North South University

Summer – 2023

FIN 435: Investment Theory

<u>**Group Report**</u>

Assigned To:

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Letter of Transmittal

November 20, 2023

Dr. Md. Arifur Rahman

School of Business and Economics

North South University

Subject: Letter of Transmittal.

Dear Sir,

We are hereby submitting our project report titled " Investment performance of different US asset classes" to fulfill the requirements of the course FIN435 – Investment Theory. We are thankful to work under your supervision in order to meet the requirements of this course. Our report dives into the differences or similarities across asset classes based on the highest possible uses of the statistics provided for two separate periods.

We would be highly obliged if you accept our submission towards the requirements of this course and enlighten us with your valuable feedback.

Sincerely,

Most. Sadia Arafin Maisha – 1921221030

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Table of Contents

Introduction

The investment environment in the United States has evolved considerably, and understanding the performance of various asset classes is crucial for making informed decisions. We examine the investment performance of numerous US asset classes from 1926 to 2020 and 1970 to 2020 in this group project report. The research focuses on key statistical indicators such as geometric and arithmetic averages, standard deviation, return and risk percentages. These data provide a comprehensive review of each asset class's historical performance, shedding light on trends, variations, and potential investing implications. By comparing and contrasting data from these two periods, we intend to acquire crucial insights into the dynamics of small and large-firm stocks, bonds, treasuries, gold, real estate, and the impact of inflation on investment returns. In a detailed commentary on the facts presented, we emphasize significant differences or similarities across asset classes, providing essential insights for investors navigating the difficult landscape of US financial markets.

Analysis

The provided data gives the information of nominal rate of return along with the inflation rate. This indicates how much money an investment makes (nominal rate) and how much prices rise (inflation rate) during both periods. However, simply looking at the nominal rate can be misleading because it does not take into account how much things cost now compared to previously (inflation).

So, we decided to calculate the real rate of return for the much accurate observation. The formula of real rate of return is provided below:

$$\text{Real rate of return} = ((1+\text{nominal rate}) / (1+\text{inflation rate})) - 1$$

The second step of our calculation is to select between arithmetic average and geometric average. We are choosing the geometric average because it is a more accurate tool for determining how investments really increase. Unlike the conventional arithmetic average, the geometric average takes into account compounding, realizing that returns do not simply

add up each year; they multiply. This is essential for capturing the genuine growth of money over time.

Lastly, we need to consider the Sharpe ratio. The Sharpe ratio is similar to a report for how well an investment is performing when both returns and risks are considered. To calculate it, take the amount you expect to earn from an investment, subtract the risk-free rate (such as what you'd get from a safe investment), and divide the result by the investment's volatility (standard deviation). It is a method of determining how well your investment is performing in comparison to how hazardous it is. A greater Sharpe ratio indicates that your investment is providing better returns for the risks you are taking. It's equivalent to asking, "Is this investment really worth it?" and the Sharpe ratio can help us determine that. The formula of Sharpe ratio is

Sharpe Ratio = (Rate of return- Risk free rate) / Standard deviation

Calculations & Derivations: We are considering 30-days treasury geometric average as risk free rate. The further calculations are provided in the following tables.

1970-2020				
	Return%		Risk%	
Asset Class	Geometric average	Real Rate (Geometric)	Standard deviation	Sharpe Ratio
1. Small - firm stocks	12.5	7.76	23.4	0.28
2. Large - firm stocks	10	5.36	17.9	0.24
3. Long - term corporate bonds	8.9	4.31	10.2	0.31
4. Long - term government bonds	8.7	4.12	11.7	0.25
5. Medium - term government bonds	8	3.45	6.6	0.35
6. 30 - day treasuries	5.6	1.15	3.1	0.00
7. Gold	9.4	4.79	29.8	0.12
8. Real estate	5	0.57	6.3	-0.09

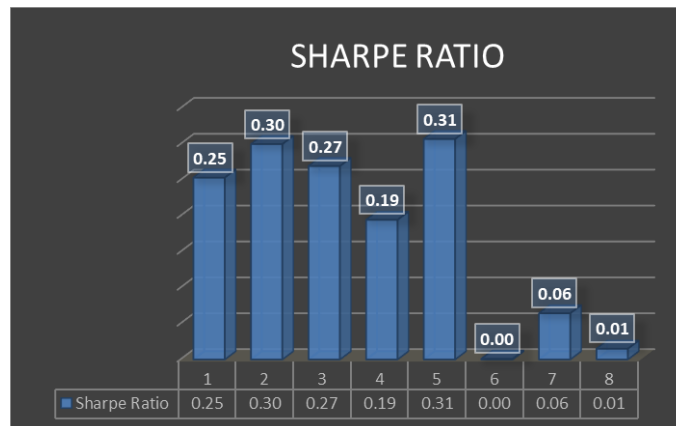| 1926-2020				
	Return%		Risk%	
Asset Class	**Geometric average**	**Real Rate (Geometric)**	**Standard deviation**	**Sharpe Ratio**
1. Small - firm stocks	12.1	8.83	32.6	0.25
2. Large - firm stocks	9.9	6.70	20.4	0.30
3. Long - term corporate bonds	5.9	2.82	8.3	0.27
4. Long - term government bonds	5.5	2.43	9.5	0.19
5. Medium - term government bonds	5.4	2.33	5.7	0.31
6. 30 - day treasuries	3.6	0.58	3.1	0.00
7. Gold	5.1	2.04	22.7	0.06
8. Real estate	3.7	0.68	6.7	0.01

<u>Asset Class-wise Comparison:</u>

1.   Risk Assessment: - The standard deviation of long-term corporate bonds and small-company stocks decreased, indicating lesser risk.

