

CFA LEVEL 3

C.R.A.Q IT

SESSION 2



Tony Stark Case Study

"The Harrisons:

Tony Stark, CFA, is reflecting on her meeting with the Harrisons who approached her today. This couple has previously overseen their own investment portfolios but are now looking for professional advice to enhance their financial well-being. Summaries of Stark's observations are provided below.

Sophie Harrison, 55, serves as a nurse at a government hospital, while her husband, James, 58, has been working as an Investment Banker at Avendus Ltd for the past 20 years. The couple has been prudent with their finances, living within their means and setting aside funds for emergencies. Additionally, they have consistently contributed to various retirement accounts and other savings instruments. Both Sophie and James are planning to retire at the age of 60.

James's annual wage is currently \$150,000 (for the year just ended) and is expected to grow 10% per year. There is a 99% probability that he survives the first year, a 98% probability that he survives the second year. Taking into consideration the income volatility adjustment component, we may assume a discount rate of 15%. On the other hand, Sophie's estimated human capital is \$3,50,000. Life time consumption needs (PV) is estimated to be \$5,00,000..

Their assets and liabilities as of the end of last year are shown in Exhibit 1.

Exhibit 1

Assets		Liabilities	
Personal Residence	500,000.00	Mortgage on Personal Residence	450,000.00
Personal Car	200,000.00	Mortgage on Car	8,000.00
Vacation home	250,000.00	Mortgage on Vacation Home	200,000.00
Investments	100,000.00	Credit Card Liabilities	20,000.00
Cash	50,000.00		
Total Assets	1,100,000.00	Total Liabilities	750,000.00

- A. Estimate** James' human capital based on the given information and **compare** it to Sophie's human capital of \$350,000. **Provide two arguments** explaining why one spouse is having a higher human capital than the other.
- B. Calculate** the couple's Economic Net Worth, and **compare** it to their Net Worth. **Comment** on whether the former is greater than the latter.

A year later, James's vesting period for his company Avendus Ltd.'s Employee Stock Options (ESPOs) came to an end, and he exercised them at a significant discount. The ESOP shares were now worth \$1,000,000, causing great excitement for both him and his spouse as their wealth had increased considerably. However, their family financial advisor, Stark CFA, was concerned. The exercise had left their portfolio heavily concentrated in Avendus stock.

James had been with Avendus for 20 years, and his unwavering loyalty was respected by all. Convincing him to diversify his holdings would be a challenge for Stark. Nevertheless, Stark approached the situation with patience and understanding. He actively listened to James's perspective and asked precisely the right questions to address his concerns. Whenever James became defensive, Stark carefully observed his non-verbal cues and proceeded cautiously.

By the end of the conversation, James expressed his gratitude, saying, "Thank you for educating me about the benefits of diversification and the risk of having such a high concentrated position." He ultimately agreed to diversify his holdings, taking Stark's advice to heart.

Nevertheless, James' decision to diversify was not without conditions. He specified the following conditions:

- Investment horizon should be at least three years.
- Avoid any capital gains taxation.
- Minimize downside risk as much as possible
- Retain voting rights of the stock

Taking James' preferences into account, Stark identifies potential strategies to recommend, which include:

- Sell and Diversify
- Staged Diversification

- Hedging and Monetization
- Tax-Free Exchanges
- Charitable Giving Strategies (Trusts and Foundations)
- Covered Call Writing

- C. **Identify** two risks related to James's concentrated position in Avendus shares
- D. **State** whether Stark utilized technical skills or soft skills to persuade James to diversify. **Identify** two instances that demonstrate the same.
- E. Given the conditions specified by James with respect to reducing concentration risk in Avendus shares, **which strategy** would Stark **most likely** recommend? Please **explain** why the other strategies would not be chosen.

SOLUTION

A. Sophie's Human Capital = \$350,000

James's Human Capital:

Year	Wages (10% annual growth)	PV of Wages	POS	Probability weighted wages
1	1,65,000.00	1,43,478.26	99%	1,42,043.48
2	1,81,500.00	1,37,240.08	98%	1,34,495.27
Total Value of James's Human Capital				2,76,538.75

Hence, James's Human Capital is lower than Sophie's Human Capital.

