Risk Measurement for Trading Activities Based on Exponential Moving Average and Count Back Line Strategy

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ABSTRACT

Technical analyst traders are trader who make decisions to buy and sell stocks when there is a signal given from the market. These traders identify trends and makes predictions based on patterns in market data. However, after analyzing the losses occurred in the trading activity using Exponential Moving Average and Count Back Line strategy, the losses incurred are much higher than the Jakarta Composite Index's losses as the benchmark. Thus, using solely sell signal to sell an asset is not limiting the risk faced by technical analyst traders. Value at Risk (VaR) is a popular risk measurement tool that is extensively used to estimate and manage risk. It gives investors an indication of the level of risk they take with a certain investment. This paper intends to use Value at Risk as a tool for risk assessment for trading activities based on Exponential Moving Average and Count Back Line strategy. This paper also aims to inform the level of risk investors take with a certain investment by calculating the maximum potential loss that occur every day and assess whether trading activities were performed within or beyond Value at Risk calculated.

Keywords: Historical Simulation, Risk Assessment, Risk Management, Value at Risk.

1. INTRODUCTION

As the only ASEAN country listed in G20 countries at present moment, Indonesia has undergone a rapid economic growth for the past few years reaching 5.1% in 2017 according to The World Bank. Oxford Business Group pointed out that Indonesia is also one of the fastest-growing capital markets in the world. In the past decade, Jakarta Composite Index (JCI) has grown for more than 300% and is expected to keep growing in the future. This is one reason why Indonesian stock market is a very interesting place for worldwide investors. Technical analyst traders are trader who make decisions to buy and sell stocks when there is a signal given from the market. These traders identify trends and makes predictions based on patterns in market data. However, after analyzing the losses occurred in the trading activity using Exponential Moving Average and Count Back Line strategy, the losses incurred are much higher than the Jakarta Composite Index's losses as the benchmark. Thus, using solely sell signal to sell an asset is not limiting the risk faced by technical analyst traders.

The word risk management has experienced tremendous growth in the past two decades. Risk, in finance, is broadly defined in terms of volatility. Investors and traders face many

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risks which if not controlled may give rise to financial risk. Among all types of risks, market risks are one of the most discussed categories in financial risk. Market risks are mainly derived from the price movement in the financial markets. Hence, numerous studies have been conducted to clearly understand and manage market risk. The rising of the economic progression leads to uncertainties and risk demands a better and more liable risk management as the enlargement of financial risks. Risk management is an indispensable aspect of long-term success in the financial markets. One can be very a skilled trader or investor in seeking investment opportunities but without decent risk management, he or she can lose it all with one or two bad trades. Although it is believed that several macroeconomic indicators may likely indicate the level of risk, it is important to investigate other variables and indicators to analyze the risk factors and general risk management (Siahaan and Anantadjaya, 2013). Hence, many new methods for quantifying and managing risks have been developed, one of such measures is the Value at Risk (VaR).

1.1. Value at Risk

In his book, Best confirmed that VaR is generally calculated for a one-day time period, known as the holding period, and is often calculated with 95% confidence. It means that there is on average a 95% probability of the loss on the portfolio being lower than the VaR calculated. In general, there are two main approaches to VaR calculation: parametric and non-parametric method. The parametric method assumes the data follows a normal distribution. Meanwhile, the non-parametric method is based on the empirical distribution. This paper uses non-parametric method which is historical simulation. In his paper, Damodaran emphasizes that historical simulation uses the assumption of the future representation by recent history. This approach estimates VaR by creating a hypothetical time series of returns on the portfolio by running the portfolio through actual historical data and computes the changes that occurred in each period. One great advantage of historical VaR is that it does not hypothesize its parametric form of the return distribution. On the other hand, Alexander remarked that the sample size is the main limitations of the historical approach. Historical simulation becomes a challenge to implement when price histories for the assets are not available for an appropriate length of history.

