Customized CSR Ratings and Optimal Sharpe Portfolios in the Bursa Malaysia

Ternence T. J. Tan, Baliira Kalyebara

Abstracte: *conomic dominance of optimal portfolios over the naïve diversification policy, among others, has been found to depend upon portfolio size (N) as argued by Duchin and Levy (2009) and Nor and Islam (2016). Apart from portfolio model, the benefit of involving corporate social responsibility (CSR) is still in uncertainty until now as argued by Fieseler (2011) and Joan and Thomas (2015). Hence, this paper extends prior literature by proposing a framework which constructs CSR rating using experts' opinions, and subsequently optimizes portfolios of firms with strong and weak CSR ratings. In consequence, the performances of Sharpe-optimal portfolios are juxtaposed with those of equal-weighted schemes across different sizes. As the result, Sharpe optimal model outperforms the naive diversification in all sample period and all scoring. This paper follows the optimal conditions of Sharpe optimal model documented in prior researches. Besides, the result showed that the bottom CSR scoring portfolio is outperforming the top CSR scoring in all different financial conditions. The study finds that this is due to internal factors such as (companies' involvement) and external factor (economic factor).*

Keywords: *corporate social responsibility; naïve diversification; optimal portfolio; Sharpe ratio*

I. INTRODUCTION

Portfolio theory or asset management has become a ubiquitous risk management method due to its robustness of risk reduction if diversification effect is efficient. The rudimentary idea of it can be traced back into 4th century when Naive Diversification or uniform distribution was first applied. Afterward, Harry Markowitz applied some mathematical parameter and framework to provide an allocation solution that followed Pareto Optimal Front. This implementation provided the fundamental structure for future portfolio models, yet to be perfect in providing the best allocation solution due to some limitation [1], [15]. Hence, portfolio optimization becomes the key element in the financial topic and is continuously explored by researchers in term of portfolio structure and asset screening.

From the perspective of asset screening, Socially Responsible Investment (SRI) was starting to be popular among the investors and its demand increased continuously.

In Malaysia, the government is very keen in promoting the Corporate Social Responsibility (CSR) after CSR framework was introduced in 2006 by Bursa Malaysia through some awards and initiatives such as Malaysia Business Ethnic Excellent Award, ACCA Malaysia Environmental and Social Reporting Award. Generally, it is often acknowledged that CSR is at an infancy stage in Malaysia. On 19 December 2017, Securities Commission further issued the guidelines on SRI in Malaysia. The Securities Commission introduction of CSR enhanced the legitimacy of SRI product and attracted more investors [25]. At the same year, the overall Assets Under Management (AUM) in Malaysia increased by 11.5 % which is equivalent to RM776.20 Billion (22% of global sustainable investment) [26].

Although awareness of CSR is spreading rapidly among public companies in recent years, there are debates about the impact of CSR on companies' financial performance or investment return. Some researches document that when CSR is incorporated in corporate governance, it reduces the financial risk caused by internal factors, boosts up the company credibility and finally attracts more investors [10], [29]. However, Joan and Thomas [12] find that including CSR in portfolio construction or decision making restricts equities selection and leads to less efficient diversification by screening out potential equities. As a result, prior researches [3], [24] find that investment return is negatively related to CSR performance.

II. LITERATURE REVIEW

In 1977, Edwin and Martin [8] conducted a study on the relationship between portfolio size and risk. In their study, they found out that most of the portfolio risk is reduced when a portfolio comprises of 10-20 securities. It recorded a reduction from 48.457 to 11.173 (76.9%). Even though the portfolio risk is reduced gradually after reaching an optimal portfolio size, but the effect becomes less favorable. Along with the development of the Modern Portfolio Theory (MPT), it is ironically to mention that quantitative model such as Naïve Diversification can outperform Modern Portfolio Theory model under certain conditions. This feature allows the quantitative model to be still favored by investors. It is proven that MPT can be able to outperform quantitative model, if the portfolio size is small and with the existence of extra constraint [2], [5], [6]. In 2016, Nor and Islam [19] compared the performance of the proposed model (Evolutionary Algorithm, EA), quantitative model (Talmudic Diversification model) and the market index among FTSE Bursa Malaysia KLCI market. It was found that both proposed and quantitative models were outperforming the market consistently.

