GROUP 37

FIN F311: Derivatives and Risk Management
Assignment

Financial Analysis of
Bombay Stock Exchange & Dr. Reddy's Lab

Under the guidance of
Dr. Nagaraju Thota and Dr ACV Subrahmamyam

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BOMBAY STOCK EXCHANGE

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Underlying Assets-Equity

1) Introduction

i) Nature of the Business:

Financial services — primarily operates as a stock exchange, providing a platform for trading in equity, derivatives, mutual funds, debt instruments, and other financial instruments.

ii) Public or Private Ownership:

Publicly listed company.

BSE is listed on its own exchange under the ticker BSE. It became the first Indian stock exchange to be listed in 2017.

iii) When Did the Company Start & Under What Circumstances:

Founded in 1875 as "The Native Share & Stock Brokers' Association" by Premchand Roychand.

It was started during the British colonial era to provide a structured and regulated marketplace for trading shares in India, making it Asia's oldest stock exchange.

iv) Which Industry They Belong To & Their Importance:

Industry: Financial Services / Capital Markets

BSE played a pioneering role in developing India's equity markets. It is the first stock exchange in Asia and one of the fastest stock exchanges in the world with a trading speed of 6 microseconds.

It introduced the Sensex, India's first and most widely tracked stock market index.

v) Overall Greatness of the Company:

BSE has a legacy of nearly 150 years and is known for its contribution to India's financial market infrastructure. Despite increased competition from NSE, BSE remains a prestigious institution, known for hosting a wide range of listed companies, especially small and mid-caps.

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Its innovations, regulatory strength, and historical relevance mark it as one of India's foundational financial institutions.

2) Spot Unadjusted Return on daily, weekly, monthly frequencies

	DAILY	WEEKLY	MONTHLY
AVERAGE	0.03	1.876398203	5.975850669
ANNUAL RETURNS	0.008112	0.200179865	0.448255033
STANDARD DEVIATION	3.528847	9.373561147	13.33136325
MIN	-9.50	-17.98761062	-12.9576406
MAX	16.37	34.62668919	29.76404297

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3) Spot Adjusted Return on daily, weekly, monthly frequencies

	DAILY	WEEKLY	MONTHLY
AVERAGE	0.002957	0.186586	0.406924
STANDARD DEVIATION	1.000001	1.000009	1.000007
MIN	-2.69653	-1.93209	-1.01163
MAX	4.634465	3.680468	2.191175

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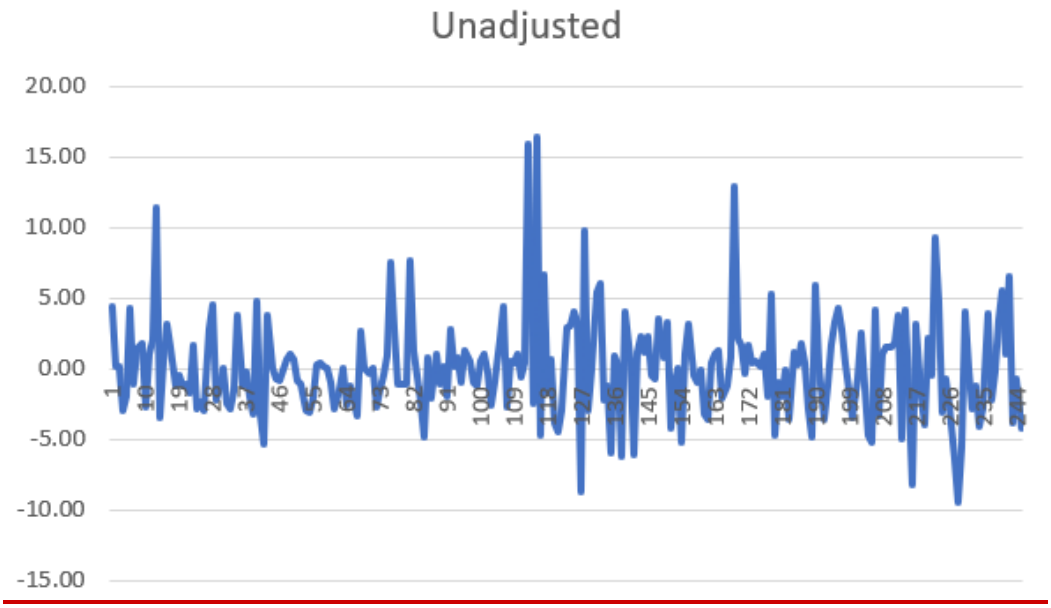
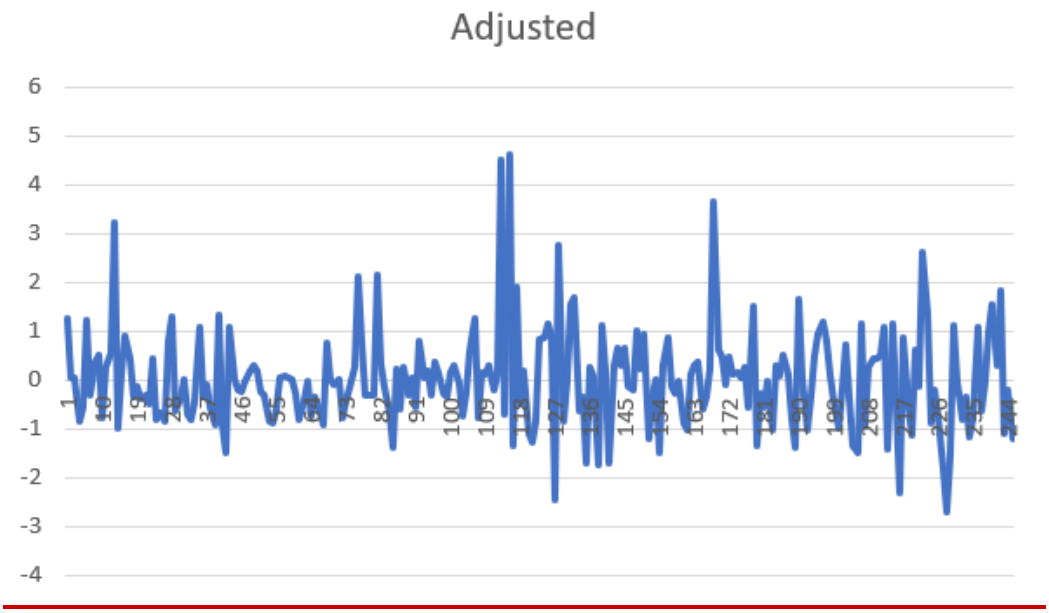
Daily Returns





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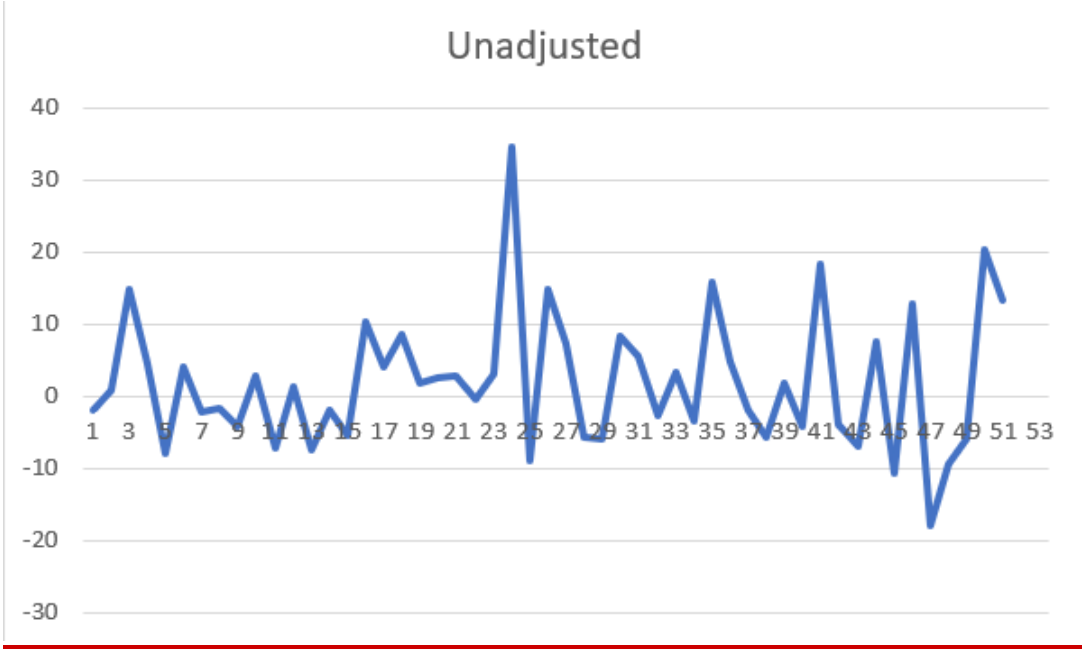
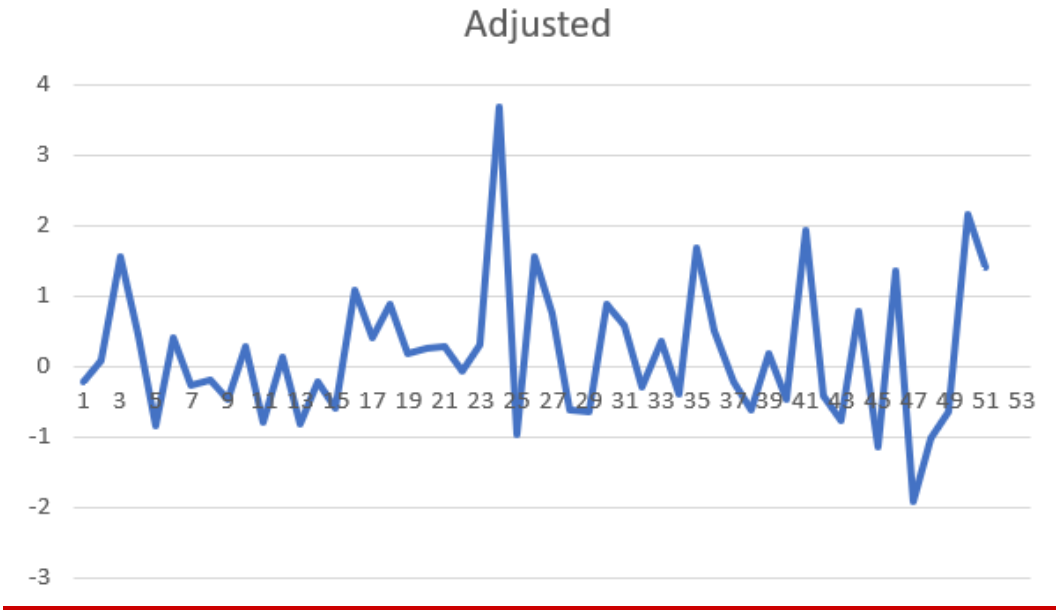
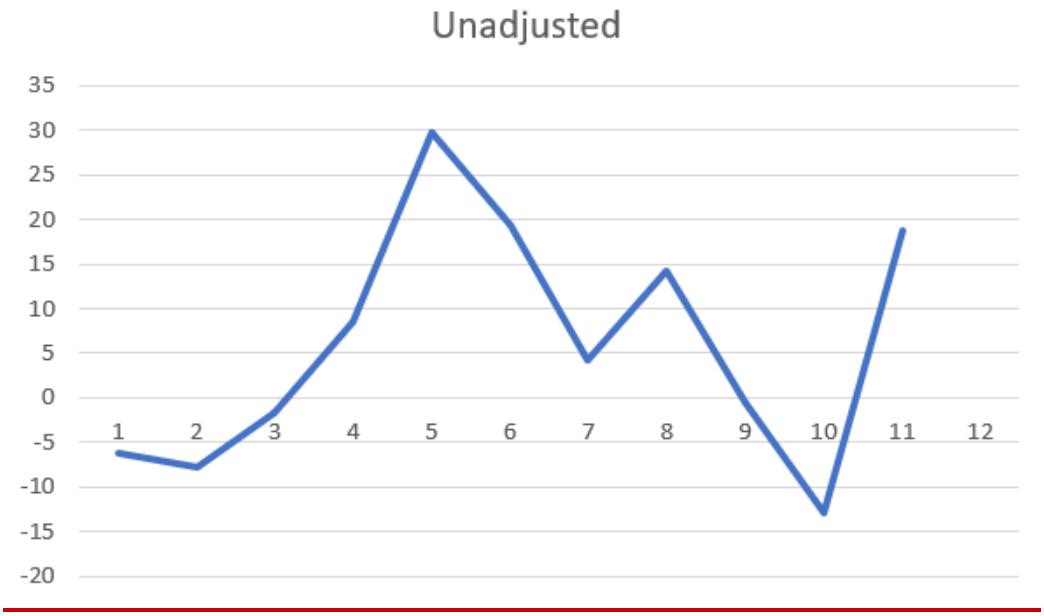
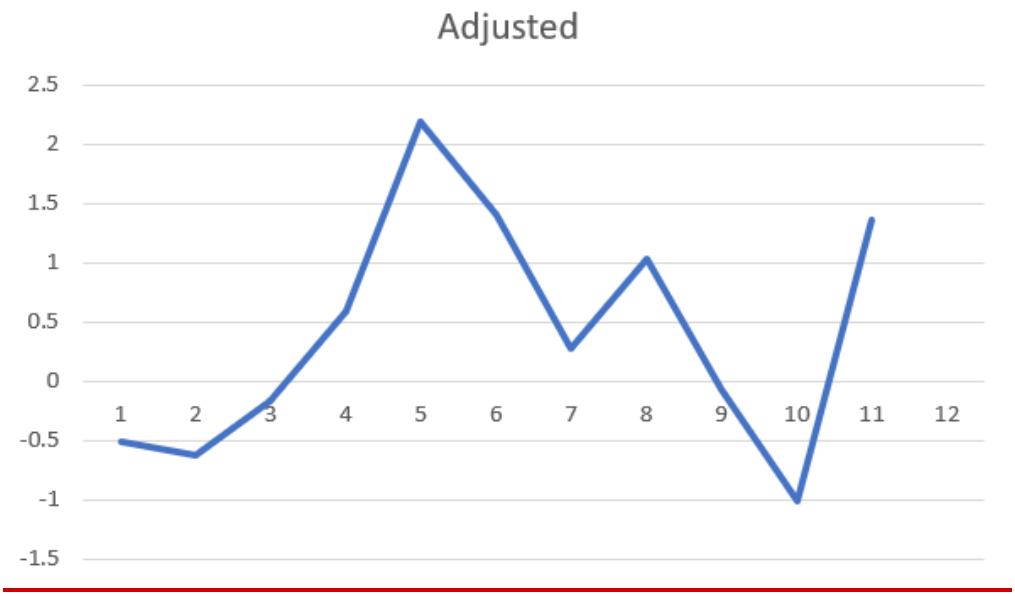
Weekly Returns





