

**KOH SIN YIN AN EMPIRICAL ANALYSIS ON DIVIDEND INVESTING AND VALUE INVESTING IN MALAYSIA STOCK MARKET 2022**

**AN EMPIRICAL ANALYSIS ON DIVIDEND INVESTING  
AND VALUE INVESTING IN MALAYSIA STOCK  
MARKET**

**KOH SIN YIN**

**MASTER OF MATHEMATICS**

**LEE KONG CHIAN FACULTY OF ENGINEERING AND  
SCIENCE UNIVERSITI TUNKU ABDUL RAHMAN**

**DECEMBER 2022**

**An Empirical Analysis on Dividend Investing and Value Investing in  
Malaysia Stock Market**

By

**KOH SIN YIN**

A project report submitted to  
Lee Kong Chian Faculty of Engineering and Science,  
Universiti Tunku Abdul Rahman,  
in partial fulfillment of the requirements for the degree of  
Master of Mathematics in  
December 2022

## ABSTRACT

This study presents the empirical analysis of value investing and dividend investing in the Malaysia stock market during the year 2017 – 2021. The value investment portfolios studied in this study consist of the Top10 stocks with the lowest price-to-earning (PE) and price-to-book (PB) ratio in Kuala Lumpur Composite Index (KLCI) index. On the other hand, the dividend investment portfolios comprise the Top10 stocks with the highest dividend yield (DY) in KLCI index. At the same time, this study also investigates whether the application of Modern Portfolio Theory (MPT) optimization paired with annual reconstitution and rebalancing (ARR) approach is effective to improve the portfolio returns in comparison to the classic buy-and-hold (BH) and equally weighted (EW) stock allocation approach. The research outcomes show that the value portfolio constructed with the Top10 stocks of the lowest PE ratio in KLCI index generates the best return over 2017-2021. The second-best performer is the dividend portfolio and followed by the PB value portfolio in terms of 5 years (5Y) portfolio returns. The application of MPT optimization paired with ARR approach is effective to further improve the portfolio returns of PE value portfolios and dividend portfolios but generate inferior results on PB value portfolios. On the other hand, the application of EW and BH approaches are more suitable for both PE and PB value portfolios instead of dividend portfolios. The findings of this study also affirm the effectiveness of active investment strategy in Malaysia's stock market which is in a weak form of efficiency.

## ACKNOWLEDGEMENTS

Foremost, I would like to take this opportunity to express my gratitude and appreciation to the main supervisor, Dr. Wong Wai Kuan and co-supervisor, Dr Goh Yong Kheng for their guidance and advice throughout this study.

In addition, I would like to thank Universiti Tunku Abdul Rahman (UTAR) for the opportunity to further my academic study in Master of Mathematics.

Lastly, I would like to express my gratitude to my beloved family for their unconditional support throughout my study.

## APPROVAL SHEET

This project report entitled “AN EMPIRICAL ANALYSIS ON DIVIDEND INVESTING AND VALUE INVESTING IN MALAYSIA STOCK MARKET” was prepared by KOH SIN YIN and submitted as partial fulfillment of the requirements for the degree of Master of Mathematics in December 2022 at Universiti Tunku Abdul Rahman.

Approved by:




\_\_\_\_\_  
(Dr. Wong Wai Kuan)

Date: 13/12/2022.....

Supervisor

Department of Mathematical and Actuarial Sciences  
Lee Kong Chian Faculty of Engineering and Science  
Universiti Tunku Abdul Rahman



\_\_\_\_\_  
(Dr. Goh Yong Kheng)

Date: 13/12/2022.....

Co-supervisor

Department of Mathematical and Actuarial Sciences  
Lee Kong Chian Faculty of Engineering and Science  
Universiti Tunku Abdul Rahman

**FACULTY OF ENGINEERING AND SCIENCE  
UNIVERSITI TUNKU ABDUL RAHMAN**

Date: 13th Dec 2022

**PERMISSION SHEET**

It is hereby certified that **Koh Sin Yin** (ID No: **20UEM00516**) has completed this project report entitled “*An Empirical Analysis on Dividend Investing and Value Investing in Malaysia Stock Market*” under the supervision of Dr. Wong Wai Kuan (Supervisor) from the Department of Mathematical and Actuarial Sciences, Lee Kong Chian Faculty of Engineering and Science, and Dr Goh Yong Kheng (Co-Supervisor)\* from the Department of Department of Mathematical and Actuarial Sciences, Lee Kong Chian Faculty of Engineering and Science.

I hereby give permission to the University to upload softcopy of my final year project  ~~/ dissertation / thesis\*~~ in pdf format into UTAR Institutional Repository, which may be made accessible to UTAR community and public.

Yours truly,



( KOH SIN YIN )

## DECLARATION

I KOH SIN YIN hereby declare that the project report is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

Name : KOH SIN YIN \_\_\_\_\_

Date : 13th Dec 2022

## TABLE OF CONTENTS

	<b>Page</b>
<b>ABSTRACT</b>	<b>ii</b>
<b>ACKNOWLEDGEMENTS</b>	<b>iii</b>
<b>APPROVAL SHEET</b>	<b>iv</b>
<b>PERMISSION SHEET</b>	<b>v</b>
<b>DECLARATION</b>	<b>vi</b>
<b>LIST OF TABLES</b>	<b>ix</b>
<b>LIST OF FIGURES</b>	<b>x</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xi</b>
<b>LIST OF APPENDICES</b>	<b>xii</b>
 <b>CHAPTER</b>	
 <b>1.0 Introduction</b>	 <b>1</b>
1.1 Background	1
1.2 Research Objectives	3
1.3 Research Contribution	4
 <b>2.0 Literature Review</b>	 <b>5</b>
2.1 Portfolio Stock Selection - Value Strategy vs Dividend Strategy	5
2.1.1 Value Investment based on PE and PB criteria	6
2.1.2 Dividend Investment – The Dogs of the Dow (DoD) Theory	6
2.1.3 Efficient Market Hypothesis (EMH)	7
2.2 Portfolio Allocation and Optimization – MPT vs EW Strategy	9
2.3 Portfolio Rebalancing – BH vs ARR Approach	10
 <b>3.0 Research Methodology</b>	 <b>12</b>
3.1 Data Collection	12
3.2 Portfolio Return, Expected Return, Covariance and Volatility Calculation	13
3.2.1 Portfolio Return and Expected Return	13
3.2.2 Portfolio Volatility and Covariance Matrix	13
3.3 Portfolio Management Methodology	14
3.3.1 Investment Strategy Determination for Stocks Selection and Portfolio Construction	14
3.3.2 Portfolios’ Stock Allocation and Optimization	18
3.3.3 Portfolio Annual Adjustment Approach	21
3.3.4 Portfolios’ Performance Measurement	22
 <b>4.0 Results</b>	 <b>23</b>
4.1 Portfolio Constituent during 2017-2021	23
4.2 5Y Portfolio Total Returns	30



<b>5.0</b>	<b>Discussion</b>	<b>33</b>
<b>6.0</b>	<b>Conclusion and Recommendations</b>	<b>37</b>
6.1	Conclusion	37
6.2	Recommendations for Future Research	38
<b>7.0</b>	<b>References</b>	<b>39</b>
<b>8.0</b>	<b>Appendices</b>	<b>42</b>

## LIST OF TABLES

Table 1.1	Portfolio Construction	17
Table 4.1	PE-EW-BH Result	24
Table 4.2	PE-EW-ARR Result	24
Table 4.3	PE-GMV-ARR Result	25
Table 4.4	PE-TP-ARR Result	25
Table 4.5	PE-EP-ARR Result	25
Table 4.6	PB-EW-BH Result	26
Table 4.7	PB-EW-ARR Result	26
Table 4.8	PB-GMV-ARR Result	27
Table 4.9	PB-TP-ARR Result	27
Table 4.10	PB-EP-ARR Result	27
Table 4.11	DY-EW-BH Result	28
Table 4.12	DY-EW-ARR Result	28
Table 4.13	DYGMV-ARR Result	29
Table 4.14	DY-TP-ARR Result	29
Table 4.15	DY-EP-ARR Result	29
Table 4.16	5Y Portfolio Value and Return	31

## LIST OF FIGURES

Figure 1.1	Application of Quadratic Programming to MVP model – Input Parameters	20
Figure 1.2	Application of Quadratic Programming to MVP model – Run Solver AddIn	21
Figure 1.3	5Y Portfolio Returns from 2017-2021	30

## LIST OF ABBREVIATIONS

ARR	Annual Reconstitution and Rebalancing
MPT	Modern Portfolio Theory
EW	Equally Weighted
BH	Buy-and-Hold
KLCI	Kuala Lumpur Composite Index
PE	Price-to-Earning
PB	Price-to-Book
DY	Dividend Yield
GMV	Global Minimum Variance Portfolio
TP	Tangent Portfolio
EP	Efficient Portfolio
5Y	5-Year

## **LIST OF APPENDICES**

KLCI Index in 2016-2017	42
KLCI Index in 2018-2019	43
KLCI Index in 2020	44

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Nowadays, stock investment in the secondary market has been gaining a lot of traction and popularity as one of the key investment vehicles among Malaysian retail investors. The Annual Report 2020 released by Securities Commission Malaysia has revealed a statistic which shows the net buying value by local institutional investors equals RM 10.3 billion while the net buying value of local retail investors achieves the amount of RM 14.3 billion in 2020. The annual report also presents the huge increment of retail investors' participation rate from 20.8% in 2019 to 32.4% in 2020 (Surendran, 2021). Hence, we are interested to find out the long-term portfolio performance of dividend and value investment strategies and whether these investment strategies are suitable and rewarding for retail investors with a long-term investment horizon in the Malaysia stock market.

This study presents the empirical analysis of value investment and dividend investment in the Malaysia stock market during the year 2017 – 2021. The value investment portfolios studied in this study consist of the Top10 stocks with the lowest PE and PB in KLCI index, while the dividend investment portfolios select the Top10 stocks with the highest DY in KLCI index. The returns of value investment portfolios over the 5 years evaluation period are then compared against the 5 years returns of dividend portfolios. At the same time, this study also studies whether the application of MPT optimization paired with

ARR approach will further improve the portfolio returns in comparison with the classic BH and EW stock allocation approach.

The research findings show that the value portfolio constructed with the Top10 stocks of the lowest PE ratio in KLCI index generates the best return over 2017-2021, followed by dividend portfolio and lastly by the value portfolio constructed with PB ratio in terms of portfolio returns. The applications of MPT optimization paired with ARR approach are effective in further improving the portfolio returns of PE value portfolios and dividend portfolios but produce inferior results for PB value portfolios. On the other hand, the application of EW and BH approaches are more suitable for both PE and PB value portfolios instead of dividend portfolios. The findings of this study also affirm the effectiveness of active investment strategy in Malaysia's stock market which is in a weak form of efficiency.

## 1.2 Research Objectives

In this study, we construct 15 value and dividend portfolios based on stock selection criteria of the Top10 lowest PE and PB stocks in KLCI index for value portfolios and the Top10 highest DY ratio in KLCI index for dividend portfolios. Subsequently we apply MPT optimization paired with ARR approach on the value and dividend portfolios to compare the portfolio performances against the portfolios adopting classic BH and EW stock allocation approaches. The key research objectives are:

- To measure and evaluate the performance of value investing and dividend investing in the Malaysia's stock market during 2017-2021.
- To examine the effectiveness of MPT optimization approach for portfolio allocation in Malaysia's stock market by measuring and comparing the portfolio returns between MPT optimized portfolios and EW portfolios.
- To investigate the effectiveness of ARR strategies in portfolio management by measuring and comparing the portfolio returns between ARR portfolios and classic BH portfolios.



