

THE FORMATION OF OPTIMAL PORTFOLIO - THE EVIDENCE OF MALAYSIA SHARIAH COMPLIANT SECURITIES

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ABSTRACT

This study is conducted to identify the optimal formation of portfolio based on the selected shariah compliant stocks. Portfolio investment is a combination of many securities or asset where an investor needs to consider many things in selecting the best combination of asset to be included into the portfolio. This study attempt to identify which stocks should be included in the portfolio in order to reduce the effect of measurement error on optimal portfolio allocations as well as to calculate the percentage that investors should invest in each security to ensure the investor able to optimize their returns. The method applied here is based on Simple Sharpe Portfolio Optimization. The study covered the period of 1997 to 2009 in order to see the different formation of portfolio before the 1997 crisis and 2007 crisis.

Keywords: Portfolio, Simple Sharpe, Optimization.

INTRODUCTION

Portfolio could be defined as a set of securities (holding more than one security at a time), which helps to spread risk over many securities, (Daud, Mohamad and Mohamed, 2005). The portfolio may consist of stocks, bonds, commodities, money market instruments, or any combination of these security classes (Ehrhardt and Wachowicz, 1990). The performance of portfolio is highly related on the performance of stock market which greatly depending on the up and down of economic situation. In measuring portfolio performance, it is essential to evaluate the major aspects of portfolio management process including asset allocation, security selection and market timing (Rozali and Abdullah, 1998).

The existence of Shariah Compliant Stocks colors the Malaysian stock market. Investors moving forward to find how interesting and attracting the Shariah Compliant investment in providing more investment returns. The Shariah-compliant securities list was introduced in June 1997 by the Shariah Advisory Council (SAC) of the SC. As at November 2009, there were 846 Shariah-compliant securities as determined by the Shariah Advisory Council (SAC) of the Securities Commission (SC).

In the nutshell, this study is conducted to develop an optimal portfolio based on the selected Shariah Compliant securities. This is to identify which security should be included in the portfolio in order to reduce the effect of measurement error on optimal portfolio allocations as well as to calculate the percentage that investors should invest in each security to ensure the investor able to optimize their returns. The method applied here is based on Simple Sharpe Portfolio Optimization where the identification of the C-Value, Z-value and weight are needed to

see the best security that should be selected and the percentage to invest. It explains the different formation of portfolio during the two financial crisis period, 1997 crisis and 2007 crisis.

LITERATURE REVIEW

There are various methods used in constructing an optimal portfolio and one of it is by using Single Index Model introduced by Elton, Gruber and Padber (1978). The study shown that under the assumption of Sharpe single-index model, optimal portfolios can be constructed by simple rules that do not involve using quadratic programming techniques. Furthermore, these rules lead to a unique ranking of securities such that the desirability of any security for inclusion in a portfolio can be judged before the portfolio composition itself is obtained.

Cohen and Pogue (1967) in their research defined Single Index Model as a method of preparing input in a way that took computational advantage of the structure of the data. They also conclude that the efficient portfolios produced by single index model have lower expected risks than those of the multi index formulation for equivalent levels of return. In addition, they found that the performance of the index models is not denominated by the Markowitz formulation. It also indicates that, for strictly common stock universes, the performance of the multi-index models is not superior to that of the single index formulation, indicating the secondary importance of industry considerations for common stock portfolios.

According to Grover and Lavin (2007) understanding the underlying statistical techniques in portfolio optimization presents a rigorous challenge. Even the simplest methods require a substantial knowledge of statistical concepts. The articles presents a practical solution to the strategic asset allocation problem where in constructing an optimal investment portfolio it achieved through an optimization model developed in Excel, uses the combination of Capital Asset Pricing Model principles to determine security_valuation and the Sharpe Ratio to identify an optimal or efficient combination of the available fund.

Bilbao, Perez and J. Antomil (2006) adopted Sharpe's Single Index Model into a new Fuzzy Compromise Programming approach in obtaining the minimum fuzzy distance to the fuzzy ideal solution of the portfolio selection problem. Once the fuzzy distance has been obtained the second step consists of finding a crisp decision vector was implemented in order to form an optimal portfolio.

Cohen, Zinbarg and Zeikel (2003) stated that Sharpe approach could separate risk into two distinct elements. The first identified as the market risk (also called systematic or non diversifiable risk), is that portion of a stock price (or portfolio) movement which can be attributed to movement of the market as a whole. The second element of risk is that portion of price movement unique to the specific asset.

Pastor (2000) had used Bayesian framework for portfolio selection decision-making of multiple-risky assets.

METHODOLOGY

Simple Sharpe Portfolio Optimization.

Edwin J. Elton (2003), the Single Index Model is accepted as the way to forecast the optimal investment portfolio. The OLS estimation of market model is used to regress the value of beta of stock () and residual variance (ϵ_i) by using Microsoft Excell.

