Question #1 of 12

Question ID: 1587588

Which of the following comments relating to fixed-income (bond) futures is *least accurate*?

A) The seller (short) party has the option of which bond and when to deliver in the delivery month.

B) **The cheapest-to-deliver bond will have the highest basis and lowest repo rate.**

C) The futures price is calculated using the cheapest-to-deliver bond and a conversion factor.

Explanation

The short party can deliver any eligible Treasury bond in the delivery month. The seller can choose when in the delivery month to deliver the bond.

Futures prices on sovereign debt are quoted for a notional bond. Each eligible bond is assigned a conversion factor (CF), computed by discounting the bond at a constant YTM, regardless of the bond's actual yield. Bonds with coupon rates lower than the YTM will have conversion factors of less than 1, and bonds with coupon rates greater than the YTM will have CFs greater than 1.

Before delivery, the quoted futures price is calculated by calculating the futures price based on the cheapest-to-deliver (CTD) bond and then dividing by the CTD conversion factor. This last step means that the price on the exchange is based on the notional bond rather than the CTD bond.

The cash and carry model is still used to price the future. The bond selected to price the future is the CTD. There are two methods to identify the CTD bond. The first method identifies the eligible bond that generates the highest return (implied repo rate) on a cash and carry trade. The second method used to identify the CTD bond is to find the eligible bond with the lowest basis. Basis is defined as the spot price − futures price.

The Treasury bond with the lowest basis will typically have the highest implied repo rate and be the cheapest to deliver.

(Module 7.1, LOS 7.a)

Question #2 of 12

Question ID: 1587611

Robert Zorn, CFA, manages an equity portfolio with a current market value of $150 million. The beta of the portfolio is 1.23, and Zorn is forecasting a short-term market adjustment that will significantly lower equity values and will occur in the near future. Zorn has decided to use S&P 500 futures, currently trading at 1,260, to reduce the portfolio's systematic risk exposure by 30%. The multiplier is 250. What is the number of futures contracts, rounded up to the nearest whole number, that will be needed to achieve Zorn's objective?

A) Buy 182.

B) Sell 169.

C) Sell 176.

Explanation

First, determine the new target beta by multiplying the current beta of the portfolio, which is 1.23 by 0.7, to achieve a new target beta that is 30% less than the current portfolio beta:

(1.23)(0.7) = 0.861

Then, use the equation:

$[(\text{beta}_T - \text{beta}_p) / \text{beta}_f][V_p / (P_f \times \text{multiplier})]$

[(0.861 – 1.23) / 1](150,000,000) / (1,260)(250) = (–0.369)(476.19) = –175.71, rounded to –176.

(Module 7.5, LOS 7.e)

Question #3 of 12

Question ID: 1587600

Marjorie Scarlett manages a U.K. equity portfolio with a market value of £20m and a beta relative to the FTSE 100 of 1.2. Scarlett wishes to increase her exposure to U.K. equities, so she takes the equity return receiver position in a 2-year equity index swap with a semiannual settlement. The swap is based on the FTSE 100, and it has a notional principal of £5m. The FTSE 100 at the start of the swap's life is 7,520, and 6-month £ LIBOR is 4%. At the time of the first settlement date, the FTSE 100 is at 7,600 and 6-month LIBOR is 4.2%. Assuming that Scarlett's existing portfolio's beta remains unchanged at 1.2, the £ return on the portfolio at the first settlement date will be *closest* to:

A) £230,510.

B) £255,319.

C) £208,510.

Explanation

Return on original portfolio:

Opening value of portfolio × FTSE 100 return × portfolio beta

$$£20\text{m} \times \left(\frac{7{,}600}{7{,}520} - 1\right) \times 1.2 = £255{,}319$$

Net return on equity swap:

Pay floating interest:

£5m × 0.04 × 180 / 360 = £100,000

Note that LIBOR at the start of the period determines the payment at the end of the period.

Receive equity return:

$$£5\text{m} \times \left(\frac{7{,}600}{7{,}520} - 1\right) = £53{,}191$$

Net return on swap = £53,191 − £100,000 = −£46,809

Total £ return at settlement date:

Portfolio return + net return on swap = £255,319 − £46,809 = £208,510

(Module 7.3, LOS 7.c)

Question #4 of 12

Question ID: 1587618

An investor has a $100 million stock portfolio with a beta of 1.2. He would like to alter his portfolio beta using S&P 500 futures contracts. The contracts are currently trading at 596.90. The futures contract has a multiple of 250. Which of the following is the correct trade required to double the portfolio beta?