### **1.3 Research Contribution**

While the subject on the performance of value investment versus dividend investment has been a popular topic of recent years, there is not much academic research focused on comparing the long-term portfolio performance of these 2 strategies in Malaysia's stock market and proposing different investment strategy and approaches to further improvise the portfolio performance.

This study has addressed the gap and compared the long-term portfolio performance of the value and dividend investment strategies in Malaysia's stock market, at the same time revealing the feasibility of quantitative approaches such as MPT and ARR to further increase portfolio returns over the long term.

The research outcomes are expected to provide Malaysia investors valuable insights on the performance of dividend and value investment strategies in the Malaysia's stock market over the long term. At the same time, this study also presents the result that shows whether the application of MPT and ARR approaches can further improve the portfolio performance.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Portfolio Stock Selection - Value Strategy vs Dividend Strategy**

Generally, the value investment strategy focuses on building a portfolio with the stocks that are underpriced in relation to the value of their current assets or earnings. On the other hand, the dividend investment strategy focuses on building a portfolio with the stocks that continuously generate dividends. From a quantitative perspective, value stocks tend to have either low PE or PB ratio while dividend portfolios solely focus on stocks with high DY.

Value portfolio returns generally comprises the long-term capital appreciation of value stocks' prices whereas the dividend portfolio focuses on the continuous stream of income based on the dividends paid by firms on regular intervals.

##### **2.1.1 Value Investment based on PE and PB criteria**

Value investors concentrate their effort in spotting underpriced stocks by analyzing the companies' business and financial fundamentals such as revenues, dividend distribution and cash flow. The passive screening on company fundamentals is ensued with stock selection based on the PE and PB quantitative ratios and the portfolio is subsequently being bought-and-held on a long-term horizon.

Arnold (2008) commented that the value stocks have low PE and PB ratio while the growth stocks are on the contrary most of the time. This is aligned with the proposition of Fama and French (1992). The difference between the value and growth stocks in returns is commonly known as value premium (Athanasakos, 2009). According to Fama and French (1992), the value premium arises when the stock market rectifies the pricing of the value stocks which have not only been mispriced but also underpriced previously.

Apart from that, the tendency of investors to naively extrapolate recent patterns in earning will result in the over-pricing of growth stocks and underpricing of value stocks while they overlook the mean reversion tendency (Lakonishok et.al, 1994). Thalmann (2016) carried out a study on the PE effect in the Swiss stock market during 2005-2015 and discovered that the low PE portfolios were able to generate significant excess returns and outperform high PE ratio stocks. Shafana et. al (2013) advocated investors to buy the low PE which are perceived to create greater increment in stock price and subsequently lead to higher returns.

The same goes for stocks with the low PB ratio which are often undervalued than their intrinsic value. The PB ratio measures the firm's equity which signifies the efficiency of the firm's book value in generating value to increase revenue and ability to distribute dividends.

### **2.1.2 Dividend Investment – The Dogs of the Dow (DoD) Theory**

In 1988, J.Slatter introduced The Dogs of the Dow (DoD) theory as a DY-based investment with focuses on dividend sustainability. There has been numerous research conducted to verify the feasibility and robustness of the DoD

theory. For example, Yan et al. (2015), Tissayakorn et al. (2013) and Chong and Luk (2010) shared that the DoD strategy produced greater returns in comparison with the market benchmark in Taiwan, Thailand and Hong Kong.

According to J.Slatter (1988), investors who apply the DoD approach typically use DY to rank the stocks in a selected market index as the first step. They will then create an EW portfolio with the Top10 stocks of the highest DY. The portfolio constitution needs to be adjusted annually based on the stock DY ranking in the index of the year to replace those stocks dropped off from the Top10 yield list with the newly risen stock. Eventually, the portfolio is rebalanced to ensure the same weight among the 10 stocks and be held for another year. This process is repeated on an annual basis.

In this study, we constructed the dividend portfolio with EW allocation paired with ARR approach based on DoD theory and named it as DY-EW-ARR to study the DoD performance in the Malaysia stock market. The other dividend portfolios are being applied to the MPT's optimization for stock allocation and compared against the DY-EW-ARR to study the effectiveness of MPT's optimization approach to further improve dividend portfolios. There is another DY-EW-BH portfolio which we would compare against DY-EW-ARR's performance to study the effectiveness of ARR in enhancing portfolio returns.

### **2.1.3 Efficient Market Hypothesis (EMH)**

Fama (1970) proposed that the fundamental mechanism of any stock market is based on the assumptions of market efficiency, where the stock price reflects the information and the actual value of the underlying assets of the

company. The Efficient Market Hypothesis (EMH) implies that the market can be viewed in 3 levels of efficiency.

The first level is the weak form EMH. A weak form EMH assumes that all security market information such as trading volume and price changes are fully captured and reflected by the current security prices (Reilly, 1992). Hence, the historical stock prices are of no use to derive information on the future prices (Blake, 2000). There will be opportunities available for investors to gain excess returns in the market with weak forms of EMH.

The second level is the semi strong-form EMH. It assumes the current market price has fully captured all publicly known information and will adjust rapidly to the release of information (Jensen, 1978). The favorable news will lead to stock price increase and the unfavorable news will lead to price drop, but there will no longer be any predictable price change to happen afterwards (Blake, 2000).

The third level is the strong form EMH. It assumes that information from all sources including privately available insider information will be instantaneously and fully reflected in the stock price (Reilly, 1992). A market that is strongly efficient will not have an opportunity of excess return in the long run for investors to tap on.

There is an abundance of literature that shows empirical evidence on the Malaysia stock market efficiency. Lim (1980) and Lanjong (1983) proposed that the Malaysia stock market was in a weak form of efficiency for actively traded stock in 1974 - 1980. The findings of Yakob (2001) based on the monthly data from January 1989 to March 2001 showed that Malaysia stock market was in a weak form efficiency during this period because the current stock price is not

impacted by the historical information. Worthington and Higgs (2005) also suggested the existence of weak form EMH in Asia, where this finding is also applicable to the Malaysian equity market during the period 1987 to 2003.

## **2.2 Portfolio Allocation and Optimization – MPT vs EW Strategy**

The famous Nobel laureate William F. Sharpe (1992) advocates the notion that 97% of a portfolio's return can be explained by the investment style. It is also widely accepted that the asset class allocation is the key determinant of a portfolio's performance. Harry Markowitz (1952) proposes that the stock selection and weight allocation of each stock should base not only on the individual asset's performance but also on the relationship between different assets within the portfolio. Hence, the MPT allows investors to optimize stock allocation within the portfolio using a quantitative approach by taking into consideration the expected return, volatility and relationship between stocks represented by mean, standard deviation and covariance (Markowitz, 1952). The diversification and risk avoidance concept of MPT makes it a popular approach for portfolio optimization as the mean-variance optimization process maximize the expected returns at certain risk levels or vice versa (Neha, 2022).

The following points show the assumptions of a mean-variance model under MPT (Pinate, M., & Oropeza, O., 2013):

1. The parameters that influence an investing decision are only the expected return and variance
2. All investors are risk averse and tend to select lower risk investment at certain expected return.

3. All investors share common goals of getting the greatest return at certain risk.
4. All investors share common expectations on the expected return, variance, and covariance of the stocks being studied in study.

On the other hand, while the construction of a portfolio with EW shares is relatively intuitive and simple for investors, it misses the ability to exploit the potential synergies within the portfolio and neglect the underlying risk (Hing, 2013). The research conducted by Plyakha, Uppal & Vilkov (2015) to contrast the EW portfolio against the value weighted portfolio and price weighted portfolios shows that the EW portfolio outperforms the others in terms of total mean returns. However, the outperformance is only partially due to the difference in the exposure to systematic risk factors. The key winning factor is mainly attributed to the monthly rebalancing activity.

### **2.3 Portfolio Rebalancing – BH vs ARR Approach**

According to Hing (2013), the classic BH strategy is not a good strategy even when the initial portfolio was well diversified and allocated optimally while the rebalancing approach being one of the under-used risk minimization methods. Rebalancing eliminates the irrational behavior driven by greed and fear which discipline investors to base their actions on the individual stock performance in the market – buy cheap and sell expensive instead of the other way (Hing, 2013).

The past performance of any stock might change, and there is hardly firm guarantee on the future performance based solely on the historical data. Therefore, it is crucial to adjust the model every now and then to allow flexibility and avoid overly concentration on certain assets that outperform historically

(Eun & Resnick, 2011). At the same time, Bernstein (2017) also claims the application of a periodic rebalancing approach can further redistribute the risks across several assets and better cushion the portfolio volatility. While a calendar rebalancing on an annual basis may not fully reap the benefits of risk minimization and return maximization, it is still better than BH approach (Colleen, Kinniry and Zilbering, 2015).

While portfolio rebalancing is crucial to ensure portfolio diversification and minimize volatility, portfolio reconstitution is a critical measure for the portfolio to reflect stock constituents with high market capitalization rank by adding or removing certain stocks into or from the portfolio. (Carl, 2015).



## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.1 Data Collection**

This study mainly uses secondary sources such as journals, academic studys, books and websites.

The choice of stock index in this study is the FTSE Bursa Malaysia KLCI Index, which is commonly known as KLCI. It is a major stock market index in Malaysia that traces the performance of the 30 companies with the largest market capitalization and enlisted on the Bursa Malaysia Main Board. The FTSE group and Bursa Malaysia reconstitute the KLCI indexes on a semi-annual basis (June and December) to better reflect Malaysia's financial market segment. This index is suitable for investors with low or medium risk appetite as the companies listed in this index are well-established firms that have greater possibility to pay high dividends and are more resilient to heal from individual company financial distress and business cycles.

The data of daily stock price and dividend distribution is downloaded from Yahoo! Finance website whereas the key financial performance indicators of each company are downloaded from KLSE i3investor website.

## 3.2 Portfolio Return, Expected Return, Covariance and Volatility Calculation

### 3.2.1 Portfolio Return and Expected Return

In this study, the individual stock's expected return and volatility is computed based on the mean and standard deviation of previous 5 years daily adjusted stock price data.

The portfolio value  $R_p$  is the weighted average return of the  $N$  individual portfolio's constituents where the weight applied is represented by  $X_i$ . The weight of each individual stock  $X_i$  are random variables whereas  $R_i$  is the stock return during the evaluation period.

$$R_p = \sum_{i=1}^N (X_i R_i)$$

$$R_i = \frac{S_1 - S_0}{S_0}$$

Where  $R_p$  is the portfolio value,

$R_i$  is the individual stock return,

$S_1$  is the ending adjusted stock price,

$S_0$  is the starting adjusted stock price

### 3.2.2 Portfolio Volatility and Covariance Matrix

The volatility of the stock  $i$  is a measure of returns dispersion (standard deviation) around the expected return (mean). The daily volatility of each stock is calculated based on their historical 5 years daily returns data. The annual volatility of each stock is the multiplication of daily volatility with the square root of the number of trading days per year.

$$\sigma_i = \sqrt{\sum_{j=1}^N \frac{((R_{ij} - E(R_i))^2}{N}} * \sqrt{\text{number of trading day per year}}$$

On the other hand, the annual covariance between stock j and stock k is computed with the formula below with the historical 5 years daily return data:

$$\sigma_{kj} = E [(R_{kj} - E(R_k)) (R_{kj} - E(R_j))] * \text{number of trading day per year}$$

The portfolio risk is represented as the standard deviation measure where  $X_k$  and  $X_j$  represented the respective weight of stock k and j within the portfolio

with formula 
$$\sigma_P = \sqrt{\sum_{j=1}^N (X_j^2 \sigma_j^2) + \sum_{j=1}^N \sum_{k=1, k \neq j}^N (X_j X_k \sigma_{jk}) .}$$

### 3.3 Portfolio Management Methodology

#### 3.3.1 Investment Strategy Determination for Stocks Selection and Portfolio Construction

In this study, our target audiences are retail investors with low- to medium-risk appetite and a long-term investment horizon of 5 years. The evaluation period starts from the first trading day of 2017 until the last trading day of 2021.

