International Journal of Financial, Accounting, and Management (IJFAM)
ISSN: 2656-3355, Vol 5, No 3, 2023, 281-296 https://doi.org/10.35912/ijfam.v5i3.1322

Investment strategy on indonesia islamic stocks using Greenblatt Magic Formula

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Article History
Received on 28 November 2022
1st Revision on 16 December 2022
2nd Revision on 15 January 2023
3rd Revision on 16 January 2023
4th Revision on 17 January 2023
5th Revision on 17 January 2023
6th Revision on 3 April 2023
Accepted on 12 June 2023

Abstract
Purpose: This study analyzes the portfolio form based on the Magic Formula investment strategy introduced by Greenblatt (2006).
Research methodology: The portfolio formed is evaluated using the Sharpe, Treynor, and Jensen indices.
Results: The results show that the Magic Formula investment portfolio provides higher returns than the reference index from June 2018 to May 2021, specifically -1.45% compared to -3.26%. The performance evaluation value of the Magic Formula investment portfolio was better than that of the reference index.
Limitations: Although the Magic Formula portfolio performs well during the study period, investment portfolios can also be built and evaluated using other portfolio formulas.
Contribution: This evidence shows that the Greenblatt Magic Formula investment strategy performs well because it can provide a greater return with less risk.
Keywords: *Investment Strategy, Joel Greenblatt, Magic Formula, Portfolio, Sharia Stock*
How to Cite: Setiawan, A. H., Fitri, R., Muthohharoh, M., & Irfany, M. I. (2023). Investment strategy on indonesia islamic stocks using Greenblatt Magic Formula. *International Journal of Financial, Accounting, and Management*, 5(3), 281-296.

1. Introduction

Investment involves sacrificing presently owned resources such as time, money, or energy with the objective of attaining greater rewards in the future (Laopodis, 2020). This practical approach enables individuals to achieve higher returns, benefit from potential market price increases, and provide retirement security while offering growth potential (Tandelilin 2017). To better serve their customers, Islamic financial institutions should prioritize investment through corporate finance over consumer finance (Kooli, Shanikat, & Kanakriyah, 2022).

The increase in public interest in investment in the Indonesian capital market has been significant in recent years, and this is evident in the growth of the Single Investor Identification (SID) program. According to KSEI (2021), the number of capital market investors in Indonesia has increased significantly from 1.6 million SIDs in December 2018 to 7.4 million SIDs as of the end of December 2021, with 3.4 million being stock investors (ksei, 2021).

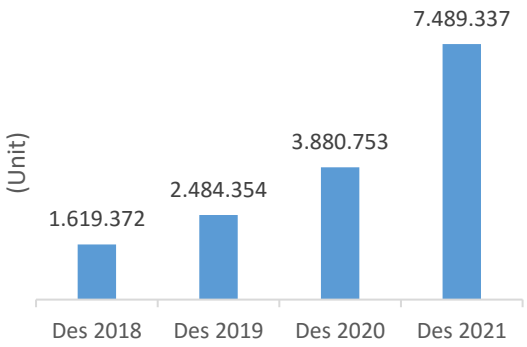

Figure 1: Number of Single Investor Identification (SID) 2017-2021
Source: Indonesian Central Securities Depository (2021)

Investors who prioritize the principles of Sharia stocks can feel at ease knowing that the constituents of the Sharia Securities List (DES) continue to grow annually, offering a broader selection of shares that meet Sharia principles. According to OJK, the number of Sharia-compliant stocks on DES has increased from 351 in June 2017 to 484 in December 2021, an increase of 133 issuers (OJK 2021a).

Investors need a fundamental understanding when making decisions, specifically in stock investments. This understanding involves more than just financing projects, and requires providing support, guidance, consultation, training, and developing investor competencies to make successful investments (Kooli et al., 2022). According to Hartono (2008), there is a direct correlation between returns and risks, and high returns are associated with greater risks (high risk, high return).

As the number of investors increases annually, it is essential to recognize that most investors often make irrational investment decisions based on cognitive and emotional factors, as noted by Fatima (2019). This has led to the development of a new paradigm in behavioral finance that highlights how such factors can hinder optimal investment decisions. Stocks offer high returns, but come with increased risk (Darmadji & Fakhruddin, 2012). irrational investment decisions can be risky.

According to Jogiyanto Hartono (2008), it is essential to diversify investments to reduce risks without sacrificing returns (Jogiyanto Hartono, 2008). Sudana (2013). recommended diversifying investment by selecting various stocks from different sectors, which is in line with the investment principle of "not putting all your eggs in one basket." This helps to allocate capital through investment diversification by forming a portfolio (Hartono, 2008). By diversifying investments, investors can spread risk across different assets and reduce the potential negative impact of market volatility on their overall portfolio.

Investors who are creating a portfolio need to consider the efficiency of the market, as it influences the available analysis and methods. According to Al Firdausi, Askandar, and Sudaryanti (2021), the market efficiency in JII is inappropriate. Therefore, past information, such as financial statements, is useful for forming a portfolio through fundamental analysis(Tandelilin, 2017). Financial statement analysis is also essential for decision-making beyond investments. This is in line with Olayinka (2022), who highlighted the importance of these statements in providing relevant financial information for decision-makers.