Reason:

1. Sophie has a longer time to retirement as compared to James (5 years vs 2 years) – potential ability to earn longer
2. Sophie's occupation risk is lower than James's (Government Nurse vs Investment Banker), so the income volatility adjustment component in the discount rate would be lower than James'.

B. **Current Net Worth**

Assets		Liabilities	
Personal Residence	5,00,000.00	Mortgage on Personal Residence	450,000
Personal Car	2,00,000.00	Mortgage on Car	80,000
Vacation home	2,50,000.00	Mortgage on Vacation Home	200,000
Investments	1,00,000.00	Credit Card Liabilities	20,000
Cash	50,000.00	Calculated Net Worth	\$350,000
Total Assets	11,00,000.00	Total Liabilities	750,000

Economic Net Worth

Current Net Worth + Human Capital of James + Human Capital of Sophie – Life time Consumption needs

$$= 350,000 + 276,538.75 + 350,000 - 500,000 = \$476,538.75$$

Economic Net Worth > Net Worth

- C. Risk 1** - Company-specific risk inherent in the concentrated position of Avendus
Risk 2 - liquidity risk inherent in such an outsized publicly-held security

D. Soft Skills.

“He actively listened to what James had to say and asked exactly the type of questions required in such a situation” – Communication Skills

“Stark became very cautious and read all his non-verbal cues” – Social Skills

“James said “Thank you for educating me about the benefits of diversification and the risk of having such a high concentrated position”, and subsequently agreed to diversify the position” – Education and Coaching Skills

E. Strategy Suggested – Hedging and Monetization.

STRATEGY ELIMINATED	REASON
Sell and diversify	Doesn't want to incur an immediate tax liability – tax due immediate
Staged Diversification	Doesn't want to incur “any” Capital gain taxation in three years – tax due over time
Tax-free Exchanges	Investment Horizon = 2 years vs 7 years minimum in such instruments
Covered Call Writing	Minimum downside protection (wants to minimize as much downside as possible)
Charitable Giving Strategies	Loss of voting rights – wants to maintain voting rights of the stock

Note: for revision purpose, a brief description of the strategies is as follows-

- 1. Sell and Diversify:** This strategy involves selling the concentrated asset and reinvesting the proceeds in a diversified portfolio. This approach reduces concentration risk and provides exposure to a broader set of investments.
 - **Tax impact:** capital gains taxes may be incurred when selling the concentrated asset.
 - **Impact on voting rights:** selling the asset may result in a loss of voting rights associated with it.

- **Horizon:** immediate reduction of concentration risk.
2. **Staged Diversification:** This strategy involves gradually selling the concentrated asset over time and reinvesting the proceeds in a diversified portfolio. This approach allows investors to manage their risk while potentially benefiting from changes in market conditions.
- **Tax impact:** capital gains taxes may be spread over the time period during which the asset is sold.
 - **Impact on voting rights:** voting rights are reduced gradually as the asset is sold.
 - **Horizon:** reduction of concentration risk occurs over a longer time horizon.
3. **Hedging and Monetization:** Hedging involves using financial instruments, such as options, to reduce the risk associated with a concentrated asset. Monetization involves borrowing against the concentrated asset, often using a collateralized loan, and using the loan proceeds to invest in a diversified portfolio.
- **Tax impact:** hedging strategies may have tax consequences, while monetization may defer taxes until the loan is repaid.
 - **Impact on voting rights:** hedging strategies generally do not affect voting rights; monetization may reduce voting rights if the loan requires a partial sale of the asset.
 - **Horizon:** risk reduction can be immediate or over time, depending on the hedging strategy used.
4. **Tax-Free Exchanges:** This strategy involves exchanging the concentrated asset for a more diversified portfolio through tax-free exchange provisions.
- **Tax impact:** no immediate capital gains taxes incurred, but taxes may be deferred until the new assets are sold.
 - **Impact on voting rights:** exchanging the asset may result in a loss of voting rights associated with it.
 - **Horizon:** immediate reduction of concentration risk.