Monthly Returns





4) Interpretation

The equity is giving fine returns on a daily, weekly, monthly basis with high standard deviation. This means that the equity is very risky and the prices keep fluctuating. Since the standard deviation is rapidly increasing on a daily, weekly and monthly basis, there is a great risk involved with holding the equity. Although the return is moderately high when compared to return on the risk-free investments, so is the risk involved with this investment. The standard deviation of 13.33% on returns means that there is also a very good chance that you might lose a lot of money here. Therefore, the return on investment is in line with the risk involved.

Equity Futures Instruments

5) Equity Futures

Commencement of Equity Futures: The BSE began as a stock exchange in 1875, but BSE Limited as a listed company started trading on NSE in February 2017.

Lot size and Contract Specifications: The lot size for BSE Ltd (the stock) futures on the NSE is 125 shares per lot for contracts expiring in April and May 2025

Contract Specifications:

Parameter	Details
Lot Size	125 shares per lot
Contract Type	Cash-settled stock futures
Expiry	Last Thursday of the expiry month
Tick Size	₹0.05
Settlement	Mark-to-market daily, final on expiry
Margin	As per exchange requirements

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Greatness of Equity Futures: The greatness of BSE Ltd equity futures lies in their cost-effectiveness, accessibility, high liquidity, and utility for both hedging and speculation. These features make them an attractive choice for a wide range of market participants, from retail traders to institutional investors.

6) Sample return on daily, weekly, monthly frequencies

Near Month Contracts

RETURNS (%)	DAILY (%)	WEEKLY (%)	MONTHLY (%)
AVERAGE	0.013038	0.30770243	-0.342174155
ANNUAL RETURNS	0.003427	0.02736892	-0.023579022
STANDARD DEVIATION	3.803939	11.2427682	14.51180458
MIN	-10.1889	-19.549205	-19.3031911
MAX	13.63053	21.4211036	15.9287705

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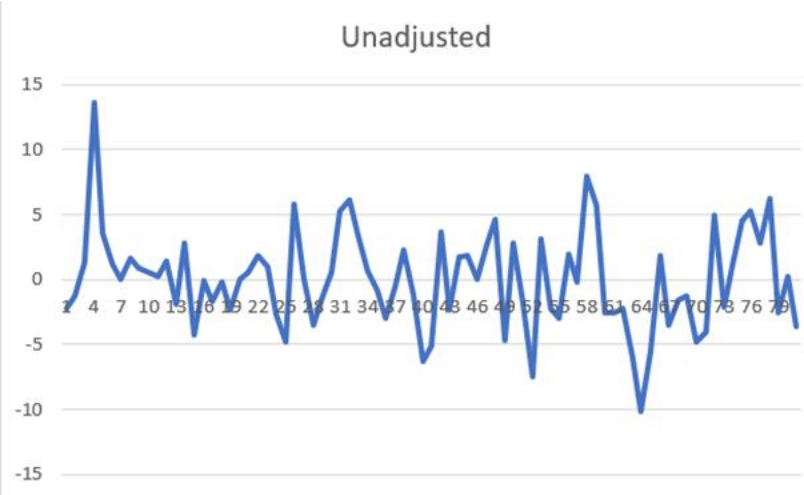
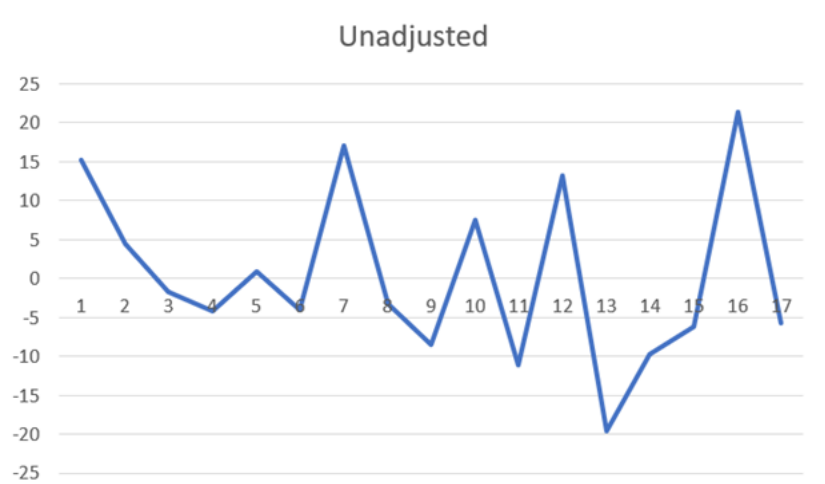
Daily rate of returns (Unadjusted)



Weekly rate of returns (Unadjusted)



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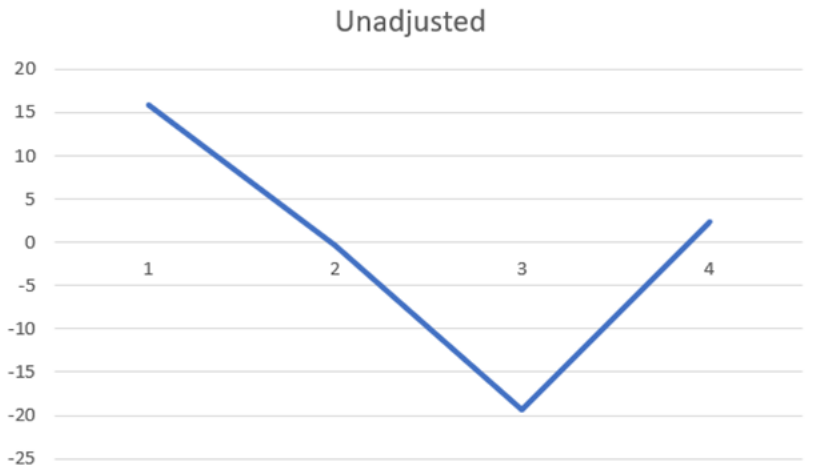
Monthly rate of returns (Unadjusted)



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7) Adjusted Returns

RETURNS (%)	DAILY (%)	WEEKLY (%)	MONTHLY (%)
AVERAGE	-0.00126	0.016316	-0.0602
SHARPE RATIO	-0.00126	0.01631605	-0.060225446
STANDARD DEVIATION	1.00001	0.971085	0.99965
MIN	-2.68316	-1.7499	-1.36664
MAX	3.578673	1.894473	1.060087

8) Interpretation

The adjusted and unadjusted returns of the given equity futures vary slightly in daily and varies more in monthly. Weekly returns lie between these two. Also, the standard deviation of monthly is greater than daily and weekly lies between these two.

As we can see here, the monthly frequency investment gives out the highest returns. This comes at the price of security though as the risk involved is quite high here which is indicated by the high standard deviation of returns.

9) Next Month Contracts

Unadjusted Values

RETURNS(%)	DAILY (%)	WEEKLY(%)	MONTHLY(%)
AVERAGE	-0.00974	0.17912081	-0.771535
ANNUAL RETURNS	-0.00257	0.01625104	-0.0527238
STANDARD DEVIATION	3.793076	11.022116	14.6335368
MIN	-9.69934	-19.475825	-19.881592
MAX	13.53104	21.2841383	15.6899372

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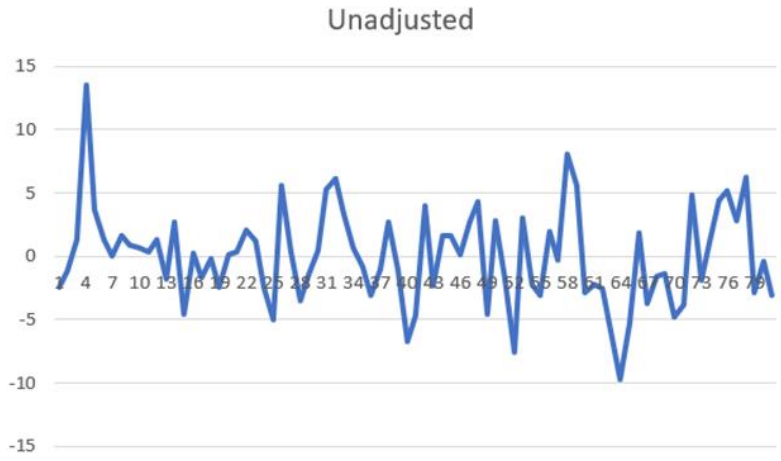
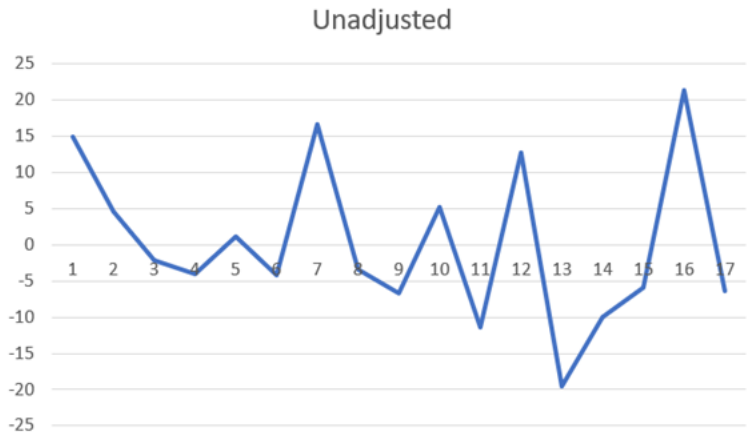
Daily rate of returns (Unadjusted)



Weekly rate of returns (Unadjusted)



Monthly rate of returns (Unadjusted)

