



STOCK SELECTION WITH REGRESSION MODEL IN TRACKING MALAYSIA STOCK MARKET INDEX

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Abstract

Stock market index measures the general behavior and performance of stock market overtime. Index tracking is a popular investment strategy in the components of stock market index. Index tracking aims to construct a tracking portfolio to achieve similar mean return with the benchmark stock market index mean return without investing in all stocks that make up the index. The objective of this paper is to determine the stock selection in constructing the portfolio for tracking Malaysia stock market index by using regression model. In this study, the data consists of weekly stock prices from Malaysia stock market index which is FTSE Bursa Malaysia Kuala Lumpur Composite Index (FBMKLCI). The results of this study indicate that the portfolio consists of 12 stocks with different weights to track FBMKLCI Index which comprises 30 stocks. The portfolio of the regression model is able to track FBMKLCI Index effectively at minimum tracking

error 0.4531% which approaches zero tracking error. Therefore, the regression model is appropriate for the investors to track the stock market index in Malaysia. The significance of this study is to determine the portfolio composition in tracking Malaysia stock market index which generates weekly excess return 0.0019% at minimum tracking error 0.4531% without purchasing all the index components.

Keywords: Index Tracking, Regression Model, Mean Return, Tracking Error, Portfolio Composition

1. Introduction

Stock market index measures the general behavior and performance of stock market overtime [1]. Stock market index consists of a group of stocks which can represent the performance of the stock market in general. Index tracking is a popular investment strategy on the components of stock market index. Index tracking aims to construct a tracking portfolio to achieve similar mean return with the benchmark stock market index mean return without investing in all stocks that make up the index [2]. This objective can be achieved by applying the mathematical model in constructing the tracking portfolio. Tracking error is an important element in index tracking problem. Tracking error is a risk measure of how closely the return of the tracking portfolio follows the benchmark stock market index return [2, 3]. Low tracking error of the portfolio indicates closer to perfectness in tracking the benchmark stock market index.

The portfolio construction involves two processes which are stock selection and stock allocation. Roll [2] introduced the optimization model to construct the portfolio for index tracking. Alexander and Dimitriu [4] introduced the regression model to determine the linear relationship between the benchmark stock market index return and the stock return for portfolio construction. Various mathematical models for index tracking problem have been developed and studied by other researchers in different stock markets [5-14]. The objective of this paper is to determine the stock selection in constructing the portfolio for tracking Malaysia stock market index by using regression model [4]. The rest of the paper is structured as follows. The next section discusses about the material and methods used in this study. Section 3 discusses about the empirical results of this study. Section 4 concludes the paper.

2. Material and Methods

2.1 Data

FTSE Bursa Malaysia Kuala Lumpur Composite Index (FBMKLCI) is the leading indicator of the performance of Malaysia stock market. FBMKLCI Index consists of 30 stocks which are listed on Malaysia Main Market. In this study, the data consists of weekly price of 20 stocks from January 2010 until December 2014. These stocks are selected in the study since they make up as components of FBMKLCI Index consistently within the study period [13]. This data is applied in the regression model [4] for stock selection in constructing the portfolio to track FBMKLCI Index in Malaysia.

2.2 Regression Model

In this study, regression model is applied for portfolio construction in order to track the benchmark stock market index. Regression is a statistical methods used to describe the nature of the relationship between the independent and dependent variables [15]. There are two processes involved in constructing the portfolio for index tracking problem, which are stock selection and stock allocation. The stock selection is performed by using the regression model as shown in equation (1) below.

$$\ln(I_t) = c + \sum_{i=1}^n [\beta_i \ln(P_{i,t})] + \varepsilon_t \quad (1)$$

where I_t is the benchmark stock market index, $P_{i,t}$ is the stock price of stock i , β_i is the respective coefficients estimated from the standard ordinary least square regression, c is the constant, ε_t is the residuals estimated from the regression. Equation (1) is the regression model which expresses the linear relationship between the benchmark stock market index and the stock price of stock i . The benchmark stock market index is a dependent variable whereas the stocks or the index components are the independent variables in the regression model. Based on the coefficients estimated from the regression, the stock allocation is then performed by normalizing the coefficients.