Historical simulation forecasts future Value at Risk directly from the past empirical distribution. This approach primarily interprets the VAR from the histogram of returns. It estimates VaR for the following day (t + 1) as the $(1 - p)$ th quantile of the empirical return distribution. In his book, Best explains a few steps to estimate Value at Risk using historical simulation. The first step is to do an asset revaluation. This revaluation is done by obtaining price change in the percentage of every asset. Following revaluation, price changes are applied to the asset to generate a historical series of asset value changes. Afterward, the series of asset value changes are sorted into a percentile. Value at Risk of an asset is the value change corresponding to the required level of confidence.

There are three parameters in determining Value at Risk. First parameter is the holding period. The longer the holding period the larger the expected price change and the measured risk. Basel Committee of the Bank of International Settlement (BIS) pointed out for trading purposes, the one-day holding period is usually used to measure potential changes in position values. On the other hand, calculations for potential changes for capital purposes usually use longer horizons. The longer the holding period mainly

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depends on the liquidity of the market. Second parameter is the confidence level. According to Basel II Accord, the confidence intervals used by banks typically range from 90% to 99%. For trading purposes, the confidence level of 95% is often used to set the limit for traders. Meanwhile, for capital buffer purposes, a higher level of probability of 99% is generally used. The last parameter is the observation Period. Basel Committee explains that the sample size is not regulated by any VaR model. Basel Committee further emphasizes that sample size is more of subjective choice. If one wishes that the VaR models to be responsive to short-term market trends and volatilities may apply a relatively short horizon. Meanwhile, for medium-term risk evaluation, a longer period of a historical period can be used.

This paper intends to use Value at Risk as a tool for risk assessment for trading activities based on Exponential Moving Average and Count Back Line strategy. This paper also aims to inform the level of risk investors take with a certain investment by calculating the maximum potential loss that occur every day and assess whether trading activities were performed within or beyond Value at Risk calculated.

2. METHODOLOGY

2.1 Data

In this paper, data uses 41 transactions of 27 stocks traded during 1 October 2018 until 31 December consists of ADRO, ANTM, ASII, BBCA, BBNI, BBRI, BBTN, BMRI, BRPT, BSDE, GGRM, HMSP, ICBP, INDF, INTP, JSMR, KLBF, LPPF, PGAS, PTBA, PTPP, SMGR, TLKM, UNTR, UNVR, WSBP, and WSKT. This data is based on the trading activities using technical analysis using Exponential Moving Average (EMA) and Count Back Line (CBL) indicator. Trading activities were performed from 1 October 2018 to 31 December 2018 based on the daily price movement and only limited to stocks listed in IDX30 index.

2.2 Value at Risk Calculation

This paper uses historical simulation to calculate Value at Risk. The historical simulation uses the assumption that history repeats itself, future returns will occur in a similar way like the historical returns. This assumption is aligned with technical analysis presumption which both methods believe history will repeat itself. The holding period of one day (daily-VaR) with a confidence level of 95% will be used as well as the observation period of three months. It is expected that variations in stock price fluctuation for the past three months will illustrate the potential losses that must be faced by investors. Thus, this period is anticipated to be responsive in order to evaluate market risk in short-term trends and volatilities. The VaR will be calculated for one day at a 95% confidence level to cater for traders on the stock exchange where trading is done frequently.

2.3 Risk Assessment

Daily Value at Risk was compared to actual daily return (P/L) for the same day, to assess the risk borne by investor during the trading period. If the actual loss exceeds the predicted VaR (exceedance), it means that the trading was done beyond the risk calculated by Value at Risk.

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3. RESULTS

The maximum potential loss of 41 transactions performed using historical simulation at 95% confidence level the day it was bought and sold was presented in Table 1. Table 1 also presented whether trading was performed within or beyond Value at Risk.