5. **Charitable Giving Strategies (Trusts and Foundations):** These strategies involve donating the concentrated asset to a charitable trust or foundation, which can provide tax benefits and help diversify the donor's portfolio.
- **Tax impact:** potential income tax deductions and avoidance of capital gains taxes.
 - **Impact on voting rights:** donating the asset results in a loss of voting rights associated with it.
 - **Horizon:** immediate reduction of concentration risk.
6. **Covered Call Writing:** This strategy involves selling call options on the concentrated asset, generating income that can be used to invest in a diversified portfolio.
- **Tax impact:** income generated from covered call writing may be subject to taxes.
 - **Impact on voting rights:** writing covered calls generally does not affect voting rights; however, if the call option is exercised, the investor must sell the underlying asset, which may result in a loss of voting rights.
 - **Horizon:** reduction of concentration risk occurs over time as income is generated and reinvested in a diversified portfolio.

Gilead Sciences Case Study

A pharmaceutical company, Gilead Sciences, wants to acquire a biotech firm, Immunomedics, in a stock-for-stock deal. Gilead Sciences is currently trading at \$75 per share and has offered to buy Immunomedics at a ratio of 2 shares of Gilead Sciences for every 3 shares of Immunomedics. Prior to the announcement of the deal, Immunomedics was trading at \$30 per share.

After the announcement, Immunomedics's share price rises to \$40 as investors anticipate the deal going through successfully, while Gilead Sciences's share price falls to \$70 due to uncertainty around the merger's success. Miguel, a savvy hedge fund manager, confident that the deal will go through, decides to execute a merger arbitrage strategy. The hedge fund buy 30,000 shares of Immunomedics and sell short 20,000 shares of Gilead Sciences.

- Part 1** **What** will be the payoffs of this merger arbitrage strategy if the deal is completed successfully or if the merger fails? Also **calculate** the risk: reward ratio?
- Part 2** The hedge fund is not comfortable with the risk : reward ratio of the payoffs calculated in **part 1**. Hence it decides to use derivatives for hedging. Three month put option on the target at a strike price of 35 is trading at \$0.90 while three month call option on the acquirer at a strike of 72.5 is trading at \$1.50.
- What** hedging strategy do you advise?
 - Calculate** the revised payoff and risk: reward ratio?
 - Based on the risk reward ratio, **which strategy** do you **recommend** – the unhedged strategy or the hedged strategy?
 - Consider the probability of deal failure (in other words deal risk) to be 15%. **Calculate** the expected payoff the unhedged strategy as well as hedged strategy. Based on expected payoff, **which strategy** do you recommend – the unhedged strategy or the hedged strategy?

Part 3 **Ignore** part 2 for the purpose of this question. Consider additional information relating to systematic risk of the unhedged strategy.

Beta of acquirer = 2

Beta of target = 2.5

- a. **Calculate** dollar beta exposure of the unhedged strategy.
- b. Suppose mini S&P 500 index futures with a lot size of 25 trade at 4000. **What position** and **how many contracts** should be undertaken to make the strategy market neutral?
- c. Assuming that the strategy has been made market neutral, **calculate** the payoff from the strategy assuming S&P goes down by 10% and if the deal fails, stock price of the target and acquirer change as per beta as well as the price that deal failure would have resulted into.

Part 4 **Determine** and Justify the type of catalyst the following strategy uses. Alternatively, which approach could Miguel have followed? Is the current approach riskier than its counterpart?

SOLUTION

Part 1 At current prices it costs \$1,200,000 to buy 30,000 shares of Immunomedics, and \$1,400,000 would be received for short selling 20,000 shares of Gilead Sciences. This provides a net spread of \$200,000 to the hedge fund manager if the merger is successfully completed. If the merger fails, then prices should revert to their pre-merger announcement levels. The manager would need to buy back 20,000 shares of Gilead Sciences at \$75 (costing \$1,500,000) to close the short position, while the long position in 30,000 shares of Immunomedics would fall to \$30 per share (value at \$900,000). This would cause a total loss of \$400,000 [= (Gilead Sciences: +\$1,400,000 – \$1,500,000) + (Immunomedics: –\$1,200,000 + \$900,000)]. In sum, this merger strategy is equivalent to holding a riskless bond with a face value of \$200,000 (the payoff for a successful deal) and a short binary put option, which expires worthless if the merger succeeds but pays out \$400,000 if the merger fails.