The first step of portfolio construction is to select stocks based on the criteria advocated by the respective investment strategy, where the portfolios adopting the value investment strategy constitute of the Top10 lowest PE ratio stocks and the Top10 lowest PB ratio stock in KLCI index of the previous year while the portfolio abide by the dividend investment strategy select the Top10 high DY stock in KLCI index of the previous year.

The PE ratio indicates the amount an investor needs to pay for the stock for each dollar earned by the company. It also indicates the market expectation of a company's growth opportunities. Meanwhile, the PB ratio measures the stock price against the book value which indicates the investors' expectation on the firm ability to produce future earnings with the firm's assets. The DY refers to the ratio of distributed incomes of the stock against the market price of the stock.

$$PE = \text{Market Value per Share} / \text{Earnings per Share}$$

$$PB = \text{Market Value per Share} / \text{Net Asset Value}$$

$$DY = \text{Annual Dividends per Share} / \text{Price per Share}$$

The maximum number of stocks for each constructed portfolio is 10 due to the consideration of investors' investment capital and lack of evidence on the diversification benefits by simply adding the number of shares within the portfolio. Raymond and Chia (2016) showed in their study that the simple addition of more stocks in portfolios in the Malaysia stock market will not result in significant diversification benefits when they applied R-squared diversification measures on randomly chosen 10 to 100 stocks. This is aligned with the findings of Elton et.al.(2013) which stated that the risk protection offered by 20 stocks with low correlation is similar to the effect of having 500 or more stocks in a portfolio. There will be around 81% risk protection in the portfolio in the event where the stock number is reduced to 8 (Elton et.al.,2013).

The constitution of those portfolios adopting the ARR approach are adjusted annually based on the stock's PE, PB and DY ranking in the index of the year to replace those stocks which have dropped off the Top10 list with the newly risen stock. Eventually, the portfolios are rebalanced to ensure the MPT optimized weight allocation or EW allocation among the 10 stocks and be held for another year. This process is repeated on an annual basis for portfolios using the ARR approach.

All portfolios in this study are hypothetical and constructed based on the following assumptions:

1. Cash contribution can only be made at the first trading day of the calendar year to construct or rebalance the portfolio using ARR approach. For portfolio using BH approach, there is only once cash contribution at the first trading day of the evaluation period.
2. All cash distributions such as dividends are reinvested into the portfolio at the first trading day of next calendar year.
3. This study upholds the homogeneous expectation assumption on the expected return, risk and covariances for all stocks within KLCI index.
4. No short selling allowed.

The Table 1.1 shows the 15 hypothetical portfolios constructed based on value and dividend investment strategy with respective stock selection criteria, portfolio allocation and annual adjustment approaches. The initial investment for each portfolio is RM10,000 with an evaluation period from 2017 – 2021.

Table 1.1 Portfolio Construction

Portfolio Type	Stock Selection	Portfolio Allocation	Portfolio Annual Adjustment Approach	Portfolio Naming Convention
PE Value Portfolio	Top 10 Lowest PE stocks from KLCI	Equal Weight	Buy-and-Hold	PE-EW-BH
		Equal Weight	Annual Reconstitution and Rebalance	PE-EW-ARR
		MPT Efficient Portfolio (EP)	Annual Reconstitution and Rebalance	PE-EP-ARR
		MPT Global Min Variance Portfolio (GMV)	Annual Reconstitution and Rebalance	PE-GMV-ARR
		MPT Tangency Portfolio (TP)	Annual Reconstitution and Rebalance	PE-TP-ARR
PB Value Portfolio	Top 10 Lowest PB stocks from KLCI	Equal Weight	Buy-and-Hold	PB-EW-BH
		Equal Weight	Annual Reconstitution and Rebalance	PB-EW-ARR
		MPT Efficient Portfolio (EP)	Annual Reconstitution and Rebalance	PB-EP-ARR
		MPT Global Min Variance Portfolio (GMV)	Annual Reconstitution and Rebalance	PB-GMV-ARR
		MPT Tangency Portfolio (TP)	Annual Reconstitution and Rebalance	PB-TP-ARR
Dividend Portfolio	Top 10 Highest DY stocks from KLCI	Equal Weight	Buy-and-Hold	DY-EW-BH
		Equal Weight	Annual Reconstitution and Rebalance	DY-EW-ARR
		MPT Efficient Portfolio (EP)	Annual Reconstitution and Rebalance	DY-EP-ARR
		MPT Global Min Variance Portfolio (GMV)	Annual Reconstitution and Rebalance	DY-GMV-ARR
		MPT Tangency Portfolio (TP)	Annual Reconstitution and Rebalance	DY-TP-ARR

Portfolio PE-EW-BH, PB-EW-BH and DY-EW-BH with the application of EW allocation approach requires stock weight allocation to be  $1/N$  where  $N$  is the number of stocks. These 3 portfolios each selected the Top10 lowest PE, PB and DY ratio stocks from 2016 KLCI index and allocated equally 10% proportion for the 10 stocks in the portfolio. There is no reconstitution and rebalancing actions applied to the portfolio over the 5 years period and the portfolio components remain constant from 2017-2021. The distributed dividends are cashed-out and not reinvested into the portfolio.

Portfolios PE-EW-ARR, PB-EW-ARR and DY-EW-ARR are subjected to the ARR performed on the first trading day of each calendar year from 2017 to 2021. In other words, these portfolio's constituents are subjected to changes annually based on KLCI index reconstitution while ensuring each stock is allocated EW of 10% portfolio value. The annually distributed dividends are collected and reinvested into the portfolio next year.

For the other 9 PE, PB and DY portfolios that apply both MPT optimization, ARR approach, the vector of expected annualized returns and covariance matrix of constituent stocks are factored into the respective MPT

optimization model with various combinations of risk and return to derive the optimized stock weight allocation for each portfolio. The annually distributed dividends are collected and reinvested into the portfolio next year.

### 3.3.2 Portfolios' Stock Allocation and Optimization

One of our key research objectives is to measure and compare the effectiveness of MPT allocation method against EW allocation method for portfolio's stock allocation.

The EW allocation approach requires stock weight allocation to be  $1/N$  where  $N$  is the number of stocks. As only 10 stocks are selected, the weight allocation for each stock in the EW portfolios is 10%.

The MPT approach uses the vector of expected returns and a covariance matrix of a set of stocks to build portfolios with various combinations of risk and return, namely efficient portfolio, tangency portfolio and minimum variance portfolios.

- Efficient Portfolio (EP): This portfolio lies on the efficient frontier and provides the greatest expected return among other portfolios

$$\text{Minimize } \sum_{j=1}^N (X_j^2 \sigma_j^2) + \sum_{j=1}^N \sum_{k=1, k \neq j}^N (X_j X_k \sigma_{jk})$$

$$\text{Subject to } (1) \sum_{i=1}^N (X_i) = 1$$

$$(2) \sum_{i=1}^N (X_i E(R_i)) \geq \mu_0$$

$\mu_0$  is the minimum expected return of investors

$$(3) X_i \geq 0 \text{ where } i = 1, 2, \dots, N$$

- Global Minimum Variance Portfolio (GMV): This portfolio lies on the efficient frontier and provides the lowest risk among other portfolios

$$\text{Minimize } \sum_{j=1}^N (X_j^2 \sigma_j^2) + \sum_{j=1}^N \sum_{k=1, k \neq j}^N (X_j X_k \sigma_{jk})$$

$$\text{Subject to } (1) \sum_{i=1}^N (X_i) = 1$$

$$(2) X_i \geq 0 \text{ where } i = 1, 2, \dots, N$$

- Tangent Portfolio (TP): This portfolio is where the capital allocation line and efficient frontier cross. It provides a maximum Sharpe ratio that focuses on excess return of the portfolio in presence of risk-free assets in the model. (Sharpe, 1964).

$$\text{Maximize } \frac{E(R_P) - R_F}{\sigma_P}$$

$$\text{Subject to } (1) \sum_{i=1}^N (X_i) = 1$$

$$(2) X_i \geq 0 \text{ where } i = 1, 2, \dots, N$$

Due to the presence of quadratic terms  $X_j^2$  and  $X_k X_j$  in the objective function, we can formulate these 3 MPT models as quadratic programming problems and apply quadratic programming to optimize the stock's weight allocation within each portfolio by either minimizing the portfolio variance or maximizing the portfolio Sharpe ratio with linear constraints specifying the lower bound of the portfolio returns. The quadratic programs have only one feasible region with an optimal solution contained within due to the linear constraints and a convex quadratic objective function (Pinate, M., & Oropeza, O., 2013). In this study, we use Microsoft Excel's Solver AddIn to perform the computation and optimize the portfolios' stock allocation with respect to MPT models.

The following screenshots shows an example of the application of quadratic programming onto the Minimum Variance Portfolio model. The excel



add-in Solver function is selected and subsequently inputted the solver parameters where the objective is to minimize the portfolio risk and the constraint is to ensure all stocks' weight is added up to 1 and non-negative. The changing variable cells are the row of stocks' weight that will be optimized using GRG Nonlinear programming method.

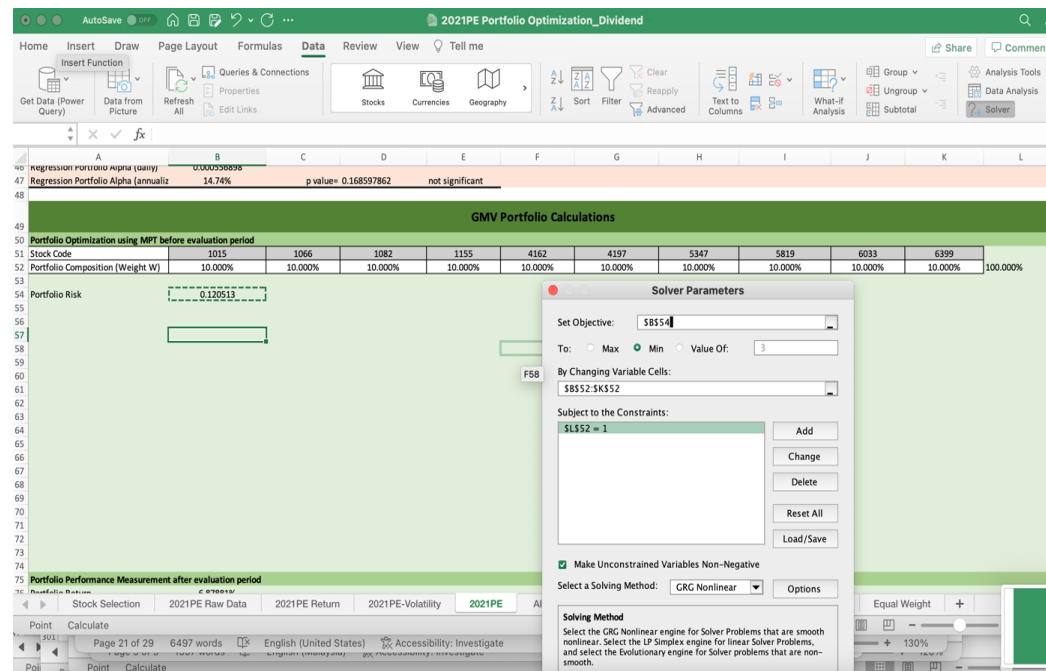


Figure 1.1 Application of Quadratic Programming to MVP model – Input Parameters

Once we run the Solver function and select the option of “Keep Solver Solution”, the values of changing variable cells are updated to reflect the optimized stock allocation within the portfolio. Each of the value is non-negative and their total value is equal to 1 which fulfill the Minimum Variance Portfolio’s constraints.

