DRM Semester 1: 2024-25

\ECON F 354 – DRM Assignment – Course Weightage 20 per cent

Hedging a Portfolio of Stocks – Comparing Stock and Index futures

**Time of Submission: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_[[1]](#footnote-1)**

|  |  |  |
| --- | --- | --- |
| ID | Name | Contributed (Yes /No) |
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|  |  |  |

\*Contribution to be marked only joint projects

**THE REPORT SHOULD BE ANALYTICALLY CLEAR AND CONCISE – Should speak for itself with clear annotations.**

1. **Part 1: Portfolio construction, descriptive statistics, returns**

**Define the portfolio**- amount, weightage of stocks assigned in the portfolio, snapshot description of the portfolio – company, sector, market capitalization etc. (**table**).

Simple and elegant table what represents your portfolio and name sector and market capitalization of the company as on 01-07-2024. The weight allocation should be given in this table along with the portfolio value and size.

**Describe the portfolio is about 100-150 words**

**Returns** – Compute the daily, weekly, monthly returns for the stocks individually and the portfolio- compare it with the returns from NIFTY 50 index. (**table & graph**)

**Correlation Plots** – Compute the correlations between stocks and NIFTY 50 index returns   
[clearly show the correlation plots]. Does the time horizon of returns impact correlations? How does portfolio return correlate with NITFY 50 index returns? Identify the underlying correlation patterns [**positive, negative, neutral**]

**Excel Sheet 1**: Should contain ordered data on date and stock wise price information and followed by returns computation.[[2]](#footnote-2) Using the data plot the graphs and correlation plots or scatter plots and explain the underlying correlation between stocks returns and NIFTY 50 returns.

**4**-5 Bullet points [100-150 words]

**All graphs should be presented in one page** – they should not be cluttered but yet signal the underlying information.

1. **Part 2: Hedging using Stock futures.**

**Establish the underlying stock futures you shall be using for hedging for each stock**

**200 words.**

**Excel sheet 2: This sheet should contain the daily data on stock and futures prices[[3]](#footnote-3) by date. The returns data and computations for OHR should be provided. Highlight the excel cell where the final computation is done.**

In this part consider you are hedging the individual stocks using appropriate stock futures – either the own stock futures or based on appropriate cross hedging stock futures.

* Compute the optimal hedging ratio (OHR) using daily, weekly, monthly prices of the underlying stocks and futures **(ignore the daily settlements**). Compute the OHR using 1 year’s data [June 2023 to June 2024] 2 years data [June 2022 to June 2024]. Give a summary table depicting OHR for each stock and time frame of analysis. [ You should submit excel sheet supporting the calculations and data should be consistent and valid for independent verification]

|  |  |  |  |
| --- | --- | --- | --- |
| Using 1 year data | | | |
| OHR | Day Returns | Weekly Returns | Monthly Returns |
| Stock 1 |  |  |  |
| Stock 2 |  |  |  |
| Stock 3 |  |  |  |
| Stock 4 |  |  |  |
| Using 2- years data | | | |
| OHR | Day Returns | Weekly Returns | Monthly Returns |
| Stock 1 |  |  |  |
| Stock 2 |  |  |  |
| Stock 3 |  |  |  |
| Stock 4 |  |  |  |

How does OHR depend on time frame of analysis. [150 words]

* **Excel Sheet 3**: Detail the portfolio position as on July 1, 2024. Stock and Futures wise and compute the OHR using the data from above.
* Subsequently, depending on the value of your position in the specific stocks of your portfolio compute the optimal number of the contracts using optimal hedging ratio computed based on OHRs computed above.

|  |  |  |  |
| --- | --- | --- | --- |
| Using 1 year data | | | |
| Optimal Contracts | Day Returns | Weekly Returns | Monthly Returns |
| Stock 1 |  |  |  |
| Stock 2 |  |  |  |
| Stock 3 |  |  |  |
| Stock 4 |  |  |  |
| Using 2- years data | | | |
| Optimal Contracts | Day Returns | Weekly Returns | Monthly Returns |
| Stock 1 |  |  |  |
| Stock 2 |  |  |  |
| Stock 3 |  |  |  |
| Stock 4 |  |  |  |

Note: All excel sheets/ computation files need to be submitted along with the assignment.