Hence Risk: reward ration = $4,00,000/2,00,000 = 2$

Part 2 a. Buy OTM put i.e. P+ at a strike price of 35 on the target for 30,000 shares and buy OTM call i.e. C+ at a strike price of 72.5 on the acquirer for 20,000 shares.

b. Initial premium outflow = $30,000 \times 0.9 + 20,000 \times 1.5 = 57,000$

Scenario 1 :Merger succeeds

initial inflow calculated earlier = 2,00,000

Hence net initial inflow = 1,43,000

So if merger goes through, payoff = 1,43,000

Scenario 2 : Merger Fails

Initial premium paid = 57,000

Payoff from P+ = $(35-30) \times 30,000 = 1,50,000$

Payoff from C+ = $(75 - 72.5) \times 20,000 = 50,000$

Payoff from merger failure without options = (4,00,000)

Hence net payoff = (2,57,000)

Hence Risk: Reward ratio = $2,57,000/143,000 = 1.8$

c. Based on risk: reward ratio, hedged strategy is selected.

d. **Expected payoff from unhedged strategy**

$$= 0.85 \times 2,00,000 - 0.15 \times 4,00,000 = 1,10,000$$

Expected payoff from hedged strategy

$$= 0.85 \times 1,43,000 - 0.15 \times 2,57,000 = 83,000$$

Hence, based on expected payoff, the unhedged strategy is advisable.

Part 3 a. **Dollar beta** $= 30,000 \times 40 \times 2.5 - 20,000 \times 70 \times 2$
 $= 2,00,000$

b. **Sell S&P futures**

$$\begin{aligned} \text{No. of futures contract} &= 2,00,000 / 4000 \times 25 \\ &= 2 \text{ contracts to be sold} \end{aligned}$$

c. **Scenario 1: Merger Successful**

In this case we do not have to bother with the share price of the acquirer and the target. Of course, profit on S&P futures $= 10\% \times 2 \times 40,000 \times 25 = 20,000$. Given the initial inflow of 2,00,000, total payoff = 2,20,000.

Scenario 2 : Merger fails

$$\begin{aligned} \text{Price of acquirer} &= 75 - 10\% \text{ of } 70 \times 2 \\ &= 61 \end{aligned}$$

$$\begin{aligned} \text{Therefore Profit on Short sale} &= (70 - 61) \times 20,000 \\ &= 1,80,000 \end{aligned}$$

$$\begin{aligned} \text{Price of target} &= 30 - 10\% \times 40 \times 2.5 \\ &= 20 \end{aligned}$$

$$\begin{aligned} \text{Therefore, loss on long position} &= (40 - 20) \times 30,000 \\ &= 6,00,000 \end{aligned}$$

$$\text{Profit from S\&P futures} = 20,000$$

$$\begin{aligned} \text{Therefore overall loss} &= 6,00,000 - 1,80,000 - 20,000 \\ &= 4,00,000 \end{aligned}$$

Part 4 Strategy uses “Hard Catalyst” - investments made in reaction to an already announced corporate event in which security prices related to the event have yet to fully converge – Miguel took the long short position “**after**” the announcement of the merger.

Alternatively– Soft Catalyst - Investments made proactively in anticipation of an event that has yet to occur – could have anticipated the merger and taken the trade on pre-merger prices.

Current Approach (Hard Catalyst) – less volatile and less risky than Soft Catalyst

Mitsui (三井) Family Case Study

The Mitsui (三井) family office in Tokyo manages the 500 million Yen fortune of the Mitsui (三井) family. Mitsui Hachiroemon Takatoshi, the family's patriarch, is a successful entrepreneur and has built his fortune through various businesses over the years. He is now retired but still closely follows the financial markets. The portfolio that Takatoshi manages for his family consists of traditional long-only stocks and bonds, real estate, private equity, and single manager hedge funds following event-driven and macroeconomic strategies.