Table 1: Value at Risk Calculation Result

Stocks	Value at Risk		Exceed/Not Exceed VaR (E/N)
	Bought	Sold	
ADRO	-4.13%	-4.13%	N
ANTM	-3.85%	-3.85%	N
ASII	-3.88%	-3.39%	N
	-3.39%	-3.29%	N
BBCA	-2.36%	-2.36%	N
	-2.36%	-1.78%	N
BBNI	-4.56%	-4.15%	N
	-4.56%	-3.18%	N
BBRI	-3.59%	-3.59%	E
	-3.69%	-3.59%	N
	-3.59%	-3.38%	N
	-3.31%	-3.28%	N
BBTN	-5.67%	-5.09%	N
	-5.67%	-5.09%	N
BMRI	-3.88%	-3.80%	N
	-3.74%	-3.52%	N
BRPT	-4.48%	-2.32%	N
	-2.32%	-2.32%	N
BSDE	-5.41%	-3.13%	N
GGRM	-2.63%	-2.63%	N
HMSP	-3.68%	-3.38%	N
	2.99%	-2.99%	N
ICBP	-2.02%	-2.02%	N
INDF	-3.17%	-3.12%	E
INTP	-5.06%	-4.85%	E
	-3.43%	-3.12%	E
JSMR	-2.84%	-2.48%	N
KLBF	-3.36%	-3.08%	E
LPPF	-7.06%	-5.14%	N
PGAS	-4.61%	-4.61%	N
	-4.35%	-4.35%	N
PTBA	-4.77%	-4.77%	N
PTPP	-3.55%	-4.64%	E
SMGR	-3.99%	-3.99%	E
	-3.99%	-3.71%	N
	-3.71%	-3.60%	N
TLKM	-3.40%	-3.66%	N
UNTR	-2.83%	-2.73%	N
UNVR	-4.15%	-3.43%	N

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Table 1: Value at Risk Calculation Result *(Cont.)*

WSBP	-3.28%	-3.06%	N
WSKT	-3.68%	-4.35%	E

4. DISCUSSION

Based on Table 4.1, among 41 transactions performed, there were eight trading activities when stocks were traded beyond its Value at Risk limit. The stocks were BBRI (first period), INDF, INTP (first and second period), KLBF, PTPP, SMGR (first period) and WSKT.

BBRI – BBRI was traded in four periods. The first period was 1 October 2018 – 11 October 2018. On the fourth day of the first period (4 October), the negative return has exceeded the VaR. However, it was not sold directly and kept until the ninth day (11 October) where the loss has reached -8.24%. In brief, BBRI was traded beyond the VaR limit.

Table 2: Trading Return and Value at Risk of BBRI

Date	Return	Value at Risk
5-Oct-18	-5.86%	-3.59%
8-Oct-18	-6.20%	-3.59%
9-Oct-18	-4.53%	-3.59%
10-Oct-18	-4.86%	-3.59%
11-Oct-18	-8.24%	-3.59%

INDF– INDF was bought on 18 October 2018 and sold on 28 December 2018. According to Table 3, there were 11 days when its return exceeds its Value at Risk. Although it generated 21.65% return when it was sold, INDF was still traded beyond the VaR limit.

Table 3: Trading Return and Value at Risk of INDF

Date	Return	Value at Risk
23-Oct-18	-3.39%	-3.17%
24-Oct-18	-5.13%	-3.17%
25-Oct-18	-3.39%	-3.17%
26-Oct-18	-5.13%	-3.17%
29-Oct-18	-6.01%	-3.17%
30-Oct-18	-5.13%	-3.17%
7-Nov-18	-4.69%	-3.17%
9-Nov-18	-3.82%	-3.17%
12-Nov-18	-7.35%	-3.40%
13-Nov-18	-6.90%	-3.43%
14-Nov-18	-6.01%	-3.43%

INTP– INTP was bought on two periods. According to Table 4, on the second day until the last day of the first period (1 October 2018 – 4 October 2018), return was negative and exceeded the Value at Risk. Meanwhile, on the second period (2 November 2018 – 20 November 2018), there was also one day (12 November) when return exceeded Value

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at Risk although when it was sold it generated positive return. In brief, INTP was traded beyond the Value at Risk for both periods.

