

DERIVATIVES AND RISK MANAGEMENT (BM40202)

ASSIGNMENT: FUTURES AND SWAPS



Group Members

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[**Calculation sheet link**](#)

Q1.**SHEET LINK****COLAB LINK**

Instrument	Underlying asset	Maturity Date	Lot Size
NIFTY50 Futures Index	NIFTY 50	31-Aug-2023	75
FUTENR	Natural Gas	28-Aug-2023	1250

A). Done in [sheet](#).

For NIFTY50 Futures Index there was no Margin Call but for FUTENR Margin Call happened **6 times** in between 1-Aug-2023 to 28-Aug-2023.

B). **Basis risk** refers to the risk that the relationship between the price of the underlying asset and the futures contract price will change unfavorably, leading to losses for hedgers or speculators. Here's a comparison of the basis risk for the two contracts:

NIFTY50 Futures Index (Standard Deviation = **33.34454238**):

- This contract exhibits a significantly higher standard deviation for its daily basis, indicating a greater degree of variability or volatility in the relationship between the underlying asset's price and the futures contract price.
- The high basis risk suggests that hedging or speculating using this contract may be riskier due to the potential for larger and more unpredictable basis movements.
- Market participants using this contract for hedging purposes may need to closely monitor and adjust their positions to mitigate the increased basis risk.

FUTENR (Standard Deviation = **7.827814405**):

- In contrast, this contract demonstrates a much lower standard deviation for its daily basis, implying lower variability or volatility in the relationship between the underlying asset's price and the futures contract price.

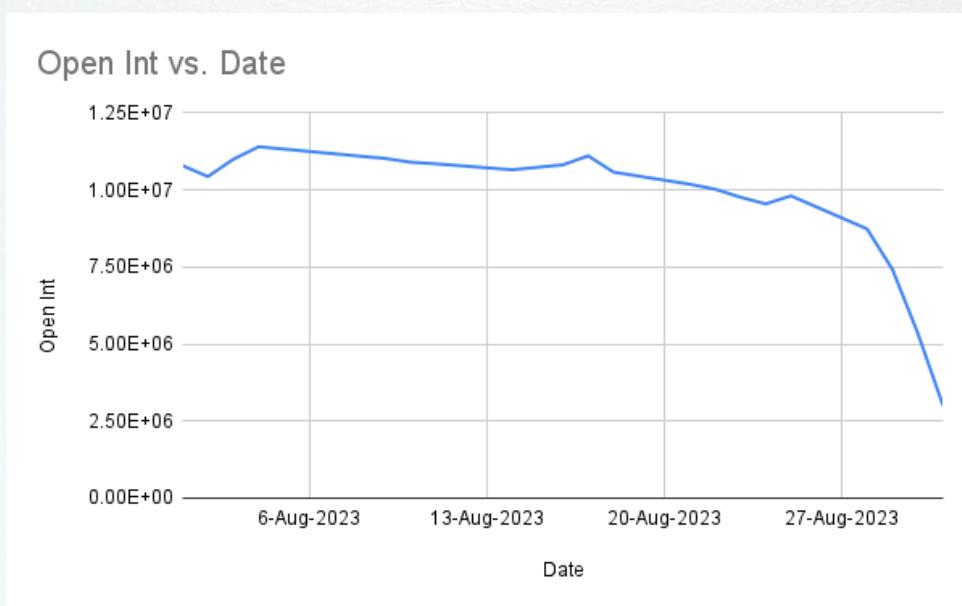
- The lower basis risk associated with this contract suggests that hedging or speculating using this contract may involve less uncertainty and potential for basis movement compared to NIFTY50 Futures Index.
- Market participants may find this contract more suitable for hedging purposes when seeking to minimize basis risk or for trading strategies that rely on more stable basis relationships.

C). Gains:

NIFTY50 Futures Index : Rs. 41906.25

FUTENR : Rs. 3125

D) Plot between OPEN INTEREST and CHANGE OPEN INTEREST



Observations:

- **Open Interest (OI):** OI represents the total number of outstanding futures contracts that have not been closed or delivered on a particular day. From the first chart, we observe fluctuations in OI over time. Initially, the OI seems to increase gradually before decreasing and stabilizing towards the end of the period.
- **Change in Open Interest:** This chart illustrates the net change in OI from the previous trading day. We notice significant fluctuations in the change in OI, indicating active participation in the market. High positive or negative values suggest increasing or decreasing interest, respectively, in the underlying asset.

E) Link to code

Q2.

A).

	Near Month	Mid Month	Far Month
Hedge Ratio	0.845753129	0.8830350198	0.8967369505

Minimum Hedge ratio is for Near Month

[Sheet link](#)

B) Differences in Hedge Ratios:

The differences in hedge ratios suggest that the sensitivity of the portfolio to changes in the underlying index varies across the different futures contracts. The ratios indicate the proportion of each futures contract needed to hedge the risk of the portfolio.