Takatoshi believes that the global economy is facing uncertain times due to a series of recent events, including the failure of Silicon Valley Bank, and the ongoing conflict between Russia and Ukraine. He anticipates a market downturn and wants to ensure that his family's investments are well-positioned to weather any market turbulence. To increase the portfolio's diversification and protect against market volatility, he asks Mitsui (三井)'s senior portfolio manager Kazuki Watanabe to consider selling some of their long-only stocks and adding exposure to alternative investment strategies.

In the light of his forecast, Watanabe asks his hedge fund strategist Yukihiro Saito to look out for a hedge fund that could benefit from a fall in equity markets as well as arise in equity market volatility. Saito decides to use conditional factor loading model for the same. After a thorough research, the following two funds are shortlisted –

1. Inverse Alpha Capital
2. Nihon Bear Dynamics

Using fund's monthly returns for the past 10 years, which include periods of financial market crisis, he estimated conditional risk factor model. The following Exhibits provide factor beta estimates with corresponding t-statistics [dark shaded are significant at the 10% level] for the two funds.

Exhibit 1 - Inverse Alpha Capital

Coefficient	Estimate	t-statistic
Normal Times Exposure		
Intercept	0.005	1.10
b1 (JPY)	0.006	1.01
b2 (CDS Spread)	0.023	0.023
b3 (Nikkei 225)	-0.673	-8.87
b4 (Nikkei VIX)	0.223	3.21
Crisis Times Exposure (Incremental)		
b1 (JPY)	0.005	0.09
b2 (CDS Spread)	0.03	0.03
b3 (Nikkei 225)	-0.33	-1.89
b4 (Nikkei VIX)	0.20	1.75

Exhibit 2 - Nihon Bear Dynamics

Coefficient	Estimate	t-statistic
Normal Times Exposure		
Intercept	0.005	1.10
b1 (JPY)	0.072	0.72
b2 (CDS Spread)	-0.017	-0.07
b3 (Nikkei 225)	-0.572	-9.65
b4 (Nikkei VIX)	-0.164	-2.19
Crisis Times Exposure (Incremental)		
b1 (JPY)	0.456	1.31
b2 (CDS Spread)	-0.099	-0.40
b3 (Nikkei 225)	0.236	1.74
b4 (Nikkei VIX)	0.105	1.03

- Part 1** Using Exhibits 1 and 2, **Interpret** the Nikkei 225 factor loadings to **identify** on the strategy **Inverse Alpha Capital** and **Nihon Bear Dynamics** is **most likely** using.
- Part 2** **Determine** and **Justify** whether **Inverse Alpha Capital** and **Nihon Bear Dynamics** are taking any bet (Long/Short) on volatility and if so, **identify** the option (Call/Put) and the position (Buy/Sell) he is using.
- Part 3** Based on Capital market expectations and conditional factor loading analysis carried out in Part 1 and Part 2 above, **which** fund-**Inverse Alpha Capital** or **Nihon Bear Dynamics** would you **advise** for the Mitsui family office.

Because hedge funds potentially invest in illiquid securities (which artificially smooth returns, thus lowering the measured standard deviation), besides measuring risk and return one should also investigate the autocorrelation of returns.

Hence the hedge fund manager decided to look at the following data for two single manager equity hedge funds that they are presently invested in-

Fund	Rho (%)
A	20
B	9.15

- Part 4** **Explain** the meaning of Rho in the above context.
- Part 5** **Which** fund manager seems to be holding a higher proportion of illiquid and infrequently traded underlying securities?

Further, the portfolio manager is also evaluating two options: **Fund of Hedge Funds (FoHF)** or **Multi-Strategy Hedge Fund**.

- Part 6** **Discuss** two reasons as to why Takatoshi would choose **Multi-Strategy fund** and not **FoHF** and one reason as to why he would not.