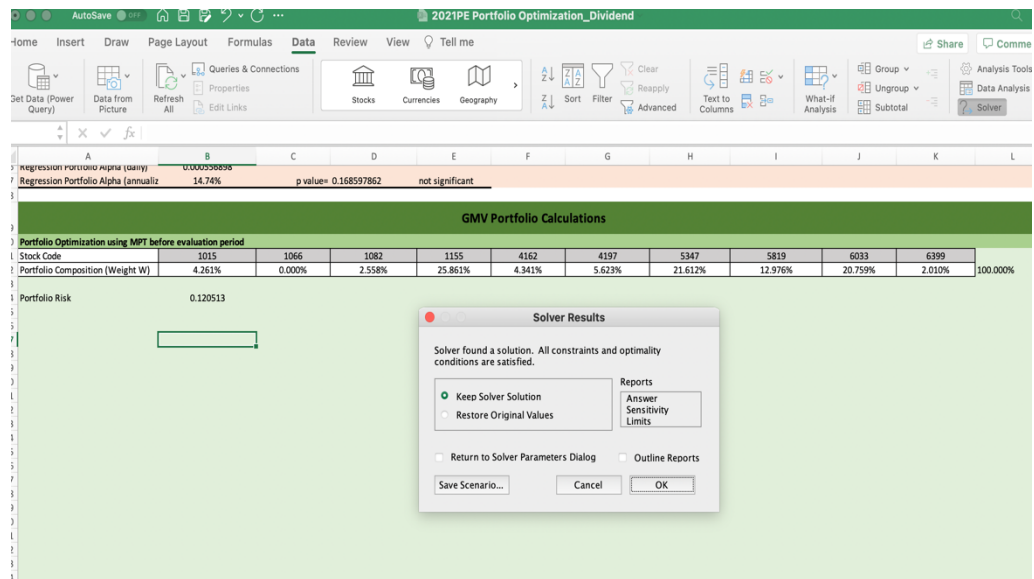


Figure 1.2 Application of Quadratic Programming to MVP model – Run Solver AddIn

### 3.3.3 Portfolio Annual Adjustment Approach

Once a portfolio is constructed, we are interested to examine whether the classic BH strategy or the annual rebalance and reconstitution approach can further improve the portfolio performance. This is due to the portfolio's risk exposure may vary based on the market condition and stock performance throughout the years.

For the portfolios applying the classic BH approach, once we perform the stock screening and selection with the defined criteria based on stock's financial performance in 2016, we construct the 2017 portfolios at the first trading day of 2017, the portfolios' constituents remain unchanged till the end of the year 2021.

On the other hand, the reconstitution and rebalancing approach is set on an annual basis interval for simplicity starting from the first trading day of 2017 until the last trading day of 2021. Each evaluation period is one calendar year.

At the beginning of each evaluation period, we perform the portfolio reconstitution approach by applying the process of deciding the stock constituents based on the previous year December's KLCI index components. Subsequently we apply the portfolio rebalancing method to ensure the weight allocation of each stock is aligned with the respective portfolio allocation methods such as EW and MPT optimization.

For example, after performing stock screening and selection with the defined criteria based on stock's financial performance in 2016, we construct the 2017 portfolios at the first trading day of 2017. The 2017 portfolio is held for a 1-year period. At the end of the last trading day of 2017, we perform the screening with similar criteria in KLCI FBM30 to decide which stock to be added to or removed from the portfolios for 2018. After that, the portfolio asset allocation and rebalancing process will be performed. This process is repeated annually until the end of the year 2021.

#### **3.3.4 Portfolios' Performance Measurement**

Eventually, we perform portfolio performance measurement to determine the portfolio return over 5 years with the following formula as stated in subsection 3.2.1.

## **CHAPTER 4**

### **RESULTS**

#### **4.1 Portfolio Constituent during 2017-2021**

In this chapter, we first present the annual constituents of each hypothetical portfolio constructed using different investment strategy and portfolio management techniques.

The annual constituents of KLCI index during 2017-2021 and the 10 stocks selected for annual reconstitution with different selection criteria are listed in the Appendix A - C.

It is important to take note that the PE, PB and DY portfolios that apply BH strategy retained the 2017 portfolio constituents throughout the 5 years period from 2017 till 2021. There is no change on annual portfolio constituents. On the other hand, the PE, PB and DY portfolios that apply ARR method have different constituents throughout the 5 years and the stock weights are rebalanced based on either EW allocation or MPT optimized approach.

Table 4.1 PE-EW-BH Result

PE-EW-BH		2017	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %
1015	AMMB HOLDINGS BHD	10%	10%
1023	CIMB GROUP HOLDINGS BERHAD	10%	10%
1066	RHB BANK BERHAD	10%	10%
1082	HONG LEONG FINANCIAL GROUP BHD	10%	10%
1155	MALAYAN BANKING BHD	10%	10%
1295	PUBLIC BANK BHD	10%	10%
3816	MISC BHD	10%	10%
4715	GENTING MALAYSIA BHD	10%	10%
5347	TENAGA NASIONAL BHD	10%	10%
5819	HONG LEONG BANK BHD	10%	10%
<b>Total Weight</b>		100%	100%
<b>Portfolio Value at start of evaluation period</b>		RM10,000.00	
<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>		RM12,278.97	
<b>5Y Portfolio Returns (%)</b>		22.79%	

Table 4.2 PE-EW-ARR Result

PE-EW-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
1015	AMMB HOLDINGS BHD	10%	10.00%	10.00%	10.00%	10.00%
1023	CIMB GROUP HOLDINGS BERHAD	10%	10.00%	10.00%	10.00%	
1066	RHB BANK BERHAD	10%	10.00%	10.00%	10.00%	10.00%
1082	HONG LEONG FINANCIAL GROUP BHD	10%	10.00%	10.00%	10.00%	10.00%
1155	MALAYAN BANKING BHD	10%	10.00%	10.00%	10.00%	10.00%
1295	PUBLIC BANK BHD	10%	10.00%			
3816	MISC BHD	10%	10.00%			
4715	GENTING MALAYSIA BHD	10%	10.00%		10.00%	
5347	TENAGA NASIONAL BHD	10%				10.00%
5819	HONG LEONG BANK BHD	10%		10.00%	10.00%	10.00%
4197	SIME DARBY BHD		10.00%	10.00%		10.00%
5183	PETRONAS CHEMICALS GROUP BHD		10.00%	10.00%		
1961	IOI CORPORATION BHD			10.00%		
6399	ASTRO MALAYSIA HOLDINGS BERHAD			10.00%	10.00%	10.00%
3182	GENTING BERHAD				10.00%	
6033	PETRONAS GAS BERHAD					10.00%
4162	BRITISH AMERICAN TOBACCO (M)				10.00%	10.00%
<b>Total Weight</b>		100%	100%	100%	100%	100%
<b>Portfolio Value at start of evaluation period</b>		RM10,000.00	RM12,120.89	RM12,172.42	RM11,984.97	RM11,250.76
<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>		RM12,100.04	RM12,300.56	RM11,922.21	RM11,297.56	RM11,602.04
<b>Annual Portfolio Returns (%)</b>		21.00%	1.48%	-2.06%	-5.74%	3.12%
<b>5Y Portfolio Returns (%)</b>		16.02%				

Table 4.3 PE-GMV-ARR Result

PE-GMV-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
1015	AMMB HOLDINGS BHD	10.769%	10.75%	10.526%	8.849%	4.261%
1023	CIMB GROUP HOLDINGS BERHAD					
1066	RHB BANK BERHAD	1.684%	2.04%	4.063%	6.346%	
1082	HONG LEONG FINANCIAL GROUP BHD	0.627%	3.09%	3.209%	7.589%	2.558%
1155	MALAYAN BANKING BHD	10.515%	13.27%	27.246%	38.104%	25.861%
1295	PUBLIC BANK BHD	44.565%	57.55%			
1961	IOI CORPORATION BHD			12.318%		
3182	GENTING BERHAD				1.674%	
3816	MISC BHD	3.245%	6.09%			
4162	BRITISH AMERICAN TOBACCO (M)				4.510%	4.341%
4197	SIME DARBY BHD		2.58%	1.594%		5.623%
4715	GENTING MALAYSIA BHD		0.16%		1.558%	
5183	PETRONAS CHEMICALS GROUP BHD		4.47%	11.208%		
5347	TENAGA NASIONAL BHD	7.902%				21.612%
5819	HONG LEONG BANK BHD	20.693%		28.057%	27.977%	12.976%
6033	PETRONAS GAS BERHAD					20.759%
6399	ASTRO MALAYSIA HOLDINGS BERHAD			1.779%	3.394%	2.010%
	<b>Total Weight</b>	100%	100%	100%	100%	100%
	<b>Portfolio Value at start of evaluation period</b>	RM10,000.00	RM11,561.93	RM13,213.01	RM12,748.75	RM12,969.64
	<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>	RM11,582.54	RM13,290.23	RM12,667.58	RM13,033.81	RM13,411.54
	<b>Annual Portfolio Returns (%)</b>	15.83%	14.95%	-4.13%	2.24%	3.41%
	<b>5Y Portfolio Returns (%)</b>			34.12%		

Table 4.4 PE-TP-ARR Result

PE-TP-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
1295	PUBLIC BANK BHD	62.996%	72.719%			
5347	TENAGA NASIONAL BHD	35.356%				
5819	HONG LEONG BANK BHD	1.648%		76.682%	60.029%	55.027%
1155	MALAYAN BANKING BHD		0.109%		39.971%	44.973%
3816	MISC BHD		20.501%			
4715	GENTING MALAYSIA BHD		6.670%			
5183	PETRONAS CHEMICALS GROUP BHD			23.318%		
	<b>Total Weight</b>	100%	100%	100%	100%	100%
	<b>Portfolio Value at start of evaluation period</b>	RM10,000.00	RM11,096.09	RM12,383.09	RM10,714.82	RM11,369.48
	<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>	RM11,124.77	RM12,464.13	RM10,696.97	RM11,357.08	RM12,018.48
	<b>Annual Portfolio Returns (%)</b>	11.25%	12.33%	-13.62%	5.99%	5.71%
	<b>5Y Portfolio Returns (%)</b>			20.18%		

Table 4.5 PE-EP-ARR Result

PE-EP-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
5347	TENAGA NASIONAL BHD	100.000%				
3816	MISC BHD		100.00%			
5819	HONG LEONG BANK BHD				100.00%	100.00%
1155	MALAYAN BANKING BHD			100.00%		
	<b>Total Weight</b>	100%	100%	100%	100%	100%
	<b>Portfolio Value at start of evaluation period</b>	RM10,000.00	RM11,498.13	RM10,649.91	RM10,965.35	RM11,941.39
	<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>	RM11,526.22	RM10,894.95	RM10,815.14	RM11,820.23	RM12,419.31
	<b>Annual Portfolio Returns (%)</b>	15.26%	-5.25%	1.55%	7.80%	4.00%
	<b>5Y Portfolio Returns (%)</b>			24.19%		

