the stage of its implementation phase and monitoring phase hedge or minimize currency risks.

3.3 A Predictive Model of Currency Risks

High relevance for assessing the effectiveness of the system of currency risk management in the Bank determine the economic-mathematical model of forecasting risks. There is currently a wide range of economic-mathematical models predict risks.

We present a brief description of the advantages and disadvantages of each of them.

Table 10. A comparative analysis of applied methods in risk forecasting

Method of Forecasting	Advantages	Disadvantages
“Quality of Origin”	modeling external risks environment, environmental change environment for identical currency transactions can distribute them in various rating group	not all external factors predictable, requires operational changes the model requires many historical data
“Life Cycles”	modeling terms currency operations is important especially in urgent currency transactions, forms curves understandable and dependent from the period of currency transactions	does not take into account other factors risk, in addition to the terms requires many historical data
“Season”	periodicity and regularity seasonality allows to anticipate and prepare to change	insufficient number of risk factors

“Mean”	definition of quality currency portfolio the basis of the average values the previous settlement periods, ease of calculation, does not require many historical data	inaccuracy does not give picture what is happening, does not include scripts and external factors
“Levels of Transition”	the reflection problem foreign currency transactions in simple calculations and management, reflects the internal the structure of the portfolio	inelastic to rapidly changing external the factors that best the results shown in fact, not a prediction, not shows the dynamics of
“Matrices of Migration”	the probability of a transition the segment of the foreign exchange portfolio from one stage to another, gives a complete picture of drivers inside currency portfolio	the need for additional models as we do not use such important factors, as life cycles, seasonality etc. are not used the data behind within the period of analysis
“Risk Curves in Generation”	used in models life cycles, clear and with a relatively simple the point of view of the calculation method, the possibility of using additional characteristics, such as the probability of closing, early redemption foreign currency transactions	external factors can to demonstrate the various the effect on different generations

The advantages of the model “origin” refers to the modeling of the external risks and the distribution of individual foreign exchange transactions in different rating groups based on changes in the external environment. The disadvantages of the model are: the requirement of a large number of statistical data and operational changes in the model due to the emergence of new risk factors or new types of currency transactions.

The model of “Life cycles” provides for the modeling period term currency transactions (depending on the type of transaction, the anticipated timing and predictable deviations from these terms).

Model “Seasonality” allows to predict the regularity of changes in foreign exchange operations by types and volumes depending on the seasonality factors. However, both of the latter models do not consider internal risk factors and also require a large number of statistics.

The model of “Moving averages” is characterized by determining the quality of currency portfolio based on the average values of financial losses of the Bank prior billing periods, the simplicity of the calculations, does not require a multitude of historical data. Its disadvantages include the inaccuracy, lack of scripts and external risk factors.

Model “transition” is based on the comparison, calculating the share of foreign currency transactions, which are expected to change in risk, due to the partial increase of the term.

This model is simple in calculation and management, reflects the internal structure of the foreign exchange portfolio, but is not resilient to rapidly changing external risk factors; the best results are shown on fact and not on prediction; does not reflect the dynamics of changes in risk.

Model migration Matrices reflects the probability of transition of a segment of the foreign exchange portfolio from one stage of the risk to another and gives a complete picture of the hidden potential factors that can change the structure and quality of the currency portfolio. However, it does not take into account other factors currency risk.

The model Curves risk generation”—private model of “Life cycles”, clear and relatively simple from the point of view of the calculation method. It includes the ability to use additional characteristics and risk factors, but does not take into account changes in the external risk factors and characteristics of individual generations of currency transactions.

From the descriptions of the models, it follows that a reasonable choice of model depends on the Bank’s objectives and requirements forecast accuracy, type of currency transactions and risk. Total use, in our opinion, will allow to estimate the probability of currency losses from different angles and with a variety of currency risk factors. The

combination of these methods involves determining the total currency risk method of adding the resulting sum calculations, weighted according to the weight of importance of factors inherent in each model.

In our opinion, credit institutions should be used all the available models to mitigate the disadvantages of each of them and determine the average level of effectiveness of the system of risk management and forecasting aggregate default on foreign currency portfolio.

4. Conclusion

Thus, minimizing currency risks is closely linked with the correct assessment from the bank's implementation of appropriate effective system of risk management and their complex nature, value and optimal function.

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