Assignment 1

# Question 1:

**Difference between Spot and Futures contracts:**

A Spot contract involves buying or selling a financial instrument at its current market price for immediate delivery. They are less standardized and require full payment.

A futures contract is a legal agreement between a buyer and a seller in which the buyer agrees to take delivery of something, and the seller agrees to deliver it at a specified price at the end of a designated period of time. Its price is based on speculated future price and the delivery is some time in the future. They are standardized and one need not make full payment but a marginal deposit.

**Futures contract in commodity exchange:**

A commodity futures contract is an agreement to buy or sell a predetermined amount of a commodity at a specific price on a specific date in the future. Commodity futures can be used to hedge or protect an investment position, to help in price discovery or to bet on the directional move of the underlying asset. Examples of commodity exchanges are Chicago Mercantile Exchange (CME) and Multi Commodity Exchange (MCX). Examples of commodities traded are crude oil, copper, coal and agricultural products.

Each futures contract specifies the quantity, quality, and delivery date of the commodity. The price is determined using cost of carry model, with some adjustments like convenience yield being included in case of supply constraints.

Forward price in cost of carry model (without supply constraints):

𝑭(𝟎,𝑻) = (𝑺𝟎)𝒆(𝑹+𝑼)𝑻

Forward price in cost of carry model (with supply constraints):

𝑭(𝟎,𝑻) = (𝑺𝟎)𝒆(𝑹+𝑼-Y)𝑻

Where S0: Spot price

T: Time period for maturity

R: Risk-free rate of Interest (compounded continuously)

U: Current value of all costs, including storage and insurance, expressed as a % of S0

Y: Convenience Yield expressed as a % of S0

Participants trade contracts through the exchange platform. Buyers and sellers place orders on the exchange’s trading system, which are then matched. Traders must deposit a margin which is a fraction of the contract's value to initiate and maintain positions. The exchange settles all positions to market daily. Profits and losses are calculated based on daily price movements and the margin accounts are adjusted accordingly. Traders may need to deposit additional funds (variation margin) if their losses reduce their margin account below maintenance margin. Futures contracts can be settled in two ways: Physical Delivery and Cash Settlement. In Physical delivery, the actual commodity is delivered at the contract's expiration. In cash Settlement the contract is settled in cash based on the difference between the contract price and the market price at expiration.

**Role of Commodity Exchange:**

A commodity exchange provides the following roles:

* Liquidity Provision: Exchanges provide a centralized marketplace. They enhance liquidity by bringing together multiple buyers and sellers.
* Price Discovery: Exchanges facilitate transparent and efficient price discovery through continuous trading.
* Risk Management: Exchanges help mitigate counterparty risk by offering standardized contracts and margin systems.
* Regulation and Oversight: Exchanges are regulated entities that ensure fair trading practices. They enforce contract specifications and protect market participants.
* Settlement and Delivery: Exchanges have a clearing house which ensures smooth settlement and delivery processes.

# Question 2:

Market depth refers to the ability of the market to sustain a substantially larger order without making an impact on the security’s market price. Market depth also refers to the number of shares of a given company that may be purchased without creating a significant level of price appreciation of that stock. Market depth shares a close relation to the volume of trade of a particular security and the associated liquidity.

Market breadth looks at the relative change of advancing to declining securities in a market. It is a technical analysis technique that gauges the strength or weakness of moves in a major index. Market breadth indicators analyse the number of stocks advancing relative to those that are declining in each index or on a stock exchange. Positive market breadth occurs when more stocks are advancing than are declining.

