УДК 004.942

ANALYSIS OF MODELS FOR FORECASTING THE PROFITABILITY OF BANKING PRODUCTS

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Keywords: scoring approach, logistic regression model, GINI index, geteroscedastic model, volatility, model building.

The main goal of this work is the analysis and research of models for forecasting the profitability of banking products.

The banking risk management strategy occupies an important place in ensuring the successful functioning of banking institutions. Scoring models are a risk management tool. These are mathematical or statistical models that allow you to determine the probability of whether the borrower will return the loan to the bank based on the analysis of the cooperation of a particular borrower with the bank. When forecasting based on scoring models, a statistical approach is used - logistic regression. The advantage of this approach compared to other models is the ease of interpretation and stability, i.e., the model retains its relevance over a long period of time and does not need to be updated.

The main stages of building a scoring model are the formation of a sample and the segmentation of characteristics to prevent losses in order to ensure the control of the profitability of the banking product.

To form a sample, all loans issued up to a certain date are fixed, so that for each loan there is information about its return. The loan repayment period is 6 to 12 months. The variables good and bad take the value 1 and 0 mean the return (non-return) of the loan. The predicative power indicator is calculated, which makes it possible to assess the possibility of including the characteristic in the model.

$$PS = \sum_{j=1}^{n} (\%good_j - \%bad_j) \circ ln(\frac{\%good_j}{\%bad_j})$$

The next stage is segmentation of the model - this is the calculation for each attribute of the weighting indicator W according to the formula

$$W_j = ln(\frac{\%good_j}{\%bad_j})$$

As a result of segmentation, characteristics are selected for building the model.

As a result of the research, a mathematical model with a GINI index of 25% was built, which indicates the stability of the selected parameters.

Another approach to predicting banking risks is the use of high-order autoregressive and heteroskedastic models.The dynamics of these processes, which can be presented in the form of time series, has a variable character, that is, its values constantly increase or decrease over time.

Volatility is the degree of variability of the time parameter. The degree of volatility is the variance or root mean square deviation. If the variance of the

process changes (decreases or increases) over time, such a process is called heteroscedastic, if the variance does not change, such a process is called homoscedastic.

To build a model of this process, we will apply the modified Jenins-Box technique of autocorrelation analysis (ACF) and partial autocorrelation function (PAF) to determine the delays that can be included in the model. First, it is necessary to smooth the series by building a low-order autoregressive model, and on the basis of the residuals of the built model, construct ACF and CHAF. Based on the analysis of the ACF and CHACF values, build a model of the heteroskedastic process of ARUG.

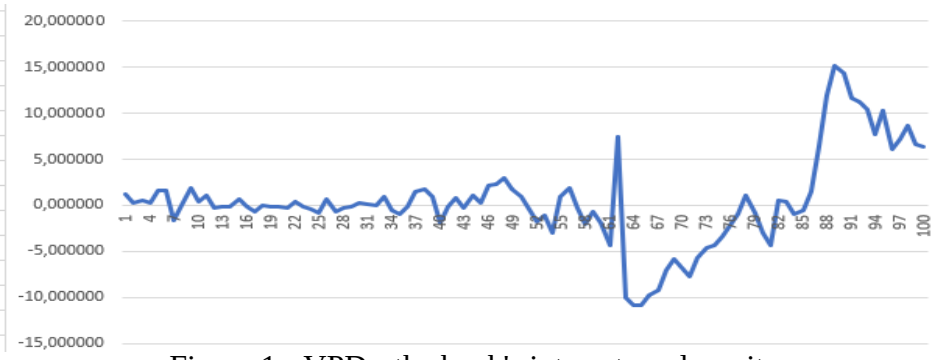

Figure 1 - VPD - the bank's interest on deposits

With the use of the Ewievs package, estimates of the parameters of the model were found, which adequately describes the dynamics of the VPD series - the bank's interest on deposits.

This is a generalized autoregressive conditionally heteroscedastic model of UARUG, in which the autoregression is of the 3rd order and the moving average is of the 2nd order.

$$z(t) = 1.960486 + 2.078621 * z(t-1) - 0.1604740 * z(t-2) + 0.471638 * z(t-3) + 0.062267 * \varepsilon^2(k-1) + 0.046292 * \varepsilon^2(k-2)$$

The models that can be applied to predict financial risks are analyzed - adjustment and autoregression models.

An application scoring model was built, which, based on the specified parameters, allows segmentation of customers in such a way that the bank does not suffer losses from a lack of profit.A model of the dynamics of the dispersion of heteroscedastic processes was built.Computational experiments were performed that illustrate the effectiveness of the proposed methodology for modeling processes that are non-stationary with respect to dispersion.

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