Table 4.6 PB-EW-BH Result

PB-EW-BH		2017	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %
1015	AMMB HOLDINGS BHD	10%	10%
1023	CIMB GROUP HOLDINGS BERHAD	10%	10%
1066	RHB BANK BERHAD	10%	10%
1082	HONG LEONG FINANCIAL GROUP BHD	10%	10%
1155	MALAYAN BANKING BHD	10%	10%
3182	GENTING BERHAD	10%	10%
3816	MISC BHD	10%	10%
4065	PBB GROUP BHD	10%	10%
4677	YTL CORPORATION BHD	10%	10%
5235SS	KLCC PROP&REITS-STAPLED SEC	10%	10%
	<b>Total Weight</b>	100%	100%
	<b>Portfolio Value at start of evaluation period</b>	RM10,000.00	
	<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>	RM11,385.34	
	<b>Annual Portfolio Returns (%)</b>	13.85%	

Table 4.7 PB-EW-ARR Result

PB-EW-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
1015	AMMB HOLDINGS BHD	10%	10.00%	10.00%	10.00%	10.00%
1023	CIMB GROUP HOLDINGS BERHAD	10%		10.00%	10.00%	10.00%
1066	RHB BANK BERHAD	10%	10.00%	10.00%	10.00%	10.00%
1082	HONG LEONG FINANCIAL GROUP BHD	10%	10.00%		10.00%	10.00%
1155	MALAYAN BANKING BHD	10%				
3182	GENTING BERHAD	10%	10.00%	10.00%	10.00%	10.00%
3816	MISC BHD	10%	10.00%	10.00%	10.00%	10.00%
4065	PBB GROUP BHD	10%	10.00%			
4677	YTL CORPORATION BHD	10%	10.00%	10.00%	10.00%	10.00%
5235SS	KLCC PROP&REITS-STAPLED SEC	10%	10.00%	10.00%	0.00%	10.00%
3336	IJM CORPORATION BHD		10.00%	10.00%	10.00%	10.00%
4197	SIME DARBY BHD		10.00%	10.00%	10.00%	10.00%
4715	GENTING MALAYSIA BHD			10.00%	10.00%	0.00%
	<b>Total Weight</b>	100%	100%	100%	100%	100%
	<b>Portfolio Value at start of evaluation period</b>	RM10,000.00	RM11,282.43	RM9,686.35	RM10,883.10	RM9,645.27
	<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>	RM11,659.03	RM11,491.37	RM10,802.82	RM9,778.02	RM9,877.15
	<b>Annual Portfolio Returns (%)</b>	16.59%	1.85%	11.53%	-10.15%	2.40%
	<b>5Y Annual Portfolio Returns (%)</b>			-1.23%		

Table 4.8 PB-GMV-ARR Result

PB-GMV-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
1015	AMMB HOLDINGS BHD	18.07%	15.51%	15.32%	12.983%	6.87%
1023	CIMB GROUP HOLDINGS BERHAD			4.34%	5.687%	
1066	RHB BANK BERHAD	5.81%	5.10%	8.32%	11.482%	7.16%
1082	HONG LEONG FINANCIAL GROUP BHD	7.79%	6.06%		24.911%	12.94%
1155	MALAYAN BANKING BHD	32.17%				
3182	GENTING BERHAD	0.15%		6.55%	4.319%	
3816	MISC BHD	6.73%	9.70%	16.12%	20.113%	17.20%
4065	PBB GROUP BHD	9.86%	11.26%			
4677	YTL CORPORATION BHD	5.35%	8.10%	4.46%	5.632%	3.53%
5235SS	KLCC PROP&REITS-STAPLED SEC	14.08%	20.14%	29.48%		42.45%
3336	IJM CORPORATION BHD		13.20%	4.12%	2.535%	
4197	SIME DARBY BHD		10.94%	8.11%	8.392%	9.85%
4715	GENTING MALAYSIA BHD			3.18%	3.946%	
	<b>Total Weight</b>	100%	100%	100%	100%	100%
	<b>Portfolio Value at start of evaluation period</b>	RM10,000.00	RM11,423.76	RM10,069.96	RM11,189.93	RM10,020.98
	<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>	RM11,619.90	RM11,083.79	RM11,149.49	RM10,532.69	RM9,987.41
	<b>Annual Portfolio Returns (%)</b>	16.20%	-2.98%	10.72%	-5.87%	-0.34%
	<b>5Y Annual Portfolio Returns (%)</b>			-0.13%		

Table 4.9 PB-TP-ARR Result

PB-TP-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
1023	CIMB GROUP HOLDINGS BERHAD					
1066	RHB BANK BERHAD					
1082	HONG LEONG FINANCIAL GROUP BHD	0.47%	4.80%			27.09%
1155	MALAYAN BANKING BHD					
3182	GENTING BERHAD					
3816	MISC BHD	10.41%	26.83%	17.59%	100.00%	
4065	PBB GROUP BHD		6.38%			
4677	YTL CORPORATION BHD					
5235SS	KLCC PROP&REITS-STAPLED SEC	89.12%	45.06%	82.41%		72.91%
3336	IJM CORPORATION BHD		1.35%			
4197	SIME DARBY BHD		15.58%			
	<b>Total Weight</b>	100%	100%	100%	100%	100%
	<b>Portfolio Value at start of evaluation period</b>	RM10,000.00	RM10,540.73	RM10,180.45	RM11,387.52	RM9,396.59
	<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>	RM11,402.16	RM10,757.32	RM11,423.14	RM9,607.75	RM9,143.98
	<b>Annual Portfolio Returns (%)</b>	14.02%	2.05%	12.21%	-15.63%	-2.69%
	<b>5Y Annual Portfolio Returns (%)</b>			-8.56%		

Table 4.10 PB-EP-ARR Result

PB-EP-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
3816	MISC BHD				100.000%	
4677	YTL CORPORATION BHD					
5235SS	KLCC PROP&REITS-STAPLED SEC	100.00%	100.00%	100.00%		100.00%
4197	SIME DARBY BHD					
	<b>Total Weight</b>	100%	100%	100%	100%	100%
	<b>Portfolio Value at start of evaluation period</b>	RM10,000.26	RM10,508.20	RM10,688.53	RM11,451.40	RM9,455.79
	<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>	RM11,475.41	RM10,655.74	RM11,524.34	RM9,666.86	RM9,174.87
	<b>Annual Portfolio Returns (%)</b>	14.75%	1.40%	7.82%	-15.58%	-2.97%
	<b>5Y Annual Portfolio Returns (%)</b>			-8.25%		

Table 4.11 DY-EW-BH Result



DY-EW-BH		2017	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %
1023	CIMB GROUP HOLDINGS BERHAD	10%	10%
1155	MALAYAN BANKING BHD	10%	10%
3034	HAP SENG CONSOLIDATED BHD	10%	10%
3816	MISC BHD	10%	10%
4162	BRITISH AMERICAN TOBACCO (M)	10%	10%
4677	YTL CORPORATION BHD	10%	10%
4863	TELEKOM MALAYSIA BHD	10%	10%
5235SS	KLCC PROP&REITS-STAPLED SEC	10%	10%
6399	ASTRO MALAYSIA HOLDINGS BERHAD	10%	10%
6947	DIGI.COM BHD	10%	10%
	<b>Total Weight</b>	100%	100%
	<b>Portfolio Value at start of evaluation period</b>	RM10,000.00	
	<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>	RM9,785.66	
	<b>5Y Portfolio Returns (%)</b>	-2.14%	

Table 4.12 DY-EW-ARR Result

DY-EW-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
1023	CIMB GROUP HOLDINGS BERHAD	10%		10.00%	10.00%	
1155	MALAYAN BANKING BHD	10%	10.00%	10.00%	10.00%	10.00%
3034	HAP SENG CONSOLIDATED BHD	10%				
3816	MISC BHD	10%	10.00%	10.00%		10.00%
4162	BRITISH AMERICAN TOBACCO (M)	10%	10.00%	10.00%	10.00%	10.00%
4677	YTL CORPORATION BHD	10%				
4863	TELEKOM MALAYSIA BHD	10%				
5235SS	KLCC PROP&REITS-STAPLED SEC	10%	10.00%	10.00%	10.00%	10.00%
6399	ASTRO MALAYSIA HOLDINGS BERHAD	10%	10.00%	10.00%	10.00%	10.00%
6947	DIGI.COM BHD	10%	10.00%	10.00%		10.00%
1015	AMMB HOLDINGS BHD		10.00%		10.00%	
4715	GENTING MALAYSIA BHD		10.00%	10.00%	10.00%	10.00%
5246	WESTPORTS HOLDINGS BERHAD		10.00%			
5681	PETRONAS DAGANGAN BHD		10.00%			
5347	TENAGA NASIONAL BHD			10.00%	10.00%	10.00%
6033	PETRONAS GAS BERHAD			10.00%	10.00%	10.00%
1066	RHB BANK BERHAD				10.00%	
4197	SIME DARBY BHD					10.00%
	<b>Total Weight</b>	100%	100%	100%	100%	100%
	<b>Portfolio Value at start of evaluation period</b>	RM10,000.00	RM10,973.67	RM10,003.20	RM10,106.01	RM9,383.19
	<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>	RM11,262.57	RM10,070.12	RM10,049.90	RM9,443.61	RM9,957.61
	<b>Annual Portfolio Returns (%)</b>	12.63%	-8.23%	0.47%	-6.55%	6.12%
	<b>5Y Portfolio Returns (%)</b>			-0.42%		

Table 4.13 DY-GMV-ARR Result

DY-GMV-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
1023	CIMB GROUP HOLDINGS BERHAD	0.844%		0.178%		
1155	MALAYAN BANKING BHD	24.998%	20.49%	24.474%	25.453%	15.30%
3034	HAP SENG CONSOLIDATED BHD	11.938%				
3816	MISC BHD	4.412%	8.78%	6.122%		7.38%
4162	BRITISH AMERICAN TOBACCO (M)	6.010%	4.75%	4.694%	3.801%	2.78%
4677	YTL CORPORATION BHD	4.027%				
4863	TELEKOM MALAYSIA BHD	23.903%				
5235SS	KLCC PROP&REITS-STAPLED SEC	11.715%	16.27%	17.987%	22.382%	28.44%
6399	ASTRO MALAYSIA HOLDINGS BERHAD	1.685%	3.14%	1.166%	1.661%	1.07%
6947	DIGI.COM BHD	10.468%	14.77%	9.276%		10.53%
1015	AMMB HOLDINGS BHD		12.73%	0.00%	8.165%	0.00%
4715	GENTING MALAYSIA BHD		1.02%	1.921%	1.951%	0.00%
5246	WESTPORTS HOLDINGS BERHAD		7.26%			
5681	PETRONAS DAGANGAN BHD		10.79%			
5347	TENAGA NASIONAL BHD			22.578%	18.460%	14.76%
6033	PETRONAS GAS BERHAD			11.603%	13.232%	15.00%
1066	RHB BANK BERHAD				4.895%	0.00%
4197	SIME DARBY BHD					4.75%
<b>Total Weight</b>		100.000%	100.000%	100.000%	100.000%	100.000%
<b>Portfolio Value at start of evaluation period</b>		RM10,000.00	RM11,067.84	RM10,936.60	RM11,216.95	RM10,730.87
<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>		RM11,368.03	RM11,030.97	RM11,147.93	RM10,812.47	RM11,049.34
<b>Annual Portfolio Returns (%)</b>		13.68%	-0.33%	1.93%	-3.61%	2.97%
<b>5Y Portfolio Returns (%)</b>				10.49%		

