Portfolio Management of 8 Australian Companies' Stocks

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Abstract

Due to the complexity of today's financial market, it is normally difficult for investors to choose high-quality investment targets. However, professional calculation and analysis can effectively evaluate the risk and the performance of each stock. Hence, the investors can choose a more suitable portfolio according to their own risk preferences. In this report, eight stocks in Australian markets are selected, which are ANZ, NST, WOW, QAN, TLS, AGL, CBA and SYD. By calculating the various data for the recent 2 years from 2016 to 2018 of these stocks, four effective investment portfolios are obtained. The purpose of this research is to provide samples and methods for investors to analyze and it can help investors to choose more suitable portfolios for themselves. In this report, Excel software is used to calculate specific data and draw the curve of the portfolio opportunity set and CAL line. Besides, Capital Asset Pricing Model is used to analyze as well.

Keywords

Portfolio Management, Expected Return, Optimal Portfolio, Alfa, Beta, CAPM, CAL

1. Introduction

This report selects eight Australian companies' stocks, and obtains the basic data of eight stocks through Yahoo Finance (2018) and Australian security (2018) exchange website and calculation. The data from 2016 to 2018 are collected and calculated in this report. The Excel software Solver is used to calculate and draw the charts. Through these specific data, the performance and value of these stocks can be analyzed. Different fund managers have different investment ideas and preferences, which will form different investment strategies, and then evolve into different investment style, which will lead to different investment performance.

Therefore, investment style is an important influencing factor of fund performance, which should be classified and evaluated on the basis of appropriate classification of investment styles (Su, 2018). As a result, this report has combined four portfolios from these eight stocks. These combinations have different characteristics. Investors can choose their own portfolio according to their own risk preferences. In this report, first of all, it is necessary to calculate the expected return, standard deviation, correlation matrix and covariance matrix. Then, portfolio opportunity set can be obtained, and use risk-free assets and CAL to analyze these portfolio structures to find a suitable portfolio. Finally, the risk and performance of different stocks and portfolios can be analyzed by calculating alpha and beta.

2. Literature Review

The evaluation of investment value is a multi-level problem, which is a continuous process for decision-makers to face a variety of needs, requirements and values. Therefore, all investments and portfolios should be evaluated, selected and prioritized, taking into account not only capital, but also reliability, sustainability and other aspects, so as to form the best portfolio (Räikkönen et al., 2020). In 1952, Markovitz established the famous optimized portfolio model, which is mean-variance model. The model solves the problem of how to allocate fixed assets to different risk assets. It helps investors to minimize the risk in the case of a given expected return, and maximum expected return when risk is given (Liu, 2019). But Black and Litterman (1991) pointed that the tiny change of the expected return will have great effect on the asset allocation. Capital asset pricing model (CAPM) is considered to be the first consistent model to describe the relationship between return on equity investment, investment risk and cost of equity. As a technical tool, it is widely used in the pricing of high-risk securities. It provides a rough estimate of the relationship between their expected return and the systemic risk caused by the use of capital expenditure (Alhabeeb, 2020). Muller (1993) pointed that according to the experience, risk models always tend to underestimate the risk of the optimal portfolio.

3. The Risk and Performance Evaluation of Stocks and Portfolios

3.1. Risk and Return Analyses

In this section, the original data is collected from Yahoo Finance (2018) and Australian security (2018) exchange website. Expected return is calculated through monthly return. Expected return equals to the average of monthly return. Monthly return is calculated by adj close form the second month minus the first month and then divided by first monthly adj close. From Table 1, it is clearly shows that the expected return of all of these 8 stocks are higher or equal than market return (0.87%) except of TLS (−1.32%). Among them, NST stock is the highest (2.14%), compare with other 7 stocks, the TLS stock is the lowest one (−1.32%).

The standard deviation can describe the statistical distribution degree in the statistics. In stock area, firstly, if standard deviation is very large, it means that this stock has high risks. Secondly, if standard deviation is very small, it means this stock has low risk and stable return. From Table 1, it is clearly shows that stock NST has the highest Standard Deviation (10.74%), and this stock has the highest risk. In addition, stock TLS has the lowest Standard Deviation (4.57%), it means that stock TLS has the lowest risk and stable return.