One popular approach to portfolio formation using fundamental analysis is the Magic Formula developed by Greenblatt, a well-known US investment manager, in 2006 (Greenblatt, 2006). This formula aims to identify companies that demonstrate strong performance at reasonable stock valuations. The Magic Formula uses two key ratios, Return on Capital (ROC) and Earnings Yield (EY), which are derived from financial statements to evaluate the investment potential of a company (Greenblatt, 2006).

The Magic Formula of portfolio formation has been tested in different countries with varying market trends. For example, Rani (2019) studied the formation of Magic Formula portfolios during bullish trends on the Indian Stock Exchange. Similarly, Gustavsson, Strömberg, and Byström (2017) examined the construction of Magic Formula portfolios during both bullish and bearish trends on the Swedish Stock Exchange. These studies showed that forming the Magic Formula portfolio yielded satisfactory performance when using stock indices as a reference. However, no study has been conducted using the Sharia Stock Index as a reference. Furthermore, this study analyzes the shape of the portfolio using the magic formula investment strategy introduced by Joel Greenblatt on the Jakarta Islamic Index (JII).

2. Literature review

In a capital market framework, stock prices result from the interaction between buyers and sellers on a stock exchange. In case the demand for a stock increase, its price tends to rise. Conversely, the stock price decline when there is an increase in the number of shares offered for sale (Darmadji & Fakhruddin,

2012). Tannadi (2019) categorized stock price trends into three, including bullish, bearish, and stagnant (sideways). Bullish trends show an upward movement of the stock price in a zigzag pattern. Bearish trends exhibit a downward movement of the stock price in a zigzag pattern, while sideways show a constant distance between the highs and lows of the stock price.

2.1. Efficient Market Assumptions

According to Tandelilin (2017), the efficient market hypothesis (EMH) shows the relationship between stock price changes and the arrival of new information. In a less efficient market, there is a lag in responding to new information, which creates opportunities for investors to obtain abnormal returns (Mujadiddah et al., 2020; Syafitri et al., 2022). However, new information is quickly reflected in the stock prices in an efficient market. EMH can be categorized into three forms: weak, semi-strong, and strong. In a weak-form efficient market, the share price reflects past information such as the financial statements of a company. Investors can earn abnormal returns using published information such as a planned dividend increase in a weak-form efficient market. In a semi-strong-form efficient market, the share price reflects past and publicly available information. Investors can earn abnormal returns in response to a market report when an event is announced. In a strong-form efficient market, share prices reflect past, public, and private information; therefore, investors cannot earn abnormal returns.

2.2. Portfolio

J Hartono (2014) defined a portfolio as a collection of investment instruments owned by individual or institutional investors. According to Tandelilin (2017), an efficient portfolio is one in which investors look for a portfolio that can provide abnormal returns at a certain risk level or one with a lower risk level that can generate a specific return. If an investor selects one of several efficient portfolios based on their preferences, then an optimal portfolio is chosen. Benjamin Graham and Joel Greenblatt are among the investors that form portfolios (Rani, 2019).

Pae and Sabbaghi (2015) describe two types of portfolio formation based on weighting: equally weighted and value-weighted. Equally weighted portfolios allocate capital equally to issuers, assuming that they have the same value. By contrast, value-weighted portfolios allocate assets based on the weighting of each issuer. In general, allocation to an issuer is greater when its weight is higher.

2.3. Investment Strategy

Financial markets are known for being unpredictable, constantly changing, and sometimes dramatic (Agarwal, 2021; Rafki, Wiliasih, & Irfany, 2022), making it challenging to develop a strategy for investment. Hasan (2010) defined strategy as the science of planning and determining the direction to move resources to make a profit. According to Laopodis (2020), investment is the allocation of current resources to acquire additional resources in the future. An investment strategy involves planning and moving available resources to achieve the investment goal. Tandelilin (2017) referred to this planning and determination of investment direction as an investment process.

Tandelilin (2017) classifies investment strategies into two types, specifically passive and active, based on the portfolio formed. A passive strategy involves investors creating a stock portfolio that mimics the performance of the market index, with the aim of following it as closely as possible. Conversely, an active strategy involves investors actively seeking information; selecting, buying, and selling stocks; and monitoring price movements to achieve abnormal returns. The passive strategy employs a buy-and-hold approach following the index, whereas the active strategy includes stock selection, sector rotation, and price momentum.

Investments can be classified into two categories: real and financial. Real assets are tangible goods and services that contribute directly to an economy. In contrast, financial assets are instruments used by individuals to make claims on a real asset, contributing indirectly to an economy (Bodie, Kane, & Marcus, 2018; Shabrina & Hadian, 2021).

2.4. Magic Formula

The Magic Formula, created by Greenblatt (2006), is a stock selection criterion used to form a stock investment portfolio in the asset management company Gotham Capital. Greenblatt achieved an average annual return of 40% using the Magic Formula between 1985 and 2006. The criteria used are similar to other stock selection strategies, and aim to identify companies with good performance and low stock prices. The Magic Formula is known for its simplicity and ease of implementation compared to other investment strategies.