- Gold's increasing standard deviation indicated that, in spite of its better returns, it was becoming riskier.
- The standard deviation of medium-term government bonds decreased, indicating a decrease in risk.

2.   Return Assessment: - The geometric average returns of small-firm stocks increased steadily from 12.1% (1926-2020) to 12.5% (1970-2020).

- Over the corresponding periods, large-firm stocks also had a positive shift, increasing from 9.9% to 10%.
- Long-term government bonds saw a minor increase in return, whereas long-term corporate bonds showed constant returns.

 Notably, profits on gold increased significantly from 5.1% to 9.4%.
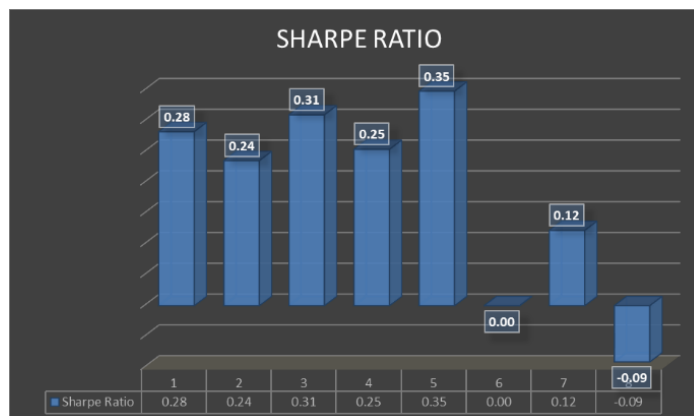
3.   Sharpe Ratio Analysis: - Long-term corporate bonds and small-company stocks showed higher Sharpe ratios, indicating higher risk-adjusted returns.

- The drop in Gold's Sharpe ratio indicates higher risk in relation to rewards.
- The Sharpe ratio for real estate decreased, suggesting less favorable risk-adjusted performance.

(1926-2020)

SHARPE RATIO

	1	2	3	4	5	6	7	8
Sharpe Ratio	0.25	0.30	0.27	0.19	0.31	0.00	0.06	0.01

(1970-2020)

SHARPE RATIO

	1	2	3	4	5	6	7	
Sharpe Ratio	0.28	0.24	0.31	0.25	0.35	0.00	0.12	-0.09

Comparing Time-wise:

1. Market Trends Over Time: - From 1926 to 2020, returns in a variety of asset types showed favorable trends overall. A change in the dynamics of risk-return was indicated by Gold's declining Sharpe ratio. For several asset classes, the standard deviation showed an overall decline in the risk profile.
2. Inflation Sensitivity Study: Real estate and long-term government bonds responded to inflation in various ways, affecting their real rates and Sharpe ratios.
3. Asset Class Rotation Analysis: - Gold showed a significant rise in demand and returns, while small-firm stocks held a solid position.

4. Trends in Sharpe Ratios: - Small-company stocks and long-term corporate bonds saw improvements in Sharpe ratios, indicating more effective risk-adjusted returns.

Cautions:

Real estate and US inflation should be avoided since their Sharpe ratios are usually lower or negative, indicating less desirable risk-adjusted returns. In light of risk, these investments might not be the best option.

Consideration:

Recall that there are other factors besides the Sharpe ratio. The Sharpe ratio has limitations, so consider your investment goals, risk tolerance, and the state of the economy.

Conclusion

Upon examining the Sharpe shares over two distinct time periods (1926-2020 and 1970-2020), intriguing patterns in the performance of various asset classes under risk can be observed. The Sharpe ratio has grown from 0.25 to 0.28 for small-cap companies throughout the years, suggesting a good risk. Though the mass firm's shares had a higher Sharpe ratio of 0.30 at first, they declined to 0.24 in the next quarter, suggesting a less risky execution. This implies that longer-term securities become increasingly effective to the financial sector. It's important to remember that the Sharpe ratio has limitations and that other factors, such investment goals, individual risk tolerance, and the state of the economy, should be taken into account when applying the ratio. Thankfully, good sand; gambling adjusted earnings expanded. Long-term corporate securities, medium-term government securities, and long-term government securities all saw rising trends in their Sharpe ratios over time. Even if long-term corporate bonds, medium-term government bonds, and small-company stocks seem to give greater risk-adjusted returns, making wise investment decisions requires a thorough understanding of the overall state of the market. concludes that small-company stocks have remained popular due to their steady, competitive, risk-adjusted returns. The subtle variations in Sharpe ratios among asset classes underscore the market's dynamic character and the necessity for investors to modify their approaches accordingly. Long-term success in investing requires a comprehensive approach, even with the insights offered by Sharpe ratios. Diversification is still a critical factor.