Problem 1B: Observations on Volume Ratios Near Expiry

1. Future vs. Underlying Volume (FUT1 / CM)

Observation: Derivatives dominate liquidity, with Futures volume consistently **4x to 16x** higher than Cash volume. This speculative intensity confirms that price discovery primarily occurs in the derivatives market.

- **Timeline:** The ratio peaks at **DTE 2-3** (Index Mean: ~16x) due to pre-expiry hedging, then drops at **DTE 0** (Mean: ~7x) as positions roll to the next month.
- **Volatility:** The standard deviation of this ratio is extremely high (e.g., ~300 at DTE 2), indicating that while average liquidity is high, it is "bursty" and event-driven rather than continuous.
- **Variations:** High-beta names like **GMRAIRPORT** show extreme speculation (peaking ~98x), whereas cash-heavy stocks like **SUZLON** often trade with ratios <1, driven by retail equity holding.

2. Far Future vs. Near Future Volume (FUT2 / FUT1)

Observation: This ratio tracks the exponential migration of open interest (Rollover).

- **The Rollover Ramp:**
    - **DTE 10:** Low ratio (**~0.20**); liquidity remains concentrated in the near month.
    - **DTE 3 (Crossover):** Ratio hits **~1.0**, marking the optimal liquidity balance.
    - **DTE 0:** Ratio surges to **>2.0**, meaning the "Far" month becomes twice as liquid as the expiring contract.
- **Consistency:** This pattern holds across sectors (e.g., LUPIN, SRF), confirming a structural shift in liquidity 72 hours before expiry.

3. Execution Implications & Conclusion

- **Liquidity Fragmentation:** Between DTE 2 and 0, liquidity fractures between expiries. The high variability in volume ratios during this transition suggests that execution risk increases significantly if orders are not routed dynamically.
- **Optimal Window:** The volume analysis confirms **DTE 2-3** as the ideal rollover window. Waiting until DTE 0 forces execution in a rapidly drying contract where bid-ask spreads often widen due to the exit of diverse market participants. Algorithmic execution engines should ideally switch their primary liquidity source from the near to the far month immediately upon crossing the 1.0 ratio threshold to minimize impact costs.