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VAR ANALYSIS AND ITS RELIABILITY

© **Bobkova N. G., Yarosh A. Yu., 2015**
Irkutsk State University

The purpose of this article is to consider the role of VaR analysis in risk management, which is especially important in the ever changing environment. In the modern world, financial risk can be extremely difficult to identify and nearly impossible to eliminate. As a result, VaR analysis gets special value and allows researchers to measure the risk of loss on a specific portfolio of financial assets. In spite of the fact that VaR is a popular model used by the financial sector, it also has disadvantages that should be taken into account.

Ключевые слова: value-at-risk, VaR analysis, reliability of VaR analysis.

Recent events such as worldwide financial recession, the development of various financial innovations and technologies, and the growth of the world's financial markets have demonstrated that risk management practices are far from the ideal standard. The incredibly low interest rate and booming real-estate prices have created a false perception of a low risk economy and strong growth potential. However, in reality a low risk economy does not exist. The economy has and will always be unstable due to unforeseen risk that may pose a threat if they were to emerge. Therefore, this false view of a strong economy has resulted in risk measures be underestimated.

Risk measures and risk management are two methods that go hand in hand [1]. Risk measures and risk management are used in conjunction when it comes to evaluating, monitoring, and mitigating possible risks. Risk management and risk measures have become a vital role in business and forecasting activities. "However, the rapid changes in risk measurement and management has affected the financial institutions, industrial organization, investors, shareholders, regulators, government, and all economies and communities as a hole" [2]. With the advances in data gathering approaches, computer technology, and applied mathematical and statistically measures has contributed to the creation of complex financial structure and their inherited risks [3].

There has been a growing problem with comparing Value-at-Risk and Expected shortfall (ES) models since the model only require measuring a single realization of underlying data generation process. This now poses a question regarding the statistical differences in the performance of the different models. Is there a rule in place to differentiate the performance of each risk measure model? This paper will examine and compare various Value-at-Risk (VaR) models, which are used to measure market risks and other kinds of risks within the financial sector. The paper will conclude with the considerations of the need to pay close attention to other types of risks such as operational, business, and systemic risk in order to develop a more resilient and optimal risk management models.

Risk is something that every organization has and will encounter. Therefore, risk measures known as Value-at-Risk (VaR) emerged as the most popular measure used by financial institutions. Since its creation VaR as a risk measure has received a great deal of criticism. Some argue that the VaR models fail to account for the extent of losses that could be suffered beyond the specified threshold. Some believe VaR is incapable of determine the different between certain situations where the losses are slightly worse than threshold or if they are overwhelming worse. Risk management has experience a state of evolution which was first created by the VaR analysis. Management of risk and measurement of risk is essentially related. Effective "measurement of risk involves complicated mathematical analysis" [4]. The nature of loss, value and frequency of losses, and uncertainty involving the losses has made measurement of risk extremely complicated. However, if it was possible to measure risk with sufficient accuracy, than management of risk would not be so vulnerable. Since risk is not easily measured, several organizations have suffered significant losses.

An alternative risk measure is Expected Shortfall (ES). VaR presents the minimum loss one would expect at a determined confidence level, ES is the expected value of that loss, provided that the loss is equal to or greater than the VaR.

VaR measures may have certain flaws, but they have been enforced on financial institutions as a regulatory obligation under Basel I, II, and III rules / regulations. Regulators have encouraged the financial market sector to make major efforts to understand and control financial risk, by using VaR analysis [5].

Value-at-Risk (VaR) Measures

A variety of different methods have been created for VaR estimation and forecasting which is categorized id several ways:

1) Indirect and direct methods
2) Parametric, semi-parametric, and non-parametric approaches

"Indirect methods start by specifying, and estimating the conditional return distribution and then calculating implied VaR from the distributional properties. The indirect methods incorporate all parametric approaches" (such as GARCH, RiskMetrics, and Monte Carlo simulation) [6].