Table 4: Trading Return and Value at Risk of INTP

Date	Return	Value at Risk
2-Oct-18	-5.07%	-4.85%
3-Oct-18	-6.27%	-4.85%
4-Oct-18	-11.99%	-4.85%
12-Nov-18	-4.42%	-3.40%

KLBF– KLBF was bought on 16 October 2018 and sold on 10 December 2018. According to Table 5, there were one day (24 October) when its return exceeds its Value at Risk. Thus, it can be said that the trading was done beyond the VaR limit although it generated positive return when it was sold.

Table 5: Trading Return and Value at Risk of KLBF

Date	Return	Value at Risk
24-Oct-18	-4.21%	-3.36%

PTPP– PTPP was bought on 8 November 2018 and sold on 26 December 2018. According to Table 6, there were three days (12– 14 November 2018) when its return exceeds its Value at Risk. Thus, it can be said that the trading was done beyond the VaR limit.

Table 6: Trading Return and Value at Risk of PTPP

Date	Return	Value at Risk
12-Nov-18	-5.98%	-3.55%
13-Nov-18	-7.71%	-4.64%
14-Nov-18	-10.54%	-4.64%

SMGR– SMGR was traded on three periods. According to Table 7, the first period was 8 – 29 October 2018. In this period, there were two days when its return exceeded the Value at Risk.

Table 7: Trading Return and Value at Risk of PTPP

Date	Return	Value at Risk
15-Oct-18	-4.16%	-3.99%
29-Oct-18	-6.74%	-3.99%

WSKT– WSKT was bought on 8 November 2018 and sold on 20 December 2018. According to Table 8, there were nine days when its return exceeds its Value at Risk. Thus, it can be said that the trading was done beyond the VaR limit although it generated positive return when WSKT was sold.

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Table 8: Trading Return and Value at Risk of WSKT

Date	Return	Value at Risk
9-Nov-18	-4.65%	-3.68%
12-Nov-18	-8.54%	-3.68%
13-Nov-18	-8.54%	-3.88%
14-Nov-18	-15.01%	-3.88%
15-Nov-18	-9.53%	-4.35%
16-Nov-18	-7.55%	-4.35%
28-Nov-18	-8.54%	-4.35%
29-Nov-18	-5.93%	-5.15%
30-Nov-18	-5.61%	-5.15%

Based on the trading activity assessment, if the actual loss exceeds the predicted VaR (exceedance) only occurs for one day, there are big chances that the return will rebound. This might be caused by some events, i.e. rumors or news, that induced the drop of the stock price. However, if the exceedance has occurred for more than one day, based on the trading assessment, it has a high probability that the exceedance will continue to take place. Thus, it is recommended to sell the asset when an actual loss exceeds the predicted VaR (exceedance) for more than one day to anticipate future losses and buy again that asset in a lower price or when the market gives another buy signal.

5. CONCLUSION

Based on Table 1, among 41 transactions performed, there were 8 trading activities when stocks were traded beyond its Value at Risk limit. The stocks were BBRI (first period), INDF, INTP (first and second period), KLBF, PTPP, SMGR (first period) and WSKT. Based on the risk assessment of the trading activities using Exponential Moving Average and Count Back Line strategy, it can be implied that Value at Risk can be used as risk management. In summary, there are a few steps to use Value at Risk as risk management for trading activities using Exponential Moving Average and Count Back Line strategy:

- Calculate daily Value at Risk (daily VaR) by using historical simulation with confidence level 95%.
- Observe daily returns and compare it with the calculated Value at Risk.
- If an actual loss exceeds the predicted VaR (exceedance) for more than one day, the probability of an exceedance event will continue to occur. Thus, that particular asset is suggested to be sold.

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