2.3 Portfolio Performance

For index tracking problem, the performance of the portfolio is measured with tracking error. Tracking error is a risk measure of how closely the return of the tracking portfolio follows the benchmark stock market index return [2, 3]. Tracking error is the standard

deviation of the difference between the returns of the portfolio and the returns of the benchmark stock market index. The tracking error is formulated as follow [16].

$$TE = \sqrt{\frac{1}{T} \sum_{t=1}^T (R_{P_t} - R_{I_t})^2} \quad (2)$$

where TE is the tracking error, T is the number of periods, R_{P_t} is the return of the portfolio at time t and R_{I_t} is the return of the benchmark stock market index at time t . Higher portfolio performance is indicated by lower tracking error.

The mean return of the portfolio over time T horizon is formulated as follow [17].

$$R = \sum_{i=1}^N R_i w_i \quad (3)$$

where w_i is the weight of each stock invested and R_i is the mean return of stock i . The portfolio generates an excess return if the return of the portfolio is higher than the return of the benchmark stock market index which is formulated as follow [14]:

$$\alpha = r_p - r_i \quad (4)$$

α is the excess mean return of the portfolio over the mean return achieved by the benchmark stock market index, r_p is the mean return of the portfolio and r_i is mean return of the benchmark stock market index.

3. Results and Discussions

Table 1 presents the results of the regression model in selecting the stocks to construct the tracking portfolio.

Table 1: Stock Selection with Regression Model

Independent Variables	Stock	Symbol	Coefficient
X1	AMMB Holdings	AMMB	-
X2	AXIATA Group Berhad	AXIATA	-
X3	British American Tobacco	BAT	0.052066
X4	CIMB Group Holding	CIMB	0.138815

Independent Variables	Stock	Symbol	Coefficient
X5	Digi. Com	DIGI	-
X6	Genting Berhad	GENTING	0.031330
X7	Genting Malaysia	GENM	0.083886
X8	Hong Leong Bank Berhad	HLBANK	-
X9	IOI Corporation	IOICORP	0.055725
X10	Kuala Lumpur Kepong	KLK	0.055296
X11	Malayan Banking	MAYBANK	0.041752
X12	Maxis Berhad	MAXIS	0.123224
X13	Petronas Dagangan Berhad	PETDAG	-
X14	Petronas Gas Berhad	PETGAS	-
X15	Public Bank Berhad	PBBANK	0.256267
X16	PPB Group Berhad	PPB	-
X17	RHB Capital Berhad	RHBCAP	0.070232
X18	Telekom Malaysia Berhad	TM	0.105783
X19	Tenaga Nasional	TENAGA	0.034035
X20	UMW Holdings	UMW	-

As shown in Table 1, those stocks with coefficient values indicate that they are selected by the regression model based on equation (1) in constructing the portfolio to track FBMKLCI Index. The tracking portfolio consists of 12 stocks to track FBMKLCI Index which comprises 30 stocks. The components of the tracking portfolio are BAT, CIMB, GENTING, GENM, IOICORP, KLK, MAYBANK, MAXIS, PBBANK, RHBCAP, TM and TENAGA. Table 2 and Figure 1 display the tracking portfolio composition by normalizing the coefficients estimated from the regression based on Table 1.

Table 2: Tracking Portfolio Composition

Stock	Symbol	Weights (%)
British American Tobacco	BAT	4.97
CIMB Group Holding	CIMB	13.24
Genting Berhad	GENTING	2.99

Stock	Symbol	Weights (%)
Genting Malaysia	GENM	8.00
IOI Corporation	IOICORP	5.32
Kuala Lumpur Kepong	KLK	5.27
Malayan Banking	MAYBANK	3.98
Maxis Berhad	MAXIS	11.75
Public Bank Berhad	PBBANK	24.44
RHB Capital Berhad	RHBCAP	6.70
Telekom Malaysia Berhad	TM	10.09
Tenaga Nasional	TENAGA	3.25