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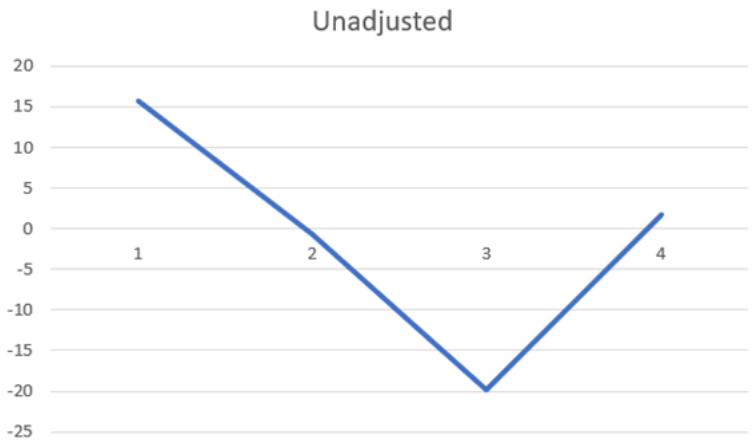

Adjusted Values

RETURNS(%)	DAILY (%)	WEEKLY(%)	MONTHLY(%)
AVERAGE	-0.00727	0.004977	-0.08908
SHARPE RATIO	-0.00727	0.004976915	-0.0890761
STANDARD DEVIATION	1.000019	1.000001	1.000022
MIN	-2.56181	-1.77827	-1.39532
MAX	3.562727	1.919963	1.035339

Far Month Contracts

Unadjusted Values

RETURNS(%)	DAILY (%)	WEEKLY(%)	MONTHLY(%)
AVERAGE	-0.02368	0.10899925	-0.9502889
ANNUAL RETURNS	-0.00635	0.01003485	-0.0631266
STANDARD DEVIATION	3.729013	10.8620718	15.0536894
MIN	-9.58505	-19.5168557	-20.691321
MAX	13.15319	20.6957389	15.9068447

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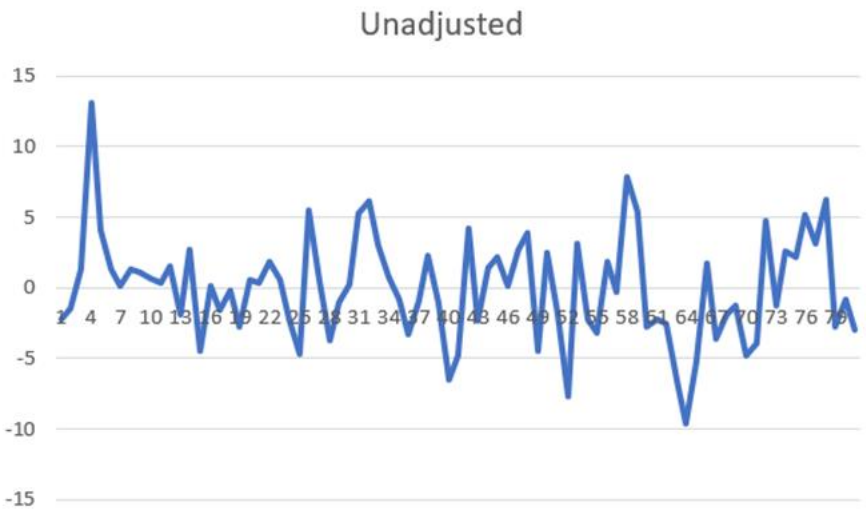
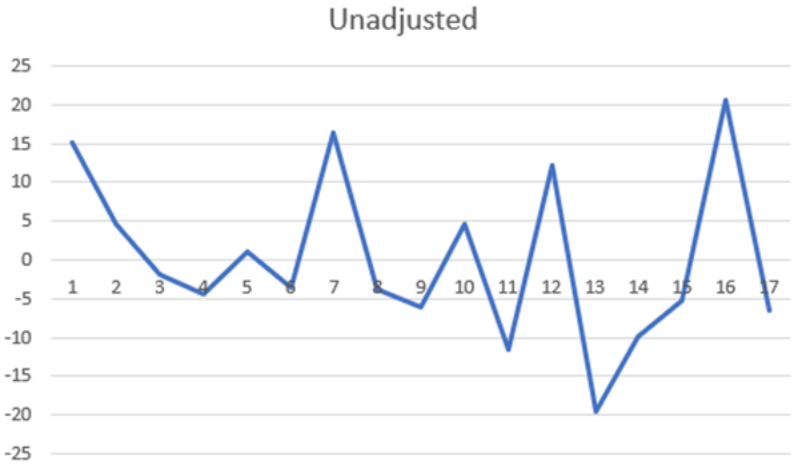
Daily rate of returns (Unadjusted)



Weekly rate of returns (Unadjusted)



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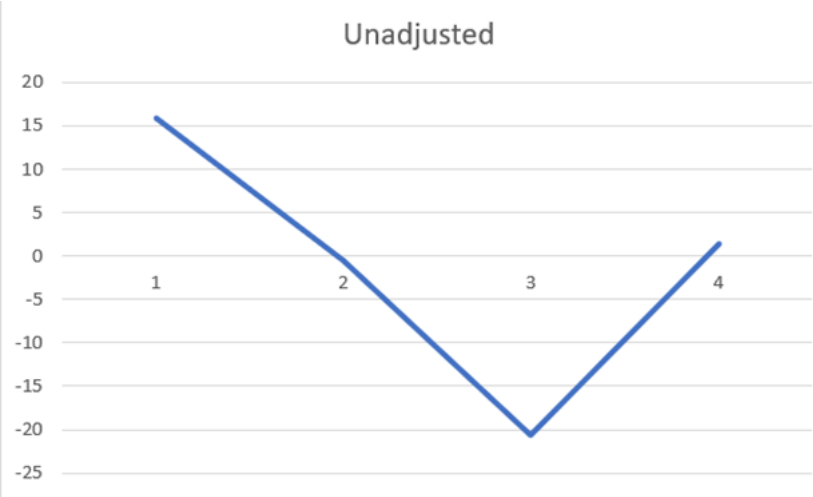
Monthly rate of returns (Unadjusted)



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Adjusted Values

RETURNS(%)	DAILY (%)	WEEKLY(%)	MONTHLY(%)
AVERAGE	-0.01113	-0.00141	-0.09846
SHARPE RATIO	-0.01113	-0.00140539	-0.0984681
STANDARD DEVIATION	1.000002	1.000005	0.999961
MIN	-2.57513	-1.80826	-1.41009
MAX	3.522546	1.894092	1.020788

Interpretation

The statistics of the return seems identical which shows that all day and month contracts are almost indifferent. As we can see, investing on a monthly basis gives the highest results but also has high risk involved. On the other hand, investing on a weekly basis gives positive returns as results with lesser risk. Hence, it's best to invest as a week trader.

Comparison of Underlying Stocks and Future Returns

10)

In this we will be comparing the performance using the “returns per unit risk” in the risk-unadjusted parts and using the “sharpe ratio” in the risk-adjusted parts.

It’s a ratio of the mean return to the standard deviation:

- Return per Unit Risk = (Mean Return/Standard Deviation)

This is similar to how the Sharpe Ratio works (which uses excess return over risk-free rate in the numerator), but in simple terms, this gives you an idea of efficiency:

- Sharpe Ratio = ((Mean Return – Risk-free Rate)/Standard Deviation)

These are the best metrics of measurement here because if you only look at mean returns, you might favour a high-return asset — but it might also be very volatile (risky).
If you only look at standard deviation, you'll favour low-risk assets — but they might not give good returns. But in the case of returns per unit risk and sharpe ratio returns and risk are balanced together.

Underlying Asset vs Near Month vs Next Month vs Far Month

I. Daily Frequency

According to table 10.1 we can clearly see from the returns per unit risk that in terms of performance (best to worst):

Underlying Asset > Near Month > Next Month > Far Month

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DAILY RISK-UNADJUSTED (Table 10.1)

Metric	Underlying asset	Near month	Next month	Far month
Mean	0.013038	0.013037562	-0.009744277	-0.02368021
Max	0.003427	13.6305303	13.53103925	13.15319195
Min	3.803939	-10.18886199	-9.699337191	-9.585048349
Standard Deviation	-10.1889	3.803939448	3.793076224	3.729013109
Returns per Unit Risk	13.63053	0.003427384	-0.002568964	-0.006350262

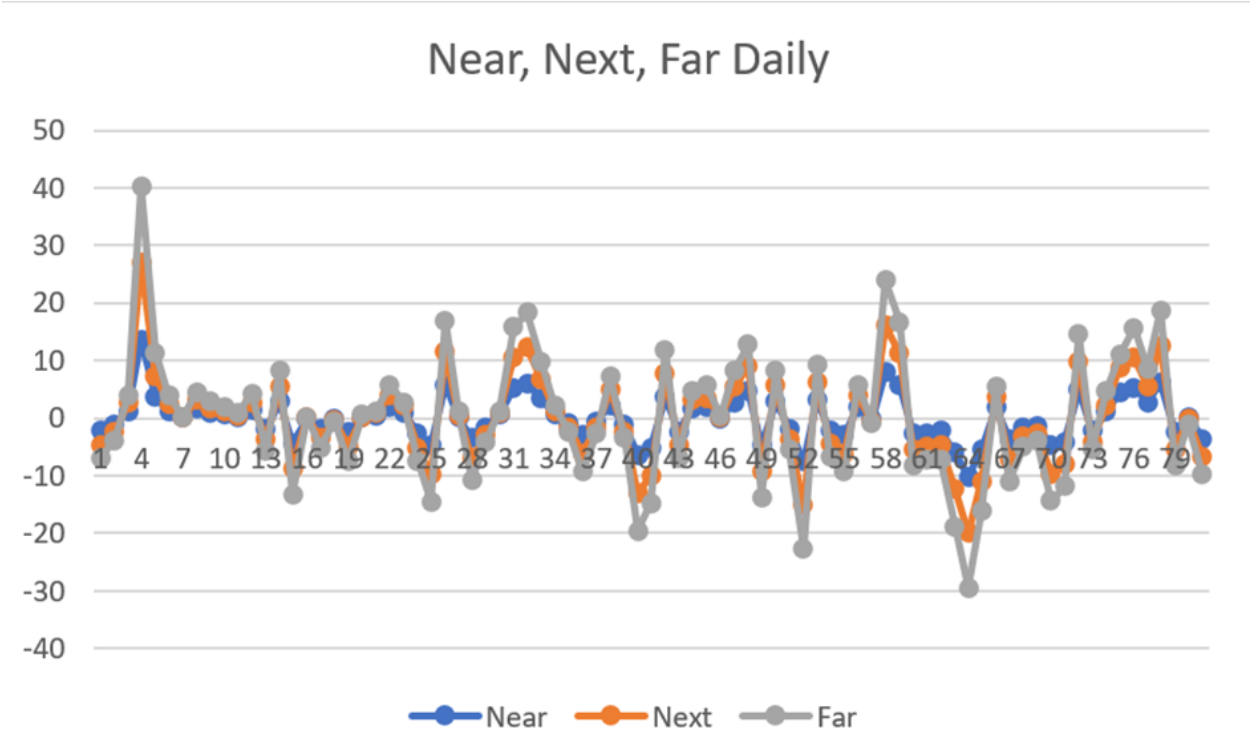
According to table 10.2 we can clearly see from the Sharpe Ratio that in terms of performance (best to worst):

Underlying Asset > Near Month > Next Month > Far Month

on a daily frequency for risk-adjusted returns.

DAILY RISK-ADJUSTED (table 10.2)

Metric	Underlying asset	Near month	Next month	Far month
Mean	0.002957	-0.00126	-0.00727	-0.01113
Max	4.634465	3.578673	3.562727	3.522546
Min	-2.69653	-2.68316	-2.56181	-2.57513
Standard Deviation	1	1.00001	1.000019	1.000002
Sharpe Ratio	0.002956737	-0.001258583	-0.00727	-0.011130394



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II. Weekly Frequency

According to table 10.3 we can clearly see from the returns per unit risk that in terms of performance (best to worst):

Underlying Asset > Near Month > Next Month > Far Month

on a weekly frequency for risk-unadjusted returns.