The average quarterly trading volume, turnover and open interest is demonstrated in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Average quarterly volume (metric tons)** | **Average quarterly turnover (₹ million)** | **Average quarterly open interest (metric tons)** |
| **2017** |  |  |  |
| Q1 | 667 | 680 | 1,654 |
| Q2 | 621 | 580 | 1,084 |
| Q3 | 1,280 | 1,430 | 1,809 |
| Q4 | 1,072 | 1,670 | 1,447 |
| **2018** |  |  |  |
| Q1 | 702 | 990 | 874 |
| Q2 | 519 | 650 | 688 |
| Q3 | 741 | 1,200 | 766 |
| Q4 | 476 | 790 | 544 |
| **2019** |  |  |  |
| Q1 | 380 | 610 | 400 |
| Q2 | 336 | 460 | 337 |
| Q3 | 488 | 620 | 525 |
| Q4 | 285 | 360 | 411 |
| **2020** |  |  |  |
| Q1 | 167 | 200 | 266 |
| Q2 | 37 | 40 | 70 |
| Q3 | 82 | 80 | 150 |
| Q4(to Nov. 30) | 51 | 50 | 154 |

The data indicates that the number of active contracts and participants has been declining since 2017. This reduction suggests that the market breadth is reducing. Fewer traders are contributing to the market dynamics. This reduction limits the exchange of diverse perspectives on the asset’s value. A lower trading volume directly impacts the market's liquidity, making it more challenging for participants to execute large trades without affecting the market price.

A reduction in market breadth leads to reduced trading volume which leads to increased price volatility. This is because fewer participants are participating in the market. Thus, market becomes more susceptible to large trades by dominant players. This can skew prices and reduce the efficiency of the price discovery process.

The open interest in the Mentha oil futures market had also declined. A reduction in open interest suggests that fewer positions are being held, leading to lower liquidity and increased potential for price manipulation.

Lower market depth indicates that large orders can lead to significant price swings, reducing the market’s ability to provide stable prices for hedgers and other participants.

**Implications for Contract Management**

* The declining market breadth and depth highlight the growing risk of reduced liquidity in the Mentha oil futures market. This reduction in liquidity can increase the cost of trading and make it more difficult for participants to hedge effectively.
* With lower participation and less market depth, hedgers may find it challenging to execute large trades without moving the market. This scenario can lead to higher transaction costs and may force hedgers to seek alternative markets, further diminishing the futures market’s relevance.

# Question 3:

Price discovery refers to the process by which market prices reflect all available information. It includes evaluating tangible and intangible factors including supply and demand, investor risk attitudes, and the overall economic and geopolitical environment. An efficient price discovery mechanism in the futures market implies that futures prices provide an accurate reflection of the underlying spot market prices and expected future prices.

To check whether Mentha oil futures contract is efficient in price discovery compared to its spot market, we can examine the correlation between daily returns of spot and futures prices.  
We can also comment on price efficiency by basis analysis.

**Co-Movement Analysis**

The correlation between the daily returns of Mentha oil spot and futures prices was found to be approximately 0.975363492 for the period 2014-17 and 0.982937636 for the period 2017-2021. This positive correlation indicates a very strong co-movement between the two markets. This suggests that the futures market is highly efficient in reflecting the underlying asset's spot price. The futures prices are closely aligned with the spot prices. With such a high correlation, futures prices can be considered a strong predictor of future spot prices.

|  |  |
| --- | --- |
| **Period** | **Correlation** |
| 2014-2015 | 0.9829786 |
| 2015-2016 | 0.9758951 |
| 2016-2017 | 0.8772471 |
| 2017-2018 | 0.99564217 |
| 2018-2019 | 0.94877036 |
| 2019-2020 | 0.973595846 |
| 2020-2021 | 0.96912193 |

**Basis Analysis**

We can also use basis to analyse the price discovery efficiency.

Basis= Spot Price - Futures Price

A stable and consistent basis suggests that the futures market is efficiently pricing in information about the underlying asset. Significant or erratic changes in the basis could indicate inefficiencies. The standard deviation for basis in time period 2014-2017 is 25.04236 and in time period 2017-2020 is 52.91037064. Both are relatively low compared to price of stock. However, we can say the price discovery efficiency is better in 2014-17 compared to 2017-2020.

**Other Factors affecting Price Discovery Efficiency**

1. **Market Liquidity**:

The liquidity in the Mentha oil futures market has been diminishing, as shown by the decline in trading volumes and open interest. Reduced liquidity generally leads to increased price volatility and a broader bid-ask spread, making price discovery less precise.