The Magic Formula stock selection criteria rely on two variables: the Return on Capital (ROC) and Earnings Yield (EY). ROC is used to identify issuers with excellent business performance and to help compare the operating income of different companies without distortions caused by tax and debt levels. Furthermore, it reflects the actual capital required to operate a company's business.

Earnings Yield (EY) is another variable used in the Magic Formula to identify stocks at low prices compared to a company's performance. The EY can compute the business's income from purchases and the price paid for stock to generate operating income. Moreover, EY is used to normalize companies with varying levels of debt and taxes.

2.5. Rebalancing

Institute (2020) reported that rebalancing is performed to align the portfolio weight with the investment strategy established by an investor. Two approaches to rebalancing exist: calendar-based and range-based. Calendar-based rebalancing utilizes a specific timeframe, such as monthly, quarterly, semi-annually, or annually, as a reference for rebalancing. The benefit of calendar-based rebalancing is simplicity. In contrast, range-based rebalancing is more rigorous than calendar-based rebalancing, and employs percentages as a reference point. For instance, suppose an asset within a portfolio has a 50% proportion with trigger points of 45% and 55%; it will be rebalanced when its value exceeds 55% or falls below 45% to revert to its original proportion.

3. Research methodology

In this study, a comparison of yields and risks was carried out between the *Joel Greenblatt Magic Formula* portfolio and benchmark index from June 2018 to May 2021. The variables used include stock closing price, Return on Capital, and Earnings Yield.

3.1. Samples

This study used the purposive sampling method, a sample-selection technique that considers several aspects (Sugiyono, 2014). The criteria for determining the sample were as follows:

1. Issuers were included in the Sharia stock group between June 2018 and May 2021.
2. The issues sampled should have a large market capitalization. This is because issuers with large market capitalizations tend to have lower risk (Greenblatt, 2006).
3. The index used as a reference in this study must contain more than 30 constituents. This is because at least 30 issuers are required to form the portfolio.

The Jakarta Islamic Index 70 (JII70) is the reference index in this study. It is a Sharia stock index that comprises of seventy Islamic stocks that have the largest market capitalization and the highest liquidity. For the purpose of this research, the issuers sampled were the constituents of JII70, taken from June 2018 to May 2021. This study used the purposive sampling method, a sample selection technique that considers several aspects.

3.2. Data types and Sources

This study used secondary data collected over six months (semesters) from the Indonesia Stock Exchange (IDX), Financial Services Authority (OJK), Bank Indonesia (BI), Yahoo Finance, and Google Finance, as shown in Table 1.

Table 1

Data Type	Source	Period
The closing price of the shares	Google Finance	June 1, 2018 – May 31, 2021
Market capitalization	Indonesia Stock Exchange	June 1, 2018 – May 31, 2021
BI 7 Days Repo Rate	Bank Indonesia	June 2018 – May 2021
CONSTITUENT JII70	Financial Services Authority	June 1, 2018 – May 31, 2021
Annual financial statements	Yahoo Finance	2017 - 2019
Earning Before Interest and Tax (EBIT)	Annual financial statements	2017 - 2019
Net Working Capital (NWC)	Annual financial statements	2017 - 2019
Net Property, Plant, and Equipment	Annual financial statements	2017 - 2019
That	Annual financial statements	2017 - 2019
Liability	Annual financial statements	2017 - 2019

3.3. Data and Methodology

The data analysis consisted of three stages. The first stage involves portfolio formation using the Magic Formula's investment strategy. The second stage included risk-adjusted return calculations using the Sharpe index, Treynor index, and Jensen index, and Microsoft Excel was utilized in the study. The third stage involves portfolio performance evaluation. The steps followed are as follows:

1. Eliminate all issuers included in the financial industry in the *Jakarta Islamic Index 70* (JII70)
2. Forming a portfolio using *the Magic Formula* begins by finding the Return *on the Capital* value of each issuer, which can be calculated by:

$$ROC = \frac{\text{EBIT}}{NWC + Net\ Fixed\ Assets}$$

3. After obtaining the *Return on Capital* value for each issuer, a rating based on the amount of *Return on Capital* value is conducted. The issuer with *the highest Return on Capital* value is ranked first.
4. The next step is to determine the *Earnings Yield* value for each issuer. The earnings *yield* value can be calculated using the following formula:

$$Earnings\ Yield = \frac{\text{EBIT}}{Enterprise\ Value}$$

5. After obtaining the *Earnings Yield* value of each issuer, a rating based on the *Earnings Yield* value was conducted. The issuer with the highest *Earnings Yield* value is ranked first.
6. The next step is to add up the *Return on Capital* rating value with each issuer's *Earnings Yield* rating value and then sort by rank from the highest to the lowest.

Thirty issuers with the highest ratings were selected as constituents in the portfolio.

