VALUE AT RISK AND EXPECTED SHORTFALL CALCULATION OF DIGITAL BANK STOCKS PORTFOLIO IN INDONESIA

UNDERGRADUATE THESIS

Submitted as one of the requirements to

obtain

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By

STEFFANY INDRA GUNAWAN

021202000036

FACULTY OF BUSINESS

ACTUARIAL SCIENCE STUDY PROGRAM

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JUNE 2023

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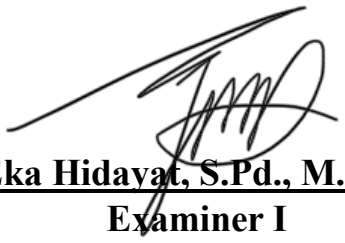

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Examiner I

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Fauziah Nur Fahirah Sudding, S.Pd., M.Si.
Thesis Advisor

Recommended by,

Maria Yus Trinity Irsan, S.Si., M.Si
Head, Actuarial Science Study Program

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CHAPTER I

INTRODUCTION

1.1.

Background of The Problem

Financial freedom has become a popular term lately.

The concept of financial freedom may be different for each individual.

Generally, financial freedom is defined as a position where money is not a reason for someone to work.

Financial freedom can also be interpreted as a condition in which a person has sufficient savings, investments and cash to live the desired lifestyle and has an allocation of retirement funds for the future.

In other words, financial freedom can only be achieved when someone has control over money, not vice versa.

Everyone wants to get financial freedom in their life.

This financial freedom can be achieved not only through work hard at a steady work, but it can be achieved through investment (Mathis, 2021).

Investment can be interpreted as an activity of investing or allocating money or valuable resources that are currently owned until specified time with aim to make profit.

Investments can be classified into several types, including property investment, gold, deposit, mutual funds, stocks, etc (Hayes, 2023).

Stocks are a type of investment that is popular and favoured by the public considering the price offered is quite affordable, easy to do, and flexible.

Along with the times, the world of capital markets has also switched to digital methods or it is often referred as scripless.

The fluctuation on price, issues, and information also can be monitored in real time using applications on mobile phones (Safitri, 2019).

Stocks have always been known as an aggressive investment.

However, it cannot be denied that stocks are one investment type that can provide greatest returns.

Investors can get maximum profit if they have good market analysis skills.

Many people will think that stock investment is like gambling.

But an investor would call it risky.

This concept is like the difference in people's perspective that getting into the sea is risky.

However, someone who has expertise in swim will know when and where to enjoy it.

In general, making profit from invested funds be the motive for someone to invest.

However, there is a fundamental thing that investors must know and remember that risk always follows return.

In the economic industry, almost all investments have risk or uncertainty in the future.

This kind of circumstances lead to inability to know the exact value of the result that will be obtained from the investment made.

In common, risk can be classified into two types, systematic risk or also called market risk and unsystematic risk or risk arising from company policy.

There is a unidirectional or linear relationship between return and risk, the greater the risk incurred, the greater expected return will be generated (Ashyana, 2020).

The Covid-19 pandemic that occurred in the past two years has changed many people's perspectives and lifestyles.

The health protocol and mobility restrictions implemented by the government certainly have a big impact on society.

During the pandemic, almost all activities can only be done online or virtually.

This is certainly be the main factor that driving digitization in all sectors, including banking industry (Sudarsono, 2021).

One of the forms of digitization is the popularity of digital banks among the public.

Way before the popularity of digital banking, the online banking model was first introduced and used by customers.

Online banking itself has the meaning of accessing banking features and services through the bank's website from a computer device.

After online banking, new innovations emerged in the world of banking that can be accessed via applications or better known as mobile banking.

Innovation continues and give birth to a new idea called a digital bank which is a combination of online banking and mobile banking system.

Digital bank has become one of the most popular and efficient ways to manage finances.

Digital banks are considered to provide flexibility for faster and easier transactions.

In accordance with its name digital banks do not use physical buildings to serve customers.

All forms of services provided use the internet network to support all the needs of its users.

Nowadays, digital banks are more emerging in Indonesia.

Some of them are the result of conventional banks transformation.

Digital banks are considered to be more oriented towards providing the best experience for their users when compared to conventional banks.