The Correlation Matrix is always use correlation between two variables. In general, Correlation Matrix will between −1 and 1. According to the Table 2, it is clearly shows that stock ANZ has a high positive correlation with dependent variable (CBA), r = 0.5579. it means that if the price of stock CBA increase, and stock ANZ will following grow. In addition, ANZ has a high negative correlation with Independent variable (TLS), r = −0.0227. It means that if the price of TLS increase, the price of ANZ will decrease.

Table 3 describes Covariance Matrix. If the Covariance Matrix is positive, it means that the price of these 8 stock has a positive correlation with market. In general, high risks will bring high return. These kinds of stocks can be investment.

Table 1. Expected return and standard deviation.

	Expected Return	Standard Deviation
ANZ	1.56%	4.93%
NST	2.14%	10.74%
WOW	1.06%	3.85%
QAN	1.98%	9.24%
TLS	−1.32%	4.57%
AGL	1.04%	5.15%
CBA	0.81%	4.90%
SYD	0.49%	5.62%
ASX & P200	0.875	2.41%

Table 2. Correlation matrix.

	ANZ	NST	WOW	QAN	TLS	AGL	CBA	SYD	ASX & P200
ANZ	1								
NST	−0.00823	1							
WOW	0.3892806	0.03766044	1						
QAN	−0.138642	−0.1512646	0.01148	1					
TLS	−0.022662	0.16877601	−0.0305	−0.267586	1				
AGL	0.166683	0.23075705	0.16094	0.091451	0.370559	1			
CBA	0.557905	−0.2265356	0.21141	−0.058059	0.398078	0.540709919	1		
SYD	−0.06633	0.22998867	0.247503	0.247503	0.088365	0.401731566	0.004743932	1	
ASX&P200	0.6208904	0.07567481	−0.063139	−0.063139	0.38973	0.544069876	0.672520234	0.468736	1

But some stocks have high risks and low return. These kinds of stocks are not recommended investment. In addition, Covariance Matrix can measure the stock. Different stocks should has low Covariance Matrix. According to this table, it is clearly shows that there are 7 stocks has positive Covariance Matrix with ASX except QAN. Among them, CBA has the highest Covariance Matrix with ASX (0.0008). NST has the lowest Covariance Matrix with ASX (0.0002). in fact, between different stocks also has Covariance Matrix. For example, NST has a high Covariance Matrix with SYD (0.017), and has a negative Covariance Matrix with CBA (−0.003). It means that SYD and CBA can be a portfolio, because the Covariance Matrix between them is negative.

3.2. Portfolio Construction and Analysis

The portfolio opportunity set can be described by a curve, which is drawn by the Excel software. The 8 stocks shows in the Figure 1 below using the red point. According to this curve, the points higher than 0.0094 (excepted return) is efficient frontier, and the points lower than 0.0094 (excepted return) is inefficient

Table 3. Covariance matrix.