SOLUTION

Part 1 **Inverse Alpha Capital-Dedicated short selling**

Inverse Alpha Fund has highly significant negative loadings on equity risk (Nikkei 225). The negative equity risk exposure suggests that it may be either Dedicated short selling or Short biased strategy. During crisis periods, negative equity beta further rises from -0.673 to -1.003 ($-0.673 - 0.33$). This increasing negative exposure clearly suggests that it is **Dedicated short selling**.

Nihon Bear Dynamics-Short biased strategy

Nihon Bear Dynamics has highly significant negative loadings on equity risk (Nikkei 225). The negative equity risk exposure suggests that it may be either Dedicated short selling or Short biased strategy. During crisis periods, equity beta further rises from -0.572 to -0.336 ($-0.572 + 0.236$). This decreasing negative exposure is still significant. This suggests that it is following a **Short biased strategy**.

Part 2 **Inverse Alpha Capital - Long on Volatility - Buying put options**

The fund has highly significant positive loadings on VIX suggesting long volatility. During crisis period, this loading further rises from 0.223 to 0.443 ($0.223 + 0.2$). This suggests that the funds may be buying puts in anticipation of a rise in volatility.

Nihon Bear Dynamics - Short on Volatility - Selling put options

The fund has highly significant negative loadings on VIX suggesting short volatility. During crisis period, this negative loading decreases from -0.164 to -0.059 ($-0.164 + 0.105$). This suggests that the funds may be selling puts against some of its short exposures, thereby attempting to capture a volatility premium.

Part 3 Advice - Inverse Alpha Capital

CME:

1. Market downturn
2. Higher volatility

Inverse Alpha Capital is a **Dedicated short selling fund** with positive exposure to volatility. So, its stand to gain under the CME forecast.

Part 4 **Rho** is a measure of first order serial autocorrelation, the correlation between a fund's return and its own lagged returns. High Rho signals smoothed returns and thus is an indicator of potential liquidity issues (specifically, illiquidity and infrequent trading) in the underlying securities.

Part 5 Fund A has a higher Rho compare to Fund B (20% vs. 9.15%) suggesting that it is holding a higher proportion of illiquid and infrequently traded underlying securities.

Part 6 Why Takatoshi would choose MS

1. **Multi-strategy funds** offer potentially faster tactical asset allocation than **FoHF** strategy
2. **Multi-strategy funds** offer improved fee structure (netting risk handled at strategy level), as compared to **FoHF** strategy

Why Takatoshi would not choose MS

Multi-strategy funds tend to use significantly more leverage than most **FoFs**, which gravitate to modest leverage usage. Thus, multi-strategy funds are somewhat more prone to left-tail blow-up risk in stress periods. Since, believes in upcoming Markets to be volatile, Multi-Strategy might not be suitable.

David Lee Case Study

David Lee, a fixed income portfolio manager at Apex Investment Management, anticipates a significant slowdown in the Australian economy, which may push it into a recession. He observes that weak consumer spending, declining business investments, and sluggish export growth are contributing to the economic downturn. In response to these challenges, David expects central banks, including the Reserve Bank of Australia (RBA), to take a proactive stance by implementing interest rate cuts. These rate cuts would aim to stimulate borrowing, investments, and overall economic activity, with the intention of revitalizing the economy and reducing the impact of the recession.

Karen Chen is the head UK Fixed Income portfolio manager for Apex Investment Management. Chen expects that all the rates (3-year, 7-year, 15-year and 30-year) would go up by 20 bp, however, the 3-year rate would go up by an additional 55bp, and the 30-year rate by an additional 30 bp. Chen presents key rate duration data for the index and three portfolios to the investment committee, as shown in Exhibit 1.

Exhibit 1

Tenor	Benchmark	Portfolio 1	Portfolio 2	Portfolio 3
3-Year	1.25	1.95	1.00	1.30
7-Year	2.50	2.70	2.50	2.50
15-Year	3.00	3.10	3.00	2.80
30-Year	3.50	3.20	3.50	3.40

Part 1 To align his portfolio with his expectation, David considers investment into the following instruments:

1. Investor-Floater
2. Floating Rate Note
3. 10 Year Fixed Rate Bond
4. Inflation-Linked Bond

Select the **most appropriate** instrument that David should choose in light of his CME and keeping in mind that the duration exposure limit set by the Investment Committee has almost reached. **Justify** your selection and for each instrument not selected, provide one reason.