WEEKLY RISK-UNADJUSTED (table 10.3)

Metric	Underlying asset	Near month	Next month	Far month
Mean	1.876398203	0.307702429	0.17912081	0.108999248
Max	34.62668919	21.42110363	21.28413832	20.69573889
Min	-17.98761062	-19.54920486	-19.47582546	-19.51685571
Standard Deviation	9.373561147	11.24276817	11.02211598	10.86207185
Returns per Unit Risk	0.200179865	0.027368921	0.016251037	0.010034849

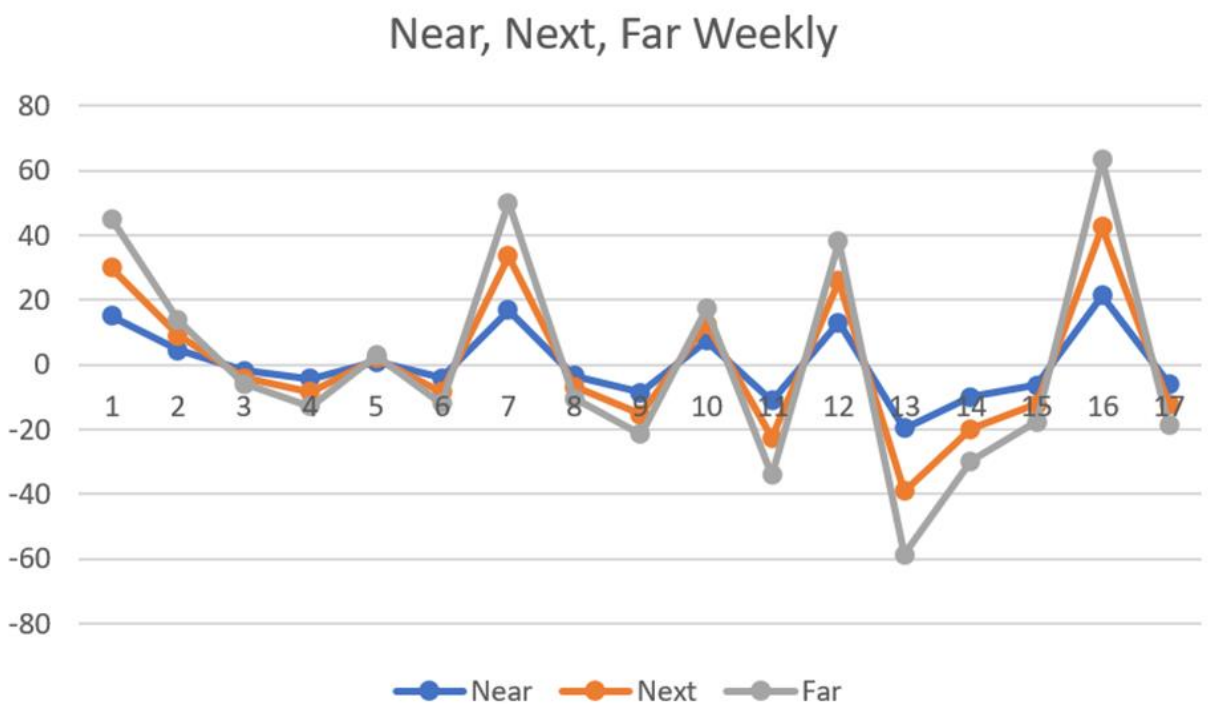
According to table 10.4 we can clearly see from the Sharpe Ratio that in terms of performance (best to worst):

Underlying Asset > Near Month > Next Month > Far Month

on a weekly frequency for risk-adjusted returns.

WEEKLY RISK-ADJUSTED (table 10.4)

Metric	Underlying asset	Near month	Next month	Far month
Mean	0.186586	0.016316	0.004977	-0.00141
Max	3.680468	1.894473	1.919963	1.894092
Min	-1.93209	-1.7499	-1.77827	-1.80826
Standard Deviation	1.000009	0.971085	1.000001	1.000005
Sharpe Ratio	0.186586	0.016316	0.004976915	-0.001405393



III. Monthly Frequency

According to table 10.5 we can clearly see from the returns per unit risk that in terms of performance (best to worst):

Underlying Asset > Near Month > Next Month > Far Month

on a monthly frequency for risk-unadjusted returns.

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MONTHLY RISK-UNADJUSTED (table 10.5)

Metric	Underlying asset	Near month	Next month	Far month
Mean	5.975850669	-0.342174155	-0.771535041	-0.950288884
Max	29.76404297	15.9287705	15.68993721	15.90684471
Min	-12.95764065	-19.3031911	-19.88159163	-20.69132067
Standard Deviation	13.33136325	14.51180458	14.63353675	15.05368941
Returns per Unit Risk	0.448255033	-0.023579022	-0.052723757	-0.063126643

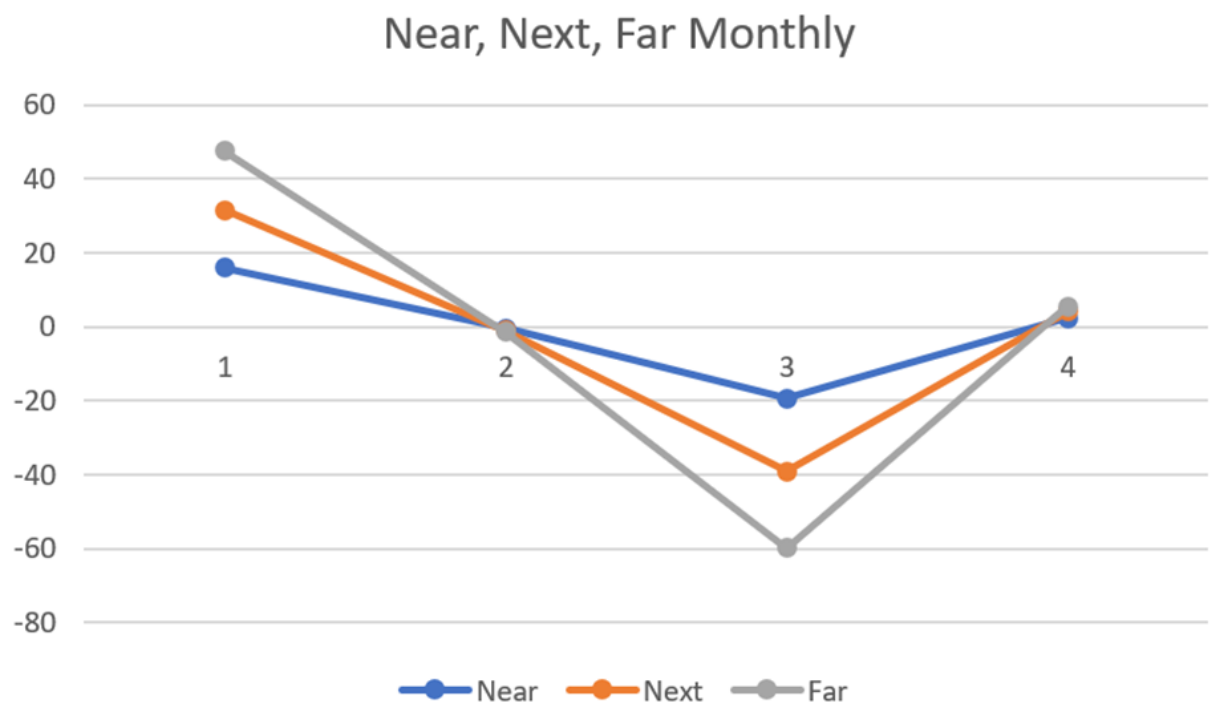
According to table 10.6 we can clearly see from the Sharpe Ratio that in terms of performance (best to worst):

Underlying Asset > Near Month > Next Month > Far Month

on a monthly frequency for risk-adjusted returns.

MONTHLY RISK-ADJUSTED (table 10.6)

Metric	Underlying asset	Near month	Next month	Far month
Mean	0.406924	-0.0602	-0.08908	-0.09846
Max	2.191175	1.060087	1.035339	1.020788
Min	-1.01163	-1.36664	-1.39532	-1.41009
Standard Deviation	1.000007	0.99965	1.000022	0.999961
Returns per Unit Risk	0.406920555	-0.060225446	-0.089076139	-0.098468144



Conclusion

Across monthly, weekly, and daily frequencies (both risk-adjusted and unadjusted), the performance order remains consistent:

Underlying Asset > Near Month > Next Month > Far Month

This shows a clear pattern:

- Underlying asset outperforms all futures in terms of risk-adjusted return.
- Near-month futures perform better than next- and far-month, but still lag behind the underlying.
- Performance worsens as the futures contract moves farther from expiry, likely due to lower liquidity and higher uncertainty.

Liquidity Conditions of Underlying Stocks and Futures (Daily, Weekly, Monthly)

Liquidity is the ease with which an asset can be sold or purchased in the market without triggering a considerable alteration in its price. In markets for derivatives, liquidity is vital for effective price discovery and low transaction costs.

a) Underlying Asset:

The underlying asset (most commonly a stock or an index) tends to be highly liquid, particularly if it is in a large index or a heavily traded stock. Large trading

volumes, small bid-ask spreads, and stable market depth make the underlying asset readily tradable with little slippage. This high liquidity lends itself to its excellent risk-adjusted returns in all observed timeframes (daily, weekly, monthly).

b) Near-Month Futures:

Near-month futures are the most liquid of futures contracts. They are highly traded as they are nearest to expiration and are commonly utilized for short-hedging, speculating, and arbitrage. Therefore, near-month futures typically have the lowest bid-ask spreads and highest open interest, which makes them easiest to enter and leave. This comparative liquidity makes them best to perform relative to mid- and far-month futures but still less than the underlying asset.

c) Next-Month (Mid-Month) and Far-Month Futures:

Far-month and mid-month futures are less liquid. They are less frequently traded, have wider bid-ask spreads, and lower open interest than near-month contracts. The reduced liquidity results in greater volatility, greater price slippage, and less efficient pricing — all of which are embodied in their uniformly lower (and negative) returns per unit risk at all frequencies. Market participants tend to shun these contracts except for those with longer-term hedging requirements.

Thus,
Underlying Asset > Near Month Futures > Next Month Futures > Far Month Futures

This ordering closely follows the order of risk-adjusted performance, and it is a hint that superior liquidity is associated with superior risk-return trade-offs.

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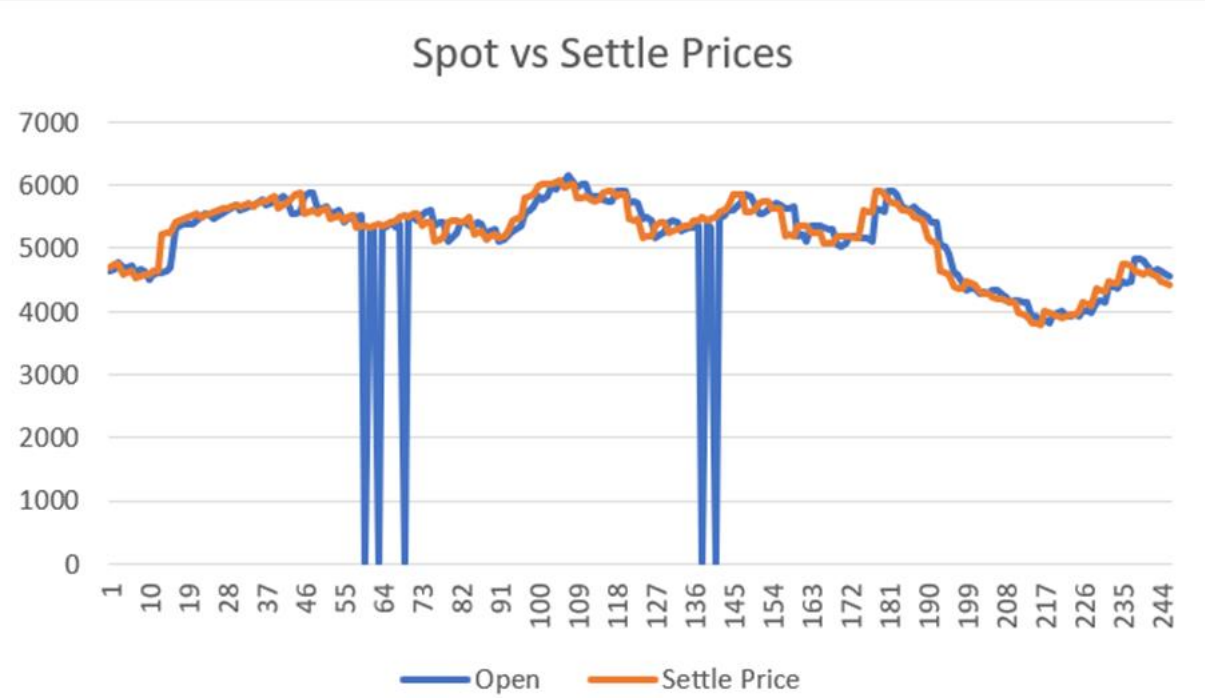
Contango or Backwardation of Futures Instruments