1. When issuers are declared out of *Jakarta Islamic Index* 70 (JII70) at the beginning of the second period, they are removed from the portfolio that has been formed. Therefore, *rebalancing* should be carried out by repeating the first to the sixth steps, eliminating issuers already constituents in the portfolio. The issuer with the highest rating replaced the issuer exiting the portfolio.
2. Repeat the first step to the seventh step to carry out portfolio formation in the next period.
3. After the *Magic Formula* portfolio is formed, the yield of the portfolio and the underlying index are calculated. The first step is to calculate the yield of each share by

$$R = \frac{P_t}{P_{t-1}} - 1$$

where,
R: Stock *return*
P_t: Share price when selling
P_{t-1}: The share price when making a purchase

4. The next step is to find the average return of *the rebalancing* issuer, which involves calculating the automatic average of each issuer that exits the portfolio and the issuers that enter the portfolio using the following formula:

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

where,
$\bar{X}$: Arithmetic average of outgoing or incoming stock yields Portfolio
X_i: Yield of each stock that exits or enters the portfolio
n: The number of stocks leaving or entering the portfolio

5. The geometric average between the issuer that came out and the issuer that entered the portfolio was calculated to obtain the average value for the issuer that experienced *rebalancing*. The geometric averages can be calculated by:

$$G = \sqrt{X_k \, x \, X_m}$$

where,
G: Geometric average of outgoing and incoming stock yields Portfolio
$\bar{X}_k$: Arithmetic average of stock yields coming out of the portfolio
$\bar{X}_m$: Arithmetic average of stock returns entering the portfolio

6. After obtaining the average value of the returns of *the rebalancing* issuer, the yields from the portfolio and the underlying index is calculated as follows

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i + G}{(n + 1)}$$

where,
$\bar{X}$: Portfolio yields
X_i: The yield of any stock that does not undergo *rebalancing*
G: Geometric average of *rebalancing* stocks
n: The number of stocks that do not experience *rebalancing*

7. The ninth to twelfth steps were repeated to obtain the value of the yield in the next period.
8. The average yield of the portfolio and the benchmark index is calculated as a whole using geometric averages

$$G = \sqrt[3]{R_{2018} \, x \, R_{2019} \, x \, R_{2020}}$$

where,
G: Geometric mean of the return portfolio or benchmark index Overall
R_n: The yield of the portfolio or benchmark index in the period n

9. The portfolio's performance was then evaluated. However, before evaluating portfolio performance, the *risk-free rate* in each period should be calculated using the following formula

$$ib = \sqrt[12]{(1 + it)} - 1$$

where,
ib: Monthly risk-free return value
it: Annual risk-free return value

Furthermore, we add the monthly interest rate to obtain the average risk-free yield for each period:

$$R_f = \sum_{i=1}^{n} ib_i$$

where,
R_f: Average risk-free Return in one period

ib_i: The value of the monthly risk-free Return
n: The multiplicity of periods

10. The standard deviation of the portfolio and the underlying index is then calculated

$$SD = \frac{\sum(X_i - \bar{X})}{N}$$

where,
SD: Standard deviation portfolio
X_i: Yield of each stock
$\bar{X}$: Portfolio yields
N: Number of shares

11. The next step is to calculate the beta between the portfolio and the reference index as

$$B = \frac{Cov\ (r_i, r_m)}{Var\ (r_m)}$$

where,
B: Beta value
Cov (r i, r_m): Covariance between portfolio yields and the benchmark index
Var (r_m): Variance of the benchmark index yield

After obtaining the value of risk-free returns, standard deviations, and betas, portfolio performance is evaluated using three indices. The first index to be benchmarked is the Sharpe index, which can be calculated as

$$S_p = \frac{R_p - R_f}{SD_p}$$

where,
S_p: Sharpe index portfolio
R_p: Average portfolio yield
R_f: Average risk-free yield in one period
SD_p: Standard deviation of portfolio yields

The performance of the portfolio was evaluated using the Treynor index, which can be expressed as follows:

$$T_p = \frac{R_p - R_f}{B_p}$$

where,
T_p: Treynor index portfolio
R_p: Average portfolio yield
R_f: Average level of risk-free Return
B_p: Portfolio beta

Portfolio work using the Jensen index is evaluated as:

$$J_p = (R_p - R_f) - (R_m - R_f)B_p$$

where:
J_p: Jensen index portfolio
R_p: Average portfolio yield
R_f: Average level of risk-free Return
R_m: Average market yield
B_p: Portfolio beta

Table 2. Definition of operational variables

Variable	Source	Definition
The closing price of the shares	Google Finance	The price is recorded at the end of stock trading at the end of session II on the working day of the exchange (Darmadji & Fakhruddin, 2012).
Market capitalization	Indonesia Stock Exchange	The market value of a share issued by an issuer (Budi, 2009).
BI 7 Days Repo Rate	Bank Indonesia	Benchmark interest rates that affect the money market, banking, and real sector
Earnings Before Interest and Tax (EBIT)	Yahoo Finance	A performance measure can compare financial performance with different capital structures (IFRS, 2017).
Net Working Capital (NWC)	Yahoo Finance	The difference between the value of current assets, short-term liabilities, and other short-term accruals (Zimon, 2021).
Net Property, Plant, and Equipment	Yahoo Finance	Tangible assets can be used for more than one reporting period (IPSAS, 2021).
That	Yahoo Finance	Currency is applicable as legal tender (Keuangan, 2007).
Liability	Yahoo Finance	Debts or obligations owned by the company are sourced from lending loans, leasing, and bond sales (Irham, 2015).