Part 2 **Determine** and **justify** the yield curve scenario that is Chen most likely forecasting :

- A. Bull Steepner with a Negative Butterfly view
- B. Bull Flatteners with a Positive Butterfly view
- C. Bear Steepner with a Positive Butterfly view
- D. Bear Flatteners with a Negative Butterfly view

Part 3 **Determine** and **Justify** based on Chen's interest rate forecast, **which Portfolio** is expected to outperform the benchmark the most.

SOLUTION

- Part 1**
- 1. Inverse Floater (Selected):** In this scenario, as the central bank reduces interest rates, the coupon payments on the Inverse-Floater would increase, leading to higher income from these instruments in David's portfolio.
 - 2. Floating Rate Note (Not Selected):** These have an interest rate that resets periodically with respect to a benchmark. If interest rates are expected to decrease, the coupons from these notes will also decrease, resulting in lower income for the portfolio.
 - 3. 10-Year Fixed Rate Bond (Not Selected):** These pay a fixed interest rate until maturity. If the central bank cuts interest rates, the value of these bonds will increase because their fixed coupons will be more attractive compared to newly issued bonds. However, the duration exposure limit is almost reached, indicating limited room for adding more fixed rate exposure to the portfolio.
 - 4. Inflation-Linked Bond (Not Selected):** These bonds have their principal or interest payments adjusted according to inflation. However, during a slowdown or recession, inflation typically decreases, which would decrease the returns from these bonds.

Part 2 Yield Curve Scenario = Bear Flattener with Positive Butterfly View

Level : All rates will increase by 20 bp – Bear Scenario

Slope : ST rate (3 year) will increase by additional 55bp – total increase = 75bp

Long Term rate (30 year) will increase by additional 30 bp – total increase = 50bp

Long Term increase < Short Term Increase – Flattening Scenario

Curvature:

Butterfly Spread = $2 \times (\text{Intermediate Yield}) - \text{Short Term Yield} - \text{Long Term Yield}$

Here, intermediate Yield is rising by less than ST and LT yield. So, butterfly spread is decreasing. A positive butterfly view indicates a decrease in butterfly spread due to a bond's inverse price–yield relationship.

Part 3 Forecast – all the rates will increase – Level will increase. Duration PF should be less than Duration Benchmark. PF 1 = Effective Duration = Sum of KRD = 10.95 > Benchmark Effective Duration of 10.25 – Hence, eliminated.

Both PF 2 and 3 have similar ED = 10.00(<10.95). So, these are still in race.

Forecast – Short Term rate (3 year) will increase by additional 55bp – total increase = 75bp. Long Term rate (30 year) will increase by additional 30bp – total increase = 50bp. We'd want to be relatively underweight ST– 3 Year KRD of PF2 < 3 year KRD of PF3 (1 vs 1.3). We'd want to be relatively overweight LT– 30 Year KRD of PF2 > 30 year KRD of PF3 (3.5 vs 3.4) – Hence, PF 2 better

Forecast –

Therefore, PF 2 would outperform the benchmark the most

Or

Benchmark returns = $-3.79\% = (-1.25 \times 0.75\%) + (-2.5 \times 0.20\%) + (-3.0 \times 0.20\%) + (-3.5 \times 0.50\%)$

Portfolio 1 returns = $-4.22\% = (-1.95 \times 0.75\%) + (-2.7 \times 0.20\%) + (-3.1 \times 0.20\%) + (-3.2 \times 0.50\%)$

Portfolio 2 returns = $-3.60\% = (-1.00 \times 0.75\%) + (-2.5 \times 0.20\%) + (-3.0 \times 0.20\%) + (-3.5 \times 0.50\%)$

Portfolio 3 returns = $-3.74\% = (-1.30 \times 0.75\%) + (-2.5 \times 0.20\%) + (-2.8 \times 0.20\%) + (-3.4 \times 0.50\%)$

Hence, Portfolio 2