

A New Perspective on Daily Value at Risk Estimates

Arthur L. Dryver

Graduate School of Business Administration, NIDA, Bangkok, Thailand

Tel: 66-86-999-8377 E-mail: dryver@gmail.com

Sarayut Nathaphan

Thammasat Business School, Thammasat University, Bangkok, Thailand

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Abstract

Daily value at risk (VaR) estimates are sometimes calculated as if the institution is only concerned about short-term performance or risk position. In reality though, a risk manager may not consider changing the investment allocation in the foreseeable future, and with a highly-leveraged position daily VaR could be very misleading in terms of true risk to the financial institution. This paper recommends looking at VaR, taking the possibility that a financial institution will use the same asset allocation over a longer period of time while borrowing at overnight rates. Finally, the paper introduces a more conservative estimate than the traditional VaR estimates.

Keywords: Bonferoni, Risk management, Value at risk

1. Introduction

Value at Risk (VaR) is used by risk managers to estimate the potential downside regarding a given time frame for a given confidence level (Jorion, 2007). There are many approaches to estimate VaR; e.g., using different probability distribution functions such as normal, pareto, Cauchy distributions, mixture distributions, etc. (e.g. Ruppert, 2004; Jorion, 2007; Haas, 2009; Dimitrakopoulos et al., 2010; Chin, 2008). These various ways to estimate VaR can yield widely different results (Beder, 1995; Pritsker, 1997, etc.). One of the shortcomings of the VaR measurement for accessing risk is that it does not yield insight into loss beyond the set VaR level α (Yamai and Yoshida, 2005). Thus the amount one could lose when the portfolio value goes below the threshold at the significant level is unknown. From this perspective, VaR is a conservative measurement of the true amount that could be lost. In addition, as Dankelsson (2002) noted, data collected during good times do not yield much insight into what will occur when times are bad. Some people go as far as to say that VaR should not be used, as it is too misleading (Szegö, 2005). Regardless, it is very important to understand VaR better, as an excerpt from The Financial Crisis Inquiry Commission (2011) illustrates its importance.

“For example, as of 2007, the five major investment banks - Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley - were operating with extraordinarily thin capital. By one measure, their leverage ratios were as high as 40 to 1, meaning for every \$40 in assets, there was only \$1 in capital to cover losses. Less than a 3% drop in asset values could wipe out a firm.”

Given the limitations of VaR and the amount of risk various financial institutions may take on it is important to have more risk management tools. This paper focuses on daily VaR and introduces a new perspective, leading to a supplemental estimate of the traditional daily VaR estimates to aid in risk management.

2. Value at Risk Technical Notation

The 24-hour, daily, VaR at α means that there is only an α probability of a loss of such a magnitude or worse within a 24-hour time frame (Chan and Wong, 2006). Let R_t be defined as the daily return for day t and

$$R_t = \frac{(P_t - P_{t-1})}{P_t}, \quad (1)$$