4. Result and discussion

This section explains the formation of the *Joel Greenblatt Magic Formula portfolio* and its performance in terms of yield and risk from June 2018 to May 2021. The JII70 Index is one of the Sharia stock indices on the Indonesia Stock Exchange, consisting of only the 70 most liquid Islamic stocks listed on the IDX, with the highest average market capitalization and daily transaction value. The JII70 Index underwent a biannual rebalancing period, similar to its predecessor Islamic stock indices, JII. The *rebalancing* periods of Islamic stock indices are shown in Table 3.

Table 3stock index rebalancing period

Year	Period 1	Period 2	Period
2016	Jun 2016 – Nov 2016	Des 2016 – May 2017	12 months
2017	Jun 2017 – Nov 2017	Des 2017 – May 2018	12 months
2018	Jun 2018 – Nov 2018	Des 2018 – May 2019	12 months
2019	Jun 2019 – Nov 2019	Des 2019 – Jul 2020	14 months
2020	Agu 2020 – Nov 2020	Des 2020 – May 2021	10 months
2021	Jun 2021 – Nov 2021	Des 2021 – May 2022	12 months

Source: OJK (2021b)

Table 3 shows that the Islamic stock index had 12 months from 2016 to 2018. In 2019. The period was extended to 14 months, although the rebalancing period scheduled for May 2020 was postponed to July 2020 the COVID-19 pandemic, resulting in a shorter period of 10 months in 2020 (OJK, 2020). The companies included in this study were listed in the JII70 index during the first and second periods of 2018, 2019, and 2020. This study aims to create a portfolio using the Magic Formula's investment strategy. Its performance was evaluated based on returns and risks calculated using various risk-adjusted return measures.

4.1. Magic Formula Portfolio Form

The Magic Formula portfolio for the years 2018 to 2021 was formed using equally weighted variables, which were the financial statement data of the previous three years, specifically 2017, 2018, and 2019. The financial statement data used include Earnings Before Interest and Tax, Net Working Capital, Net

Property, Plant, and Equipment, Market Capitalization, Total Cash, and Total Liabilities of each company (Greenblatt, 2006).

An issuer excluded from the JII70 Index in period 2 is removed from the portfolio and replaced by another until the end of period 2. If an issuer is not excluded from the JII70 Index in period 2, it remains in the portfolio, even when other issuers have a better rating (Greenblatt, 2006).

The formed portfolio was classified based on the industry sector to identify the most promising industries or vice versa. Investors use this classification to form portfolios with a smaller number of stocks based on their industry (Ekawati & Yanti, 2022; Tandelilin, 2017).

4.1.1. Magic Formula 2018 Portfolio Form

The Magic Formula portfolio was created using the JII70 constituents' validity period in 2018, from June 2018 to May 2019. Table 4 presents the portfolios formed in June, 2018.

Table 4. Highest-rated Issuers in 2018 before *rebalancing*

Stock Code	Company Name	Total Rankings
UNVR	PT Unilever Indonesia Tbk	6
WSKT	PT Waskita Karya (Persero) Tbk	11
ASIA	PT Astra International Tbk	17
TLKM	PT Telkom Indonesia (Persero) Tbk	17
ICBP	PT Indofood CBP Sukses Makmur Tbk	24
BSDE	PT Bumi Serpong Damai Tbk	25
PTBA	PT Bukit Asam Tbk	25
SCMA	PT Surya Citra Media Tbk	27
UNTR	PT United Tractors Tbk	28
LPPF	PT Matahari Department Store Tbk	33

In November 2018, WSKT shares were excluded from the JII70 constituents during rebalancing. As a result, a Magic Formula portfolio is needed to remove these shares. To maintain a portfolio of 30 stocks, it was necessary to calculate the remaining JII70 constituents for two years, excluding the already included stocks. The calculation results are presented in Table 5.

Table 5. Highest-rated Issuers after *rebalancing* 2018

Stock Code	Company Name	Total Rankings
MYOR	PT Mayora Indah Tbk	32
LINK	PT Link Net Tbk	66
ISAT	PT Indosat Tbk	67
PTPP	PT Pembangunan Perumahan (Persero) Tbk	68
CTRA	PT Ciputra Development Tbk	70

Based on these calculations, MYOR shares had the highest rating compared to other stocks; hence, they were included in the portfolio instead of the WSKT shares. The *Magic Formula* portfolio was formed in 2018 (June 2018 to May 2019), as shown in Table 6.

