

GROUP WORK PROJECT # 1
GROUP NUMBER: 3687

MScFE 560: FINANCIAL MARKETS

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Remember: Any group members who did **not contribute to the project should be given all zero (0) points for the collaboration grade on the GWP submission page.*

<p>Statement of integrity: By typing the names of all group members in the text boxes below, you confirm that the assignment submitted is original work produced by the group (excluding any non-contributing members identified with an “X” above).</p>	
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Use the box below to explain any attempts to reach out to a non-contributing member. Type (N/A) if all members contributed.

Note: You may be required to provide proof of your outreach to non-contributing members upon request.

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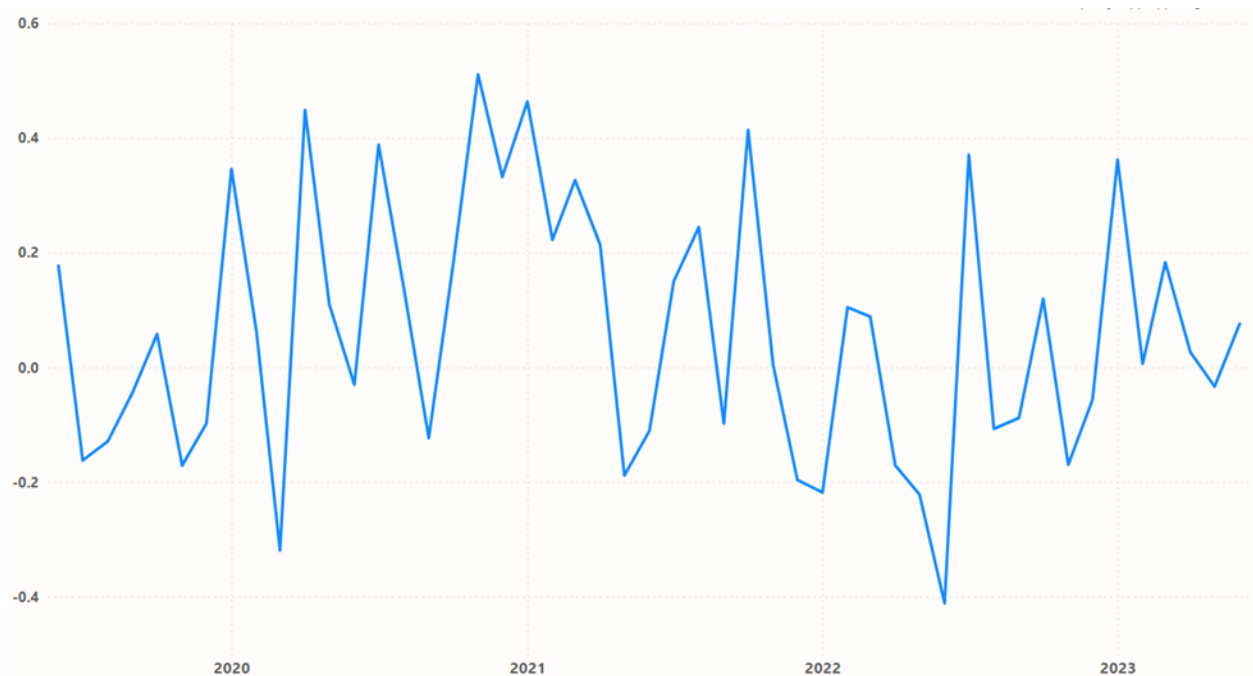
PORTFOLIO-B

Investment 3: Cryptocurrency - PORTFOLIO B :Buy any number of assets (no shorting allowed)

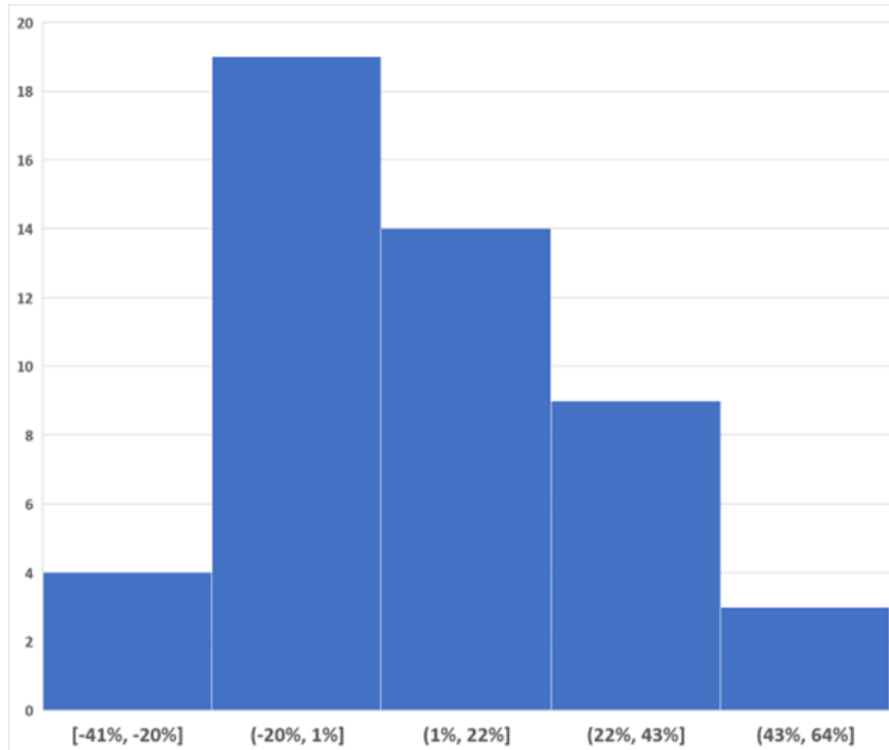
The composition of the portfolio consists of 50% BTC and 50% ETH.
Purchased from June 2019 and calculates monthly profit until June 2023.