From the above consider the optimal hedging ratio based on daily returns and 2-year data for hedging the stocks in your portfolio.[[4]](#footnote-4)

**Hedging strategy: 100 words – how many futures contract and at what price do you enter and close out [ present a table with clear dates].**

You should enter an appropriate futures contract on 1st July 2024 and close the position on 25th September 2024 (reference period) for each stocks in your portfolio. Establish the hedging position (short or long) and take position on stock futures.

**[Remember to ignore the daily settlement, margin requirements if any on the hedging]**

* **Show the portfolio hedging returns using stock futures. [ 1 table]**

1. **Part 3: Hedging using Stock Index futures for the entire portfolio**

**Compute the portfolio – ‘beta’ and discuss the same**

**Excel Sheet 4:** Indicate day wise portfolio returns and the NIFTY 50 returns – show the computation of CAPM beta. This file should contain appropriate T-bill rate as risk free rate.

* Depict a visual representation of how excess returns from your portfolio are related to the excess returns from market portfolio (NIFTY 50). [ Scatter plot]
* **Compute the OHR using portfolio b –** and optimal number of contracts for the given portfolio value.[[5]](#footnote-5)

**Describe the hedging using index futures [150-**200 words] – bullet points

• Using capital asset pricing model (CAPM) and the 2 year and daily return data compute the portfolio “beta” of your portfolio. For this purpose, use portfolio returns, NIFTY 50 returns and consider 1 year (364 day) T-bill rate as the risk-free rate. [12-month T-bill rate file is attached]. You should submit excel sheet supporting the calculations and data should be consistent and valid for independent verification.

* Using the above information compute the portfolio optimal contracts for hedging using NIFTY 50 futures. Establish an appropriate hedge position on your portfolio. Enter the contract as on 1st July 2024 and close the position as on 25th September 2024 (Reference period). [ Ignore dividends, daily settlements etc.]
* Compute the profits from your portfolio and futures positions on the final date (25th September 2024, considering 1st July 2024 as the reference point). Evaluate whether hedging using optimal hedging ratio and stock index futures resulted in protecting the portfolio value. Also, assume there is no dividend yield in your portfolio or ignore the cash dividends paid if any
* **Show the portfolio hedging returns using index futures. [ 1 table]**

**Part 4: Conclusion**

**Excel 5: Show the final portfolio value movement from 1st July 2024 to 30th September 2024. Show the hedging and portfolio profits using the table below. Give clearly analytical reasoning on how the hedging using stock and index futures is working and which is better given your portfolio. [ 200-250 words – 10 bullet points]**

• Compute the profits from your stock holdings and futures positions on the final date (25th September 2024, considering 1st July 2024 as the reference point). Evaluate whether hedging using optimal hedging ratio and stock futures resulted in protecting the portfolio value.

|  |  |  |  |
| --- | --- | --- | --- |
| Using Stock Futures | Stock Profits | Hedge Profits | Overall Profit |
| Stock 1 | | | |
| Stock 2 | | | |
| Stock 3 | | | |
| Stock 4 | | | |
| Portfolio | | | |
| Overall Return | | | |
| Using Stock Index Futures | Portfolio Profits | Hedge Profits | Overall Profit |
| Portfolio | | | |
| Overall Return | | | |

**General Instructions:**

* + 1. Report should be like a professional report – Marks will be given for presentation and accuracy
    2. Excel sheet should be clearly presented and should be have workable data points for independent verification
    3. Marks will be given for clearly demonstrating the return calculations, computation of OHR and portfolio hedging.
    4. Remember we are not targeting the Best return or maximum return.
    5. All graphs and tables should be labelled and self explanatory. [ Marks will be deducted for non-clear presentation]

1. Assignments without mentioning the time of submission eg. 15th November 2024 @ 22.30 hrs will not be evaluated. Mail with attachments should be sent to [Subrahmanyam.acv@hyderabad.bits-pilani.ac.in](mailto:Subrahmanyam.acv@hyderabad.bits-pilani.ac.in) with Group ID. [↑](#footnote-ref-1)
2. Submit single excel sheet with multiple sheets- each sheet should be clearly labelled with appropriate titles [↑](#footnote-ref-2)
3. *Futures prices will have 3 data point for each near, current and far month on each trading day. Compute the price variations consistently with a particular time frame and mention the same.*  [↑](#footnote-ref-3)
4. In cases where there is no full data for the two year period. Consider the partial period and mention the same as footnotes. [↑](#footnote-ref-4)
5. If some stocks do not have full data – consider partial data and say one stock has 15 months data. The portfolio will have 3 stock for 9 months and 4 stocks for 15 months. [↑](#footnote-ref-5)