Table 6. Magic Formula Portfolio in 2018

Stock code	Name of company	Sectoral code	Total Rank
UNVR	PT Unilever Indonesia Tbk	D	6
ASII	PT Astra International Tbk	I	17
TLKM	PT Telkom Indonesia (Persero) Tbk	J	17
ICBP	PT Indofood CBP Sukses Makmur Tbk	D	24
BSDE	PT Bumi Serpong Damai Tbk	K	25

PTBA	PT Bukit Asam Tbk	E	25
SCMA	PT Surya Citra Media Tbk	C	27
UNTR	PT United Tractors Tbk	I	28
LPPF	PT Matahari Department Store Tbk	C	33
INDF	PT Indofood Sukses Makmur Tbk	D	34

The portfolio formed can be classified based on sector (Tandelilin, 2017). This classification provides information regarding the sectors included in the *Magic Formula* criteria. Table 7 presents the classification of sectors in *the Magic Formula* 2018 portfolio.

Table 7Magic Formula portfolios by sector

Sector Code	Information	Sum
A	*Technology*	0
B	*Basic Materials*	4
C	*Consumer Cyclicals*	4
D	*Consumer Non-Cyclicals*	5
And	*Energy*	5
F	*Financials*	0
G	*Transportation & Logistic*	0
H	*Healthcare*	2
I	*Industrial*	2
J	*Infrastructure*	4
K	*Properties & Real Estate*	5
Total		31

Based on the sector, the Magic Formula 2018 portfolio consists mainly of issuers from the consumer non-cyclical, energy, and properties and real estate sectors, with as many as five issuers each. There are also no issuers from the technology, transportation, or logistics sectors in the portfolio.

4.1.2. Magic Formula 2019 Portfolio Form

The 2019 Magic Formula portfolio was created using the JII70 constituent validity period in 2019, spanning from June 2019 to July 2020. The portfolio is formed during the first period and continues until the end of the second period. Table 8 lists the portfolios formed in June 2019.

Table 8 Highest-rated Issuers in 2019 before *rebalancing*

Stock Code	Company Name	Total Rank
UNVR	PT Unilever Indonesia Tbk	6
ASIA	PT Astra International Tbk	13
ICBP	PT Indofood CBP Sukses Makmur Tbk	17
GIAA	PT Garuda Indonesia (Persero) Tbk	18
TLKM	PT Telkom Indonesia (Persero) Tbk	19
UNTR	PT United Tractors Tbk	20
CPIN	PT Charoen Pokphand Indonesia Tbk	27
PTBA	PT Bukit Asam Tbk	31
PWON	PT Pakuwon Jati Tbk	32
INDF	PT Indofood Sukses Makmur Tbk	39

In November 2019, GIAA, INDY, and SMGR shares were removed from the JII70 index during the rebalancing. As a result, these shares must be excluded from the Magic Formula portfolio. To maintain a portfolio of 30 shares, it was necessary to calculate the JII70 constituents for the next two periods, excluding previously removed stocks. The calculation results are presented in Table 9.

Table 9. The highest issuers in the 2019 *rebalancing* portfolio

Stock code	Company name	Total rank
PGAS	PT Perusahaan Gas Negara Tbk	55
SIDO	PT PT Industri Jamu dan Farmasi Sd Mncl	61
MIKA	PT Mitra Keluarga Karyasehat Tbk	62
MNCN	PT Media Nusantara Citra Tbk	64
PTPP	PT Pembangunan Perumahan (Persero) Tbk	64

The calculation results show that PGAS, SIDO, and MIKA shares had the highest ratings compared with the other stocks. Consequently, the GIAA, INDY, and SMGR shares were replaced by MIKA, PGAS, and SIDO shares in the Magic Formula portfolio. Table 10 presents the period and composition of the 2019 Magic Formula portfolio formed from June 2019 to July 2020.

Table 10. *Magic Formula* Portfolio in 2019

Stock code	Company name	Sector code	Total Rank
UNVR	PT Unilever Indonesia Tbk	D	6
ASII	PT Astra International Tbk	I	13
ICBP	PT Indofood CBP Sukses Makmur Tbk	D	17
TLKM	PT Telkom Indonesia (Persero) Tbk	J	19
UNTR	PT United Tractors Tbk	I	20
CPIN	PT Charoen Pokphand Indonesia Tbk	D	27
PTBA	PT Bukit Asam Tbk	E	31
PWON	PT Pakuwon Jati Tbk	K	32
INDF	PT Indofood Sukses Makmur Tbk	D	39
SMRA	PT Summarecon Agung Tbk	K	40

To be continued in Appendix 10

The formed portfolio can be categorized based on the sector, according to Tandelilin (2017). This categorization provides information about sectors that meet the Magic Formula criteria. Table 11 displays the sector classifications of the 2019 Magic Formula Portfolio.

Table 11Magic Formula 2019 portfolios by sector

Sector Code	Information	Sum
A	*Technology*	0
B	*Basic Materials*	3
C	*Consumer Cyclicals*	5
D	*Consumer Non-Cyclicals*	6
And	*Energy*	6
F	*Financials*	0
G	*Transportation & Logistic*	1
H	*Healthcare*	3
I	*Industrial*	2
J	*Infrastructure*	2
K	*Properties & Real Estate*	5
Total		33

Based on the sector, the *Magic Formula* 2019 portfolio consists mainly of issuers from the *non-cyclical consumer* sector and *energy*, with six issuers each. There are no issuers in the *technology* sector in the portfolio.