[\[Data source\]](#)

Portfolio monthly rate of return chart



Histogram distribution of portfolio returns chart



	ETH	BTC	Portfolio
AVG	7.5%	4.6%	6.1%
Stdev	27.6%	20.7%	22.5%
skew	0.51	0.25	0.21
kurtosis	-0.15234	-0.5981	-0.75395

VAR	ETH	BTC
ETH	0.075393	0.059048
BTC	0.059048	0.042281

Correlation	ETH	BTC
ETH	1	0.72636
BTC	0.72636	1

1. Average return : 7.5% per month with ETH and 4.6 % per month with BTC

2. Portfolio Volatility: 22%

3. Portfolio Skewness : 0.21

4. Portfolio Kurtosis : - 0.754

Step 2

1. Shorting

a. Can this portfolio be sold short?

Yes, I can short my crypto portfolio including Bitcoin and Ethereum.

b. If it can be sold short, walk through the mechanics.

To do this, I need to find a brokerage firm that will allow me to short sell cryptocurrencies. The popular broker that allows short selling of my cryptocurrency is Binance. When I short the cryptocurrency, I am essentially borrowing the cryptocurrency from the brokerage firm and selling it at the current price. If the price of crypto goes down, I will make money because I can buy back the cryptocurrency for less than the price I sold it for.

However, if the price of the cryptocurrency goes up, I will suffer a loss because I will have to buy back the cryptocurrency at a higher price than I sold it for.

2. Credit Risk

a. Does this portfolio have credit risk?

Yes, my crypto portfolio including Bitcoin and Ethereum has credit risk

b. If it has credit risk, explain what the credit risk is.

Credit risk is the risk that counterparties will not meet their financial obligations. In this case, the counterparty is the issuer of the cryptocurrency. If the crypto issuer is unable to pay my debts, I may lose my entire investment. Credit risk is one of the main risks for cryptocurrencies.

Cryptocurrency is a new asset and is not controlled by any regulatory authority. This means there is no protection for investors if anything goes wrong with the crypto issuer.

3. Portfolio Statistics

a. The weighted return of the portfolio is $0.5 \times 7.52\% + 0.5 \times 4.63\% = 6.08\%$

b. The variance of the portfolio is :

$$0.5^2 \times 0.28^2 + 0.5^2 \times 0.21^2 + 2 \times 0.726 \times 0.5 \times 0.5 \times 0.28 \times 0.21 = 0.05$$

4. Diversification

a. Describe the diversification in words between the two assets.

A portfolio standard deviation of 22% indicates a relatively high level of volatility. This is because both Bitcoin and Ethereum are highly volatile assets. The correlation coefficient of 0.72626 shows that Bitcoin and Ethereum are highly correlated with each other. This means that the two assets tend to move in the same direction.

b. Do you think this portfolio is well diversified or not?

Cryptocurrency portfolio including Bitcoin and Ethereum that is not well diversified:

- Both Bitcoin and Ethereum are highly volatile assets, which means their prices can change dramatically in a short period of time. This can make my portfolio more vulnerable to losses.
- Bitcoin and Ethereum are highly correlated, which means their prices tend to move in the same direction. This means that if either asset falls in price, my portfolio may also fall in price.
- A portfolio consists of only two assets, which means it is not well diversified in terms of asset allocation. This means that my portfolio is more risky if either asset is at risk.

5. Comparing Portfolios

a. How does your portfolio compare to the others in terms of risk?

To compare different portfolios in terms of risk is to use standard deviation. Standard deviation is a measure of the volatility of a portfolio. The higher the standard deviation, the more volatile and riskier the portfolio.

b. How does your portfolio compare to the others in terms of return?

To compare different portfolios in terms of return is to use the rate of return. Rate of return is a measure of a portfolio's return over a specific time period. The higher the rate of return, the more profitable the portfolio will be over that time period.

6. Assessing Risk

a. Describe economic conditions or scenarios that would affect your security

I am in Vietnam, when there was the Covid-19 Pandemic, the blockade and isolation orders asked people not to go out. As a result, most economic activities have stagnated and people are shifting to remote work, reducing the demand for energy such as gasoline.

b. Determine if similar events would hurt one or both members of a portfolio.

Does not affect the portfolio.

7. Performance

a. Now describe economic conditions or scenarios that would greatly improve each security.

After the covid 19 pandemic was thought to be no longer dangerous, more people went out to the streets, and companies resumed operations. At the

same time, the Russia-Ukraine war occurred, making energy supplies difficult to access, but demand was high, causing gasoline prices to increase.

b. Determine if similar events would help one or both members of a portfolio.

Does not affect the portfolio.

8. Disrupters

a. List the potential influence the central bank may have on the portfolio.

Central banks can ban financial institutions from handling Bitcoin and Ethereum transactions, or they can impose capital regulations on Bitcoin and Ethereum trading companies. This makes it more difficult to handle deposit and withdrawal issues, or if left unresolved, I lose my money completely.

b. List the potential influence that investment banks may have on the portfolio.

