| FULL LEGAL NAME | **LOCATION (COUNTRY)** | **EMAIL ADDRESS** | **MARK X FOR ANY NON-CONTRIBUTING MEMBER** |
| --- | --- | --- | --- |
| Duong Tuan Tran | Vietnam | [tuanduong2739@gmail.com](mailto:tuanduong2739@gmail.com) |  |
| Adebowale Taiwo | Nigeria |  |  |
| Kim Siang Yeo | Singapore | ks.yeo.2021@mitb.smu.edu.sg |  |

*\*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.*

|  |  |
| --- | --- |
| **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). | |
| **Team member 1** | **Duong Tuan Tran** |
| **Team member 2** | **Adebowale Taiwo** |
| **Team member 3** | **Kim Siang Yeo** |

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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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**Step 1:**

**Portfolio 1 (Income Stocks):**

In this portfolio, we long PC1 VN Equity, REE VN Equity, POW VN Equity; and short NT2 VN Equity, GEG VN Equity. The weight of each long position is 60%, and the weight of each short position is -40% respectively. Returns are calculated based daily with 2 years of data. (from 07 Jan 2022 to 06 Feb 2024).

|  |  |  |
| --- | --- | --- |
| Company | Code | Weight (%) |
| PC1 VN Equity | PC1 | 60% |
| REE VN Equity | REE | 60% |
| POW VN Equity | POW | 60% |
| NT2 VN Equity | NT2 | -40% |
| GEG VN Equity | GEG | -40% |

Calculations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | PC1 | REE | POW | NT2 | GEG |
| Average returns | 0,0% | 0,0% | -0,1% | 0,1% | -0,1% |
| Volatility | 3,1% | 2,3% | 2,4% | 2,4% | 2,7% |
| Skewness | -0,15 | -0,08 | -0,38 | -0,11 | -0,17 |
| Kurtosis | 0,42 | 2,24 | 1,86 | 1,68 | 0,92 |

Correlations Matrix:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | PC1 | REE | POW | NT2 | GEG |
| PC1 | 1,000000 | 0,552419 | 0,583754 | 0,557092 | 0,685577 |
| REE | 0,552419 | 1,000000 | 0,552574 | 0,506391 | 0,520764 |
| POW | 0,583754 | 0,552574 | 1,000000 | 0,616508 | 0,655671 |
| NT2 | 0,557092 | 0,506391 | 0,616508 | 1,000000 | 0,543205 |
| GEG | 0,685577 | 0,520764 | 0,655671 | 0,543205 | 1,000000 |

Covariances Matrix:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | PC1 | REE | POW | NT2 | GEG |
| PC1 | 0,000950 | 0,000387 | 0,000425 | 0,000415 | 0,000574 |
| REE | 0,000387 | 0,000518 | 0,000297 | 0,000278 | 0,000322 |
| POW | 0,000425 | 0,000297 | 0,000557 | 0,000352 | 0,000421 |
| NT2 | 0,000415 | 0,000278 | 0,000352 | 0,000584 | 0,000357 |
| GEG | 0,000574 | 0,000322 | 0,000421 | 0,000357 | 0,000738 |

Over entire portfolio:

|  |  |
| --- | --- |
|  | Entire Portfolio |
| Average returns | 0,0% |
| Volatility | 2,7% |
| Skewness | -0,32 |
| Kurtosis | 1,31 |

Answers to Questions

1. Shorting:
   1. This portfolio can be sold short.
   2. Mechanism: We must contact the broker. The broker then will find the investors who own the stocks and are willing to lend the stocks. After that, we can execute the trade. However, there are some issues needed to be considered. First, we must pay the lender some fees to borrow the stocks. Second, the liquidity of the stocks must be taken into consideration.
2. Credit risk:
   1. b. Our portfolio solely focuses on equity. So, it does not have credit risk.

**Portfolio 3 (Cryptocurrencies):**

Like stocks, cryptocurrencies can also be ranked based on market capitalization. To calculate market capitalization, we multiply the number of coins in circulation by the price that day.

Large-cap cryptos refer to the top 10 cryptos by market capitalization and are the most stable. Mid-cap cryptos have a market capitalization between $1 billion and $10 billion and are usually in the top 10-50 cryptos by market cap. Low-cap or micro-cap cryptos have a market capitalization below $1 billion or are not in the top 50 by market capitalization. These tend to be the riskiest and frequented by speculative investors.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Cryptocurrency | Code | Size of Cryptocurrency | Weight | Number of Corresponding Coins If Portfolio Was Created On 20/08/2020 |
| Bitcoin | BTC | Large-caps | 40% | 33.67 |
| Ethereum | ETH | Large-caps | 20% | 480.26 |
| Solana | SOL | Mid-caps | 15% | 46754.21 |
| Cardano | ADA | Mid-caps | 10% | 748268.95 |
| Polkadot | DOT | Mid-caps | 5% | 17240.90 |
| Theta | THETA | Low-caps/micro-caps | 5% | 109853.36 |
| Filecoin | FIL | Low-caps/micro-caps | 3% | 1709.41 |
| Syntropy | NOIA | Low-caps/micro-caps | 2% | 177480.85 |

We chose a riskier portfolio that contains 60% large-cap cryptos, 30% mid-cap cryptos, and 10% low-cap/micro-cap cryptos. We also assume that our initial investment was USD 1,000,000 and that we bought all the cryptocurrencies I was interested in on 20 Aug 2020.

