Name: Vidhi Singh
Financial Econometrics (Options Assignment)

Answer 1:

Identifying Market Sentiment and Political Context The 2009 Indian general election introduced a high-stakes environment due to political uncertainty. If the INC-led coalition (UPA) won decisively, markets were expected to surge; alternatively, an unclear or weak coalition might lead to a significant downturn.

Strategies:

1. Long Call on Nifty Index Options

- Objective: Profit from an anticipated market rally.
- Strike Price: Near-the-money option at 3,700, as Nifty was around 3,671.65.
- Premium: 150 (Exhibit 3 data for 3,700 strike).
- Payoff: Gains if Nifty rises above 3,850; limited to the premium paid if it declines.

2. Bull Call Spread on Nifty Index

- Objective: Limit risk while capturing moderate upside.
- Strike Prices: Buy the 3,600 call at 210 and sell the 3,800 call at 108.
- Premium Cost: Net cost is 210−108=102210 - 108 = 102210−108=102.
- Payoff: Maximum profit if Nifty closes at or above 3,800, capped profit of 200−102=98200 - 102 = 98200−102=98.

3. Long Straddle on Nifty Index

- Objective: Profit from high volatility, capturing large price movements in either direction.
- Strike Price: At-the-money strike at 3,700.
- Premium: 150 (call) + 162 (put) = 312.
- Payoff: Profitable if Nifty moves significantly above 4,012 or below 3,388.