Investment banks can do research on Bitcoin and Ethereum, which can help investors better understand these assets and their potential. Investment banks can buy Bitcoin and Ethereum, which can increase the demand and price of these assets.

9. Re-assessing Risk

a. Do the two investments in the portfolio have the same skew?

Yes. ETH : 0.51 , BTC: 0.25

b. Is there a difference between the types of correlation?

There is not much difference in terms of correlation because the correlation of ETH and BTC in the portfolio is 0.726.

REFERENCE:

[1] Data source: [investing.com](https://www.investing.com)

PORTFOLIO-A

Investment 3: Cryptocurrency - PORTFOLIO A : Buy 1 asset and short 1 asset

I created 1 position to buy BTC and short sell ETH with the same amount on 23/4/2023. [[Data source](#)]

Step 1 :

	Short :ETH	Buy :BTC	Portfolio
23-Apr	-2.59%	2.73%	0%
23-May	-0.25%	-6.96%	-4%
23-Jun	-3.21%	11.97%	4%
AVG	-2.0%	2.6%	0.3%
Std	1.6%	9.5%	4.0%
Skew	1.43	-0.07	0.237

Correlation	ETH	BTC
ETH	1	-0.95234

BTC	-0.95234	1
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Var	ETH	BTC
ETH	0.000244	0.004315
BTC	0.004315	0.00896

Step 2

1. Shorting

a. Can this portfolio be sold short?

Yes, I can short my crypto portfolio including Bitcoin and Ethereum.

b. If it can be sold short, walk through the mechanics.

To do this, I need to find a brokerage firm that will allow me to short sell cryptocurrencies. The popular broker that allows short selling of my cryptocurrency is Binance. When I short the cryptocurrency, I am essentially borrowing the cryptocurrency from the brokerage firm and selling it at the current price. If the price of crypto goes down, I will make money because I can buy back the cryptocurrency for less than the price I sold it for. However, if the price of the cryptocurrency goes up, I will suffer a loss because I will have to buy back the cryptocurrency at a higher price than I sold it for.

2. Credit Risk

a. Does this portfolio have credit risk?

yes, buying and selling crypto without credit risk especially short selling the risk is much higher

b. If it has credit risk, explain what the credit risk is.

In addition to the aforementioned cryptocurrency buying risk, the credit risk in short selling cryptocurrencies includes:

Interest Loss: I have to pay interest when I borrow cryptocurrency from someone else or an exchange. If the cryptocurrency price does not fall as predicted, I will lose interest without profit from the short sale.

Unlimited Risk: Unlike buying cryptocurrencies directly, when selling short, the risk is unlimited. Cryptocurrency prices can increase indefinitely, so I can lose large amounts of money if I don't set a suitable stop-loss limit.

Margin Trading: Margin trading can pose a higher risk because I am using other people's money to trade. If not managed well, I can lose more money than the initial amount.

3. Portfolio Statistics

a. The weighted return of the portfolio is $0.5 \cdot (-2)\% + 0.5 \cdot 2.6\% = 0.38\%$

b. The variance of the portfolio is :

$$0.5^2 \cdot 0.0156^2 + 0.5^2 \cdot 0.095^2 + 2 \cdot (-0.95) \cdot 0.5 \cdot 0.5 \cdot 0.0156 \cdot 0.095 = 0.0016$$

4. Diversification

a. Describe the diversification in words between the two assets.

The standard deviation of the portfolio is 4%. This value shows the volatility of the portfolio. With a low standard deviation, the portfolio tends to be more stable and less volatile. The correlation coefficient of -0.95 is a very close value to -1. A correlation coefficient of -1 indicates an inverse return relationship between the two assets.

b. Do you think this portfolio is well diversified or not?

This portfolio has moderate diversification through holding both BTC and selling ETH at the same percentage. The combination of a low standard deviation and a correlation coefficient close to -1 reduces the overall risk of the portfolio

5. Comparing Portfolios

a. How does your portfolio compare to the others in terms of risk?

To compare different portfolios in terms of risk is to use standard deviation. Standard deviation is a measure of the volatility of a portfolio. The higher the standard deviation, the more volatile and riskier the portfolio.

b. How does your portfolio compare to the others in terms of return?

To compare different portfolios in terms of return is to use the rate of return. Rate of return is a measure of a portfolio's return over a specific time period. The higher the rate of return, the more profitable the portfolio will be over that time period.

6. Assessing Risk

a. Describe economic conditions or scenarios that would affect your security

I am in Vietnam, when there was the Covid-19 Pandemic, the blockade and isolation orders asked people not to go out. As a result, most economic activities have stagnated and people are shifting to remote work, reducing the demand for energy such as gasoline.

b. Determine if similar events would hurt one or both members of a portfolio.

Does not affect the portfolio.

7. Performance

a. Now describe economic conditions or scenarios that would greatly improve each security.

After the covid 19 pandemic was thought to be no longer dangerous, more people went out to the streets, and companies resumed operations. At the same time, the Russia-Ukraine war occurred, making energy supplies difficult to access, but demand was high, causing gasoline prices to increase.

b. Determine if similar events would help one or both members of a portfolio.

Does not affect the portfolio.

8. Disrupters

a. List the potential influence the central bank may have on the portfolio.