Table 4.14 DY-TP-ARR Result

DY-TP-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
1155	MALAYAN BANKING BHD			2.42%	34.88%	53.77%
3034	HAP SENG CONSOLIDATED BHD	61.22%				
3816	MISC BHD		29.61%	10.72%		
4715	GENTING MALAYSIA BHD		6.00%			
4863	TELEKOM MALAYSIA BHD	6.10%				
5235SS	KLCC PROP&REITS-STAPLED SEC	27.93%	50.24%	65.44%	65.12%	46.23%
6947	DIGI.COM BHD	4.75%				
5246	WESTPORTS HOLDINGS BERHAD		14.14%			
5347	TENAGA NASIONAL BHD			21.42%		
<b>Total Weight</b>		100%	100%	100%	100%	100%
<b>Portfolio Value at start of evaluation period</b>		RM10,000.00	RM10,957.61	RM10,502.81	RM11,452.73	RM11,049.22
<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>		RM11,237.68	RM10,549.31	RM11,473.67	RM11,157.29	RM11,363.92
<b>Annual Portfolio Returns (%)</b>		12.38%	-3.73%	9.24%	-2.58%	2.85%
<b>5Y Portfolio Returns (%)</b>				13.64%		

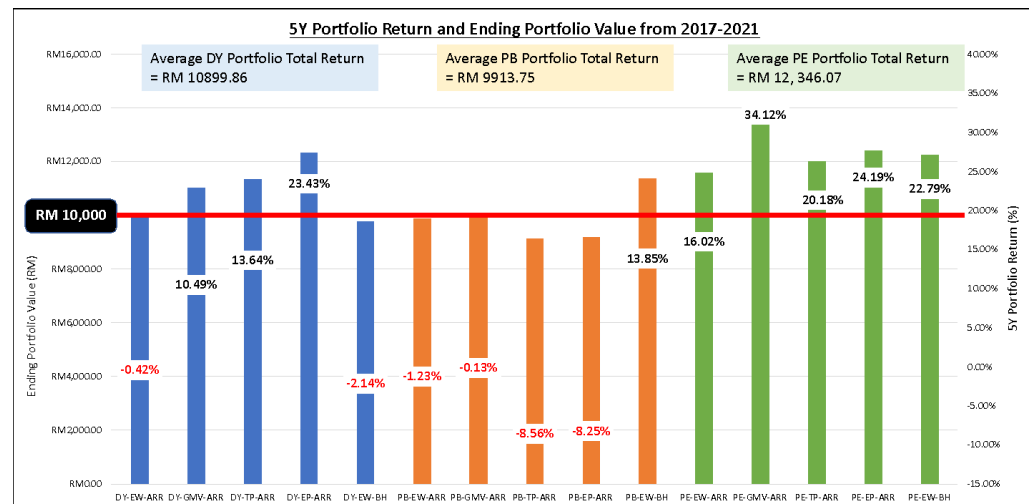
Table 4.15 DY-EP-ARR Result

DY-EP-ARR		2017	2018	2019	2020	2021
Stock Code	Stock Name	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %	Stock Allocation %
1155	MALAYAN BANKING BHD					100.00%
3034	HAP SENG CONSOLIDATED BHD	100.000%				
5235SS	KLCC PROP&REITS-STAPLED SEC		100.00%	100.00%	100.00%	
<b>Total Weight</b>		100%	100%	100%	100%	100%
<b>Portfolio Value at start of evaluation period</b>		RM10,000.00	RM11,222.53	RM11,415.12	RM12,237.99	RM11,450.14
<b>Portfolio Total Value at end of evaluation period (Include dividend)</b>		RM11,181.32	RM11,380.10	RM12,308.02	RM11,537.68	RM12,342.76
<b>Annual Portfolio Returns (%)</b>		11.81%	1.40%	7.82%	-5.72%	7.80%
<b>5Y Portfolio Returns (%)</b>				23.43%		

## 4.2 5Y Portfolio Total Returns

Figure 1.3 shows the total portfolio value and the 5Y return percentage of the 15 hypothetical portfolios studied in this study.

Figure 1.3 5Y Portfolio Returns from 2017-2021



With respect to our first research objective to measure and evaluate the performance of value portfolios and dividend portfolios in Malaysia stock market during 2017-2021, we can summarize the 5Y total portfolio returns in the following:

- For all the 5 DY dividend portfolios, the 5Y average total returns is RM 10,899.86 with 9% average return increment. The range of 5Y returns percentage range between -2.14% to 23.43%.
- For all the 5 PB value portfolios, the 5Y average total returns is RM 9,913.75 with 0.8% average return decrease. The range of 5Y returns percentage range between -8.56% to 13.85%.
- For all the 5 PE value portfolios, the 5Y average total returns is RM 12,346.07 with 23.46% average return increment. The range of 5Y returns percentage range between 16.02% to 34.12%.

Hence, we conclude that during 2017-2021 the PE value portfolios perform the best in the Malaysia stock market with all PE portfolios generating positive returns during the evaluation period, subsequently followed by dividend portfolios and lastly by PB value portfolios.

Next, we rank all 15 portfolios according to their total portfolio value and 5Y return percentage over 2017-2021, which is shown in Table 1.17.

Table 4.16 5Y Portfolio Value and Return

Portfolio	Initial Portfolio Value in 2017	Final Portfolio Value in 2021	5Y Return	Rank
PE-GMV-ARR	RM10,000.00	RM13,411.54	34.12%	1
PE-EP-ARR	RM10,000.00	RM12,419.31	24.19%	2
DY-EP-ARR	RM10,000.00	RM12,342.76	23.43%	3
PE-EW-BH	RM10,000.00	RM12,278.97	22.79%	4
PE-TP-ARR	RM10,000.00	RM12,018.48	20.18%	5
PE-EW-ARR	RM10,000.00	RM11,602.04	16.02%	6
PB-EW-BH	RM10,000.00	RM11,385.34	13.85%	7
DY-TP-ARR	RM10,000.00	RM11,363.92	13.64%	8
DY-GMV-ARR	RM10,000.00	RM11,049.34	10.49%	9
PB-GMV-ARR	RM10,000.00	RM9,987.41	-0.13%	10
DY-EW-ARR	RM10,000.00	RM9,957.61	-0.42%	11
PB-EW-ARR	RM10,000.00	RM9,877.15	-1.23%	12
DY-EW-BH	RM10,000.00	RM9,785.66	-2.14%	13
PB-EP-ARR	RM10,000.00	RM9,174.87	-8.25%	14
PB-TP-ARR	RM10,000.00	RM9,143.98	-8.56%	15

The Top3 best performing portfolios over 2017-2021 are the PE and DY portfolios with the application of MPT optimization paired with ARR method with 5Y returns range between 23.43% to 34.12%.

All PE portfolios generate high positive returns over 2017-2021 where all 3 MPT optimized portfolios generate 5Y returns above 20%. The other 2 EW portfolios also produce high 5Y returns of 16.02% and 22.79% which outperform majority dividend portfolios and beat all PB portfolios.

For dividend portfolios, all MPT optimized portfolios outperform the EW portfolios. We can see that the MPT optimized DY portfolios generate positive 5Y returns above 10.49% while all EW DY portfolios produced negative 5Y returns.

For PB portfolio categories, the PB-EW-BH portfolio performs the best and is the only portfolio that generates positive 5Y returns in comparison with other 4 PB portfolios that produces negative 5Y returns.

In accordance with our second research objective to examine the effectiveness of MPT optimization in the Malaysia stock market, we can conclude that the MPT optimization is a feasible approach to further improve the PE value and dividend portfolios' return in the long term. However, cautions must be exercised to apply this approach upon PB value portfolio as the PB-EW-BH portfolio with EW stock allocation approach outperforms the other 4 PB value portfolios in this study.

Apart from that, we also observe that PE and DY portfolios that applied ARR strategy paired with MPT optimization approach generally outperform all portfolios using BH strategy regardless of EW or MPT portfolio allocation approach. On the contrary, the application of MPT and ARR does not contribute to the PB value portfolios' excess return.

Hence, with respect to our 3<sup>rd</sup> research objective to investigate the effectiveness of annual portfolio reconstitution and rebalancing strategies in portfolio management in comparison with the classic BH approach, we conclude that the ARR strategy paired with MPT optimization approach generally outperforms the BH strategy regardless of portfolio allocation approach for PE value and dividend investing. However, the PB value investing is more suitable to apply the EW and BH approach.

## **CHAPTER 5**

### **DISCUSSION**

The main objective of this study is to study whether dividend and value investment strategies are effective in the Malaysia stock market during 2017-2021 by comparing the 5-year portfolio returns.

It's important to note the significant events in 2018 that contributed to the poor performance of not only KLCI index but Malaysia's overall stock market. In 2018, KLCI ended up losing 5.91% due to domestic political uncertainties with the unexpected victory of Pakatan Harapan (PH) in the 14th general election as well as the rising US interest rate and growing trade tensions between US and China.

The research outcomes affirms that the strategy to select stocks with the Top10 lowest PE ratio, Top10 lowest PB ratio and Top10 highest DY ratio in KLCI index works well in Malaysia's stock market regardless of the stock market turbulences where 9 out of the 15 hypothetical portfolios deliver positive double digits portfolio returns throughout 2017-2021. Among these 3 stock selection criteria, PE ratio serves as the best indicator to construct portfolios that deliver high returns in the long term. This matches the study carried out by Thalmann (2016) on the PE effect in the Swiss stock market during 2005-2015 which showed that the low PE portfolios were able to generate significant excess

returns and outperform high PE ratio stocks. Apart from that, it further reaffirms the proposition of Shafana et. al (2013) who advocated investors to buy low PE stocks that are perceived to produce greater increment in stock price and subsequently higher expected returns.

At the same time, the application of MPT optimization and ARR approaches helps PE value portfolios and dividend portfolios to deliver substantial excess returns with consistent capital appreciation and dividend incomes throughout the evaluation period. However, these approaches are not effective for PB value portfolios to deliver excess return.

While this study presents affirmation that the PE, PB and DY are adequate ratios for screening performing stocks in the Malaysia stock market, the market capitalization also serves as an important determining factor. Market capitalization is the total value of the stocks by the multiplication of outstanding stocks with the stock closing price. A high market capitalization rank indicates the high price of outstanding stock which poses great potential to generate high returns to the investors (Menaje, 2012). This in turns creates a greater demand from investors to purchase the stock and further increase the stock price which can generate excess returns in the form of capital gain.

The selection of Top10 stocks from KLCI index with respect to PB, PE and DY ratio serves as a good starting point and builds a robust foundation for the subsequent application of portfolio allocation approaches as these 10 stocks are among the Top30 stocks with the greatest market capitalization in Malaysia stock market. This is supported by the claims of Pavone (2019) on the positive relationship between market capitalization and PE ratio, working capital per share and operating income per share in his study. The working capital per share

refers to the equity value of a company which is closely linked with PB ratio that measures a company's share price over its book value. At the same time, the operating income per share is linked with DY as a high profitability business tends to provide steady distribution of dividend to its shareholders.

Hence, the ARR approach is playing a critical role to ensure that addition of stocks that are not only aligning to this stock selection strategy but also with high market capitalization rank that better reflect the market confidence in the stock and the company's net worth on an annual basis. While portfolio rebalancing is crucial to ensure portfolio diversification and minimize volatility, portfolio reconstitution is a critical measure for the portfolio to reflect stock constituents with high market capitalization rank by adding or removing certain stocks into or from the portfolio. (Carl, 2015).