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During the in-sample analysis test (1 July 2002 - 30 June 2008), portfolio return and annualize Sharpe Ratio generated by EA were found to be higher than Talmudic Diversification.

Afterwards, portfolio optimized by EA can only dominate Talmudic Diversification in a sample analysis when the number of stocks included in a portfolio reaches 30. In further examination of 1/N portfolio rules, Nor and Islam [20] investigated and found that the effect of portfolio size and objective function for MPT to outperform the naïve diversification in 2017. Hence, the performances of Sharpe-optimal model and Naïve Diversification were compared over different portfolio sizes (15, 20, 25 and 30). Along with framework of the portfolio optimization construction, there were a few additional conditions added in the optimization framework to provide plausible performance comparisons results such as tighter floor-ceiling constraints and trading cost (1%). As a result, Naïve Diversification is found to outperform Sharpe-optimal model in all portfolio size from the perspective of Sharpe Ratio, Information Ratio and Maximum Drawdown. At the same time, the performance differences gap increases along with portfolio size.

In another study on the effect of Corporate Social Responsibility (CSR) in investment performance, Emanuele et al. [9] documented the benefit of CSR in investment performance over 5 years (1 December 2005 – 19 January 2011). In this study, companies from ECPI database were screened and grouped into three portfolios (Top ESG-rated, Bottom ESG-rated and ESG Neutral Europe) according to CSR performances of respective companies. Using Sharpe ratio comparison, Top ESG rated ranked first followed by ESG Neutral Europe (0.1) and Bottom ESG rated (0.04). In long-term, Top ESG rated also provided the highest cumulative return (27.5%) compared to other portfolios. Based on the research already carried on, the study relating to the CSR and investment performance keeps being revised. Leite and Cortez [14] examine the performance of socially responsible funds and conventional funds from MSCI EMU database from a crisis period to a non-crisis period (2001-2003;2007-2009;2011-2012). During non-crisis period, SR funds underperform the conventional funds. However, SR funds can outperform conventional funds more significantly during crisis period. In another study, Halbritter and Dorfleitner [11] investigate the impact of CSR in US equities' portfolio performance. The study finds that portfolios with high CSR commitment had similar performance with the market, while portfolios with low CSR commitment slightly underperform the market. The study also documented that CSR has a low influence on portfolio performance. This finding is due to alpha measurement that showed a negative value indicating that performance differences are insignificant. Furthermore, Nakai, Yamaguchi, Takeuchi [18] investigated the effect of CSR on fund performance during the 2008 financial crisis. From the view of average cumulative abnormal return (ACAR), SRI funds can provide better result during the financial crisis compared to conventional funds. Recently, Nor and Zawawi [23] revisited the topic but specifically from the view of Corporate Governance (CG). Firstly, the companies from London Stock Exchanges grouped according to their CG ranking and compared the portfolio performance between the two portfolios. During the in-sample analysis, Top scoring portfolio was found to outperform the Bottom scoring portfolio.

III. METHODOLOGY

The purpose of this paper is to compare the portfolio performance between high-ranked and low-ranked CSR portfolios, Sharpe-optimal model and Naive diversification with the size of 15. It is generally believed among researchers in finance that the efficient portfolio optimization model will enhance investment performance. This study examines the effect of CSR in the investment performance from the perspective of Environmental, Social and Governance. Hence, the study employs the data of 30 companies listed on FTSE Bursa Malaysia KLCI for the period of 10 years (1 Jan 2009 - 1 July 2019). Firstly, all the companies are ranked according to ESG scoring variables. Indeed, all the respective variables applied are predetermined by investment professionals through survey. Afterwards, 4 portfolios are constructed according to different model and different rating. Accordingly, this paper exhibits two portfolio model which are Naive diversification and Sharpe optimal model. Sharpe optimal model applied is the model without any complex constraints, just using 0.05 as floor constraint while 1.00 as ceiling constraint to maintain diversification effect:

$$Maximize \qquad \frac{\sum_{k=1}^{N} W_k\, E\,(R_i) - TR}{\sqrt{\sum_{i,j=1}^{i,j=N} w_i w_j \sigma_{ij}}} \qquad (1.0)$$

$$subject\ to\ \sum_{k=1}^{N} w_k = 1 \qquad (2.0)$$

$$0.05 < W_k < 1.00 \qquad (3.0)$$

Whereas:

w_i	:	weight of stock i
w_j	:	weight of stock j
w_k	:	weight of stock k in a portfolio
σ_{ij}	:	covariance of stock i and stock j
$E\,(R_i)$	:	expected return of stock i
TR	:	target return or risk-free rate

Meanwhile, target return or risk-free rate applied in this research is 12-month Malaysia Treasury Bill (3.17%).