|	ANZ	NST	WOW	QAN	TLS	AGL	CBA	SYD	ASX & P200
ANZ	0.002325	−0.0011625	0.00071	−0.000605	−4.9E−05	0.00040518	0.00128	−0.00018	0.000707109
NST	−0.00116	0.01106047	0.00015	−0.001439	0.000795	0.00122339	−0.0011	0.001735	0.000187964
WOW	0.000707	0.00014386	0.00142	3.91E−05	−5.1E−05	0.00030566	0.00038	0.000149	0.000466258
QAN	−0.00060	−0.0014386	3.9E−05	0.008178	−0.00108	0.00041690	−0.0002	0.001231	−0.00013485
TLS	−4.89E−05	0.00079477	−5.1E−05	−0.00108	0.002005	0.00083642	0.00085	0.000218	0.000412139
AGL	0.000405	0.00122339	0.00031	0.000417	0.000836	0.00254124	0.00130	0.001114	0.000647761
CBA	0.001289	−0.001142	0.00038	−0.000252	0.000854	0.00130660	0.00229	1.25E−05	0.000761372
SYD	−0.00017	0.00173467	0.00015	0.001231	0.000218	0.00111386	1.25074E	0.002298	0.000608889
ASX & P200	0.0007071	0.00018796	0.00047	−0.000135	0.000412	0.000647761	0.0007613	0.000609	0.000557793
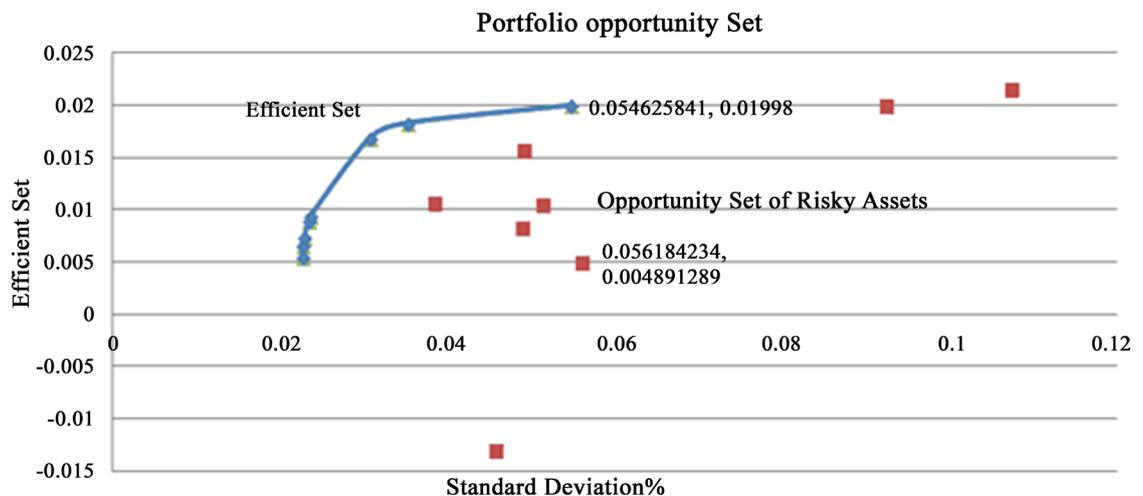
Figure 1. Portfolio opportunity set.

frontier. Efficient frontier is a slanting curve, and it Satisfy the high return and high risk principles. Following with high return, the risk will be high. Minimum Variance Portfolio is MVP. According to the curve, just QAN and NST are higher than the portfolio opportunity curve, and other 6 stocks are below than the portfolio opportunity curve. These 6 stocks mean that they may be have the high risk but low return. In addition, NST has the highest return and it can be a portfolio with NST which can be invest advance.

3.3. Portfolio Recommendation

The minimum variance portfolio and the recommended portfolios A and B are listed in Table 4 below. And the data of expected rate of return and standard deviation for each portfolio is included in the table. It also presents the weight of the eight stocks in each portfolio and the dollar amount which are calculated by Excel.

According to the tabular data, the expected yield of the minimum variance portfolio is 0.54% with a standard deviation of 2.25%. The minimum variance portfolio is the portfolio with the lowest effective boundary risk. As the chart shown in section two, all points on the opportunity curve below the minimum variance portfolio has a lower expected return and a higher standard deviation than the minimum variance portfolio.

It is clear that portfolio A has the monthly expected rate of return (0.65%) is higher than the minimum variance portfolio. However, the standard deviation of portfolio A is only 2.26%, only a little higher than it of minimum variance portfolio. In addition, due to the much higher monthly expected return of Portfolio B (1.83%), which is almost four times the minimum variance portfolio, it is recommended as well. Nevertheless, Portfolio B is more risky than Portfolio A because of its standard deviation which is the highest among three portfolios (3.51%). It is advisable that the directors and investors balance the return and

Table 4. Weight and amount of portfolios.

	Min Variance Portfolio		Portfolio A		Portfolio B	
Expected Return	0.54%		0.65%		1.83%	
Standard Deviation	2.25%		2.26%		3.51%	
	Weight	Amount	Weight	Amount	Weight	Amount
ANZ	20.48%	$ 20,478,689	22.71%	$ 22,705,498	46.31%	$ 46,309,440
NST	4.02%	$ 4,024,301	5.24%	$ 5,241,487	26.25%	$ 26,246,485
WOW	24.85%	$ 24,849,672	24.85%	$ 24,847,320	0.00%	$ 0
QAN	10.64%	$ 10,638,695	11.35%	$ 11,345,768	27.44%	$ 27,444,075
TLS	29.49%	$ 29,494,971	26.23%	$ 26,225,475	0.00%	$ 0
AGL	0%	$ 0	0%	$ 0	0.00%	$ 0
CBA	0%	$ 0	0%	$ 0	0.00%	$ 0
SYD	10.51%	$ 10,513,672	9.63%	$ 9,634,452	0.00%	$ 0

risks before choosing from portfolio A and portfolio B.