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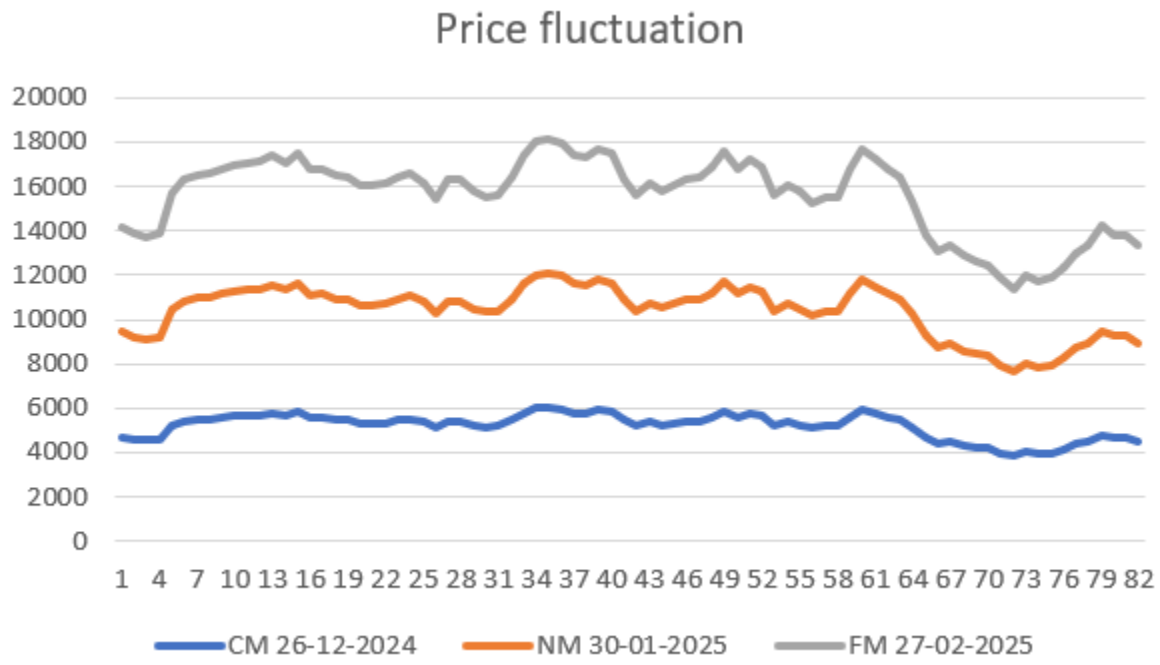

12)

This is contango in the futures market.

- In the chart, the orange Settlement Price line closely tracks the blue Spot line, with only small deviations.
- At most points, the Settlement Price is slightly above the Spot price, indicating a mild contango situation.
- There are no consistent periods where the Settle Price is below the Spot price, which would indicate backwardation.

We can observe the pattern:

- The blue line (CM 26-12-2024) shows the lowest prices
- The orange line (NM 30-01-2025) shows medium prices
- The grey line (FM 27-02-2025) shows the highest prices

Since the contracts with later expiration dates consistently trade at higher prices than those with earlier expirations, this represents a contango market structure.

13) Frequency

The frequency of price observations does matter when analysing futures markets:

a. The fundamental relationship between contracts of different maturities is what defines contango or backwardation, not the frequency of fluctuations. Even with the visible price fluctuations across all three contracts, the price structure remains consistent.

b. Higher frequency analysis allows traders to identify short-term opportunities within the overall contango structure. The fluctuations visible in all three lines suggest potential trading opportunities even while the general contango pattern persists.

c. The amplitude and frequency of price fluctuations within each contract provide information about volatility, which is crucial for risk management despite not changing the contango classification.

In summary, this market exhibits contango because futures contracts with later expiration dates (Feb 2025) consistently trade at higher prices than those with earlier dates (Dec 2024). While frequency of price movements doesn't change this classification, it does provide valuable information for traders about market volatility and potential trading opportunities within the overall contango structure.

Conclusion

As it can be seen from the above analysis, it is evident that underlying stock returns are positive compared to the futures instruments and it is better to invest in the stock than the futures. Moreover, trading BSE stock on a weekly basis would give higher return compared to daily and monthly basis. The return that was realized between 3 April, 2024 and 26 March,2025 by trading on BSE stock on weekly frequency is better compared to on daily frequency and negative returns on monthly frequency. Further, if an investor inevitably has to trade in the futures market for hedging purposes, it would be better to trade near month futures on monthly frequency basis as the returns are less negative for monthly frequency basis. A closer look at the near, next and far month would tell us that all the returns on these months are negative and next month future returns are comparatively less negative. It can also be concluded that the underlying stock of BSE has underperformed during the period and investing in the stock might not guarantee the expected returns to an investor. To conclude the analysis, it can be stated that investing in BSE on a weekly frequency would've maximized the return for an investor trading on BSE stock and futures.

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DR. REDDY'S LABORATORY

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Underlying Assets-Equity

1) Introduction

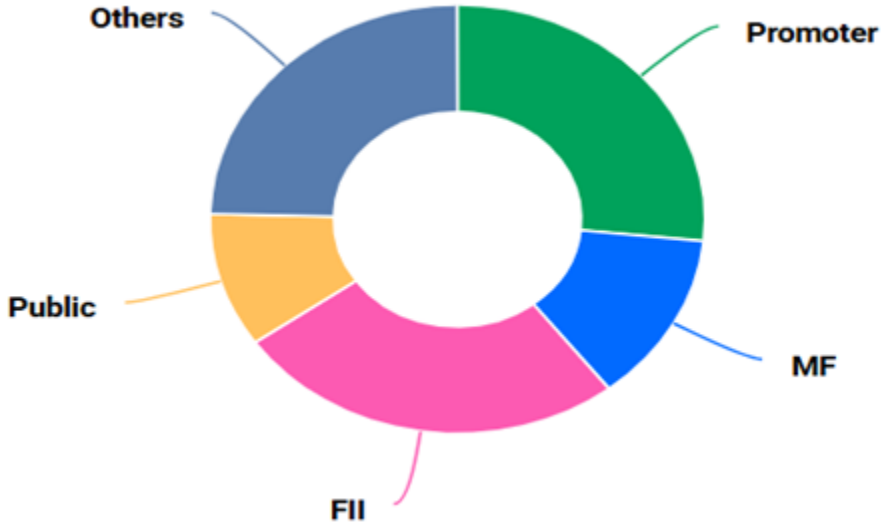
i) Nature of the Business:

Dr. Reddy's Laboratories is a global pharmaceutical company headquartered in Hyderabad, India. Founded in 1984, the company is engaged in the manufacture, development, and marketing of a wide range of generic medicines, active pharmaceutical ingredients (APIs), biosimilars, and over-the-counter (OTC) products. Its core business spans across both emerging and developed markets, including the United States, India, Russia, and parts of Europe.

ii) Public or Private Ownership:

Publicly listed company — trades on the NSE, BSE, and also on the NYSE as an ADR (American Depository Receipt).

The Lab, being one of the private sector institutions of India,is driven by the social objective of extending affordable medicines to all regions of the country and to all classes of people. As it can be seen from Figure 2, promoters hold 26.6% of the shares in Andhra Bank, while FIIs hold 25.75% of the shares, Mutual Funds hold 15% of the shares, individuals hold 10.5% of the shares and the rest 24.6% is held by others.



iii) When Did the Company Start & Under What Circumstances:

Dr. Reddy's Laboratories commenced business in 1984, founded by Dr. Kallam Anji Reddy, a former scientist at Indian Drugs and Pharmaceuticals Limited. With a vision to provide affordable and innovative medicines, the company began by manufacturing active pharmaceutical ingredients. It quickly expanded into formulations, exports, and research-driven products, establishing a strong foundation in both domestic and international pharmaceutical markets within a short span.

iv) Which Industry They Belong To & Their Importance:

Industry: Healthcare / Pharmaceuticals

Dr. Reddy's Laboratories operates in the Pharmaceutical and Healthcare industries, which are key components of the service sector. The pharmaceutical sector plays a critical role in ensuring public health and supporting economic growth. It contributes by developing, manufacturing, and supplying essential medicines. Its importance lies in enhancing quality of life, reducing disease burden, and

supporting healthcare infrastructure through innovation, research, and global access to affordable treatments.

v) Overall Greatness of the Company:

Dr. Reddy's Laboratories was one of the early Indian pharmaceutical companies to focus on research driven drug development and global generics. It pioneered affordable medication access by launching cost effective generics in international markets, including the US and Europe. This positioned the company as a key player in the global pharma space. Dr. Reddy's is ranked among the top pharmaceutical companies in India for innovation and global reach.

2) Spot Unadjusted Return on daily, weekly, monthly frequencies

As it can be seen from Table, returns are higher for weekly and daily trading compared to the returns on monthly trading. Moreover, daily returns account to 0.0020% per day which is 0.73% per annum while weekly returns account to -0.094% per day which is -4.88% per annum while monthly returns are -0.401% which is -4.81% per annum.

METRIC	**DAILY**	**WEEKLY**	**MONTHLY**
MINIMUM	-5.04	-4.66	-12.33
MAXIMUM	4.5	8.32	15.49
MEAN	0.0020	8.32	-0.401
STANDARD DEVIATION	1.30	3.39	8.24

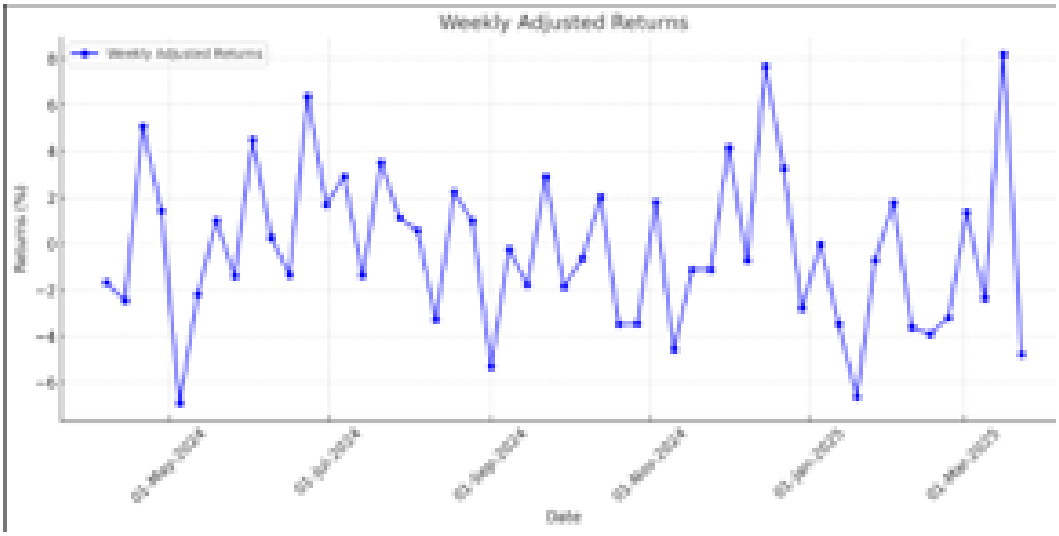
3) Spot Adjusted Return on daily, weekly, monthly frequencies

It can be observed from Table that risk adjusted daily, monthly and weekly returns are negative. Risk adjusted weekly returns are -0.221% per week which accounts to 11.492% per annum.

	DAILY	WEEKLY	MONTHLY
AVERAGE	-3.9	-2.03	-1.51
STANDARD DEVIATION	3.45	2.41	1.813
MIN	-0.012	-0.06	-0.11
MAX	0.99	0.99	1.00

Daily Returns

Weekly Returns



Monthly Returns

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4) Interpretation

Risk-adjusted return evaluates an investment's profitability by factoring in the level of risk taken to achieve that return. In contrast, risk unadjusted return simply reflects the raw return without considering associated risk. Therefore, assessing risk adjusted returns is crucial for investors to ensure a balanced reward to risk ratio. This metric is equally vital for portfolio managers handling diverse client expectations regarding returns for a specific level of risk or vice versa. Figures 3, 4, and 5 illustrate the daily, weekly, and monthly returns of the underlying stock, respectively

Equity Futures Instruments

5) Equity Futures

Commencement of Equity Futures: Equity futures of DR. REDDY started trading in 30-May-2003 with Near month (April 2025): 34,74,375 contracts and Next month (May 2025): 5,97,500 contracts on the National Stock Exchange.