Central banks can ban financial institutions from handling Bitcoin and Ethereum transactions, or they can impose capital regulations on Bitcoin and Ethereum trading companies. This makes it more difficult to handle deposit and withdrawal issues, or if left unresolved, I lose my money completely.

b. List the potential influence that investment banks may have on the portfolio.

Investment banks can do research on Bitcoin and Ethereum, which can help investors better understand these assets and their potential. Investment banks can buy Bitcoin and Ethereum, which can increase the demand and price of these assets.

9. Re-assessing Risk

a. Do the two investments in the portfolio have the same skew?

No.

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Short ETH : 1.43

Buy BTC: -0.07

b. Is there a difference between the types of correlation?

The correlation coefficient of -0.95 is a very close value to -1. A correlation coefficient of -1 indicates a completely inverse relationship between the two assets.

REFERENCE:

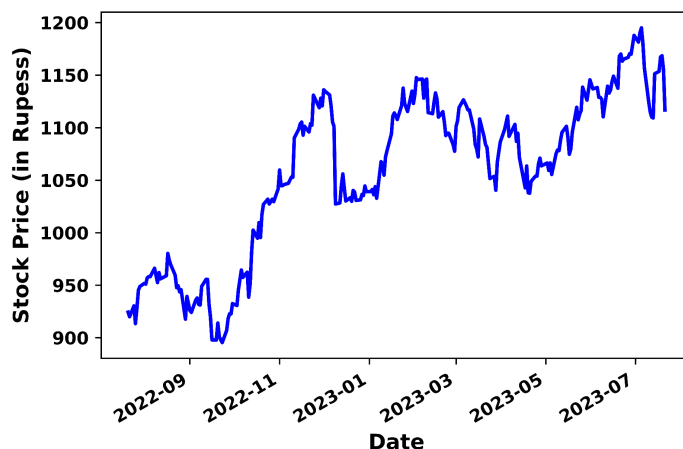
[1] Data source: [investing.com](https://www.investing.com)

PORTFOLIO-C

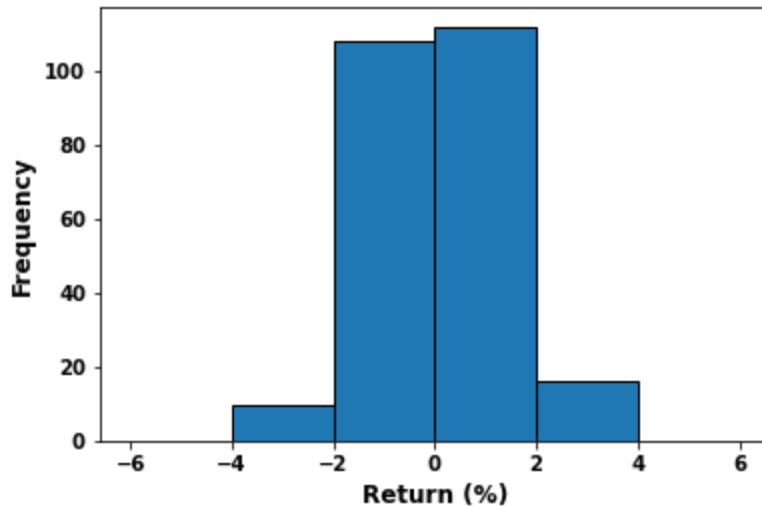
Investment-2: Income Stocks

Income stocks can be considered stable and regular dividend-paying stocks.^[1] This type of stock is very attractive for the passive investor who wants a stable income from the stocks. Dividend-paying stocks also have a chance of price appreciation as a company grows.

In this investment category, I would like to do an analysis of HCL Technologies Ltd. (NSE: HCLTECH) traded on National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) in India. It has a market cap of 302,696 Crore rupees on 22nd July 2023. The company has given dividends consistently since 2007. HCL technologies ltd. give a 4.3% dividend yield this year [[data source-1](#)]. I used the last one year on a daily time scale for the analysis[[data source-2](#)]. Its price movement during this time period is given in the below figure.



It gave a 20.80% return last year. The return distribution is based on the daily stock's closing price in the figure below.



Based on the distribution, the analysis is given below.

- Maximum daily return: 3.79%
- Minimum daily return: -6.71%
- Range of distribution: 10.51%
- Standard deviation (Volatility) of daily return: 1.31%
- Skewness of distribution: -0.38
- Kurtosis of distribution: 2.61