1. **Structural Changes in Contract Specifications:**

Adjustments in contract specifications, such as higher margin requirements and larger lot sizes, have further contributed to inefficiencies. These changes have discouraged smaller traders and Farmer Producer Companies (FPCs) from participating. The reduced diversity of participants limits the range of information influencing futures prices, diminishing the market's effectiveness in price discovery.

The Mentha oil futures market on the MCX has historically been effective in price discovery, closely tracking spot prices during periods of high market activity. However, the efficiency of this market has declined since 2017 due to reduced liquidity, structural changes in contract specifications, and regulatory factors.

# Question 4:

The Mentha oil futures market on the Multi Commodity Exchange (MCX) has declined in activity since 2017. This period was marked by reduced market breadth, depth, and liquidity. To restore the viability of the Mentha oil futures market, Nathany should consider the following actions:

1. **Reducing Trading and Delivery Lot Sizes:**

One of the primary reasons for declining market participation is the increase in trading and delivery lot sizes. Larger lot sizes and higher margin requirements make things difficult for smaller traders and farmers from participating in the market. By reducing the lot sizes, MCX could lower the entry barriers, making it easier for small and medium-sized participants to engage in futures trading. Smaller lot sizes would also attract a broader range of participants increasing market liquidity. Greater participation would enhance market depth, reducing the impact costs associated with trading large volumes.

This method also poses following challenges. Implementing changes to lot sizes requires approval from SEBI and consultation with MCX. This could be time-consuming. There is also a risk of market fragmentation if too many different contract sizes are introduced.

1. **Rationalizing Assaying Costs:**

Market participants were deterred by increase in assaying costs. The doubling of these costs has particularly affected hedgers and small depositors who rely on accurate and affordable quality assessments of their Mentha oil. Lowering assaying costs would make it more affordable for participants to deliver Mentha oil, thereby encouraging more participation and enhancing market liquidity. With reduced costs, more producers might opt to deliver their product through the MCX, improving the alignment between futures and spot prices.

This method also has its challenges. Convincing assaying agencies to lower their fees could be difficult since they also face high operational costs. Also, there should be no compromise on the quality of the product, making reducing costs difficult.

1. **Capacity Building for FPCs:**

Enhancing the financial and technical capabilities of FPCs could be a long-term solution for increasing their participation in the Mentha oil futures market. MCX could provide training and support to FPCs, helping them understand the benefits and mechanics of futures trading. FPCs can become a significant market player with MCX’s support. Educating and empowering FPCs could lead to sustained growth in market participation, contributing to the overall stability and liquidity of the Mentha oil futures market.

Nathany can face following challenges- Capacity building requires significant investment in education and training programs. This takes time to yield results. Ensuring that FPCs remain engaged with the market after receiving training could be challenging, especially if immediate benefits are not apparent.

Nathany's best course of action to revive the Mentha oil futures market would involve a combination of these strategies. Reducing lot sizes and margin requirements could provide immediate relief and attract more participants, while rationalizing assaying costs would make the market more accessible and affordable. Simultaneously, investing in the capacity building of FPCs would lay the groundwork for long-term market stability and growth. By carefully evaluating and implementing these options, Nathany can restore confidence in the Mentha oil futures market and ensure its sustained relevance in the commodity trading landscape.

# Question 5

**Correlation Analysis:**

A primary analysis involves calculating the correlation between the futures and spot prices over the period from 2014 to 2020. A high correlation indicates that the futures market is effectively tracking the spot market, suggesting that it is functioning well as a tool for price discovery and risk management. Any significant deviation in this relationship might indicate inefficiencies or potential arbitrage opportunities.

|  |  |
| --- | --- |
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**Basis Analysis:**

Basis is defined as the difference between the spot price and the futures price, can be analysed over time. This analysis helps in understanding the convergence between the two prices as the contract approaches expiration. A narrowing basis indicates that the futures price is aligning with the spot price, which is expected in an efficient market. Conversely, a widening basis might signal inefficiencies or external factors influencing the market.

Basis Standard deviation:

2014-17: 25.042357

2017-20(20 Nov): 52.91037064