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SELECTION OF QUANTILE MODELS OF RISK MARKET MEASUREMENT IN A FINANCIAL INSTITUTION

ABSTRACT

Management of financial risk is one of the most developing areas of theory and practice of finance in recent decades. In the process of risk management, verification of applied models is necessary, both before implementation and when they are regularly used. It allows to identify models that need to be corrected or replaced. The models of market risk used to estimate the so-called *quantile risk measures* are particularly important. They are measures based on quantiles of risk variable distribution.

The goal of the thesis was to present methodology of selection of quantile model of market risk measurement with reference to the needs and requirements of financial institutions – proper quality of a forecast, appropriate level of model risk and time necessary to estimate parameters. A review of methods of verification of forecasting volatility and value at risk models was also presented. In addition, techniques of forecasting volatility and methods of estimation of value at risk were discussed.

In response to **research questions**, it was proposed to add criterion of estimation time and criterion of estimation of model parameters to classic criteria of assessment of statistical quality. It was also argued that model selected while application of additional criteria better suits actual needs of financial institution within particular segments of activity. In the empirical part, it was shown, which of the models are applied in various areas of activity of a financial institution.

The realization of main goal and indirect goals was divided into stages in subsequent chapters.

In the **first chapter**, definition of market risk and potential concepts of measuring it were accepted. Choosing from the measures of market risk, the author focused on quantile measures from a negative concept of risk. In addition, history of regulations in the area of management of financial risk and elements of modern theory of finance were presented.

Basic concepts underlying modelling of market risk were presented in the **second chapter**. A review of more advanced techniques of forecasting volatility.

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The concepts of value at risk in the context of management of market risk are presented in the **third chapter**. Synthetic comparison of the most popular estimation methods *VaR* and analysis of advantages and disadvantages of all of them was presented. A review of measures supplementing value at risk with particular reference to expected deficit is presented in the second part of this chapter.

Model risk and methodology of model selection were presented in the **fourth chapter**. The requirements concerning models applied in practice were discussed in the first part of this chapter. Then, a review of selected methods of assessment and selection of *VaR* forecasting models with particular reference to methods using conditional variance was presented. The author's methodology of verification of value at risk model was also described in this chapter, taking following three aspects into consideration: forecasting ability of a model, estimation risk of parameters and time necessary for making a forecast of value at risk. An example of application of the proposed approach was presented.

Conducted empirical research are presented in the **fifth chapter**.

The author's contribution is a proposition of methodology of selection of quantile model of market risk measurement, taking following three elements into consideration: the quality of *VaR* forecast, level of estimation risk of parameters and time necessary for making a forecast. **The author's contribution** is also a proposition of a measure of estimation risk of parameters of value at risk model – which was marked in the thesis with symbol δ .