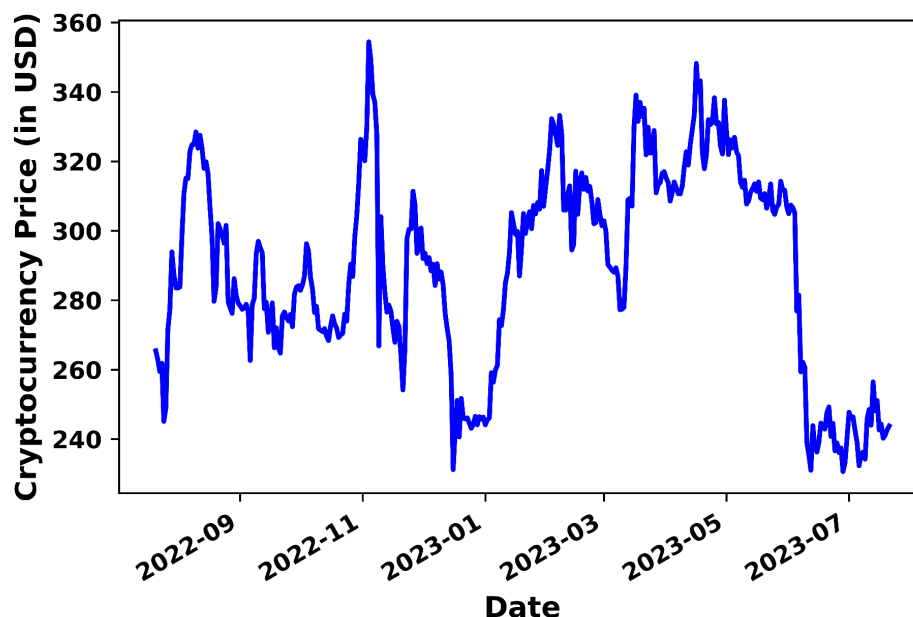
The kurtosis of distribution is close to the kurtosis of standard normal distribution (≈ 3). However, the kurtosis of distribution is less than that of standard normal distribution, so it is platykurtic, and dependency on outliers is very low.

Investment-3: Cryptocurrency

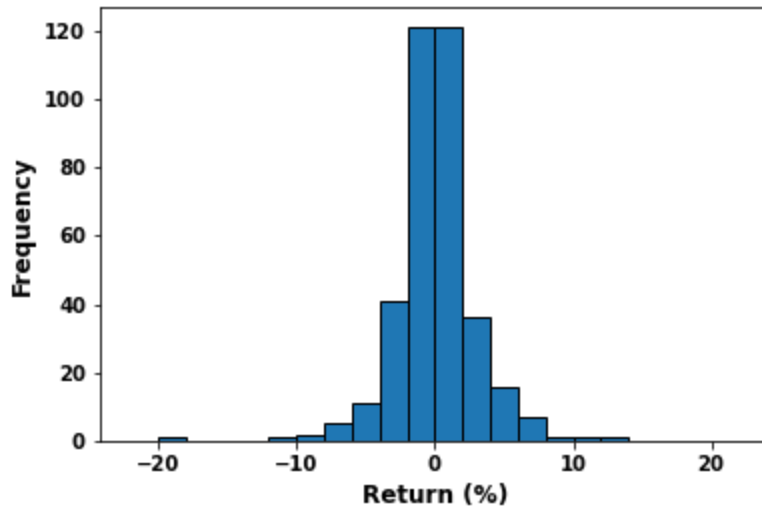
Cryptocurrency is known as digit currency, according to Forbes [4]. It is in electronic form and consists of strings of code known as blockchain. Many types of cryptocurrencies are in the market, such as payment cryptocurrencies, utility tokens, stablecoins and central bank digital

currencies [5]. There are thousands of cryptocurrencies available in the market to trade. However, there are only a few cryptocurrencies that are popular among investors.

I select Binance coin (BNB-USD) for investment analyse for the portfolio. Binance coin is considered as a utility token and used as a medium of exchange [6]. Binance's market capitalisation is \$36.648B on the data on 24th July 2023. I consider the last one year's daily closing price data of Binance coin for analysis, which is shown in the below figure [data source-3].



The closing price of the Binance coin was \$265.46 on 21st July 2022, and its closing price was \$243.78 on 21st July 2023. So it gave -8.16% return in the last year. The following plot can represent the return distribution of Binance coins in the last year.



Based on the distribution, the analysis is given below.

- Maximum daily return: 13.95%
- Minimum daily return: -18.56%
- Range of distribution: 32.51%
- Standard deviation (Volatility) of daily return: 2.90%
- Skewness of distribution: -0.35
- Kurtosis of distribution: 6.95

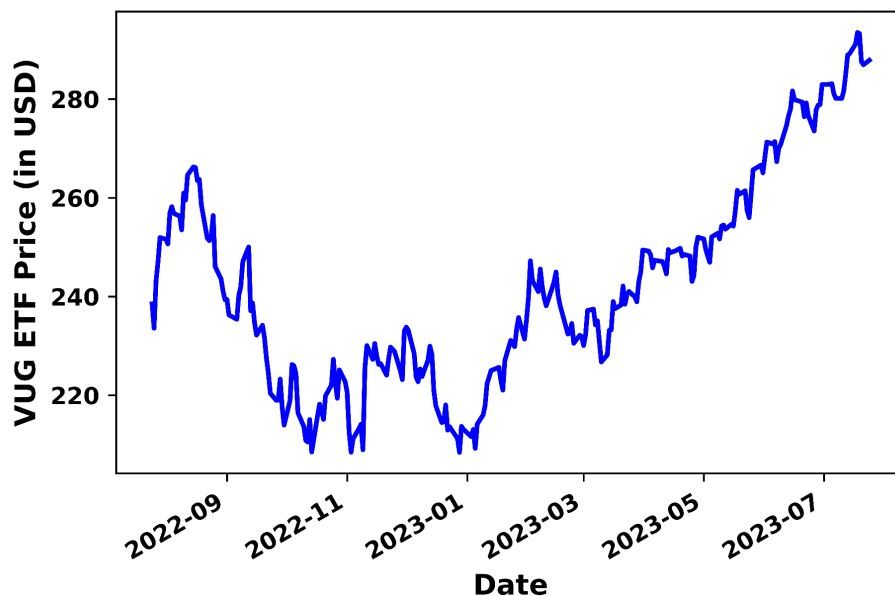
The distribution shows negative skewness. This means distribution is left-skewed. Additionally, Kurtosis is greater than 3 (Kurtosis for standard normal distribution), which represents Leptokurtic distribution. The distribution is heavily dependent on outliers. Hence, we can not consider this distribution as a normal distribution.