Lot size and Contract Specifications: DR. REDDY is currently trading in the Futures and Options market of the NSE with a lot size of 625 and Total Contracts: for the near month (April 2025): 5,559 contracts, for the next month (May 2025): 956 contracts, for the far month (June 2025): 49 contracts.

Contract Specifications:

- Instrument Type: FUTSTK (futures stock)
- Trading cycle: Maximum of 3 months
- Expiry date: Last Thursday of the expiry month
-

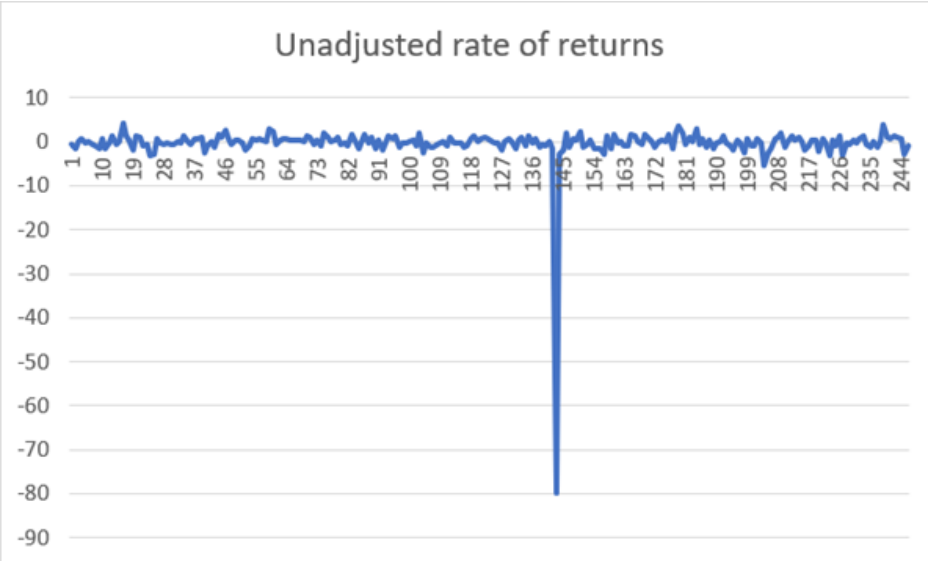
Greatness of Equity Futures: Dr. Reddy's Laboratories equity futures have gained significant importance in the derivatives market due to their close correlation with the underlying stock prices. These futures contracts provide investors with an effective tool to hedge against price volatility and mitigate risk by locking in future prices of the asset.

6) Sample return on daily, weekly, monthly frequencies

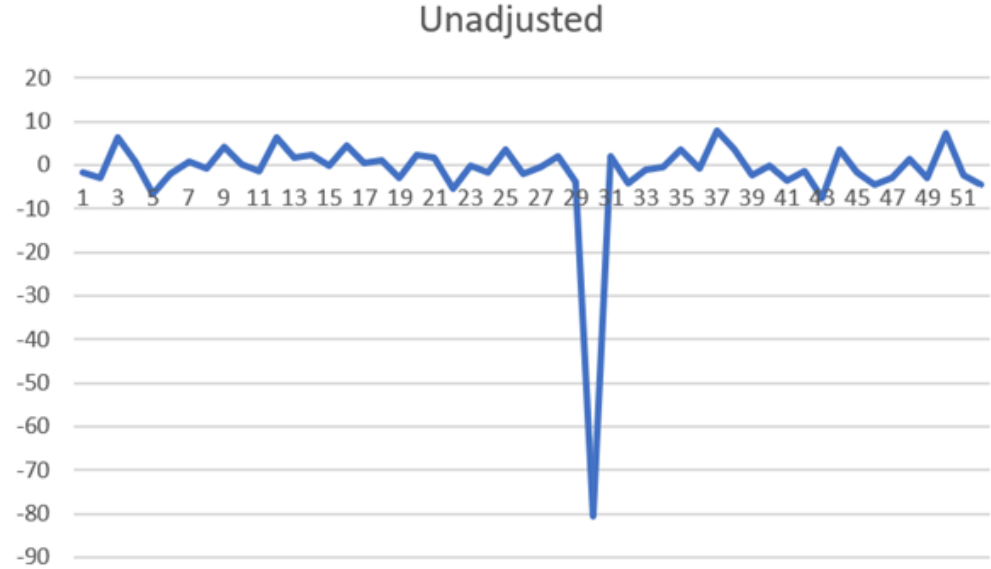
Near Month Contracts

RETURNS (%)	DAILY (%)	WEEKLY (%)	MONTHLY (%)
AVERAGE	-0.35229	-1.593973464	-6.600267
ANNUAL RETURNS	-0.06711	-0.135181406	-0.2675543
STANDARD DEVIATION	5.249634	11.79136617	24.6688881
MIN	-79.8792	-80.64992047	-81.451227
MAX	4.249612	7.957463884	12.2344113

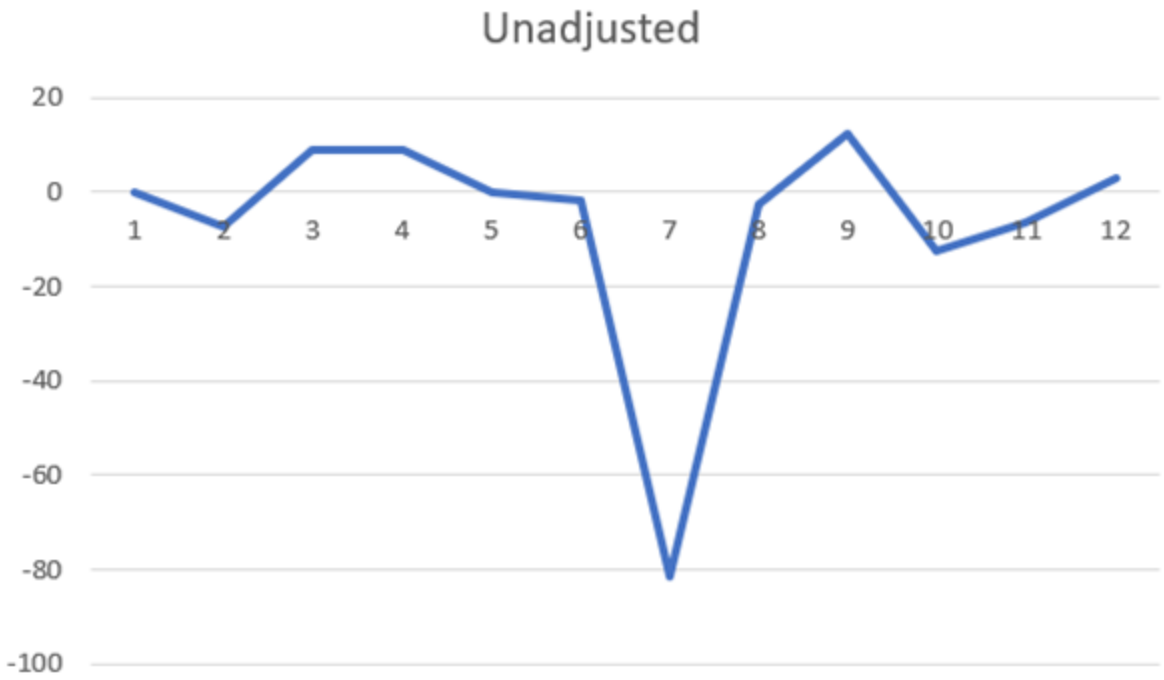
Daily rate of returns (Unadjusted)



Weekly rate of returns (Unadjusted)



Monthly rate of returns (Unadjusted)



7) Adjusted Returns

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RETURNS (%)	DAILY (%)	WEEKLY (%)	MONTHLY (%)
AVERAGE	-0.37048	-1.7210436	-7.1457670
SHARPE RATIO	-0.07057	-0.145965238	-0.2896884
STANDARD DEVIATION	5.24961	11.79077719	24.6670762
MIN	-79.8971	-80.7735743	-81.9920601
MAX	4.230599	7.8311177	11.6894113

8) Interpretation

The adjusted and unadjusted returns of the given equity futures vary slightly in daily and varies more in monthly. Weekly returns lie between these two. Also, the standard deviation of monthly is greater than daily and weekly lies between these two.

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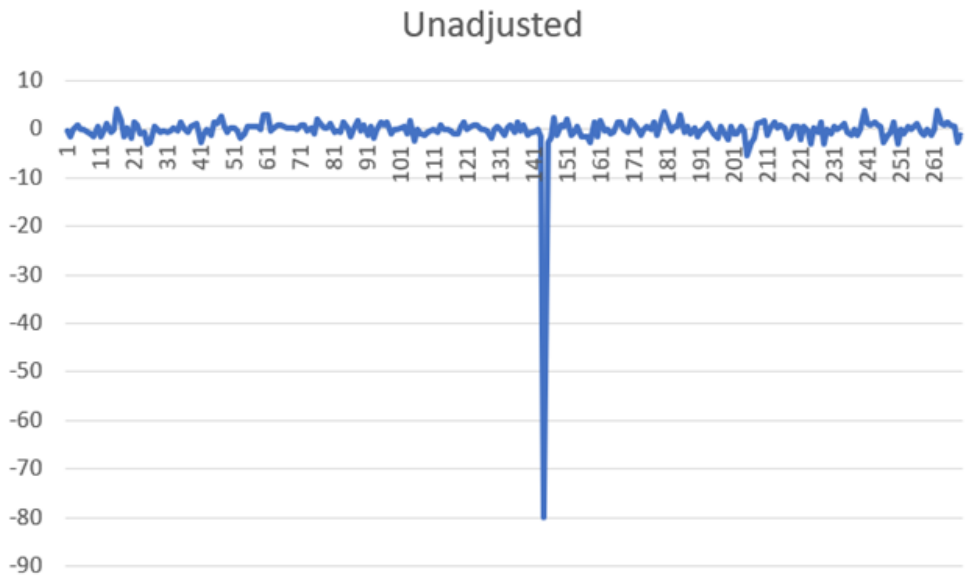
As we can see here, the monthly frequency investment gives out the highest returns. This comes at the price of security though as the risk involved is quite high here which is indicated by the high standard deviation of returns

9) Next Month Contracts

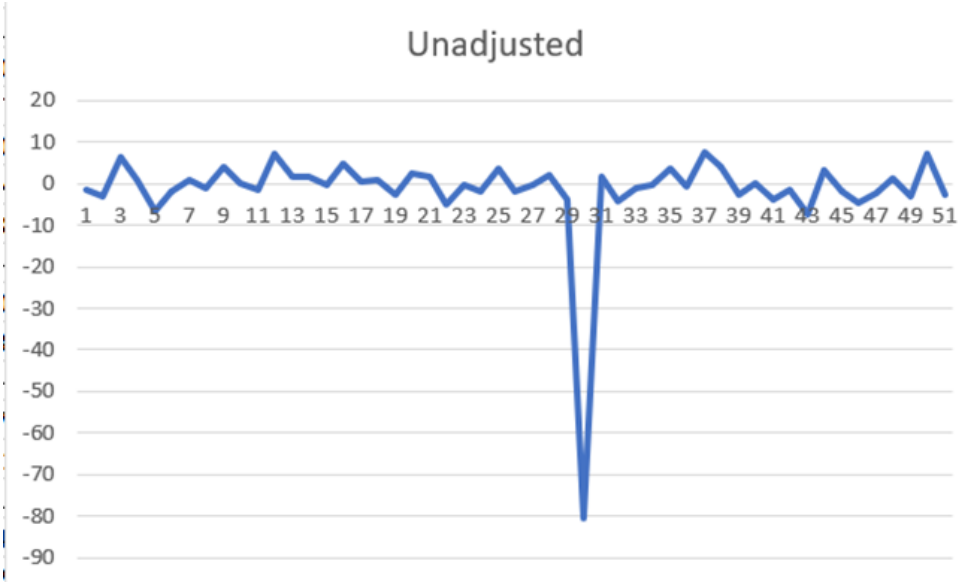
Unadjusted Values

RETURNS(%)	DAILY (%)	WEEKLY(%)	MONTHLY(%)
AVERAGE	-0.35355	-1.605927749	-6.62233012
ANNUAL RETURNS	-0.06734	-0.136229572	-0.26810969
STANDARD DEVIATION	5.250586	11.7883931	24.7000771
MIN	-79.9085	-80.64116865	-81.4633004
MAX	4.041844	7.455494046	12.142944