On Top of that, the combination of MPT's optimization approach with ARR strategy have generated the greatest returns among the constructed hypothetical portfolios for PE value and dividend portfolios. This shows the MPT's optimization is a feasible approach to further maximize the portfolio returns even during bearish market conditions. Kan (2017) showed that the application of MPT's optimization in Malaysia stock market during 2011-2016 produced better risk-adjusted returns in comparison with the EW portfolios and even protected the investors from the macro downtrend during 2014 bearish market. This also coincides with the findings of Raymond and Chia (2016) that the active portfolio strategy with MPT's optimization approach outperforms the passive portfolio strategy in Malaysia stock market. The application of MPT allows investors to optimize stock allocation within the portfolio in a quantitative manner with focuses on the expected return, volatility and relationship between



stocks represented by mean, standard deviation and covariance to maximize expected returns at certain risk or minimize risk at certain expected returns (Markowitz, 1952).

Lastly, the results presented in this study have reaffirmed the theory of weak market efficiency in the Malaysia stock market where there are opportunities for investors to profit from the stock market pricing mechanism over the long term. This result is aligned with the findings by Lim (1980), Yakob (2001), Worhington and Higgs (2005) on EMH which show that the Malaysia stock market is in the weak form efficiency, and hence the occurrence of stocks' mispricing that explains the realization of excess returns due to capital appreciation when the stock prices are corrected by the market in the long run.

## CHAPTER 6

### CONCLUSION AND RECOMMENDATIONS

#### 6.1 Conclusion

Overall, this study presents findings that show the strategy to select stocks with the Top10 lowest PE ratio, Top10 lowest PB ratio and Top10 highest DY ratio in KLCI index works well in Malaysia's stock market regardless of the stock market turbulences where 9 out of the 15 hypothetical portfolios deliver positive double digits portfolio returns throughout 2017-2021. Among these 3 stock selection criteria of PE, PB and DY ratio to pick 10 stocks from KLCI index, the PE ratio outperforms the other 2 criteria in constructing the best performing portfolios.

The application of MPT optimization and ARR approaches enables PE value portfolios and dividend portfolios to deliver substantial excess returns throughout the evaluation period. On the other hand, the application of EW portfolio allocation approach and BH strategy is more suitable for value portfolios as both PE and PB value portfolios adopting these approaches outperform the EW and BH dividend portfolios which deliver negative 5Y returns in this study.

The research outcome further affirms that the active investment strategy outperforms the passive investment strategy in Malaysia stock market which is

in the form of weak efficiency where investors have opportunity to gain excess returns from investing.

## **6.2 Recommendations for Future Research**

This study is limited to the 30 companies listed on the FTSE KLCI index whose data such as stock price and financial ratios are available during the year 2016 to 2021. Apart from that, the 15 hypothetical portfolios constructed in this study focuses solely on PE, PB and DY ratios from an academic value and dividend investment perspective.

Hence, we recommend the future research to select a bigger market index and include other criteria such as the company's business and financial fundamentals such as earning growth, cash flow, competitive advantages and intrinsic value during stock selection and allocation (Hanson, 2013).

We also recommend the future research to apply more sophisticated portfolio rebalancing methods other than the simple annual rebalancing applied in this study to investigate whether the frequency of rebalancing can further improve the portfolio performance.

## REFERENCES

- Arnold, G., 2008. *Corporate Financial Management*. 4<sup>th</sup> ed. Pearson Education limited.
- Athanassakos, G., 2009. Value versus growth stock returns and the value premium: the canadian experience 1985-2005. *Canadian Journal Of Administrative Sciences*, 26(2), pp.109-121.
- Bernstein, W., 2017. *The intelligent asset allocator: how to build your portfolio to maximize returns and minimize risk*. New York: McGraw-Hill.
- Blake, D., 2000. *Financial Market Analysis*. 2nd Ed, West Sussex: John Wiley & Sons.
- Carl, U., 2015. Understanding Rebalancing and Portfolio Reconstitution. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2915442>
- Chong, T. T., and Luk, K. K., 2010. Does the Dogs of the Dow Strategy Work Better in Blue Chips. *Applied Economics Letters*, pp.1173-75. <https://doi.org/10.1080/17446540902845495>.
- Chun, W. W., & Ming, L. M., 2009. Investor behavior and decision-making style: a Malaysian perspective. *Banker's Journal Malaysia*, vol. 133, pp. 3-13.
- Colleen, J., Kinniry, F. and Zilbering, Y., 2015. Best Practices for Portfolio Rebalancing. Available at < <https://www.financieelonafhankelijkblog.nl/wp-content/uploads/2021/11/Vanguard-ISGPORE.pdf>> [Accessed: October 11, 2022].
- Elton, E. J., Brown, S. J., Goetzmann, W. N. and Gruber, M. J., 2013. *Modern portfolio theory and investment analysis*. 9<sup>th</sup> edn. New York: John Wiley & Sons.
- Eun, C., & Resnick, B., 2011, *International financial management (Mcgraw-hill/Irwin series in finance, insurance, and real estate)*. 6th edn. New York: McGraw-Hill/Irwin.
- Hanson, D., 2013, ESG investing in Graham & Doddsville. *Journal of Applied Corporate Finance* 25(3), pp. 20-31.
- Hing, M., 2013. *The pragmatic investor*. 5th edn. British Columbia: Aptus Communications Inc.
- Fama, E.F., 1970. Efficient Capital Markets: A Review of Theory and Empirical Work, Blackwell Publishing for the American Finance Association. *Journal of Finance*, 25(2), pp. 383-417.

- Fama, E., French K., 1992. The Cross-Section of Expected Stock Returns. *The Journal of Finance*, Vol. 2, pp. 427-465.
- Jensen, M., 1978. Some Anomalous Evidence Regarding Market Efficiency, *Journal of Financial Economics*, 6, pp. 95-101.
- Kan, Y. Y., 2017. Is portfolio optimization worthwhile? A study in Malaysia. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4085989>
- Lakonishok, J., Shleifer, A., Vishny, R., 1994. Contrarian Investment, Extrapolation, and Risk. *Journal of Finance*, 49, pp.1541-1578.
- Lanjong, M.N., 1983. A study of Market Efficient and Risk Return Relationship in the Malaysian Capital Market. Ph.D. Thesis. Leuven: Catholic University of Leuven.
- Lim, T.L., 1980. The Efficient Market Hypothesis and Weak Form Test on the KLSE. MBA dissertation. Sheffield: University of Sheffield.
- Markowitz, H., 1952. Portfolio selection, *The Journal of Finance*, 71(1), pp. 77-91, DOI: <https://doi.org/10.2307/2975974>.
- Menaje, P. M., 2012. Impact of Selected Financial Variables on Share Price of Publicly Listed Firms in The Philippines. *American International Journal of Contemporary Research*, 2(9).
- Neha, J., Akash, R. M., Vikash, D., Paramesh, R. (2022). Mean Variance Optimization and Momentum Investing. *International Journal of Engineering Reseach & Technology (IJERT)*, 11(6).
- Reilly, F., 1992. *Investments*. 3rd Ed, Orlando: The Dryden Press.
- Pavone, P., 2019. Market Capitalization and Financial Variables: Evidence from Italian Listed Companies. *International Journal of Academic Research Business and Social Sciences*, 9(3), pp. 1356–1371.
- Pinate, M., & Oropeza, O., 2013. Portfolio Construction & Modern Portfolio Theory. Honor's thesis. University of Florida.
- Plyakha, Y., Uppal, R. & Vilkov, G., 2015. *Why Does an Equal-Weighted Portfolio Outperform Value- and Price-Weighted Portfolio*.
- Raymond.L. L. B., & Chia, J. Y., 2016. Portfolio Diversification Strategy in the Malaysian Stock Market. *Capital Markets Review*, Vol. 24, No. 1, pp. 38-67.
- Shafana, M.A.C.N., Rimziya, A.F., and Jariya, A.I. 2013. Relationship between stock returns and firm size, and book-to-market equity: Empirical evidence from selected companies listed on Milanka Price Index in Colombo

Stock Exchange. *Journal of Emerging Trends in Economics and Management Sciences*, 4(2), pp. 217- 225.

Slatter, J., 1988. 'Study of industrial averages finds stocks with high dividends are big winners', *Wall Street Journal*, Eastern edn.

Sharpe, W.F., 1964. 'Capital asset prices: A theory of market equilibrium under conditions of risk', *Journal of Finance*, vol.19, pp. 425-442.

Sharpe, W.F., 1992. 'Asset allocation: Management style and performance measurement', *Journal of Portfolio Management*, pp. 7-19.

Surendran, S., 2021. 'An exceptional year for retail investors', *The Edge Markets*, 30 March. Available at: <<https://www.theedgemarkets.com/article/exceptional-year-retail-investors>> [Accessed: October 11, 2022].

Thalmann, G.L., 2016. 'The performance of SPI stocks in relation to their PE ratios', Zurich University of Applied Science ZHAW. DOI: <https://doi.org/10.21256/zhaw-1260>.

Tissayakorn, K. et al., 2013. 'A study on effectiveness of the Dogs of the Dow strategy for the Thai stock investment', *International Journal of Innovation, Management and Technology*, Vol. 4, Issue 2, pp. 277-80. DOI: <https://doi.org/10.7763/IJIMT.2013.V4.406>.

Worthington, A. & Higgs, H., 2005. 'Weak-form Market Efficiency in Asian Emerging and Developed Equity Markets: Comparative Tests of Random Walk Behavior', *University of Wollongong, School of Accounting and Finance Working Paper Series*, Vol. 5, Issue 3.

Yakob, N., 2001. Monetary Uncertainty and Stock Prices: The Case of Malaysia. Universiti Kebangsaan Malaysia.

Yan, H., Song, Y., Qiu, M., & Akagi, F., 2015. An Empirical Analysis of the Dogs of the Dow Strategy for the Taiwan Stock Market. *Journal of Economics, Business and Management*, 3(4), pp.435-39.