IV. RESULT

In the process of examining the out-sample performance between portfolios, this paper separates sample period into two non-overlapping sub period. In-sample period (1st Jan 2009 - 31st July 2018) is mainly for analysis purpose, while out-sample period (1st Aug 2018 - 31st July 2019) is for examining the effect of portfolio model and CSR. Table 1 is the correlation matrix between the companies in Top Scoring Portfolio. Alternatively, Table 2 is the correlation matrix between the companies in Bottom Scoring Portfolio. Average correlation for Top Scoring Portfolio is 0.2343, while 0.1674 is for Bottom Scoring Portfolio. These figures indicate that overall component in a portfolio is positive but weakly correlated and this provides the benefit of diversification in reducing the unsystematic risk.

Table 3 summarizes the results of this paper. Generally, Sharpe optimal model is outperforming the Naive diversification in all sample period and all scoring. The results of this study are similar to the optimal conditions of Sharpe optimal model documented by prior researches [2], [5], [6]. Additionally, the results show that Bottom CSR Scoring Portfolio underperform Top CSR Scoring in all conditions. This is due to internal factors (correlation between assets) and external factors (economical pressure). From the perspective of internal factors, the correlation of

Bottom CSR scoring portfolio is less than Top CSR scoring portfolio, which results into lower non-systematic risk during portfolio optimization. Besides, all portfolios experience global and domestic economic pressure such as US interest rate rises, US-China trade war, volatile oil price increase, political and policy changes [13]. All these economic factors have an impact on systematic risk of portfolio components. Hence, this results into Bottom Scoring Portfolio performing better than Top Scoring Portfolio.

Table- I: Top scoring portfolio correlation matrix

1.00														
0.29	1.00													
0.52	0.32	1.00												
0.43	0.32	0.34	1.00											
0.35	0.31	0.29	0.83	1.00										
0.26	0.02	0.09	0.14	0.24	1.00									
0.29	0.02	0.03	(0.05)	0.24	0.50	1.00								
0.11	(0.00)	0.07	0.11	0.12	0.28	0.22	1.00							
(0.07)	0.11	(0.06)	0.26	0.15	0.14	(0.04)	0.16	1.00						
0.05	0.06	(0.07)	0.07	(0.00)	0.34	0.04	0.26	0.51	1.00					
0.36	(0.02)	0.05	0.22	0.28	0.40	0.32	0.07	0.30	0.34	1.00				
(0.00)	0.22	0.12	(0.14)	(0.17)	0.19	0.03	0.16	0.21	0.18	0.17	1.00			
0.18	(0.17)	0.11	(0.06)	(0.09)	0.36	0.26	0.33	0.14	0.22	0.44	0.24	1.00		
0.08	(0.21)	(0.13)	(0.10)	(0.04)	(0.04)	0.32	0.34	0.18	0.14	0.42	0.16	0.48	1.00	
0.18	0.09	0.12	(0.00)	0.10	0.10	0.62	0.37	0.15	0.09	0.09	0.09	1.00	0.34	1.00