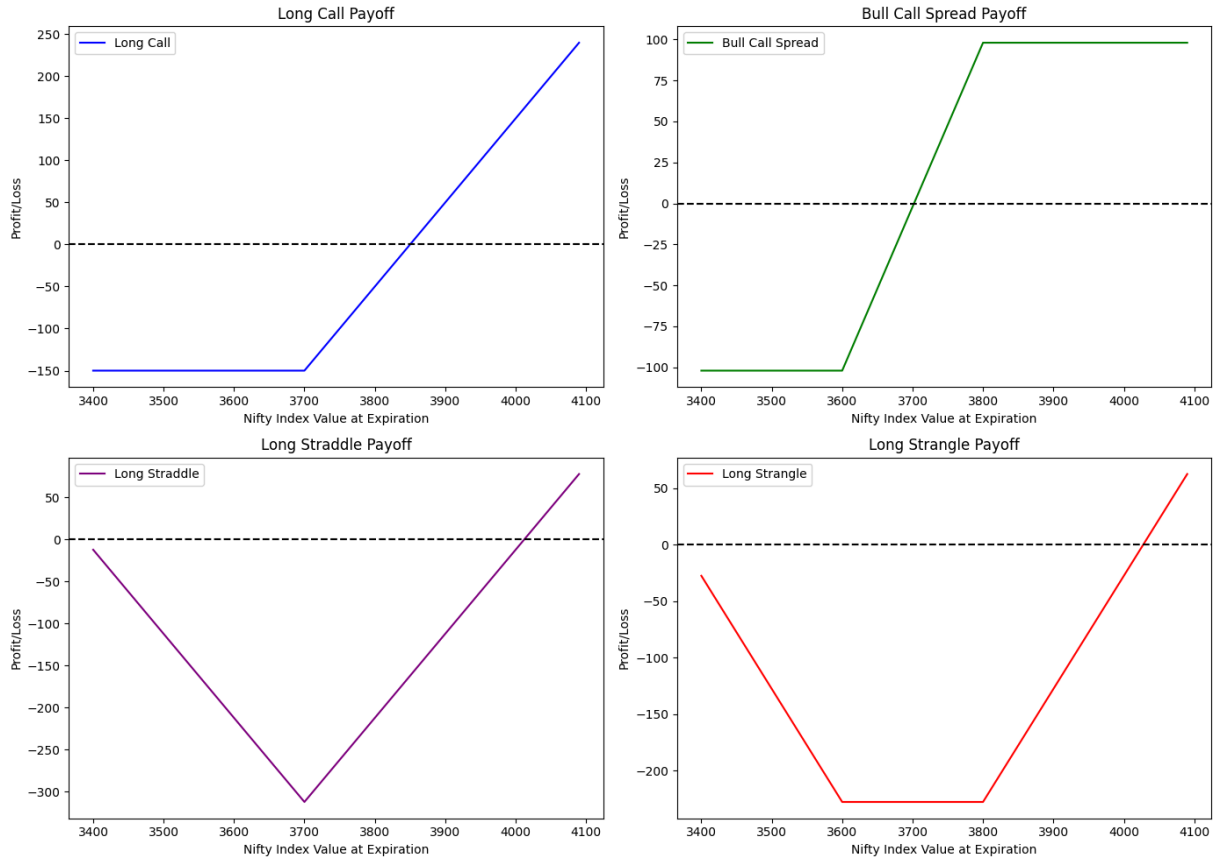
4. Long Strangle on Nifty Index

- Objective: Capture extreme volatility with lower premium cost.
- Strike Prices: Buy out-of-the-money 3,600 put and 3,800 call.
- Premium: 119.65 (put) + 108 (call) = 227.65.
- Payoff: Profitable if Nifty moves above 4,027.65 or below 3,372.35.

Final Summary:

1. **Long Call on 3,700**: Profitable if Nifty exceeds 3,850.
2. **Bull Call Spread (3,600 - 3,800)**: Profitable up to 98 points if Nifty is above 3,800.
3. **Long Straddle on 3,700**: Gains if Nifty rises above 4,012 or falls below 3,388.
4. **Long Strangle (3,600 - 3,800)**: Gains if Nifty exceeds 4,027.65 or drops below 3,372.35.

In volatile market scenarios, options strategies like **long calls** and **bull spreads** allow traders to capitalize on anticipated market trends, while strategies like **straddles** and **strangles** benefit from large price swings regardless of direction.



Answer 2:

1. Initial Market Data on May 15, 2009:
    - Nifty Spot Price: 3,671.65
2. Post-Election Market Data on May 18, 2009:
    - Nifty Spot Price: 4,323.15

1. Long Call Strategy (Strike Price 3,700, Premium 150 on May 15)

- Expected Move: Profit if Nifty rises above the breakeven of 3,850 (strike + premium).
- LTP on May 18: 601 (from Exhibit 6).
- Profit Calculation:
    - Profit per Unit = LTP on May 18−Premium=601−150=451
    - Total Profit: 451 points.

2. Bull Call Spread Strategy (Buy 3,600 Call at 210, Sell 3,800 Call at 108)

- Expected Move: Profit when Nifty is between 3,600 and 3,800; maximum profit if it exceeds 3,800.
- LTP on May 18 for 3,600 Call: 750
- LTP on May 18 for 3,800 Call: 460
- Profit Calculation:
    - Profit from 3,600 Call = LTP on May 18−Premium=750−210=540
    - Profit from 3,800 Call (sold) = Premium−LTP on May 18=108−460=−352
    - Total Profit = 540+(−352)=188.