Possible Reasons for Differences:

- **Time Horizon:** Different futures contracts have different expiration dates, affecting their sensitivity to market movements. Near-month contracts may have higher sensitivity due to the shorter time to expiration.
- **Market Expectations:** Traders may have different expectations for the market in the near, mid, and far terms, impacting the effectiveness of each contract as a hedge.
- **Liquidity and Volume:** Contracts with lower liquidity and trading volume may exhibit different hedge ratios due to potential market inefficiencies

Suitability for Hedging:

Given the varying hedge ratios, the choice of which contract to use for hedging depends on the portfolio manager's risk exposure and market outlook. If the manager expects short-term volatility, the near-month contract might be preferred for its higher sensitivity. Conversely, if the manager anticipates longer-term trends, the mid or far-month contracts might offer better protection.

C) Number of Contracts:

Based on the chosen hedge ratio (assuming hedging for January only), the number of contracts required for each month is as follows:

- Near Month: 62,779.75 contracts
- Mid Month: 65,160.91 contracts
- Far Month: 65,723.97 contracts

D) Sheet link

Impact of Hedging on Portfolio Value:

To evaluate the impact of hedging, we compare the total portfolio value for the first two weeks of February with and without hedging.

- Without Hedging: Portfolio value fluctuates based on market movements.
- With Hedging: Portfolio value remains more stable, reflecting the effectiveness of hedging in mitigating risk.

In this case Manager should hedge (we did calculations using mid-month futures) where average returns when hedged is higher than average returns when not hedged.

Q3.

- i) TT Textiles faces transaction exposure in currency risk due to its significant engagement in international trade, exporting to over 30 countries. The company's revenue is highly susceptible to fluctuations in exchange rates due to the nature of its export business. This exposure primarily arises from the company's need to convert foreign currencies received in different currencies to dollars and then convert them back to INR for use in company production. Thus, changes in exchange rates and economic risk can adversely affect the company's profits.

ii) The instrument used in this deal is a currency swap combined with options. The swap was based on the historical stability of the CHF against the USD, designed to protect TT Textiles from the risk of INR appreciation. The nature of payouts was such that TT Textiles would receive a fixed interest of 1.77% semi-annually on a notional amount of INR 225 million from ABC Bank, without needing to pay any interest on the CHF notional amount of CHF 6,306,554.84. In essence, TT Textiles would benefit from fixed semi-annual payments as long as the CHF/USD exchange rate remained within agreed boundaries.

iii) Valuation of swap :

On Oct 19, 2007, for TT textiles = 7.826 million

Valuation of swap on OCT 19,2007				
		Start date	Oct 19,2006	
		Expiration date	October 15, 2009	
		Indian interest rate	1.77% compounded semi-annually	
				0.017622137 compounded continuously
Time	Cash Flows on Rupee bond(in mil)	Present Value	Cash flows on Swiss Franc bond(in INR,mil)	Present value
0.5	2	1.982455271	0	0
1	2	1.96506445	0	0
1.5	2	1.947826189	0	0
2	227	219.1388932	-225	-217.208154
Total		225.0342391		-217.208154
Value of swap		7.826085057 million		

iv) No, it is not suitable to refer to it as a hedge. By guaranteeing future expenses or income, a traditional hedge helps businesses reduce risk by locking in exchange rates and guarding against unfavorable currency fluctuations.

The swap agreement in the case of TT Textiles first seems to act as a hedge by establishing predetermined conditions for currency exchange. The agreement does, however, include a speculative component due to the partial barrier feature, which adjusts the spot rate if the USD/CHF drops below 1.04 during the maturity month. This requirement compromises the instrument's ability to effectively hedge because it exposes TT Textiles to market risk when the CHF depreciates significantly compared to the USD—exactly what a hedge is meant to prevent.

v) In March 2009, Sanjay Jain faced significant uncertainty due to the volatile movements of the Swiss Franc and the potential for substantial losses. Given the situation, Jain's options included:

- Exiting the swap deal immediately to mitigate further losses, even at the cost of foregoing potential gains if the market turned favorable.
- Holding onto the swap until maturity in the hope that the CHF/USD rate would remain stable or improve, potentially maximizing the benefit from the swap.
- Exploring additional hedging options to cover potential losses from the swap, although this could be costly.
- Negotiating with ABC Bank for a restructuring of the swap terms to better protect TT Textiles against the adverse movement in exchange rates.

Given the complexity of the situation, Jain's decision should be based on a thorough analysis of market forecasts, consultation with financial experts, and a risk assessment of the potential impacts on TT Textiles' finances.

vi) The ethics of ABC Bank's behavior in designing the deal depend on the transparency and completeness of the information provided to TT Textiles and whether the bank adequately disclosed the risks involved. If ABC Bank fully informed TT Textiles of the potential risks and consequences of the swap agreement, including the scenarios under which TT Textiles could face significant losses, then the bank acted ethically.

However, if the bank downplayed the risks, failed to provide comprehensive risk assessments, or took advantage of TT Textiles' lack of expertise in sophisticated financial instruments, then its behavior could be considered unethical. Without explicit evidence of misrepresentation or failure to disclose risks, it's challenging to definitively judge the bank's ethics in this case.