3.4. Portfolios with Riskless Assets and CAL

It can be seen that the **Figure 2** below combines the CAL line and the opportunity setting curve, and the junction of the two lines. The above data and graphic can be obtained by Excel and Solver functions. The cut point is the optimal portfolio and the expected return on the optimal portfolio is 1.68% with a standard deviation of 3.06%. Initially, all combinations involving risky assets and risk-free assets are concentrated on the CAL line. In this report, the risk-free assets in the portfolio are Treasury bills with an annual interest rate of 1.56%, from which the monthly interest rate is calculated to be 0.13%. The point of the optimal portfolio can be found by finding the point with the sharpest interest rate in the opportunity set of 8 stocks. A sharp ratio indicates the relationship between excess returns and risk. According to yahoo finance data, the expected return rate of the ASX200 market index is 0.87%, and the standard deviation is 2.41%. The slope of the optimal portfolio is 0.51, and the slope of the market index is calculated to be 0.31. The risk return of the optimal portfolio is higher than it of the market index. In other words, the optimal portfolio has a higher rate of return and a higher standard deviation, so the risk is higher than the market index. Overall, the optimal portfolio is the best choice among all portfolios.

Table 5 shows the risky portfolios A and B recommended in the previous section, as well as the new portfolios C and D that is added the risk-free assets. The purpose of the action is to reduce the risk of portfolios A and B by combining risk-free assets with risk-free assets. The new portfolios C and D use the same
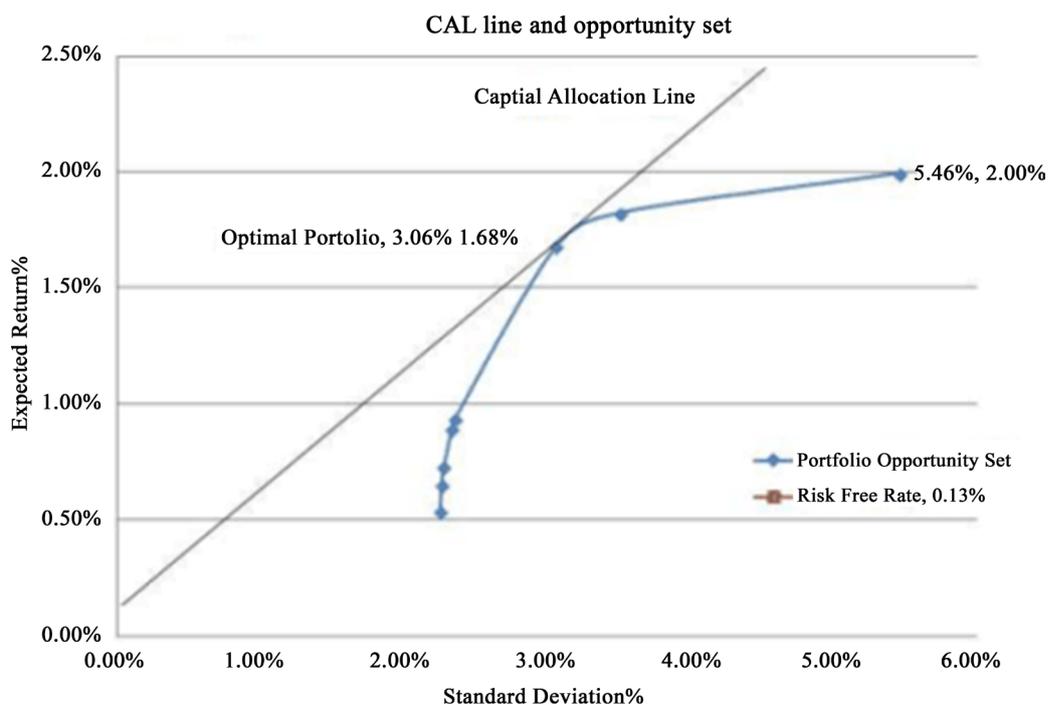