3. Long Straddle Strategy (Buy 3,700 Call and 3,700 Put; Premiums: Call 150, Put 162)

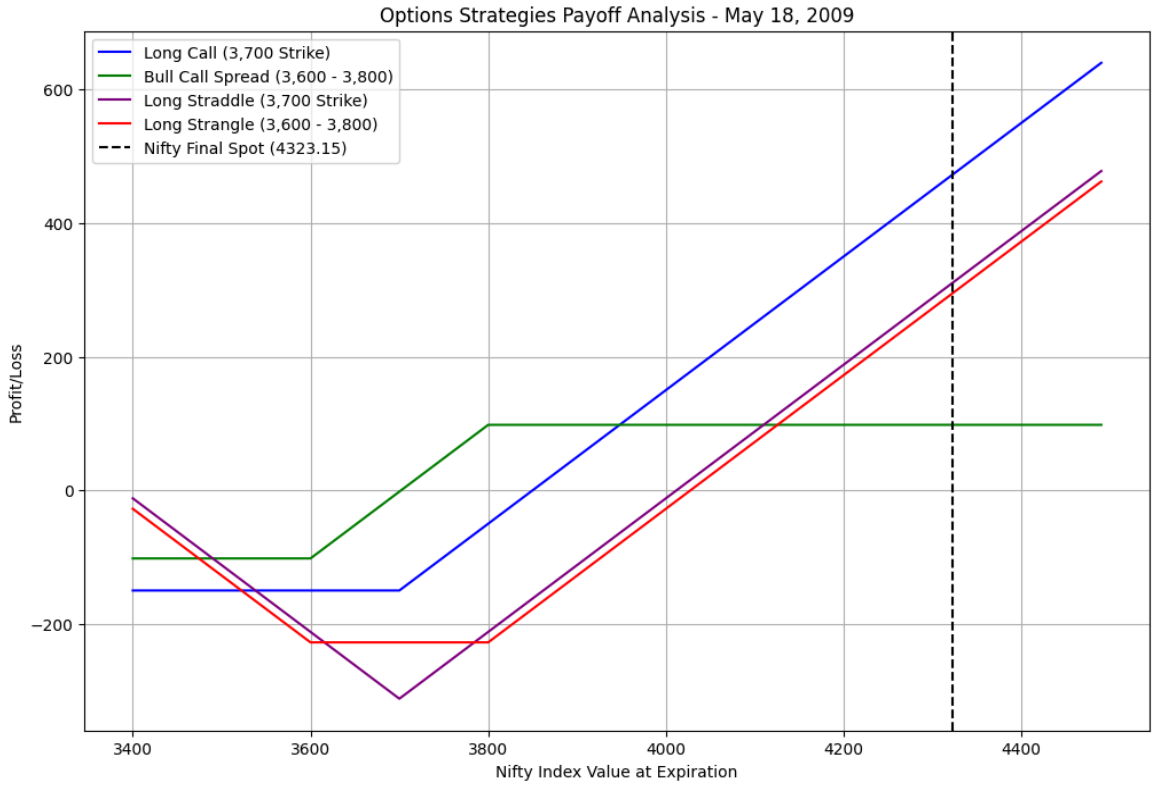
- Expected Move: Profit if Nifty moves significantly away from 3,700 in either direction.
- LTP on May 18 for 3,700 Call: 601
- LTP on May 18 for 3,700 Put: 17
- Profit Calculation:
    - Profit from 3,700 Call = LTP on May 18−Premium=601−150=451
    - Loss from 3,700 Put = Premium−LTP on May 18=162−17=145
    - Total Profit = 451−145=306451 - 145 = 306451−145=306.

4. Long Strangle Strategy (Buy 3,600 Put and 3,800 Call; Premiums: Put 119.65, Call 108)

- Expected Move: Profit if Nifty moves significantly away from the strike prices (3,600 and 3,800).
- LTP on May 18 for 3,600 Put: 6.95
- LTP on May 18 for 3,800 Call: 460
- Profit Calculation:
    - Profit from 3,800 Call = LTP on May 18−Premium=460−108=352
    - Loss from 3,600 Put = Premium−LTP on May 18=119.65−6.95=112.7
    - Total Profit = 352−112.7= 239.3

The profits for each options strategy based on May 18, 2009, prices are as follows:

1. Long Call (Strike 3,700): 451 points profit
2. Bull Call Spread (3,600 - 3,800): 188 points profit
3. Long Straddle (Strike 3,700): 306 points profit
4. Long Strangle (3,600 - 3,800): 239.3 points profit



Answer 3:

ICICI Bank Options Analysis:

- Underlying Price on May 15, 2009: 574.7
- Underlying Price on May 19, 2009: 756.15 (up 31.57%)

Call Options: Profitability and Open Interest Changes

- 540 Strike Call:
  - Premium on May 15: 58.5
  - LTP on May 19: 248
  - Profit: 248−58.5= 189.5
  - Open Interest Change: From 172,900 to 123,200 (decreased by 49,700)

This option offered significant profit, indicating a highly effective hedge for those expecting a price increase. The decrease in OI reflects profit-taking as hedges were unwound.

- 560 Strike Call:

    - Premium on May 15: 45
    - LTP on May 19: 194.05
    - Profit: 194.05−45=149.05
    - Open Interest Change: From 632,100 to 541,800 (decreased by 90,300)

The large profits and significant decrease in OI for the 560 strike show strong demand for hedging in a rising market, with investors locking in gains.