Investment-4: Equity ETF

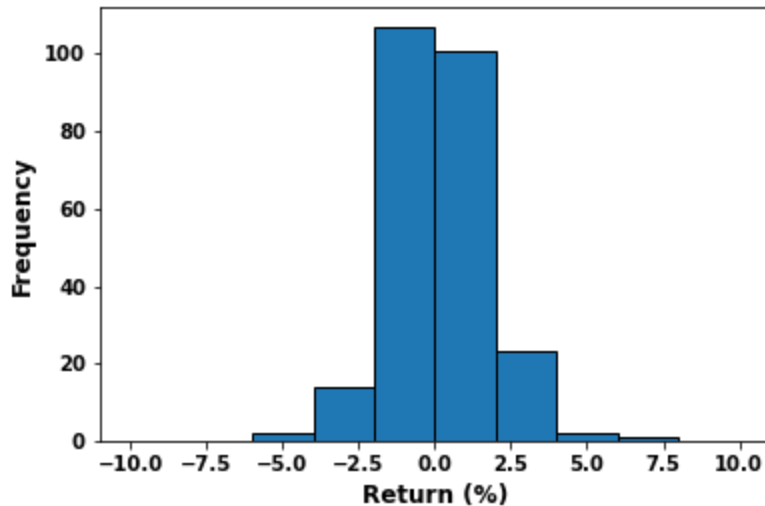
A collection or a basket of securities is referred to as Exchange-Traded Fund (ETF) same as a Mutual fund. However, unlike the mutual fund, ETFs can be traded on the stock exchange same as equity [\[8\]](#). ETF track various

type of investment such as equity, commodity, bonds and a mixture of investments. There are two types of ETFs: Active ETFs, which is managed by the fund manager and actively take a decision regarding the investments. While passive ETFs are structured to track the index, and there are not actively managed by fund managers. Since the expense ratio of passive ETFs is low, we will focus our study on passive ETF Vanguard Growth ETF (VUG). This equity ETF tracks the MSCI US Prime market index. This ETF exposes investors to large-cap—companies within the growth sector. VUG mirrors an index with just over 400 holdings, with a significant focus on the technology sector, while industrials, health care, and consumer goods receive equal weightings [9].

The VUG ETF closing price data for the last one year is given in the below figure [data source-4].



The closing price of the VUG ETF was \$238.53 on 25th July 2022, and its closing price was \$287.88 on 24th July 2023. So it gave a 20.66% return in the last year. The following plot can represent the return distribution of VUG ETF in the last year.



Based on the distribution, the analysis is given below.

- Maximum daily return: 7.89%
- Minimum daily return: -5.15%
- Range of distribution: 13.05%
- Standard deviation (Volatility) of daily return: 1.55%
- Skewness of distribution: 0.41
- Kurtosis of distribution: 2.37

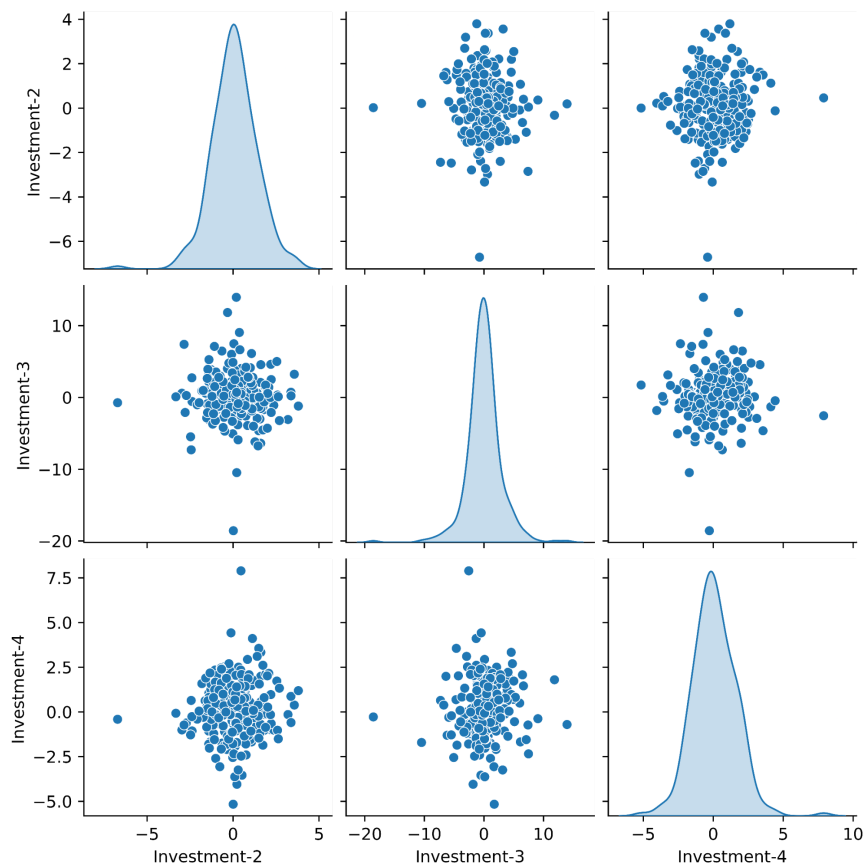
This distribution is positively skewed, which indicates that the return distribution is more skewed toward positive returns. The kurtosis of this distribution is less than the kurtosis of the standard normal distribution, which represents the platykurtic distribution. Hence, the distribution is less dependent on the outliers.