Figure 2. CAL line and opportunity set.

method, which is calculated by Excel Solver. It can be seen that A and C maintain the same expected return of 0.65%, while the same B and D maintain the expected return of 1.68%. According to the rules, the portfolio can short risky assets but each asset weight does not exceed 5%. From the above table, it can be concluded that the new portfolio C has standard deviation that is half the lower than Portfolio A, with the expected return being the same. Portfolios B and D share the same situation. This conclusion means that it is effective to reduce the risk of portfolios A and B by rebuilding risk and risk-free assets as portfolios C and D, while can still maintain the expected return equal. Therefore, C and D are more worthy of recommendation than portfolios A or B.

3.5. Systematic Risk and Unsystematic Risk Component

Beta indicates the risk of securities or portfolio systems. It is a mathematical tool to measure the systematic undiversifiable market risk (Alhabeeb, 2020). It represents a direct relationship between securities or portfolio returns and market trends. Based on Beta, the expected return can be calculated by using the Capital Asset Pricing Model (CAPM). Alpha refers to the return of more than expected returns in the CAPM model. In this section, all Betas are calculated based on the standard deviation of stocks, portfolios, and market indices, as well as covariance and correlation coefficients. Among them, Alpha is the difference between the actual return of the portfolio and the expected return of the CAPM model. In addition, in general, the risk increases with the increase of Beta.

The alpha and beta values for the four selected stocks and the four portfolios are depicted in the chart above. In the analysis of the portfolio, a higher Beta means higher risk. Table 6 shows that the most risky asset is ANZ, which reached 1.544. The lowest risk asset is the stock QAN, and the risk factor is negative. In the

Table 5. Expected return, SD & weight of 4 portfolios.

	Portfolio A	Portfolio C	Portfolio B	Portfolio D
Expected Return	0.65%	0.65%	1.83%	1.83%
Standard Deviation	2.26%	1.08%	3.51%	2.93%
Weight				
ANZ	22.71%	14.19%	46.31%	45.86%
NST	5.24%	7.02%	26.25%	19.69%
WOW	24.85%	5.22%	0.00%	16.07%
QAN	11.35%	6.86%	27.44%	20.81%
TLS	26.23%	−5%	0.00%	−5%
AGL	0%	3.09%	0.00%	3.38%
CBA	0%	2.23%	0.00%	3.98%
SYD	9.63%	−5%	0.00%	−5%
Risk Free Asset	22.71%	71.39%	0.00%	00.21%

Table 6. Alpha & beta of stocks and portfolios.

	Beta	Alpha
ANZ	1.544042	0.0147
NST	0.410437	0.0037
WOW	1.01812	0.0095
QAN	−0.00146	0.0024
Portfolio A	0.702703	0.0072
Portfolio B	1.254802	0.0101
Portfolio C	0.502703	0.0046
Portfolio D	2.297297	0.0106

portfolio, portfolio D has the highest risk factor. In terms of alpha, ANZ and B have the highest alpha, and higher alpha can bring higher returns. It should be noted that investment assets with higher alpha prefer to have higher beta coefficient, which means that high returns always have high risks. Overall, portfolio C is a good choice for risk-averse investors, and portfolio D is attractive for risk lovers.

4. Conclusion

In summary, the report analyzes the portfolio of eight stocks and Treasury bills. The report shows opportunities for risky assets in graphical and tabular form, and finds the optimal portfolio, the portfolios with riskfree assets through Solver and the effective set. This report separately calculates the min variance portfolio and the weights of portfolios A and B. The risk of portfolio B is higher than portfolio A. It is recommended to balance the benefits and risks when customers choose A or B. Then it shows the CAL line, using risk and risk-free assets as portfolios C and D to rebuild portfolios A and B while still maintaining the expected return equal. The expected return on portfolio C is relatively low, so the risk is also lower than portfolio D, which represents a safer management of such a large portfolio of funds. Portfolio D has higher returns and higher risks.

However, the analysis in this report is limited. For example, the data in this report are from 2016 to January 2018. This report will be more accurate if there is more data to support the analysis.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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