## APPENDICES

### Appendix A KLCI Index in 2016 and 2017

Stock Code	Stock Name	Year of KLCI Index	P/E Ratio	P/B Ratio	Dividend Yield
1155	MALAYAN BANKING BHD	2016	12.35	1.25	6.21%
4677	YTL CORPORATION BHD	2016	20.80	1.12	6.13%
6399	ASTRO MALAYSIA HOLDINGS BERHAD	2016	20.22	23.33	4.81%
4162	BRITISH AMERICAN TOBACCO (M)	2016	19.03	22.69	4.76%
523555	KLCC PROP&REITS-STAPLED SEC	2016	15.93	1.10	4.56%
6947	DIGI.COM BHD	2016	23.43	70.29	4.25%
1023	QMB GROUP HOLDINGS BERHAD	2016	12.31	0.97	4.00%
3816	MISC BHD	2016	13.14	0.89	3.95%
3034	HAP SENG CONSOLIDATED BHD	2016	22.44	4.08	3.66%
4863	TELEKOM MALAYSIA BHD	2016	29.73	3.00	3.50%
5246	WESTPORTS HOLDINGS BERHAD	2016	22.11	6.81	3.39%
1015	AMMB HOLDINGS BHD	2016	10.97	0.89	3.35%
6012	MAXIS BERHAD	2016	23.49	9.98	3.18%
4715	GENTING MALAYSIA BHD	2016	10.74	1.56	3.02%
6033	PETRONAS GAS BERHAD	2016	23.42	3.40	3.01%
3336	IJM CORPORATION BHD	2016	26.67	1.35	2.92%
5819	HONG LEONG BANK BHD	2016	12.85	1.27	2.91%
5681	PETRONAS DAGANGAN BHD	2016	25.49	4.54	2.89%
1295	PUBLICBANK BHD	2016	14.94	2.27	2.88%
5183	PETRONAS CHEMICALS GROUP BHD	2016	20.41	2.21	2.54%
1082	HONG LEONG FINANCIAL GROUP BHD	2016	11.34	1.08	2.50%
1066	RHB BANK BERHAD	2016	11.76	0.91	2.41%
2445	KUALA LUMPUR KEPONG BHD	2016	23.09	2.40	1.99%
1961	IOI CORPORATION BHD	2016	36.82	4.06	1.94%
6888	AXIATA GROUP BERHAD	2016	79.44	1.72	1.77%
4065	PBB GROUP BHD	2016	18.76	0.93	1.51%
3182	GENTING BERHAD	2016	15.88	0.99	1.38%
4197	SIME DARBY BHD	2016	25.59	1.67	1.32%
5225	IHH HEALTHCARE BERHAD	2016	82.11	2.30	0.49%
5347	TENAGA NASIONAL BHD	2016	7.51	1.44	2.20%
4715	GENTING MALAYSIA BHD	2017	2.04	1.55	12.03%
1155	MALAYAN BANKING BHD	2017	14.88	1.55	5.26%
4162	BRITISH AMERICAN TOBACCO (M)	2017	19.57	24.54	5.14%
523555	KLCC PROP&REITS-STAPLED SEC	2017	16.04	1.08	4.63%
6399	ASTRO MALAYSIA HOLDINGS BERHAD	2017	19.88	21.96	4.46%
1015	AMMB HOLDINGS BHD	2017	10.25	0.77	4.25%
3816	MISC BHD	2017	15.95	0.91	4.24%
5246	WESTPORTS HOLDINGS BERHAD	2017	18.53	5.31	4.05%
6947	DIGI.COM BHD	2017	26.06	70.71	3.80%
5681	PETRONAS DAGANGAN BHD	2017	16.61	4.25	3.77%
6033	PETRONAS GAS BERHAD	2017	19.49	2.79	3.74%
3034	HAP SENG CONSOLIDATED BHD	2017	21.54	4.12	3.66%
4863	TELEKOM MALAYSIA BHD	2017	24.37	2.89	3.57%
1023	QMB GROUP HOLDINGS BERHAD	2017	14.70	1.37	3.45%
4677	YTL CORPORATION BHD	2017	20.32	1.11	3.38%
5183	PETRONAS CHEMICALS GROUP BHD	2017	15.51	2.33	3.33%
6012	MAXIS BERHAD	2017	21.62	6.74	3.24%
1066	RHB BANK BERHAD	2017	11.25	0.95	2.74%
1295	PUBLICBANK BHD	2017	15.73	2.30	2.74%
3336	IJM CORPORATION BHD	2017	18.31	1.11	2.59%
5819	HONG LEONG BANK BHD	2017	15.95	1.63	2.48%
3182	GENTING BERHAD	2017	24.85	1.02	2.37%
1082	HONG LEONG FINANCIAL GROUP BHD	2017	13.01	1.22	2.06%
2445	KUALA LUMPUR KEPONG BHD	2017	27.85	2.32	1.98%
1961	IOI CORPORATION BHD	2017	19.07	3.77	1.98%
4065	PBB GROUP BHD	2017	17.41	1.00	1.69%
6888	AXIATA GROUP BERHAD	2017	56.27	2.08	1.50%
4197	SIME DARBY BHD	2017	5.77	1.29	1.45%
5347	TENAGA NASIONAL BHD	2017	32.25	1.56	1.36%
5225	IHH HEALTHCARE BERHAD	2017	51.90	2.30	0.49%

## Appendix B KLCI Index in 2018 and 2019

Stock Code	Stock Name	Year of KLCI Index	P/E Ratio	P/B Ratio	Dividend Yield
6399	ASTRO MALAYSIA HOLDINGS BERHAD	2018	12.78	10.94	8.53%
1155	MALAYAN BANKING BHD	2018	13.01	1.40	5.97%
4715	GENTING MALAYSIA BHD	2018	-1001.64	1.08	5.48%
5235SS	KLCC PROP&REITS-STAPLED SEC	2018	19.67	1.09	4.68%
3816	MISCBHD	2018	23.52	0.87	4.34%
6947	DIGI.COM BHD	2018	22.86	50.33	4.33%
1023	QMB GROUP HOLDINGS BERHAD	2018	9.97	1.09	4.23%
4162	BRITISH AMERICAN TOBACCO (M)	2018	22.57	25.20	4.16%
5347	TENAGA NASIONAL BHD	2018	20.45	1.32	3.97%
6033	PETRONAS GAS BERHAD	2018	19.81	2.76	3.97%
1066	RHB BANK BERHAD	2018	9.72	0.96	3.67%
3034	HAP SENG CONSOLIDATED BHD	2018	21.45	3.50	3.55%
6012	MAXIS BERHAD	2018	24.72	6.19	3.55%
5183	PETRONAS CHEMICALS GROUP BHD	2018	14.72	2.40	3.49%
1015	AMMB HOLDINGS BHD	2018	10.54	0.80	3.30%
5246	WESTPORTS HOLDINGS BERHAD	2018	23.65	5.22	3.17%
3182	GENTING BERHAD	2018	20.64	0.82	2.94%
1295	PUBLICBANK BHD	2018	17.40	2.37	2.75%
5681	PETRONAS DAGANGAN BHD	2018	31.33	4.51	2.61%
3336	IJM CORPORATION BHD	2018	37.84	0.77	2.54%
5819	HONG LEONG BANK BHD	2018	16.08	1.78	2.25%
6888	AXIATA GROUP BERHAD	2018	-7.67	2.20	2.24%
1082	HONG LEONG FINANCIAL GROUP BHD	2018	11.86	1.24	1.99%
4197	SIME DARBY BHD	2018	14.37	1.08	1.75%
1961	ICI CORPORATION BHD	2018	12.16	3.24	1.69%
4065	PBB GROUP BHD	2018	24.48	1.25	1.51%
4863	TELEKOM MALAYSIA BHD	2018	74.10	1.51	0.66%
2445	KUALA LUMPUR KEPONG BHD	2018	38.54	2.45	0.61%
5225	IHH HEALTHCARE BERHAD	2018	75.99	2.25	0.53%
4677	YTL CORPORATION BHD	2018	44.98	0.87	0.04%
4162	BRITISH AMERICAN TOBACCO (M)	2019	10.53	9.34	9.29%
5347	TENAGA NASIONAL BHD	2019	15.19	1.19	8.26%
1155	MALAYAN BANKING BHD	2019	11.67	1.17	7.52%
4715	GENTING MALAYSIA BHD	2019	11.87	0.90	6.83%
1015	AMMB HOLDINGS BHD	2019	7.30	0.62	5.57%
1066	RHB BANK BERHAD	2019	9.06	0.87	5.53%
6399	ASTRO MALAYSIA HOLDINGS BERHAD	2019	11.17	8.53	5.51%
1023	QMB GROUP HOLDINGS BERHAD	2019	10.41	0.85	5.35%
6033	PETRONAS GAS BERHAD	2019	16.75	2.45	5.01%
5235SS	KLCC PROP&REITS-STAPLED SEC	2019	18.23	1.09	4.76%
3182	GENTING BERHAD	2019	9.96	0.56	4.26%
3816	MISCBHD	2019	24.66	1.01	4.19%
1295	PUBLICBANK BHD	2019	12.31	1.56	4.18%
6947	DIGI.COM BHD	2019	24.47	56.38	4.04%
5681	PETRONAS DAGANGAN BHD	2019	25.63	3.55	3.97%
3034	HAP SENG CONSOLIDATED BHD	2019	19.27	3.05	3.89%
6012	MAXIS BERHAD	2019	27.80	6.00	3.70%
5246	WESTPORTS HOLDINGS BERHAD	2019	22.56	5.21	3.32%
5819	HONG LEONG BANK BHD	2019	11.68	1.19	3.29%
5183	PETRONAS CHEMICALS GROUP BHD	2019	16.63	1.56	3.08%
1082	HONG LEONG FINANCIAL GROUP BHD	2019	9.28	0.90	2.67%
4863	TELEKOM MALAYSIA BHD	2019	22.91	1.96	2.62%
6888	AXIATA GROUP BERHAD	2019	28.47	2.40	2.24%
4197	SIME DARBY BHD	2019	12.82	0.93	2.01%
1961	ICI CORPORATION BHD	2019	43.18	3.04	1.89%
3336	IJM CORPORATION BHD	2019	18.57	0.81	1.86%
4065	PBB GROUP BHD	2019	22.59	1.21	1.69%
5225	IHH HEALTHCARE BERHAD	2019	90.69	2.24	0.70%
2445	KUALA LUMPUR KEPONG BHD	2019	47.36	2.48	0.63%
4677	YTL CORPORATION BHD	2019	82.86	0.77	0.04%



## Appendix C KLCI Index in 2020

Stock Code	Stock Name	Year of KLCI Index	P/E Ratio	P/B Ratio	Dividend Yield
5347	TENAGA NASIONAL BHD	2020	16.02	1.03	7.92%
6033	PETRONAS GAS BERHAD	2020	15.83	2.52	7.90%
1155	MALAYAN BANKING BHD	2020	14.03	1.08	6.43%
4162	BRITISH AMERICAN TOBACCO (M)	2020	15.54	10.05	6.31%
6399	ASTRO MALAYSIA HOLDINGS BERHAD	2020	8.98	4.57	6.25%
4197	SIME DARBY BHD	2020	8.19	0.96	5.45%
3816	MISC BHD	2020	-664.38	0.89	5.16%
4715	GENTING MALAYSIA BHD	2020	-7.24	1.10	5.00%
523555	KLCC PROP&REITS-STAPLED SEC	2020	29.37	0.98	4.27%
6947	DIGI.COM BHD	2020	25.15	49.38	3.95%
6012	MAXIS BERHAD	2020	26.83	5.28	3.58%
1066	RHB BANK BERHAD	2020	10.69	0.80	3.26%
3182	GENTING BERHAD	2020	-17.41	0.54	3.24%
3034	HAP SENG CONSOLIDATED BHD	2020	26.28	2.63	3.16%
1295	PUBLIC BANK BHD	2020	16.61	1.71	3.12%
5246	WESTPORTS HOLDINGS BERHAD	2020	23.81	5.51	2.52%
4065	PBB GROUP BHD	2020	19.96	1.15	2.49%
1015	AMMB HOLDINGS BHD	2020	8.54	0.49	2.31%
4863	TELEKOM MALAYSIA BHD	2020	23.14	3.30	2.30%
1082	HONG LEONG FINANCIAL GROUP BHD	2020	9.72	0.88	2.11%
1961	IOI CORPORATION BHD	2020	30.47	2.77	2.00%
5681	PETRONAS DAGANGAN BHD	2020	69.12	3.38	1.98%
6888	AXIATA GROUP BERHAD	2020	89.65	1.86	1.96%
5819	HONG LEONG BANK BHD	2020	14.72	1.30	1.93%
3336	IJM CORPORATION BHD	2020	18.58	0.60	1.85%
5183	PETRONAS CHEMICALS GROUP BHD	2020	36.83	1.97	1.60%
1023	CIMB GROUP HOLDINGS BERHAD	2020	35.97	0.77	1.11%
5225	IHH HEALTHCARE BERHAD	2020	154.35	2.05	0.79%
2445	KUALA LUMPUR KEPONG BHD	2020	25.49	2.25	0.66%
4677	YTL CORPORATION BHD	2020	-34.47	0.58	0.00%