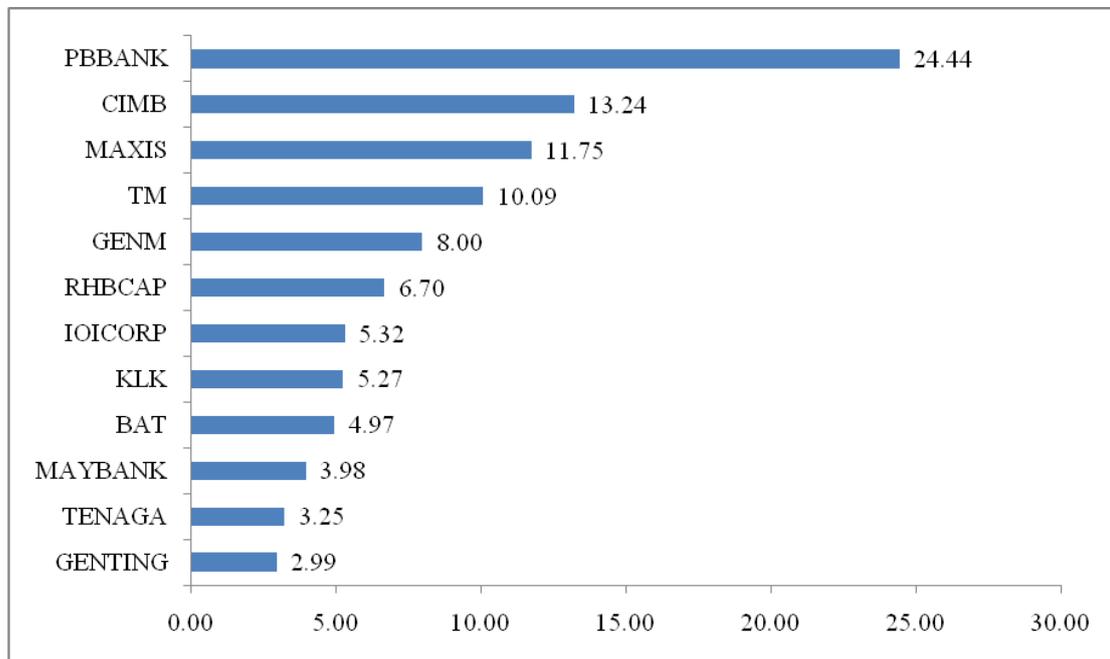


Figure 1: Components in Tracking Portfolio

As shown in Table 2 and Figure 1, based on the investment fund, the tracking portfolio consists of BAT (4.97%), CIMB (13.24%), GENTING (2.99%), GENM (8.00%), IOICORP (5.32%), KLK (5.27%), MAYBANK (3.98%), MAXIS (11.75%), PBBANK (24.44%), RHBCAP (6.70%), TM (10.09%) and TENAGA (3.25%). PBBANK is the most dominant stock in the tracking portfolio whereas GENTING is the smallest component in the tracking portfolio. Table 3 presents the performance of the tracking portfolio which is constructed using the regression model.

Table 3: Performance of the Tracking Portfolio

	Number of Stocks	Weekly Mean Return (%)	Tracking Error (%)	Weekly Excess Return (%)
FBMKLCI Index (Benchmark)	30	0.1386	-	-
Tracking Portfolio	12	0.1405	0.4531	0.0019

Based on Table 3, the weekly mean return for FBMKLCI Index is 0.1386% based on the study period. The portfolio of the regression model is tracking FBMKLCI Index with weekly mean return 0.1405% at minimum tracking error 0.4531% which approaches zero tracking error. This implies that the portfolio of the regression model is able to track FBMKLCI Index effectively in Malaysia. In addition, the positive deviation from FBMKLCI Index indicates that the portfolio is able to generate weekly excess return 0.0019% over the benchmark index.

4. Conclusions

This paper discusses about the stock selection in constructing the portfolio to track Malaysia stock market index by using regression model. The portfolio consists of 12 stocks with different weights to track FBMKLCI Index in Malaysia. The minimum tracking error of the portfolio is 0.4531% which approaches zero tracking error. This implies that the portfolio of the regression model is able to track FBMKLCI Index effectively. Therefore, the regression model is appropriate for the investors to track the benchmark stock market index in Malaysia. The significance of this study is to determine the portfolio composition in tracking Malaysia stock market index which generates weekly excess return 0.0019% at minimum tracking error 0.4531% without purchasing all the index components.

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