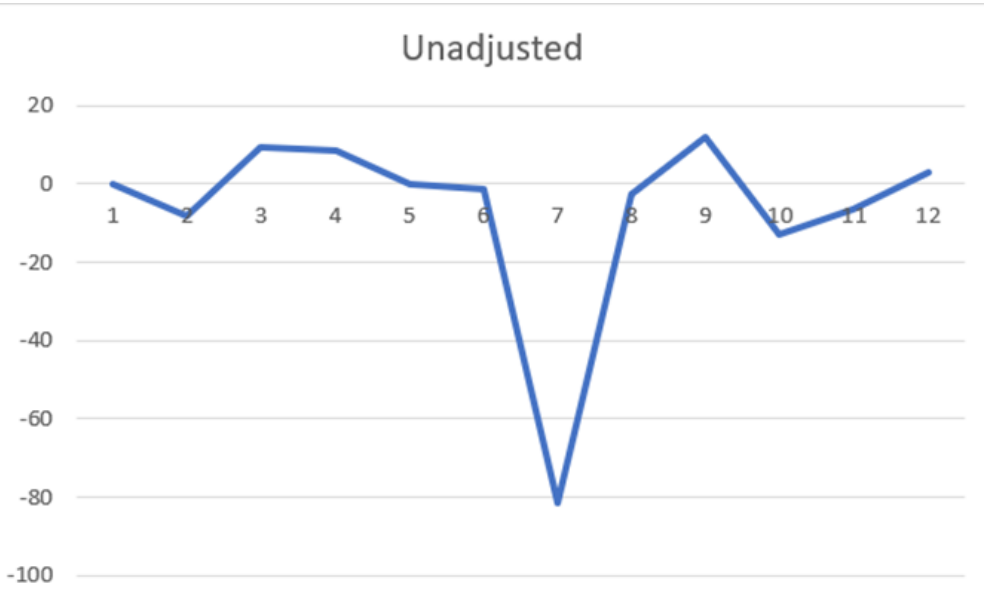
Daily rate of returns (Unadjusted)



Weekly rate of returns (Unadjusted)



Monthly rate of returns (Unadjusted)



Adjusted Values

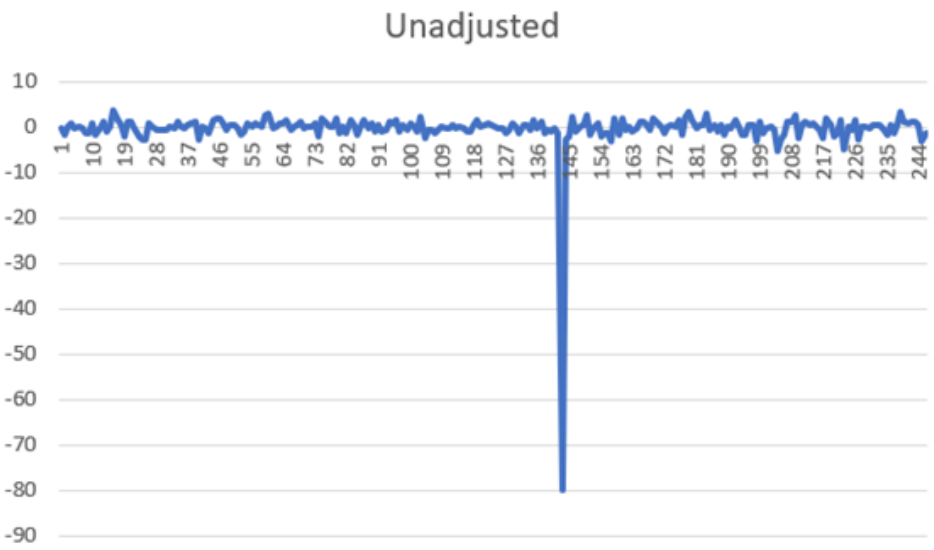
RETURNS (%)	DAILY (%)	WEEKLY (%)	MONTHLY (%)
AVERAGE	-0.37175	-1.7329979	-7.16783012
SHARPE RATIO	-0.0708	-0.147016156	-0.29021556
STANDARD DEVIATION	5.250563	11.78780575	24.6982974
MIN	-79.9263	-80.7648225	-82.0041338
MAX	4.02283	7.3291479	11.5979440

Far Month Contracts

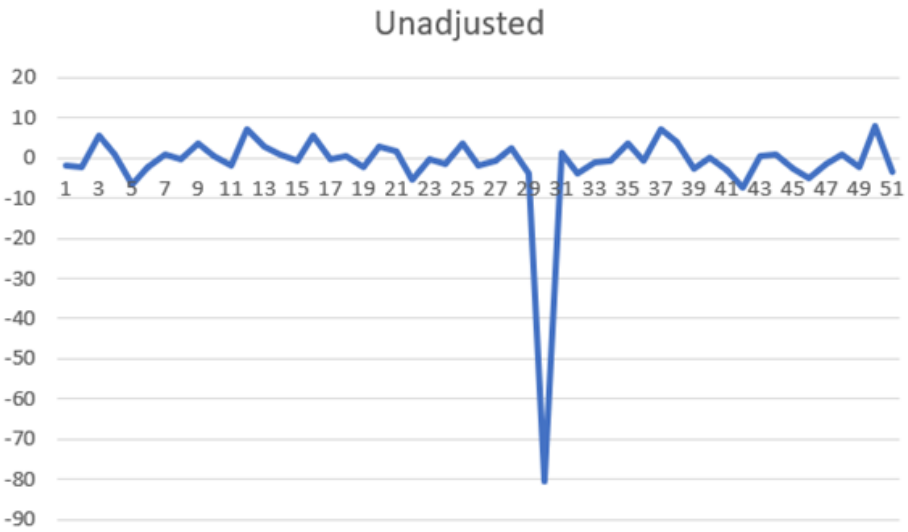
Unadjusted Values

RETURNS(%)	DAILY (%)	WEEKLY(%)	MONTHLY(%)
AVERAGE	-0.35282284	-1.6137001	-6.66819019
ANNUAL RETURNS	-0.06695757	-0.1369601	-0.27072804
STANDARD DEVIATION	5.269349717	11.7822602	24.63058587
MIN	-79.9243142	-80.61216	-81.3829013
MAX	3.844340208	7.96022119	11.81429493

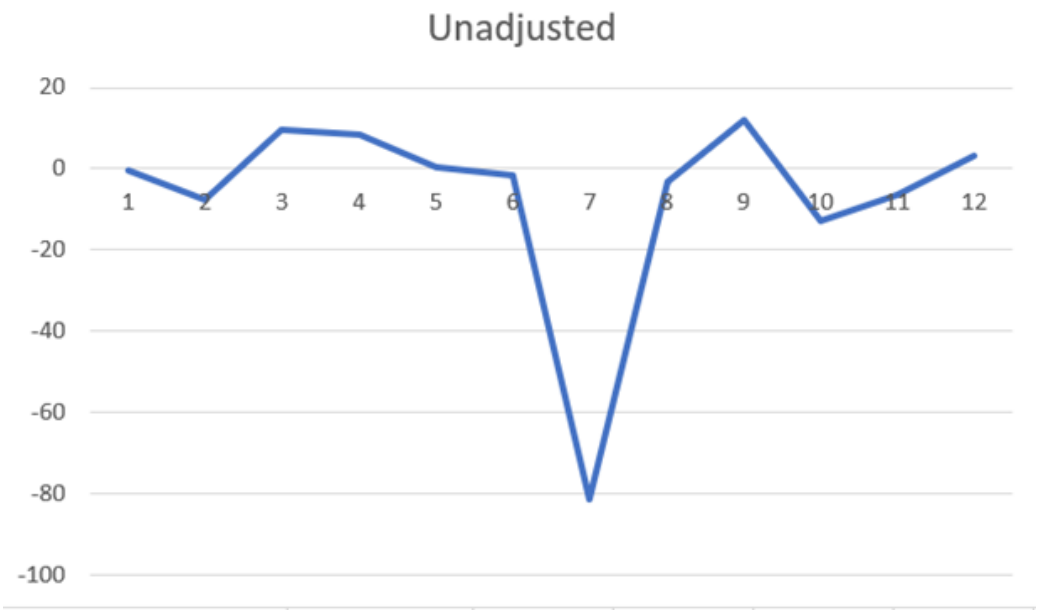
Daily rate of returns (Unadjusted)



Weekly rate of returns (Unadjusted)



Monthly rate of returns (Unadjusted)



Adjusted Values

RETURNS (%)	DAILY (%)	WEEKLY (%)	MONTHLY (%)
AVERAGE	-0.37101574	-1.7407702	-7.2136902
SHARPE RATIO	-0.07041047	-0.1477522	-0.29289612
STANDARD DEVIATION	5.26932648	11.7816877	24.62883473
MIN	-79.9421773	-80.7358136	-81.9237346
MAX	3.825326509	7.8381058	11.2692949

Interpretation

The statistics of the return seems identical which shows that all three contracts are almost indifferent. As we can see, investing on a monthly basis gives the highest results but also has high risk involved. On the other hand, investing on a daily basis gives almost comparable results with significantly lesser risk. Hence, it's best to invest as a day trader.

Comparison of Underlying Stocks and Future Returns

10)

Underlying Asset vs Near Month vs Next Month vs Far Month

I. Daily Frequency

According to table 10.1 we can clearly see from the returns per unit risk that in terms of performance (best to worst):

Underlying Asset > Far Month > Near Month > Next Month

on a daily frequency for risk-unadjusted returns.

Metric	Underlying asset	Near month	Next month	Far month
Mean	-0.01247809	-0.35229	-0.35355	-0.35282284
Max	4.50	4.249612	4.041844	3.844340208
Min	-5.04	-79.8792	-79.9085	-79.9243142
Standard Deviation	1.30	5.249634	5.250586	5.269349717
Returns per Unit Risk	0.1556	-0.06711	-0.06734	-0.06695757

DAILY RISK-UNADJUSTED (Table 10.1)

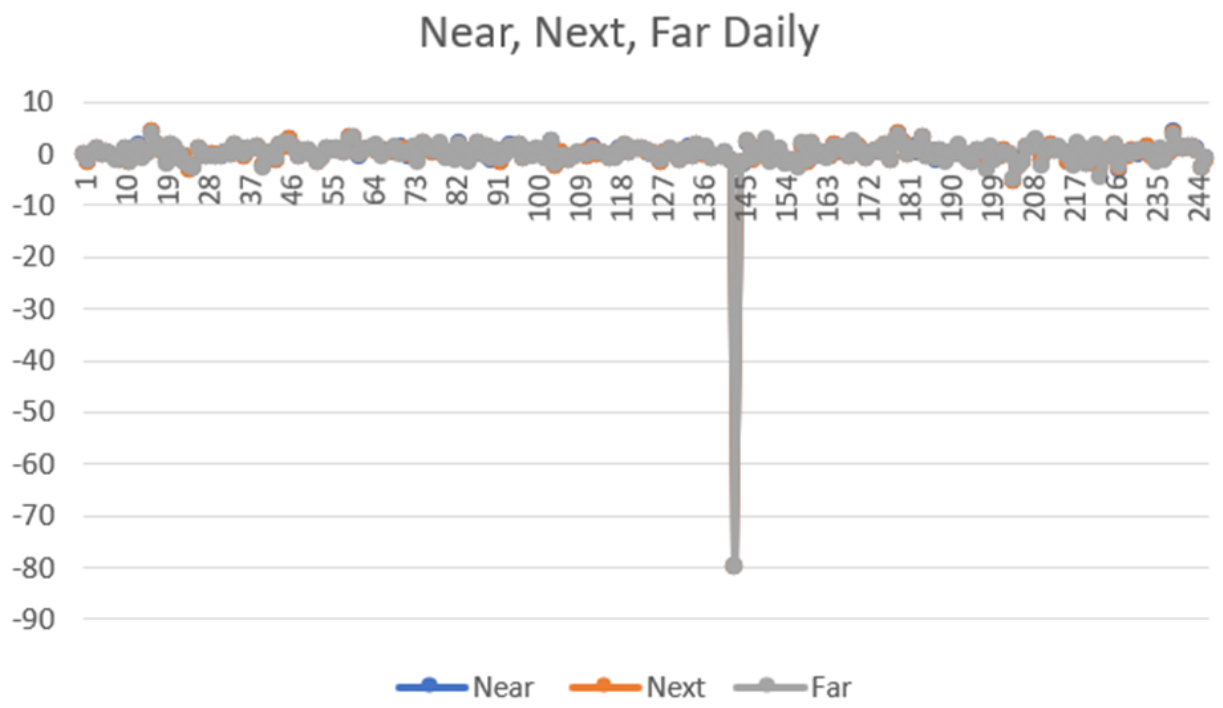
According to table 10.2 we can clearly see from the Sharpe Ratio that in terms of performance (best to worst):

Underlying Asset > Far Month > Near Month > Next Month

on a daily frequency for risk-adjusted returns.