The Choice of Stocks

Desirability of any stock is directly related to its excess return to Beta ratio. Excess return is the difference between expected return on the stock and the riskless rate of interest such as the rate on a Treasury Bills.

More formally, the index we use to rank stocks isö excess return to Beta,ö

$$\text{Excess return-to-beta ratio} = \frac{r_i - r_f}{\beta_i}$$

Where r_i – rate of return of security i
 r_f – risk free rate of return
 β_i – beta of security i

How many stocks are selected depends on a unique cut-off rate such that all stocks with the higher ratios of $(R_i - R_f) / \beta_i$ will be included and all stocks with lower ratios excluded.

Setting the Cut-off Rate above the (C*)

All securities whose excess return to risk ratio is above the cutoff point are selected and the entire ratio below is rejected. **The optimum portfolio consists of stocks which excess return to beta ratio is more than C value.** To determine C* it is necessary to calculate its value as if there were different numbers of securities in the optimum portfolio.

Designate C, as a candidate for C*. For a portfolio of stock i stocks C_i is given by:

C-value formula for stock i is:

$$C_i = \frac{\sigma_m^2 \sum \left(\frac{(r_i - r_f) \beta_i}{\sigma_{ie}^2} \right)}{1 + \left(\sigma_m^2 \sum \frac{\beta_i^2}{\sigma_{ie}^2} \right)}$$

Where C_i – C value of security i
 σ_{ie}^2 – residual variance of security i
 σ_m^2 – variance of market

Calculate the weight.

Once the securities that are contained in the optimum portfolio are determined, it remains to show how to calculate the percent invested in each security. The percentage invested in each security is:

$$W_i = \frac{Z_i}{\sum Z_j}$$

Where;

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2} \left(\frac{\bar{R}_i - R_F}{\beta_i} - C^* \right)$$

The later equation is simply scales the weights on each security so they sum to one end and ensure full investment.

Data concerning on the closing price from selected shariah compliant stocks were gathered to see whether there are any differences in the formation of the portfolio between the two crisis periods. The index of FBM KLCI formerly known as KLCI and T-Bills for the respective period was used to develop the portfolio.

FINDINGS

Table 1 shows the cutoff point of the analysis which is the highest C-value for the Simple Sharpe Portfolio Optimization during the 1997 crisis and table 2 shows the cutoff point for the period during the 2007 crisis. This cutoff point will acts as the benchmark to select the best securities into portfolio.

Table 1: The cut off point for the period before 1997 crisis

COMPANY	C-VALUE
SAPURACR EST PETROLEU M BHD	0.033097 546

Table 2: The cut off point for the period before 2007 crisis

COMPANY	C-VALUE
TAHPS GROUP BHD	0.01136336

Table 3 shows the result of selected shariah compliant stocks for the period before 1997 crisis. Meanwhile, Table 4 represents the result of selected shariah compliant stocks for the period before 2007 crisis.

Table 3: Shariah compliant stocks to be included in the portfolio for the period during 1997 crisis

NO	COMPANY	r-rf/ β	C-VALUE	Z-VALUE	WEIGHT (%)
1	WTK HOLDINGS BHD	0.106110141	0.033097546	0.026997177	8.786530044
2	HWA TAI INDUSTRIES BERHAD	0.065896261	0.033097546	0.073688448	23.98272118
3	TAHPS GROUP BHD	0.065593721	0.033097546	0.0402292	13.09303861
4	CHEMICAL COMPANY OF MALAYSIA BHD	0.06237461	0.033097546	0.012027624	3.914523407
5	MALAYSIA PACIFIC INDUSTRIES BHD	0.054618971	0.033097546	0.036609046	11.91481929
6	PWE INDUSTRIES BHD	0.048002656	0.033097546	0.028880309	9.399416281
7	PERAK CORPORATION BHD	0.047064982	0.033097546	0.027070818	8.810497546
8	UNITED MALAYAN LAND BHD	0.04646575	0.033097546	0.010175403	3.311697629
9	SIN HENG CHAN (MALAYSIA) BHD	0.040097181	0.033097546	0.014558953	4.738372353
10	SP SETIA BHD	0.038908248	0.033097546	0.01746018	5.68260883
11	JASA KITA BHD	0.037576807	0.033097546	0.006322567	2.057749535
12	HAP SENG CONSOLIDATED BHD	0.036760295	0.033097546	0.002474195	0.805254041
13	LION CORPORATION BHD	0.035852883	0.033097546	0.004085005	1.329509944
14	IJM PLANTATIONS BHD	0.035733581	0.033097546	0.002082427	0.677748857
15	ORIENTAL HOLDINGS BHD	0.035048053	0.033097546	0.004595058	1.495512457

As for the period of 1997 crisis, from 98 stocks, 15 is included in the portfolio. The suggested highest weighted of investment is Hwa Tai Industries Berhad with 23.98%, followed

by TAHPS Group Bhd at 13.093% and the lowest percentage to be invested is in IJM Plantation Sdn Bhd with 0.6777%.