Correlation and Covariance

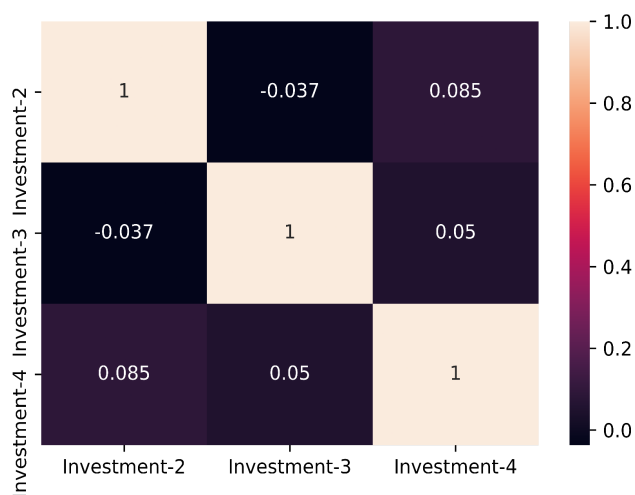
To minimize the volatility and maximize the return of a portfolio, we need to correlate our investments. The following formula can relate covariance and correlation:

$$\text{Correlation: } r = \frac{\text{Cov}(X,Y)}{\sigma_X \sigma_Y}$$

We can plot the pair plots of our investments using the Python programming language, which is given in the below figure.



Correlation Matrix:



The correlation matrix can be represented by following the heat map. From the heat map, we observed that investment-2 and investment-3 are negatively correlated. While investment-2 and investment-3 both are positively correlated with investment-4.

Step-2 Questions and Answers

1. Shorting

a. Can this portfolio be sold short? (Hint: Yes, but be sure to explain part b)

Yes, We can short the investment-3, the Binance coin, since it gives a negative return in the last year.

b. If it can be sold short, walk through the mechanics.

We need to borrow binance coin cryptocurrency from a broker or exchanges. Then we sell it in the market at the current price. We square off our position at a lower price and return it to the lenders. We make a profit from the difference between the selling price and the buy price. However, the Binance coin is highly volatile, and there is a chance of losing money when the price increases. So we need to consider stoploss to reduce the risk of potential loss.

2. Credit Risk

a. Does this portfolio have credit risk?

Yes, there is a credit risk associated with the portfolio.

b. If it has credit risk, explain what the credit risk is.

Cryptocurrencies are decentralized. Many governments do not recognise digital currencies. Hence, Regulatory risk associated with cryptocurrencies. Sudden changes in regulation or ban on cryptocurrency activity may lead to potential default on our investments.

We invested in VUG Growth ETF. but, it is heavily dependent on technology sector. Hence, It is associated with sector risk. Slow down in the sector activity may affect our ETF investment.

3. Portfolio Statistics

a. Compute the weighted return of the portfolio.

Let's consider the following weights for the investments:

Investment-2 (Stock: HCL Technology Ltd):

Weights, $W_{I2} = 50\%$

Return, $R_{I2} = 20.80\%$

Investment-3 (Cryptocurrency: Binance Coin): (Short sell)

Weights, $W_{I3} = -10\%$

Return, $R_{I3} = -8.16\%$

Investment-2 (Equity ETF: VUG Growth ETF): $W_{I4} = 60\%$

Weights, $W_{I4} = 60\%$

Return, $R_{I4} = 20.66\%$

We assign weight of the investments such that $W_{I2} + W_{I3} + W_{I4} = 1$

Portfolio return= $W_{I2} \times R_{I2} + W_{I3} \times R_{I3} + W_{I4} \times R_{I4}$

$$=(0.5)(20.80\%)+(-0.1)(-8.16\%)+(0.6)(20.66\%) =23.61\%$$

b. Compute the variance of the portfolio.

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The standard deviation or volatility of the investment is calculated from the above data analysis. This can be summarised as

- Investment-2: $\sigma_{I2} = 1.31\%$
- Investment-3: $\sigma_{I3} = 2.90\%$
- Investment-4: $\sigma_{I4} = 1.55\%$

We know the correlation coefficient from the correlation matrix, which can be written as,

- Correlation between investment-2 and investment-3 is $r_{2,3} = -0.037$.
- Correlation between investment-2 and investment-4 is $r_{2,4} = 0.085$.
- Correlation between investment-3 and investment-4 is $r_{3,4} = 0.05$.

Variance of Portfolio,

$$\sigma_p^2 = W_{I2}^2 \sigma_{I2}^2 + W_{I3}^2 \sigma_{I3}^2 + W_{I4}^2 \sigma_{I4}^2 + 2r_{2,3} W_{I2} W_{I3} \sigma_{I2} \sigma_{I3} + 2r_{2,4} W_{I2} W_{I4} \sigma_{I2} \sigma_{I4} + 2r_{3,4} W_{I3} W_{I4} \sigma_{I3} \sigma_{I4}$$

$$= (0.5)^2 (0.0131)^2 + (-0.1)^2 (0.029)^2 + (0.6)^2 (0.0155)^2$$

$$+ 2(-0.037)(0.5)(-0.1)(0.0131)(0.029) + 2(0.085)(0.5)(0.6)(0.0131)(0.0155)$$

$$+ 2(0.05)(0.6)(-0.1)(0.0155)(0.029)$$

$$= 0.0001468$$

Standard deviation of portfolio, $\sigma_p = 1.21\%$

4. Diversification

a. Describe the diversification in words between the two assets.