4.1.3. Magic Formula 2020 Portfolio Form

The 2020 Magic Formula portfolio was formed using the JII70 constituent validity period spanning August 2020 to May 2021, which includes the first and second periods. Table 12 displays the composition of the portfolio formed in August 2020

Table 12. Emitents with the highest ranking in 2020 before *rebalancing*

Code	Name of company	Total rank
UNVR	PT Unilever Indonesia Tbk	4
ASII	PT Astra International Tbk	12
ICBP	PT Indofood CBP Sukses Makmur Tbk	15
TLKM	PT Telkom Indonesia (Persero) Tbk	15
UNTR	PT United Tractors Tbk	26
CPIN	PT Charoen Pokphand Indonesia Tbk	33
PTBA	PT Bukit Asam Tbk	38
PWON	PT Pakuwon Jati Tbk	38
SMRA	PT Summarecon Agung Tbk	39
INDF	PT Indofood Sukses Makmur Tbk	40

During the rebalancing process of November 2020, ASII and BSDE shares were removed from the JII70 index. Consequently, these shares must be removed from the Magic Formula portfolio. To maintain a portfolio of 30 shares, it was necessary to calculate the JII70 constituents for the next two periods, excluding previously removed stocks. The calculation results are listed in Table 13.

Table 13. Emitents with the highest ranking in 2020 after *rebalancing*

Stock code	Company name	Total Rank
JRPT	PT Jaya Real Property Tbk	51
ULTJ	PT Ultrajaya Milk Industry Tbk	54
TKIM	PT Pabrik Kertas Tjiwi Kimia Tbk	55
CTRA	PT Ciputra Development Tbk	60
INKP	PT Indah Kiat Pulp and Paper Tbk	61

To be continued in Appendix 14

Based on the calculation, JRPT and ULTJ shares had the highest ratings compared with the other stocks. Consequently, the ASII and BSDE shares were replaced by JRPT and ULTJ shares in the Magic Formula portfolio. The period for the 2020 Magic Formula portfolio was August 2020 to May 2021, as presented in Table 14.

Table 14. Portofolio of *Magic Formula* in 2020

Stock code	Company name	Total Rank	Stock code
UNVR	PT Unilever Indonesia Tbk	D	4
ICBP	PT Indofood CBP Sukses Makmur Tbk	D	15
TLKM	PT Telkom Indonesia (Persero) Tbk	J	15
UNTR	PT United Tractors Tbk	I	26
CPIN	PT Charoen Pokphand Indonesia Tbk	D	33
PTBA	PT Bukit Asam Tbk	E	38
PWON	PT Pakuwon Jati Tbk	K	38
SMRA	PT Summarecon Agung Tbk	K	39
INDF	PT Indofood Sukses Makmur Tbk	D	40
ACES	PT Ace Hardware Indonesia Tbk	C	42

The 2020 Magic Formula portfolio can be classified by sector (Tandelilin, 2017) to provide information on sectors included in the criteria. Table 15 displays the sector classifications of the Magic Formula 2020 portfolio.

Table 15. Classification of Magic Formula 2020 portfolios by sector

Sector Code	Information	Sum
A	*Technology*	0
B	*Basic Materials*	3

C	*Consumer Cyclicals*	5
D	*Consumer Non-Cyclicals*	7
And	*Energy*	3
F	*Financials*	0
G	*Transportation & Logistic*	0
H	*Healthcare*	3
I	*Industrial*	2
J	*Infrastructure*	4
K	*Properties & Real Estate*	5
Total		32

Based on the sector, it can be seen that *the Magic Formula* 2020 portfolio consists mainly of issuers from the *consumer non-cyclicals* sector, with as many as seven issuers. There are no issuers in the *technology* sector in the portfolio.

4.2. Magic Formula Portfolio Returns

To evaluate portfolio yield, it is necessary to calculate the yield of the benchmark index, which can provide insight into market trends. In this study, the JII70 was used as the benchmark index. The portfolio and benchmark index yields are presented in Table 16.

Table 16. Portfolio yields and benchmark indices

	Jun 2018-May 2019	Jun 2019-Jul 2020	Aug 2020-May 2021	Average
Magic Formula Portfolio	-5,15%	-19,39%	24,14%	-1,72%
JII70 benchmark index	-9,03%	-25,12%	32,91%	-3,26%

Table 16 shows that, between June 2018 and May 2021, the market mainly experienced a sideways trend, as indicated by the fluctuations in the last two periods. As a result, there was an average yield of -3.26% for the benchmark index. The market demonstrated a sideways trend from June 2018 to May 2019, with a yield of -9.03%, followed by a bearish trend from June 2019 to July 2020, yielding -25.12%. Eventually, a bullish trend occurred from August 2020 to May 2021, with a yield of 32.91%.

