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Constructing an Optimal Portfolio Consisting of Stocks on the MSE

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YOUR LOGO

Abstract

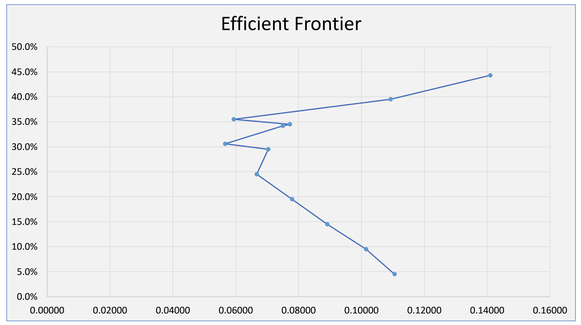
This research sought to construct an optimal portfolio allocation consisting of stocks listed on the Mongolian Stock Exchange.
To abbreviate the result, our recommended optimal stock allocation begins with investing over 60% of the portfolio in INV stock, a little over 10% in the TUM stock, and dividing the rest equally among other stocks. The term optimal stock allocation here refers to the portfolio that represents the highest Sharpe ratio.
We also recommended another portfolio to investors which is constructed in pursuit of minimizing the risk. The portfolio consists of only two stocks, INV and GOV, where the weight of INV dominates the other.

Introduction

An investor can construct an optimal portfolio that maximizes return value given its level of risk by choosing its components and deploying the required calculations. In the example of the Mongolian stock market, investors might intend to select stocks that characterize higher market capitalization and greater liquidity compared to peers. However, research studies that suggest the appropriate asset allocation consisting of stocks listed on the MSE are not accessible to every investor. Thus, we aim to propose an optimal portfolio allocation that can be practically useful for investors focusing on the Mongolian stock market.
In pursuit of choosing the portfolio which suggests the highest excess return over its risk, one can take a look at its Sharpe ratio (a higher Sharpe ratio offers a higher excess return over its risk).

$$Sharpe\ ratio = \frac{Return\ of\ portfolio - Risk\ free\ rate}{Standard\ deviation}$$

Figure 1. Efficient Frontier



Methods and Materials

In the calculation, we used the historical price data of seven stocks listed on the MSE. Criteria, including liquidity, market dominance, capitalization volume, etc were utilized to select the stocks. Given that the listing date of each stock differed, we set the starting point of all monthly and daily data to be started from Jun 2019 to provide consistency.
Recent volatile stock market movements have made the use of a single, trailing rate of return to be misleading. Thus a mean value of 36 months of data was applied to determine the appropriate rate of return, which could have a higher likelihood of presenting more accurate results.
To construct an optimal portfolio, several portfolio structures with different weightings of stocks were computed, which resulted in variable return and risk profiles, thus leading to increased or decreased Sharpe ratio. In addition, a portfolio structure with the lowest risk value and one with the highest Sharpe ratio were constructed.

Figure 2. Markowitz Efficient Frontier

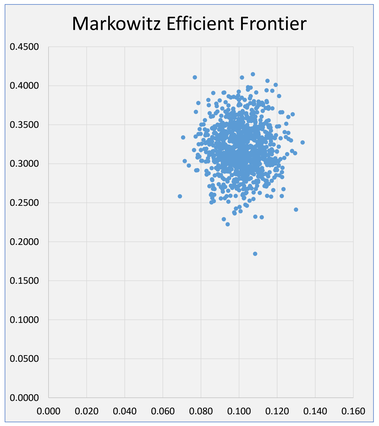


Figure 3. Sharpe ratio

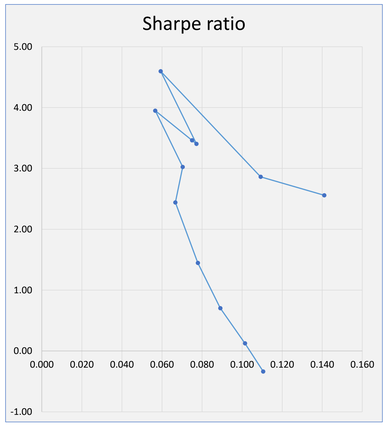


Table 1. Portfolio allocation

	APU	TUM	SUU	MNDL	MFC	GOV	INV	R	SD	Sharpe ratio
1	0.1%	0.1%	0.1%	0.6%	0.0%	99.0%	0.1%	4.5%	0.11052	-0.34
2	0.0%	0.0%	0.0%	9.8%	0.0%	82.0%	8.2%	9.5%	0.10144	0.13
3	0.0%	0.0%	0.0%	13.5%	29.0%	49.8%	7.7%	14.5%	0.08910	0.70
4	0.0%	0.0%	0.0%	5.4%	57.3%	19.2%	18.1%	19.5%	0.07791	1.45
5	1.0%	1.4%	2.2%	3.8%	0.5%	35.2%	56.0%	24.5%	0.06667	2.44
6	4.1%	5.6%	8.9%	2.2%	1.8%	20.8%	56.6%	29.5%	0.07033	3.02
7	0.0%	0.0%	0.0%	0.0%	0.0%	15.7%	84.3%	30.6%	0.05661	3.95
8	5.0%	11.8%	5.0%	5.0%	5.0%	5.0%	63.2%	34.2%	0.07500	3.46
9	7.1%	9.8%	15.5%	0.7%	3.2%	6.3%	57.3%	34.5%	0.07721	3.40
10	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	35.5%	0.05934	4.60
11	10.7%	29.2%	39.4%	0.0%	1.5%	0.0%	19.2%	39.5%	0.10925	2.86
12	0.0%	98.5%	1.5%	0.0%	0.0%	0.0%	0.0%	44.3%	0.14099	2.56

Discussion

Since each stock on the MSE characterizes a different risk and return profile, it was a challenge to pursue constructing the optimal portfolio. Normally, the risk-return trade-off exists: the higher the return of a financial asset, the higher its risk. However, in this study, that was not always the case which made the calculation puzzling. We managed it by setting several limitations in the calculation and exercising the analyst's judgment for the portfolio that was deemed to be optimal.

Results

As per our calculation, to construct an optimal portfolio with the highest Sharpe ratio given several base limitations (each stock weighs at least 5%), it is recommended that over 60% of the portfolio allocates to INV stock, 11.8% of it allocates to TUM and, the rest of the stocks get equal weightings.
If an investor is willing to choose a portfolio that minimizes the risk, one which requires a composition of INV (84%) and GOV (16%) stocks is preferable.

Conclusions

To summarize the results of this research, a portfolio that characterizes a better risk and return profile regarding its value of Sharpe ratio can be built by assigning different weights to the portfolio components. If an investor intends to find optimality in the portfolio that consists of Mongolian top stocks, we recommend No.8 portfolio allocation shown in the Table 1.
However, at a time when the stock market has been heated up and shown volatility, the recommended portfolio structure in this research may not provide the same expected results in the upcoming period of economic uncertainty. Therefore, repeated re-evaluation of the portfolio allocation is suggested for every investor who is willing to obtain an excess return.

In Table 1:
- *No.7 portfolio allocation refers to the one that minimizes the risk*
- *No. 8 portfolio represents the optimal portfolio given some limitations (our recommended portfolio)*
- *No. 10 portfolio allocation refers to the one with the highest Sharpe ratio*

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