Diversification of the portfolio is spreading the investment in different assets so that risk can be reduced. Diversification of the portfolio reduces the volatility of the portfolio. The correlation relation between that assets can

quantify diversification between the two assets. When the correlation coefficient between two assets is less than 1 can be referred to as diversification. A correlation coefficient of less than 1 reduces the volatility. Hence, it increases the Sharpe ratio. Diversification of the portfolio increase return per volatility.

b. Do you think this portfolio is well diversified or not?

Yes, this portfolio is well diversified since it invests in the stock market, cryptocurrency and equity ETF. The correlation matrix indicates a correlation between each investment. This correlation decreases the volatility of the portfolio returns.

5. Comparing Portfolios

a. How does your portfolio compare to the others in terms of risk?

Since, this portfolio is diversified among stocks, cryptocurrency and ETF. We have low risk compare to individual investment. Standard deviation of portfolio is 1.21%, which lower than individual investments. Portfolio's coefficient of variation is 0.0512, which is indicated the low risk compare to the other investments.

b. How does your portfolio compare to the others in terms of return?

This portfolio's weighted return is 23.61%, which is higher then all individual investment. Diversification also decrease the volatility of the portfolio. Hence, Portfolio give better returns compare to individual investments.

6. Assessing Risk

a. Describe economic conditions or scenarios that would affect your security. For example, the COVID-19 pandemic could disrupt travel and halt the production of new aircraft, hurting the demand for airline parts. (Note: this particular example CANNOT be used!)

Inflation and Recession may affect portfolio returns. HCL Technology Ltd operates its business in other countries. Recession and Inflation affect the demand for their services, leading to a decrease in revenue. Hence, It leads to fall in the stock price.

b. Determine if similar events would hurt one or both members of a portfolio.

Inflation and the Recession also affect ETF and cryptocurrency. Inflation and recession decrease investment activity in the market. Hence, It leads to price depreciation in ETF and cryptocurrency assets.

7. Performance

a. Now describe economic conditions or scenarios that would greatly improve each security. For example, increased business and vacation travel could increase the demand for airline parts (Note: this particular example CANNOT be used!)

HCL Technology Ltd is an IT sector business. Breakthrough in technology leads to expansion in the business and affect the stocks. For example, development in cloud computing, Artificial intelligent technology and 5G technology increase new streams of business development.

b. Determine if similar events would help one or both members of a portfolio.

Similarly, advancements in blockchain technology also increase the utility of the Binance coin. It will lead to price appreciation in our invested assets.

New technology creates a new ecosystem for consumers. It opens the door for new products or services for growth companies. Hence, it will impact on the Vanguard Growth ETF.

8. Disrupters

a. List the potential influence the central bank may have on the portfolio.

1. Tax increment of a capital gain on cryptocurrency affects investment-3 of this portfolio.
2. Increasing interest rates could affect HCL Technology Ltd because its major revenues come from the Banking sector. Hence, Bank might terminate their contract or reduce service from HCL Technology Ltd.
3. Similarly, Increasing interest rates also impact on the borrowing cost, consumer spending and business investment. Hence, It affects the growth of companies. Since VUG ETF is a collection of growth stocks, it is also affected by the interest rate.

b. List the potential influence that investment banks may have on the portfolio.

1. Investment banks often conduct research on particular investment assets. Their recommendation or rating might influence investors' perspectives and decisions about specific assets.
2. Investment banks are market makers and liquidity providers in the market. Their trading affects the price of our invested assets.

9. Re-assessing Risk

a. Do the two investments in the portfolio have the same skew?

Yes, Two investments have negatively skewed but not the same magnitude.

b. Is there a difference between the types of correlation?

Yes, the correlation between investment-2 and investment-3 is negative. At the same time, investment-3 and investment-2 are positively related to investment-4.

Step-4:

	Return	Volatility
Portfolio-A	0.38%	4%
Portfolio-B	6.05%	22%
Portfolio-C	23.61%	1.21%

We recommend Portfolio-C to investors due to its high return and low volatility. However, the analysis of each portfolio has a different time period. But, we can conclude that Portfolio-C has a coefficient of variance (0.0512) that is lower than the coefficient of variance of portfolio-B and portfolio-A. Hence, Portfolio-C has the potential for high returns with lower volatility than other portfolios.

REFERENCES:

- [1] fool.com/incomestocks
- [2] Data source-1: ticker.finology.in
- [3] Data source-2: bseindia.com
- [4] forbes.com
- [5] Type of Cryptocurrency: corporatefinanceinstitute.com
- [6] Understanding the Different Types of Cryptocurrency: sofi.com
- [7] Data source-3: finance.yahoo.com
- [8] ETF explanation with pros and cons: investopedia.com
- [9] Vanguard Growth ETF: etfdb.com
- [10] Data source-4: finance.yahoo.com/vugetf
- [11] Data source : <https://vn.investing.com/crypto>