Calculations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Average Return | Standard Deviation | Skewness | Kurtosis |
| Bitcoin | 0.15617% | 3.31773% | 4.74790% | 341.38117% |
| Ethereum | 0.23014% | 4.35471% | 2.40484% | 456.95508% |
| Solana | 0.51465% | 7.05570% | 58.29660% | 558.09799% |
| Cardano | 0.23958% | 5.27251% | 78.48145% | 437.27052% |
| Polkadot | 0.23645% | 5.93048% | 122.93112% | 1164.81715% |
| Theta | 0.23846% | 5.98253% | 8.84698% | 386.23501% |
| Filecoin | 0.12350% | 7.02952% | 329.78588% | 3710.79621% |
| Syntropy | 0.46945% | 11.61831% | 1370.36938% | 35660.52565% |

Correlations Matrix:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | BTC | ETH | SOL | ADA | DOT | THETA | FIL | NOIA |
| BTC | 1.00000 | 0.80012 | 0.51408 | 0.64140 | 0.64026 | 0.64920 | 0.49638 | 0.26919 |
| ETH | 0.80012 | 1.00000 | 0.60347 | 0.68893 | 0.69399 | 0.60739 | 0.47506 | 0.30402 |
| SOL | 0.51408 | 0.60347 | 1.00000 | 0.53045 | 0.53311 | 0.49650 | 0.36724 | 0.20823 |
| ADA | 0.64140 | 0.68893 | 0.53045 | 1.00000 | 0.64728 | 0.57930 | 0.44965 | 0.25097 |
| DOT | 0.64026 | 0.69399 | 0.53311 | 0.64728 | 1.00000 | 0.61812 | 0.46651 | 0.26589 |
| THETA | 0.64920 | 0.60739 | 0.49650 | 0.57930 | 0.61812 | 1.00000 | 0.45884 | 0.22363 |
| FIL | 0.49638 | 0.47506 | 0.36724 | 0.44965 | 0.46651 | 0.45884 | 1.00000 | 0.27921 |
| NOIA | 0.26919 | 0.30402 | 0.20823 | 0.25097 | 0.26589 | 0.22363 | 0.27921 | 1.00000 |

Covariance Matrix:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | BTC | ETH | SOL | ADA | DOT | THETA | FIL | NOIA |
| BTC | 0.00110 | 0.00150 | 0.00304 | 0.00194 | 0.00231 | 0.00234 | 0.00302 | 0.00730 |
| ETH | 0.00150 | 0.00190 | 0.00344 | 0.00234 | 0.00271 | 0.00274 | 0.00342 | 0.00770 |
| SOL | 0.00304 | 0.00344 | 0.00498 | 0.00388 | 0.00425 | 0.00428 | 0.00496 | 0.00923 |
| ADA | 0.00194 | 0.00234 | 0.00388 | 0.00278 | 0.00315 | 0.00318 | 0.00386 | 0.00814 |
| DOT | 0.00231 | 0.00271 | 0.00425 | 0.00315 | 0.00352 | 0.00355 | 0.00423 | 0.00851 |
| THETA | 0.00234 | 0.00274 | 0.00428 | 0.00318 | 0.00355 | 0.00358 | 0.00426 | 0.00854 |
| FIL | 0.00302 | 0.00342 | 0.00496 | 0.00386 | 0.00423 | 0.00426 | 0.00494 | 0.00922 |
| NOIA | 0.00730 | 0.00770 | 0.00923 | 0.00814 | 0.00851 | 0.00854 | 0.00922 | 0.01349 |

Over entire portfolio:

|  |  |  |  |
| --- | --- | --- | --- |
| Portfolio Average Return | Portfolio Standard Deviation | Portfolio Skewness | Portfolio Kurtosis |
| 0.24649% | 6.27763% | 62.86263% | 1257.47224% |