"The direct methods estimate VaR without assuming a specific distribution, and it includes methods such as semi-parametric dynamic quantile-based CAViaR models or non-parametric historical simulation method that is used by many financial institutions. Additionally, these methods capture skewness in the return distribution" [7].

VaR is a single number that summarizes potential risk coming from a broad spectrum of causes such as investment risks, operational risk, and credit risk. VaR can be defined as the maximum expected loss of a company's portfolio over a certain amount of time and at a specific confidence level. VaR has been widely used to measure the market risks. However, VaR poses some challenges. The most discussed and debated issues with VaR are its volatility clustering and non-normal behavior of the market returns. There is still a lingering debate on how to effectively measure volatility and how it should be measured. Volatility is measured by using continuous time models. With the increased availability of high frequency data, it become imperative to know the optimal frequency at which the data should be sampled to get the best volatility forecast [8]. Whereas sampling a small frequency of data may generate an increase amount of errors.

"Non-normality is also a problem area and must be fixed before using a dynamic VaR model" [9].

VAR Concept and Construction of VAR

VAR summarizes the expected maximum loss over a target horizon within a given confidence level. For the purpose of this concept sources of risk are considered both positive and negative deviations in returns due to movements in financial variable, even though investors are mainly concerned only with negative deviations.

VAR is used to set a guideline for the portfolio performance and is used as a benchmark for financial risk manager.

Construction of VAR includes 5 steps:

1. determine the mark-to-market value of current portfolio;
2. measure the variability of the risk;
3. set the time horizon;
4. set the confidence level;
5. report the worst loss.

Criticism of VaR methods

When it comes to evaluating VaR there are three issues. First, the backtesting tests which is the probability of rejecting a model that is invalid. Backtesting test is more common amongst small samples of data. It has been proven that these tests have a low power, as the backtesting procedure is too optimistic where it does not reject the validity of a model as often as it should.

Second, the backtesting method has to be model-free when used. And third, estimation risk must be taken into account. VaR series can be estimated using variety of models. Therefore, testing procedures can successfully answer the quest of VaR validity only by taking into account estimation error, as the risk of estimation error present in the estimate of parameters take over VaR forecasts. Conditional on allowing for these errors, we should observe no particular orientation of the diagnostic of the backtest in the sense of under-rejecting or over-rejecting too often [10]. ■

1.*Bhattacharyya, M.* (2008), Contemporary financial risk management: the role of value at risk (VAR) models, IIMB Management Review, pp. 292–296.

2.Ibid.

3.Ibid.

4.Ibid.

5.*Hermsen, O.* (2009), The impact of the choice of VaR models on the level of regulatory capital according to Basel II, Germany: Department of Economics, University of Bamberg, Feldkirchenstrasse.

6.*Yun Hsing Cheung, R. P.* (2012), Anybody can do value at risk: a teaching study using parametric computation and Monte Carlo simulation, Australasian Accounting Business and Finance Journal, pp. 101–118.

7.Ibid.

8.*Moraux, F.* (2010), How valuable is you VaR? Large sample confidence interval for normal VaR, Journal of Risk Management in Finanical Institutions, pp. 189–200.

9.Ibid.

10. *Elena-Ivona Dumitrescu, C. H.* (2012), Backtesting Value-at-Risk: From Dynamic Quantile to Dynamic Binary Tests, Association Francaise de Finance.

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VaR-анализ и его надежность

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В статье рассматривается роль VaR-анализа в управлении рисками, что особенно важно в постоянно меняющихся условиях. В современном мире финансовый риск чрезвычайно трудно выявить и почти невозможный устранить. В результате VaR-анализ приобретает особую ценность и позволяет исследователям измерять риск потери по определенном портфелю финансовых активов. Несмотря на то, что VaR — популярная модель, используемая финансовым сектором, у нее также есть недостатки, которые должны быть приняты во внимание.

Ключевые слова: стоимостная мера риска, VaR-анализ, надежность VaR-анализа.