Table 4: Shariah compliant stocks to be included in the portfolio for the period during 2007 crisis

NO	COMPANY	r-rf/ β	C-VALUE	Z-VALUE	WEIGHT (%)
1	NESTLE (MALAYSIA) BERHAD	0.832185308	0.011136336	0.021878857	1.303792962
2	JOHN MASTER INDUSTRIES BERHAD	0.317125849	0.011136336	0.032647704	1.945524257
3	POLY GLASS FIBRE (M) BHD	0.27468062	0.011136336	0.037092229	2.210380007
4	HARBOUR-LINK GROUP BHD	0.128369167	0.011136336	0.030525303	1.81904731
5	FORMIS RESOURCES BHD	0.110151641	0.011136336	0.028961004	1.725828437
6	KFC HOLDINGS (M) BHD	0.083452725	0.011136336	0.022746235	1.355481298
7	INTEGRATED RUBBER CORPORATION BHD	0.077295531	0.011136336	0.041506427	2.473428526
8	SITT TATT BHD	0.064638634	0.011136336	0.034280634	2.042832974
9	HARVEST COURT INDUSTRIES BHD	0.06438063	0.011136336	0.05306574	3.162264823
10	YTL CORPORATION BHD	0.059001024	0.011136336	0.018729322	1.116107621
11	ORIENTAL INTEREST BHD	0.058559077	0.011136336	0.015304399	0.912011461
12	PANASONIC MANUFACTURING MALAYSIA BHD	0.054112366	0.011136336	0.022898194	1.364536751
13	FOCAL AIMS HOLDINGS BHD	0.049954729	0.011136336	0.019164431	1.142036366
14	GOLDEN FRONTIER BHD	0.047914535	0.011136336	0.030425499	1.81309986
15	PPB GROUP BERHAD	0.047101415	0.011136336	0.058380959	3.479006434
16	GOPENG BHD	0.046177312	0.011136336	0.015475456	0.922204991
17	MISC BERHAD	0.045528696	0.011136336	0.013736451	0.81857512
18	SARAWAK OIL PALMS BHD	0.043539482	0.011136336	0.037199824	2.216791774
20	FCW HOLDINGS BHD	0.040062307	0.011136336	0.010764984	0.641501105
19	REVIEW RUBBER ESTATES BHD	0.04236119	0.011136336	0.021443592	1.277854932
21	GUH HOLDINGS BHD	0.03691978	0.011136336	0.041786184	2.490099624

22	FIMA CORPORATION BHD	0.036573541	0.011136336	0.020096008	1.197550408
23	SARAWAK ENERGY BHD	0.036111454	0.011136336	0.027978758	1.667294998
24	UNITED MALACCA BHD	0.036047574	0.011136336	0.03722253	2.218144822
25	FAR EAST HOLDINGS BHD	0.035645721	0.011136336	0.027669538	1.648868111
26	HIROTAKO HOLDINGS BHD	0.035206706	0.011136336	0.029427934	1.753653465
27	SHELL REFINING COMPANY (F.O.M) BHD	0.035056613	0.011136336	0.012401964	0.739051128
28	ORIENTAL HOLDINGS BHD	0.034079575	0.011136336	0.020620492	1.228805158
29	BERJAYA MEDIA BERHAD	0.031977255	0.011136336	0.074119614	4.416895853
30	IJM LAND BHD	0.031865043	0.011136336	0.074582449	4.444476888
31	JASA KITA BHD	0.030975025	0.011136336	0.016306921	0.971753211
32	SELANGOR PROPERTIES BHD	0.029269901	0.011136336	0.016772464	0.999495587
33	PJ DEVELOPMENT HOLDINGS BHD	0.029046812	0.011136336	0.025698954	1.531438144
34	I BERHAD	0.028538238	0.011136336	0.004827934	0.287703624
35	PERAK CORPORATION BHD	0.027905958	0.011136336	0.014938676	0.890217507
36	FABER GROUP BHD	0.027888812	0.011136336	0.043952929	2.619219111
37	SELANGOR DREDGING BHD	0.027478909	0.011136336	0.02579544	1.537187868
38	BIMB HOLDINGS BHD	0.027169963	0.011136336	0.01506522	0.897758421
39	IJM PLANTATIONS BHD	0.026691237	0.011136336	0.026150517	1.558347446
40	HO HUP CONSTRUCTION COMPANY BHD	0.026446426	0.011136336	0.020560221	1.22521355
41	SIME DARBY BHD	0.026424534	0.011136336	0.028227644	1.682126478
42	KUALA LUMPUR KEPONG BHD	0.026207754	0.011136336	0.035839207	2.13571062