*Source: Compile by author

Table- II: Bottom scoring portfolio correlation matrix

1.00													
0.02	1.00												
0.12	0.03	1.00											
(0.08)	0.05	(0.04)	1.00										
0.04	(0.00)	0.15	(0.05)	1.00									
0.27	(0.02)	0.03	0.01	(0.14)	1.00								
0.21	0.09	0.13	(0.10)	0.046	0.17	1.00							
0.17	(0.01)	0.00	0.00	0.06	0.30	(0.04)	1.00						
0.12	0.07	0.07	0.24	0.14	(0.04)	(0.08)	0.16	1.00					
0.07	0.04	0.00	0.40	(0.04)	0.14	0.03	0.02	0.42	1.00				
0.02	(0.02)	0.03	(0.05)	0.01	(0.05)	0.06	(0.02)	0.21	0.15	1.00			
0.03	0.06	0.00	0.31	0.06	0.14	0.01	0.12	0.28	0.46	0.13	1.00		
0.13	(0.00)	0.09	0.34	0.10	(0.05)	(0.00)	(0.02)	0.30	0.51	0.20	0.24	1.00	
(0.11)	0.06	0.08	0.25	0.24	0.08	(0.08)	0.08	0.34	0.36	0.23	0.27	0.17	1.00
(0.02)	(0.08)	0.02	0.26	0.28	(0.04)	(0.14)	0.27	0.25	0.30	0.18	0.41	0.35	0.35	1.00

*Source: Compile by author

Table III: Portfolio performance summary

Portfolio Performances Measurement	Top 15 CSR Scoring				Bottom 15 CSR Scoring			
	Naive diversification		Sharpe optimal model		Naive diversification		Sharpe optimal model	
	In Sample	Out sample	In Sample	Out sample	In Sample	Out sample	In Sample	Out sample
Annualized Portfolio Return	0.1211	**(0.0413)**	0.1277	**(0.0096)**	0.2604	0.4826	0.3190	0.4558
Excess Return	0.0894	**(0.0730)**	0.0960	**(0.0413)**	0.2287	0.4509	0.2873	0.4241
Portfolio Risk	0.0281	0.0387	0.0256	0.0480	0.0277	0.1180	0.0304	0.0877
Downside Volatility	-	0.2590	-	0.3020	-	0.1724	-	0.1659
Sharpe Ratio	3.1798	**(1.8845)**	3.7495	**(0.8601)**	8.2450	3.8197	9.4361	4.8368
Sortino Ratio	-	**(0.2819)**	-	**(0.1368)**	-	2.6157	-	2.5564

*Source: Compile by author

V. CONCLUSION

With the intention to justify the effect of Corporate Social Responsibility (CSR) and optimal condition of portfolio model on investment as argued by prior researches [7], [20], [9], [10], [12], this paper extends the prior researches by proposing a framework that involving Corporate Social Responsibility (CSR) into optimal portfolio construction. Firstly, all the companies are ranked according to their ESG scoring variables. Afterwards, this paper compares and contrasts portfolios with different CSR rating by using different portfolio model (Sharpe-optimal model and Naïve Diversification). The results show that Sharpe optimal model outperforms the Naive Diversification in all sample period and all scoring. The results of this study confirm the optimal conditions of Sharpe optimal model documented by prior researches. [2], [5], [6]. The results show that Bottom CSR scoring portfolio outperform the Top CSR scoring in all conditions. This is due to internal factors such as companies' involvement and external factors such as economic factors. From the external factor, all portfolios experience global and domestic economic pressure such as US interest rate rises, US-China trade war, volatile oil price increase, political and policy changes [13]. All these economic factors impact the systematic risk of portfolio components. On the other hand, the correlation of Bottom CSR Scoring Portfolio is less than Top CSR Scoring Portfolio, which allows lower unsystematic risk during portfolio optimization.

However, the paper consists of some limitations that need further study. Firstly, Sharpe optimal model applied in this paper follows the basic assumption such as the historical performance can ensure future performance, the market is efficient, etc. [16]. Besides, constraints less implied the practical parameter such as trading costs and short sales constraint, which will alter the real-time return. [2], [17], [30]. Hence, further studies can apply more sophisticated model such as Evolutionary algorithm, Black-Litterman model, etc. Another important factor is that portfolio diversification assumes that the market is efficient. However, previous studies [4], [21], [22], [28] indicate that

stock markets may not be entirely efficient. Furthermore, other factors such as causality between credit and stock markets [27] can also affect investment portfolios.

Finally, extending specifically our paper, future studies can employ Corporate Socially Responsible (CSR) rating system, since there is still lack of comprehensive rating enforced in Malaysia. This may cause some of the potential companies to be eliminated and hence have an impact on portfolio performance (whether good or bad).

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