DAILY RISK-ADJUSTED (table 10.2)

Metric	Underlying asset	Near month	Next month	Far month
Mean	-0.01247809	-0.07057	-0.0708	-0.07041082
Max	3.45808481	0.80589	0.76618	0.72596484
Min	-3.90346472	-15.2196	-15.2226	-15.1713088
Standard Deviation	0.99998043	1.000002	1.000012	1.00000503
Sharpe Ratio	-0.01247833	-0.07057	-0.0708	-0.07041082



II. Weekly Frequency

According to table 10.3 we can clearly see from the returns per unit risk that in terms of performance (best to worst):

Underlying Asset > Near Month > Next Month > Far Month

on a weekly frequency for risk-unadjusted returns.

WEEKLY RISK-UNADJUSTED (table 10.3)

Metric	Underlying asset	Near month	Next month	Far month
Mean	-0.094	-1.593973464	-1.605927749	-1.6137001
Max	8.32	7.957463884	7.455494046	7.96022119
Min	-4.66%	-80.64992047	-80.64116865	-80.61216
Standard Deviation	3.39	11.79136617	11.7883931	11.7822602
Returns per Unit Risk	-0.00028	-0.135181406	-0.136229572	-0.1369601

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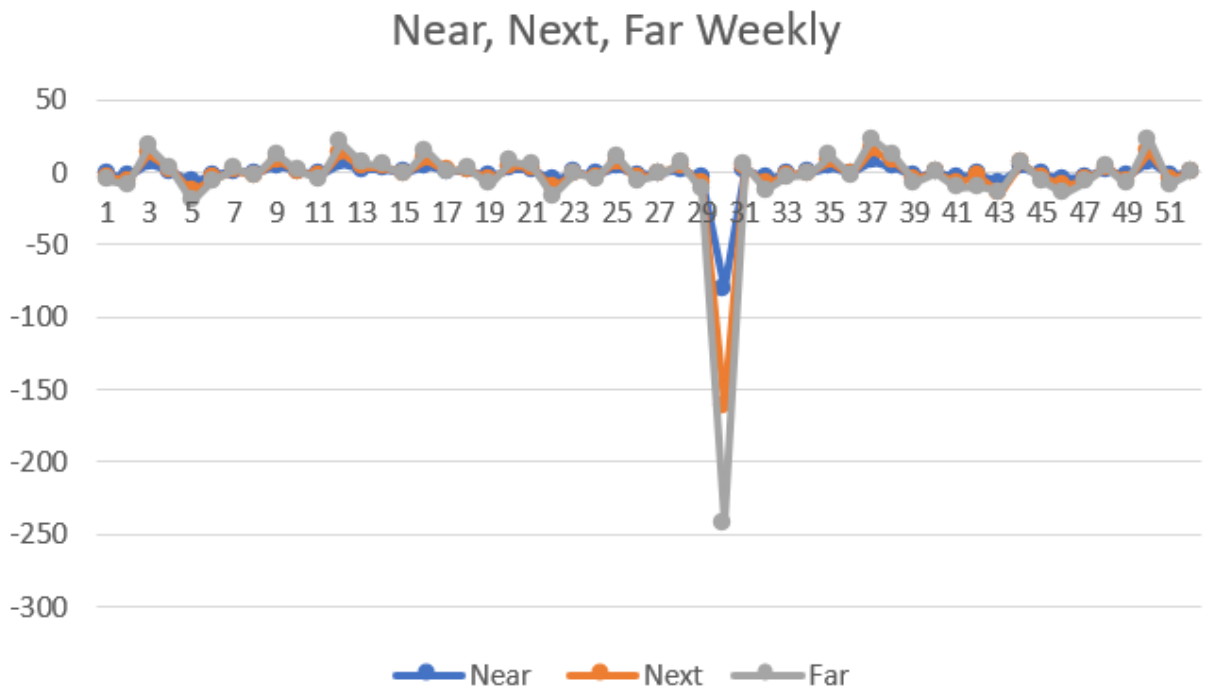
According to table 10.4 we can clearly see from the Sharpe Ratio that in terms of performance (best to worst):

Underlying Asset > Near Month > Next Month > Far Month

on a weekly frequency for risk-adjusted returns.

WEEKLY RISK-ADJUSTED (table 10.4)

Metric	Underlying asset	Near month	Next month	Far month
Mean	-0.06527598	-0.13519	-0.14703	-0.14775
Max	2.419772433	0.674876	0.621799	0.665261
Min	-2.03277236	-6.83996	-6.85203	-6.85247
Standard Deviation	0.999927886	1.010183	1.000068	0.999973
Sharpe Ratio	-0.06528069	-0.145965238	-0.147016156	-0.1477522



III. Monthly Frequency

According to table 10.5 we can clearly see from the returns per unit risk that in terms of performance (best to worst):

Underlying Asset > Near Month > Next Month > Far Month

on a monthly frequency for risk-unadjusted returns.

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MONTHLY RISK-UNADJUSTED (table 10.5)

Metric	Underlying asset	Near month	Next month	Far month
Mean	-0.401	-6.600267	-6.62233012	-6.66819019
Max	15.49	12.2344113	12.142944	11.81429493
Min	-12.33	-81.451227	-81.4633004	-81.3829013
Standard Deviation	8.24	24.6688881	24.7000771	24.63058587
Returns per Unit Risk	-0.000486635	-0.2675543	-0.26810969	-0.27072804

According to table 10.6 we can clearly see from the Sharpe Ratio that in terms of performance (best to worst):

Underlying Asset > Near Month > Next Month > Far Month

on a monthly frequency for risk-adjusted returns.

MONTHLY RISK-ADJUSTED (table 10.6)

Metric	Underlying asset	Near month	Next month	Far month
Mean	-0.11520331	-0.28969	-0.29021	-0.29291
Max	1.813964686	0.473889	0.469571	0.457581
Min	-1.56280346	-3.32396	-3.32014	-3.32645
Standard Deviation	0.999638454	1.000003	0.999972	1.000034
Returns per Unit Risk	-0.11524497	-0.2896884	-0.29021556	-0.29289612

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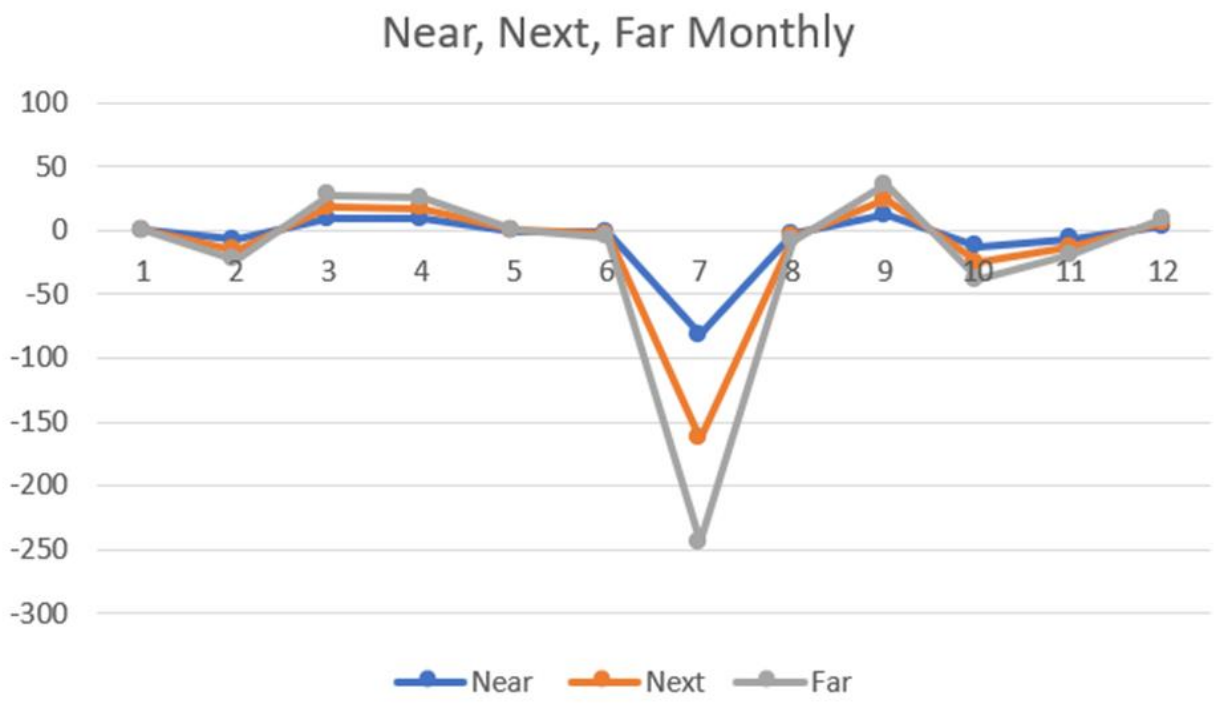

Conclusion

Across monthly, weekly frequencies (both risk-adjusted and unadjusted), the performance order remains consistent:

Underlying Asset > Near Month > Next Month > Far Month

For daily:

Underlying Asset > Far Month > Near Month > Next Month

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This shows a pattern:

- Underlying asset outperforms all futures in terms of risk-adjusted return.
- Near-month futures perform better than next- and far-month, but still lag behind the underlying. (except in daily cases)
- Performance worsens as the futures contract moves farther from expiry, likely due to lower liquidity, except for daily where better performance is in the far month.

Liquidity Conditions of Underlying Stocks and Futures (Daily, Weekly, Monthly)

- The underlying asset is the most liquid and efficient for trading.
- Among futures, liquidity is highest in the near-month contract and decreases as the contract's expiry date moves further into the future.
- Lower liquidity in middle and far-month contracts results in wider spreads, higher transaction costs, and less efficient price discovery, impacting both trading strategies and risk-adjusted performance.

Contango or Backwardation of Futures Instruments

12)

This is contango in the futures market.

- In the chart, the orange Settlement Price line closely tracks the blue Spot line, with only small deviations.
- At most points, the Settlement Price is slightly above the Spot price, indicating a mild contango situation.

13) Frequency

The best frequency for trading largely affects the returns realized by investing in the stock or futures. It can be observed that trading daily on the underlying stock outperforms all other trading strategies. It generates an EAR of 3.15%. To mitigate losses a daily momentum based strategy is recommended.

Conclusion

Dr. Reddy's Laboratories Ltd. demonstrates consistent performance of its underlying equity compared to its futures contracts across daily, weekly, and monthly trading frequencies. On a risk-adjusted and unadjusted basis, the underlying asset delivers the highest returns per unit of risk for both weekly and monthly periods, followed by near-month, next-month, and far-month futures contracts. This pattern highlights the efficiency and liquidity of the underlying equity and near-month futures, making them the most attractive options for investors seeking stable and strong returns.

On a daily basis, however, the far-month futures briefly outperform the near- and next-month contracts, ranking just behind the underlying asset. This exception may be attributed to short-term trading dynamics or temporary liquidity shifts. Generally, as futures contracts move further from expiry, their performance and liquidity decline, reflected in wider bid-ask spreads and lower trading volumes.

Overall, Dr. Reddy's equity stands out as one of the most efficient and reliable investments, while near-month futures provide the best alternative among derivatives. Both instruments offer adequate liquidity for investors to enter and exit positions as needed. The results suggest that Dr. Reddy's is well-suited for risk-averse investors, supporting both portfolio diversification and hedging strategies, with the underlying asset and near-month futures being the preferred choices for optimal risk-adjusted returns.

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