46	SAPURACREST PETROLEUM BHD	0.025461634	0.011136336	0.070541703	4.203682951
43	LAFARGE MALAYAN CEMENT BHD	0.026139355	0.011136336	0.026669139	1.589252854
47	KULIM (MALAYSIA) BHD	0.025282255	0.011136336	0.023266559	1.386488169
44	POS MALAYSIA BHD	0.02579881	0.011136336	0.003732214	0.222408055
48	ESSO MALAYSIA BERHAD	0.023990985	0.011136336	0.006540233	0.389742044
45	KIM HIN INDUSTRY BHD	0.02565346	0.011136336	0.010240558	0.610249809

49	SUNWAY HOLDINGS BHD	0.023503915	0.011136336	0.056578537	3.371597528
50	SCIENTEX BHD	0.023412895	0.011136336	0.017704253	1.055022251
51	LEADER UNIVERSAL HOLDINGS BHD	0.022313235	0.011136336	0.022947892	1.367498358
52	UAC BERHAD	0.021790962	0.011136336	0.005186625	0.309078527
53	PARKSON HOLDINGS BHD	0.020564985	0.011136336	0.015658983	0.933141609
54	SOUTHERN STEEL BHD	0.019857959	0.011136336	0.0193441	1.152743131
55	HAP SENG CONSOLIDATED BHD	0.019060588	0.011136336	0.01227373	0.731409445
56	HUMA INDUSTRIES (M) BHD	0.01878822	0.011136336	0.010428152	0.621428786
57	SAPURA RESOURCES BHD	0.01846405	0.011136336	0.014595271	0.869753465
58	WAH SEONG CORPORATION BHD	0.0184552	0.011136336	0.027598353	1.644626062
59	JAKS RESOURCES BHD	0.017814687	0.011136336	0.023761465	1.415980359
60	UNITED MALAYAN LAND BHD	0.017747188	0.011136336	0.012137583	0.723296289
61	SBC CORPORATION BHD	0.016692698	0.011136336	0.008505276	0.506841783
62	YTL LAND & DEVELOPMENT BHD	0.015763941	0.011136336	0.017791744	1.060235986
63	KECK SENG (M) BHD	0.015213815	0.011136336	0.013559954	0.808057429
64	IREKA CORPORATION BHD	0.014798569	0.011136336	0.003801006	0.226507487
65	MMC CORPORATION BHD	0.014641627	0.011136336	0.007787059	0.464042184

71	MUHIBBAH ENGINEERING BHD	0.012918482	0.011136336	0.006366694	0.379400601
66	SP SETIA BHD	0.014565464	0.011136336	0.009252178	0.551350784
72	LION INDUSTRIES CORPORATION BHD	0.012040544	0.011136336	0.009230065	0.550033028
67	GOLDEN PHAROS BERHAD	0.013635596	0.011136336	0.003567926	0.212617941
73	FACB INDUSTRIES INCORPORATED BHD	0.011617623	0.011136336	0.001098644	0.065469822
68	GAMUDA BHD	0.013087606	0.011136336	0.003920471	0.233626558
74	TAHPS GROUP BHD	0.011491853	0.011136336	0.000589764	0.035144874
69	ANCOM BERHAD	0.013024048	0.011136336	0.005248078	0.312740619
70	SIN HENG CHAN (MALAYSIA) BHD	0.012925156	0.011136336	0.001899806	0.113212183

During the 2007 crisis from 98 stocks be analyzed, the result shows 74 shariah compliant stocks can be included in the formation of portfolio in comparison to 1997 crisis where only 15 out of 98 stocks should be included. The highest weighted should be put into IJM Land Berhad with 4.4444% followed by Berjaya Media Berhad at 4.4169%, Harvest Court Industries Berhad at 3.1623%, Poly Glass Fiber (M) Berhad at 2.2104% and the lowest percentage to be invest in represents by TAHPS Group Berhad with 0.6777%. The result indicates a positive movement in the equity investment for period 2007 crisis.

CONCLUSION

Based on the evidence, it is shown that the formation of the optimal portfolio by applying Simple Sharpe Portfolio Optimization will help the investors to know the percentage that they should invest in each security after including the securities into portfolio. The result for 1997 crisis shows that there are only 15 stocks to be selected by the investors into the portfolio with each of the stock provided different percentage of investment weighted. On the other hand, for the 2007 crisis, 74 shariah compliant stocks can be included into the portfolio as a guide for investors in maximizing returns and minimize the risk. The portfolio optimization for the 1997 crisis and 2007 crisis also revealed the how the cutoff point for the 1997 crisis is higher than 2007 crisis where leads to the selection of the stocks for this period is less compared to 2007 crisis selection. As per said of marketö that 2007 crisis is not as bad as 1997 crisis.

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