Answers to Questions

Question 1: Comment whether multiple assets provide differentiation benefits.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Crypto-currency** | **Portfolio Value If Invested 100% In Chosen Crypto** | **Average Portfolio Value** | **Highest Portfolio Value** | **Difference With True Portfolio Highest Value** | **Lowest Portfolio Value** | **Difference With True Portfolio Lowest Value** |
| BTC | Large-caps | 1001561.682 | 1034738.939 | -30502.2216 | 968384.4238 | 28695.77824 |
| ETH | Large-caps | 1002301.392 | 1045848.528 | -19392.6330 | 958754.2569 | 19065.61136 |
| SOL | Mid-caps | 1005146.513 | 1075703.501 | 10462.3404 | 934589.5255 | -5099.119991 |
| ADA | Mid-caps | 1002395.779 | 1055120.926 | -10120.2347 | 949670.6324 | 9981.986899 |
| DOT | Mid-caps | 1002364.513 | 1061669.286 | -3571.8749 | 943059.7408 | 3371.095225 |
| THETA | Low-caps/micro-caps | 1002384.635 | 1062209.885 | -3031.2754 | 942559.3852 | 2870.739669 |
| FIL | Low-caps/micro-caps | 1001234.971 | 1071530.141 | 6288.9804 | 930939.7998 | -8748.845745 |
| NOIA | Low-caps/micro-caps | 1004694.531 | 1120877.599 | 55636.4386 | 888511.4633 | -51177.18219 |
| True Portfolio |  | 1002464.903 | 1065241.1609 | 0.0000 | 939688.6455 | 0 |

Here, we define differentiation benefit as the ability to meld the characteristics of different portfolio components to build one that maximizes the benefits while minimizing the downsides of each. The new portfolio does provide differentiation benefits. In terms of average and highest possible return, the current portfolio outperforms a majority of the assets, allowing us to leverage on the stable returns of the high-cap stocks while also benefitting from the higher end returns that the more volatile stocks make accessible. However, the portfolio fails in hedging against the lowest possible value.

Question 2: Shorting

Yes, this portfolio can be shorted. More specifically, cryptocurrencies can be shorted. Here is how.

1. Select a Trading Platform:
   * Choose a trading platform or exchange that permits the short selling of cryptocurrencies. Not all platforms offer this option due to regulatory constraints or risk factors.
2. Set Up and Verify Your Account:
   * Create an account on the selected platform, undergo necessary verification steps, including identity verification, and fund your account with the required collateral.
3. Identify Borrowable Assets:
   * Confirm that the platform allows you to borrow the specific cryptocurrencies you intend to short-sell. The platform should have these assets available for borrowing.
4. Initiate Borrowing Process:
   * Once you've located the borrowable cryptocurrency, initiate the borrowing process. Remember that a fee is typically associated with borrowing the asset.
5. Sell the Borrowed Cryptocurrency:
   * After securing the borrowed cryptocurrency, sell it at the prevailing market price.
6. Close Your Short Position:
   * To close your short position, repurchase the same quantity of cryptocurrency you borrowed and sold. If the price has decreased, repurchasing it at a lower price results in a profit (minus any fees and interest).
7. Return Borrowed Cryptocurrency:
   * After buying back the cryptocurrency, return it to the lender on the platform.

By following these steps, you can engage in short selling of cryptocurrencies, potentially capitalizing on price declines.

Question 3: Credit Risk

Credit risk refers to the potential for financial losses associated with various factors. This portfolio has the following credit risks.

1. Counterparty Risk:
   * Counterparty risk is the probability that the other party in an investment, credit, or trading transaction may not fulfill its part of the deal and may default on the contractual obligations.
   * Cryptocurrency transactions often involve trading platforms or exchanges. The credit risk arises from these platforms' potential default or financial instability. If a platform fails or faces financial issues, it could impact the value of your portfolio.
2. Volatility Risk:
   * The volatile nature of cryptocurrencies introduces credit risk. Sudden and significant price drops in any allocated cryptocurrencies may result in losses. The higher the volatility, the greater the potential credit risk.
3. Liquidity Risk:
   * Low-caps/micro-caps in the portfolio may have lower market liquidity. Selling these assets could be challenging in market stress or distress, leading to increased credit risk.
4. Asset-Specific Risks:
   * Each cryptocurrency in your portfolio carries its own set of risks. The credit risk is influenced by factors such as the technology behind the cryptocurrency, adoption rates, regulatory developments, and overall market sentiment.
   * Technology Behind the Cryptocurrency:
     + Vulnerabilities, hacks, or technological shortcomings in the underlying technology of a cryptocurrency can erode investor confidence. If a cryptocurrency faces issues related to its technology, it may lead to a significant loss in value, contributing to credit risk.
   * Adoption Rates:
     + The success of a cryptocurrency often hinges on its adoption by users and businesses. Low adoption rates may indicate a lack of trust or utility, making the cryptocurrency susceptible to market downturns. A crypto asset with limited adoption risks becoming illiquid, amplifying credit risk.
   * Regulatory Developments:
     + Cryptocurrencies operate in a regulatory environment that is subject to change. Regulatory crackdowns or stringent measures can impact the legality and viability of a cryptocurrency. Sudden regulatory shifts can result in value depreciation, affecting the creditworthiness of the asset.
   * Overall Market Sentiment:
     + Cryptocurrency markets are highly influenced by investor sentiment. Positive sentiment can lead to price surges, while negative sentiment can trigger significant selloffs. The overall market sentiment can create a volatile environment, exposing investors to credit risk, especially if sentiments turn bearish.