Despite the sideways market trend, the Magic Formula portfolio performed remarkably well from June 2018 to May 2021, as shown by the portfolio average yield being lower at -1.72%. The portfolio also experienced a lower decline in two periods, specifically June 2018 to May 2019 and June 2019 to July 2020, with yields of -5.15% and -19.39%, respectively. However, from August 2020 to May 2021, portfolio performance was not impressive, experiencing an increase of only 24.14%. This can be attributed to the fact that the study period was less than 12 months.

To evaluate the overall performance of the Magic Formula portfolio, Table 17 compares its yield with other indices on the Indonesian Stock Exchange.

Table 17. Stock index performance in Indonesia

	Jun 2018-May 2019	Jun 2019-Jul 2020	Aug 2020-May 2021	Average
Magic Formula	-5,15%	-19,39%	24,14%	-1,72%
JCI	3,23%	-18,12%	18,80%	0,14%
DAD	1,76%	-18,19%	19,49%	-0,17%
JII	-3,22%	-17,89%	5,26%	-5,78%
LQ45	2,15%	-19,86%	14,76%	-2,06%
IDX30	3,48%	-20,56%	12,33%	-2,62%
KOMPAS100	1,48%	-18,92%	11,42%	-2,85%

Table 17 shows that JCI, which is an overall stock index, was the only index with a positive yield of 0.14% during the study period. The Magic Formula portfolio had a yield of -0.14%, while JII, an overall Islamic stock index, had a slightly lower yield of -0.17%. Other indices with larger market caps, such as LQ45, IDX30, and KOMPAS100, had negative and smaller returns compared to the Magic Formula portfolio. This shows that issuers with smaller market caps had higher yields during the study period, whereas issuers with larger market caps had lower yields. Overall, the Magic Formula portfolio performed relatively well compared with the other indices during the study period.

4.3. Portfolio Performance Evaluation

To evaluate the performance of the Magic Formula portfolio and benchmark index, several measuring indices were used, including the Sharpe, Treynor, and Jensen indices. However, assessing the level of risk using these measuring indices requires the calculation of several variables such as the risk-free rate, standard deviation, and beta value. Table 18 lists the values of these variables.

Table 18. Risk-free rate, standard deviation, and beta values

	Jun 2018-May 2019	Jun 2019-Jul 2020	Aug 2020-May 2021	Average
Magic Formula Portfolio				
Standard deviation	0.310980	0.288158	0.414801	0.337980
Beta	0.992854	1.061562	0.869641	0.974686
JII70 benchmark index				
Standard deviation	0.299038	0.322730	0.590408	0.404059
Beta	1	1	1	1
Risk-free rate	5.64%	5.62%	3.05%	4.76%

Once the standard deviation and beta values of the portfolio were obtained, along with the reference index and risk-free rate value, the next step was to evaluate the portfolio's performance using the Sharpe, Treynor, and Jensen indices. The results of this evaluation are listed in Table 19.

Table 19. Portfolio performance evaluation

	Jun 2018-May 2019	Jun 2019-Jul 2020	Aug 2020-May 2021	Average
Magic Formula Portfolio				
Sharpe Index	-0.34697	-0.86793	0.50485	-0.23549
Treynor Index	-0.10868	-0.23560	0.24251	-0.03392
Index Jensen	0.03775	0.07622	-0.04877	0.02173
JII70 benchmark index				
Sharpe Index	-0.49057	-0.95250	0.50575	-0.31244
Treynor Index	-0.14670	-0.30740	0.29860	-0.05183
Index Jensen	0	0	0	0

Table 19 shows that, from June 2018 to July 2020, the Magic Formula portfolio had a lower risk than the benchmark index, as indicated by its higher Sharpe and Treynor index values. The portfolio with a higher Jensen index value than the benchmark index also suggests that it outperformed the benchmark index during this period. However, from August 2020 to May 2021, the Magic Formula portfolio underperformed the benchmark index, as indicated by its lower Jensen index value. It still had higher average Sharpe and Treynor index values than the benchmark index, indicating its overall better performance. Importantly, the Jensen index value is affected by the yield calculation between the portfolio and benchmark index.

5. Conclusion

In conclusion, the Magic Formula portfolio showed a better yield performance than the benchmark index, with a geometric mean of -1.72% compared to -3.26%. During 2018 and 2019, portfolio periodic yields were also higher than the benchmark index, with values of -5.15% versus -9.03% and -19.39%

versus -25.12%, respectively. However, the portfolio yield in 2020 was lower than the benchmark index, with a value of 24.14% versus 32.91%, possibly because of the shorter study period.

The Magic Formula portfolio performed well during the study period, as shown by its higher Sharpe index value of -0.23549 compared with the benchmark index value of -0.31244. Moreover, the Treynor index value of -0.03392 was higher than the benchmark index value of -0.05183. The Jensen index value for the Magic Formula portfolio is also positive at 0.021734. Although the portfolio periodic performance was better than the benchmark index in 2018 and 2019, it underperformed in 2020, with a negative Jensen index value of -0.04877, which is influenced by the yield calculation between the portfolio and benchmark index.

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