The main reason is that most conventional banks are monopolistic.

The presence of digital banks seems to erase this monopolistic character.

All agencies seem to be competing from scratch to design the most attractive and most perfect digital banking.

Therefore, it can gain more attention from customers.

Ever-increasing popularity of digital bank impact on their successes, hence there are several digital banks that already list their stock in Indonesia Stock Exchange (Zakawali, 2022).

Digital bank stock prices have experienced a significant decline during 20

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ABSTRACT

Nowadays, stocks investment has been increasingly growing in the society. In investing activities, there are risks that may be experienced by investors. However, sometimes many investors do not realize how much risk they might suffer in the future. One way that can be done to measure this risk is to calculate Value at Risk (VaR) and Expected Shortfall (ES). This thesis will discuss the calculation of VaR and ES values using two methods, including the Historical Simulation and Monte Carlo Simulation method for digital bank stock portfolio. Furthermore, the VaR value will be tested for accuracy using Kupiec Backtesting method with the loglikelihood ratio approach. From the results of VaR and ES calculations using Historical Simulation method sequentially obtained results of IDR 6,006,718 and 7,474,493 for 99% confidence level, IDR 4,135,857 and IDR 5,106,761 for 95% confidence level, and IDR 3,219,885 and IDR 4,388,922 for 90% confidence level. While the results of VaR and ES calculations using Monte Carlo Simulation sequentially obtained results of IDR 10,797,904 and 15,272,779 for a 99% confidence level, IDR 5,376,949 and IDR 9,159,777 for a 95% confidence level, and IDR 3,417,553 and IDR 6,868,538 for a 90% confidence level. Based on these results it is found that the results of VaR and ES are directly proportional to the confidence level used. In this case, the backtesting test results that Monte Carlo Simulation produces a more accurate VaR value compared to the Historical Simulation.

Keywords: *Digital Bank Portfolio, Value at Risk (VaR), Expected Shortfall (ES), Historical Simulation, Monte Carlo Simulation, Kupiec Backtesting*

ABSTRAK

Dewasa ini, kegiatan investasi saham semakin berkembang di kalangan masyarakat. Dalam kegiatan berinvestasi, terdapat risiko yang mungkin dialami oleh investor. Namun, terkadang banyak investor yang tidak menyadari seberapa besar risiko yang mungkin mereka derita di masa depan. Salah satu cara yang dapat dilakukan untuk mengukur risiko ini adalah dengan menghitung Value at Risk (VaR) dan Expected Shortfall (ES). Skripsi ini akan membahas perhitungan nilai VaR dan ES dengan menggunakan dua metode yaitu metode Simulasi Historis dan Simulasi Monte Carlo pada portfolio bank digital. Kemudian nilai VaR yang diperoleh akan diuji akurasinya menggunakan metode Kupiec Backtesting dengan pendekatan loglikelihood ratio. Dari hasil perhitungan VaR dan ES dengan menggunakan metode Simulasi Historis secara berurutan diperoleh hasil IDR 6,006,718 dan 7,474,493 untuk tinkat kepercayaan 99%, IDR 4,135,857 dan IDR 5,106,761 untuk tingkat kepercayaan 95%, dan IDR 3,219,885 dan IDR 4,388,922 untuk tingkat kepercayaan 90%. Sedangkan hasil perhitungan VaR dan ES dengan Simulasi Monte Carlo secara berurutan diperoleh hasil IDR 10,797,904 dan 15,272,779 untuk tingkat kepercayaan 99%, IDR 5,376,949 dan IDR 9,159,777 untuk tingkat kepercayaan 95%, dan IDR 3,417,553 dan IDR 6,868,538 untuk tingkat kepercayaan 90%. Berdasarkan hasil tersebut ditemukan bahwa hasil VaR dan ES berbanding lurus dengan tingkat kepercayaan yang digunakan. Dalam kasus ini, pengujian backtesting memberikan hasil bahwa metode Simulasi Monte Carlo menghasilkan nilai VaR yang lebih akurat dibandingkan dengan Simulasi Historis.

Kata Kunci: *Portofolio Bank Digital, Value at Risk (VaR), Expected Shortfall (ES), Simulasi Historis, Simulasi Monte Carlo, Kupiec Backtesting*

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