Put Options: Losses and Reduced Need for Hedging

- 540 Strike Put:
    - Premium on May 15: 23
    - LTP on May 19: 2.45
    - Loss: 23−2.45=20.5523 - 2.45 = 20.5523−2.45=20.55
    - Open Interest Change: From 438,200 to 396,900 (decreased by 41,300)

With ICICI's sharp price increase, the 540 strike put saw considerable losses. Reduced OI reflects diminished need for downside protection, as the upward trend lowered demand for puts as hedges.

Reliance Options Analysis:

- Underlying Price on May 15, 2009: 1,950.7
- Underlying Price on May 19, 2009: 2,230.9 (up 14.39%)

Call Options: Profitability and Open Interest Changes

- 1,890 Strike Call:
    - Premium on May 15: 130
    - LTP on May 19: 370
    - Profit: 370−130=240
    - Open Interest Change: From 91,500 to 72,600 (decreased by 18,900)

Substantial profit and decreased OI suggest that the 1,890 call was an effective hedge, as investors closed positions to realize gains.

- 1,920 Strike Call:
    - Premium on May 15: 114
    - LTP on May 19: 350
    - Profit: 350−114=236350 - 114 = 236350−114=236
    - Open Interest Change: From 153,600 to 121,200 (decreased by 32,400)

Similar to the 1,890 call, the 1,920 strike provided strong returns. The decline in OI reflects profit-taking as hedgers exited positions following the positive movement.

Put Options: Limited Usefulness and Lower Demand

- 1,890 Strike Put:
    - Premium on May 15: 56.1
    - LTP on May 19: 8.95
    - Loss: 56.1−8.95=47.1556.1 - 8.95 = 47.1556.1−8.95=47.15
    - Open Interest Change: From 135,300 to 111,600 (decreased by 23,700)

The decrease in Reliance's put option OI and the significant losses on the 1,890 strike suggest lower demand for puts as the stock trended upward.

Hedging Ratio (Delta) Calculation for Optimal Hedging

- **ICICI 540 Call Delta**: 1.04 (approximated as (248−58.5)/(756.15−574.7)
- A delta of 1.04 suggests needing 100/1.04≈ 96 contracts to hedge 100 shares.
- **Reliance 1,890 Call Delta**: 0.86 (approximated as (370−130)/(2,230.9−1,950.7)
- A delta of 0.86 implies requiring 100/0.86≈ 116 contracts per 100 shares.

Conclusion: In a bullish scenario, **call options** on ICICI Bank and Reliance proved to be highly effective for hedging or speculative purposes, with delta-based hedge ratios supporting optimal position sizing. In contrast, **put options** offered limited value and saw reduced demand due to the upward trend in stock prices.

Answer 4:

Calculate the Overall Market Return: We'll first confirm the general market return between May 15 and May 19 using the Nifty Index values.

Nifty Return= (Nifty Price on May 19−Nifty Price on May 15)/Nifty Price on May 15×100

- Nifty Index on May 15, 2009: 3,671.65
- Nifty Index on May 19, 2009: 4,318.45

Nifty Return=(4,318.45−3,671.65)/3,671.65×100≈17.63%

This 17.63% return serves as a benchmark for comparing individual stock performance.

Individual Stock Return Calculations:

For **DLF**:

- Price on May 15: 258.25
- Price on May 19: 377.40

DLF Return=(377.40−258.25)/258.25×100≈46.14%

For **ICICI Bank**:

- **Price on May 15**: 575.00
- **Price on May 19**: 745.00

ICICI Bank Return=(745.00−575.00)/575.00×100≈29.57%

For **Cipla** (an underperformer):

- Price on May 15: 230.00
- Price on May 19: 226.40

Cipla Return=(226.40−230.00)/230.00×100≈−1.57%

Classification of Stocks Based on Performance

Outperformers: Stocks that had a return greater than the 17.63% Nifty Index return, include:

- **DLF (46.14%)**
- **Larsen & Toubro (36.37%)**
- **Kotak Bank (32.87%)**
- **SBI (32.35%)**
- **Bank of Baroda (31.58%)**
- **ICICI Bank (29.57%)**

Underperformers: Stocks that had a return less than the Nifty Index return include:

- **Power Grid (16.54%)**
- **NMDC (16.34%)**
- **Hindustan Unilever (2.43%)**
- **ITC (2.61%)**
- **Cipla (-1.57%)**

Observation:

1. **Infrastructure and Construction**
    - **Examples**: DLF (+46.14%), Larsen & Toubro (L&T) (+36.37%): Infrastructure and construction stocks surged significantly due to the market's anticipation of increased government spending on infrastructure projects, which often follows an election with favorable results for a stable government.
2. **Banking and Financial Services**
    - **Examples**: SBI (+32.35%), ICICI Bank (+29.57%), Bank of Baroda (+31.58%), Kotak Bank (+32.87%): Banks like ICICI and SBI likely benefited from improved investor sentiment around economic recovery, which would increase demand for banking products and credit.

3. **Engineering and Industrial Goods**
    - **Examples**: BHEL (+26.28%), Jindal Steel (+22.99%): Companies in this sector, such as BHEL (a leader in power equipment manufacturing) and Jindal Steel, were well-positioned to benefit from an expected uptick in industrial projects and capital expenditure.
4. **Automobiles**
    - **Examples**: M&M (Mahindra & Mahindra) (+23.44%), Maruti Suzuki (+18.05%): Mahindra & Mahindra and Maruti Suzuki saw gains due to market expectations of increased consumer confidence and spending in a stable political climate.
5. **Consumer Staples and Pharmaceuticals (Defensive Sectors)**
    - **Examples**: Hindustan Unilever (HUL) (+2.43%), ITC (+2.61%), Cipla (-1.57%), Dr. Reddy's (+3.03%): These sectors underperformed relative to the index because they are considered defensive - they exhibit stable demand regardless of economic cycles.
6. **Technology**
    - **Examples**: TCS (+2.77%), HCL Tech (+7.1%): Technology stocks underperformed because their revenue largely comes from international markets, making them less sensitive to domestic political events. Additionally, at this time, there may have been concerns over global demand due to economic uncertainties outside India, particularly as global markets were still recovering from the 2008 financial crisis.

Answer 5:

To design options strategies for a highly volatile or plunging market scenario, particularly where Nifty might hit lower circuits or experience high volatility, as outlined in Exhibit 2, I'll create strategies that:

1. Benefit from significant market movement in either direction.
2. Protect against downside risk in case of market crashes.

Market Conditions: The Nifty index experienced a 20% drop during a single day in January 2008, with lower circuits imposed, as seen in Exhibit 2. Objective is to mitigate potential losses from a sharp market decline or to profit from high volatility.

1. Long Straddle

- Strategy: Buy a call and a put at the same strike price (near-the-money).
- Objective: Profit from large movements in either direction.
- Strike Price: Near-the-money (e.g., 3,700, close to recent Nifty levels).
- Premiums: Suppose call and put premiums are 150 and 162, respectively, for a 3,700 strike.
- Payoff: Profitable if Nifty moves significantly above or below the strike price (e.g., beyond 4,012 or below 3,388).

The long straddle provides a balanced approach to capture profits from both upward or downward volatility, making it suitable when the market's direction is uncertain but expected to be highly volatile.

2. Long Strangle

- Strategy: Buy an out-of-the-money call and an out-of-the-money put.
- Objective: Capture profits from extreme volatility with a lower premium cost than a straddle.
- Strike Prices: Buy a 3,600 put and a 3,800 call.
- Premiums: Assume premiums are 119.65 for the put and 108 for the call.
- Payoff: Profitable if Nifty moves above 4,027.65 or below 3,372.35.

This strategy is suitable if Nifty is expected to fluctuate widely but avoids paying the higher premiums of a straddle.

3. Protective Put

- Strategy: Buy a put option to protect a long position in Nifty.
- Objective: Limit downside risk in case of a market plunge.
- Strike Price: Choose a slightly out-of-the-money put, e.g., 3,600.
- Premium: Suppose the premium is 119.65.
- Payoff: Provides downside protection below the 3,600 level, while allowing unlimited upside potential if the market rallies.

A protective put is ideal for investors who hold long positions in Nifty but are concerned about significant downside risk.