Risk Prediction According to Basel III Based on Artificial Intelligence

AnaSavic[1], Nenad Kojic[1], Nikola Slavkovic[1]

[1]ICT College of Vocational Studies, ZdravkaCelara 16, 11000 Belgrade, Serbia
ana.savic@ict.edu.rs
nenad.kojic@ict.edu.rs

Abstract. Basel III is a comprehensive set of reform measures, developed by the Basel Committee on Banking Supervision, to strengthen the regulation, supervision and risk management of the banking sector. These measures aim to improve the banking sector's ability to absorb shocks arising from financial and economic stress, whatever the source and to improve risk management and governance. It was supposed to be introduced from 2013 until 2015, but the implementation was extended until 31 March 2018. Basel III was developed as a response to inefficiencies in financial sector and the late-2000s financial crisis.

The current financial crisis has underlined even more the importance of risk management in banks. At a time, Basel I and Basel II were imposed to financial institutions to meet capital requirement based on VaR estimates. VaR (*Value at Risk*) is defined as the predicted worst-case loss at a specific confidence level over a certain period of time. It is a number that indicates how much a financial institution or an investor can lose with a given probability over a given time horizon. It is crucial to provide accurate estimates. If the risk is not properly estimated, these can lead to a sub-optimal allocation. Unfortunately, this is exactly what happened. It turned out that VaR is inadequate when applied to banking risks. Until now, no single method developed for the risk management in banks provided satisfactory results.Even after the clear separation between the severity and frequency of banking risks, the VaR which is generated through these two processes does not provide optimal results.

In these circumstances, new alternative models are needed that can assess small and medium values, predict the probability of extreme events, reflect asymmetric behavior at the output and analyze nonlinearity of the input-output values. These obvious asymmetries and nonlinearities cannot be assumed easily.
As the only comprehensive and accurate solution for this problem we suggest using artificial neural network logic. Neural network methods, offer a powerful alternative to linear models for forecasting, classification, and risk assessment in finance and economics.
Neural networks can approximate a multifactorial function in such a way that creating the functional form and fitting the function are performed at the same time, unlike nonlinear regression in which a fit is forced to a prechosen func-

A. Madevska Bogdanova, D. Gjorgjevikj (Editors): ICT Innovations 2014, Web Proceedings, ISSN 1857-7288

tion. This capability gives neural networks a decided advantage over traditional statistical multivariate regression techniques.

A neural network is a highly complex nonlinear system. Relatively simple feed forward neural nets outperform the linear models in some cases, or do not do worse than the linear models.Generally, a network model is better in terms of overall explanatory power than a linear model, especially in economics. A lot of studies, in the last decade, revealed that artificial intelligent techniques are advantageous to statistical models for risk evaluation. Artificial neural networks are among the most effective learning methods currently known. Neural networks are an artificial intelligence method used for modeling complex target functions.

Basel II turned out to be ineffective. Therefore, as the regulatory framework now we meet Basel III. The problem is that neither Basel II nor Basel III clearly defined methods of measurement and assessment of banking risks. The focus is still on statistical models, which proved to be ineffective. Our paper proposes a methodology based on artificial neural network, which could improve the management of banking risks and banking risk prediction, under Basel III. Forecasting revenues and expenditures, with a high confidence level, using a large number of conditions on the input is a multi parameter problem. Bearing in mind that the complex business relationships cannot be quantified statistically, algorithm shown in this paper is based on back propagation neural network.

Keywords: Artificial neural network, Back propagation NN, Basel III, banking risk, risk prediction.