A) Buy 1,608 contracts.

B) Sell 804 contracts.

C) Buy 804 contracts.

Explanation

The number of futures contracts required to double the portfolio beta is computed as follows:

Number of contracts = [(target beta – portfolio beta) / futures beta] × (portfolio value / futures contract value) = [(2.4 – 1.2) / 1] × [$100 million / (596.90 × $250)] = 804 contracts.

To double the portfolio beta, we buy 804 contracts.

(Module 7.5, LOS 7.f)

Question #5 of 12

Question ID: 1587598

Which of the following statements about portfolio hedging is *least accurate*?

A) Futures contracts have a symmetrical payoff profile.

B) To synthetically create the risk/return profile of an underlying common equity security, buy the corresponding futures contract, sell the common short, and invest in a T-bill.

C) For a fixed portfolio insurance horizon, using put options generally requires less rebalancing and monitoring than with the use of futures contracts.

Explanation

To synthetically create the risk/return profile of an underlying common equity security, buy the corresponding futures contract and invest in a T-bill.

Futures contracts involve margin, so there may be margin calls that require rebalancing. Option contracts do not have margin calls.

Futures contracts are a zero-sum game, to the extent that one side loses, the other side gains by the same. Therefore, the payoff profile is symmetrical.

(Module 7.3, LOS 7.c)

Question #6 of 12

Question ID: 1587623

An investor has a cash position currently invested in T-bills but would like to "equitize" it by using S&P futures contracts. Which of the following trades will create the desired synthetic equity position?

A) Selling the T-bills and buying S&P 500 futures contracts.

B) Selling S&P 500 futures contracts short.

C) Buying S&P 500 futures contracts.

Explanation

The trader can buy stock index futures and hold them in conjunction with T-bills to mimic a stock portfolio. So, we have the following:

Synthetic stock portfolio = T-bills + stock index futures.

(Module 7.5, LOS 7.f)

Question #7 of 12

Question ID: 1587603

Shota Hideaki manages a Japanese equity fund with a market value of ¥21,712,000,000 and a beta relative to the Nikkei 225 of 0.75. Due to recent sales, a cash balance of ¥1,065,500,000 has built up, and Hideaki has become concerned about the cash drag. Hideaki wishes to create a cash overlay to equitize these funds. Hideaki is considering using Nikkei 225 futures and wishes the cash overlay to have the same beta as his existing portfolio. The current futures price is 21,500 with a multiplier of ¥1,000. To correctly execute the cash overlay, Hideaki would *most appropriately* purchase:

A) 44 contracts.

B) 37 contracts.

C) 50 contracts.

Explanation

$$\text{Number of futures required} = \left(\frac{\beta_T - \beta_P}{\beta_F}\right)\left(\frac{MV_P}{F}\right)$$

β_P = current portfolio beta of cash position = 0 (note that cash has a beta of 0)

MV_P = cash position

$$\text{Number of futures required} = \left(\frac{\beta_T}{\beta_F}\right)\left(\frac{MV_P}{F}\right)$$

β_T = target portfolio beta. In this case, the target will be set to 0.75 because we want the beta of the synthetically invested cash to match the beta of the existing portfolio.

$$\text{Number of futures required} = \left(\frac{0.75}{1}\right)\left(\frac{¥1{,}065{,}500{,}000}{21{,}500 \times ¥1{,}000}\right) = 37.17$$

$$\approx 37 \text{ futures contracts}$$

(Module 7.3, LOS 7.c)

Question #8 of 12

Question ID: 1551887

A manager of a $20,000,000 portfolio wants to decrease beta from the current value of 0.9 to 0.5. The beta on the futures contract is 1.1 and the futures price is $105,000. Using futures contracts, what strategy would be appropriate?

A) Short 19 contracts.

B) Long 69 contracts.

C) Short 69 contracts.

Explanation

Number of contracts = -69.26 = (0.5 − 0.9) × ($20,000,000) / (1.1 × $105,000), and this rounds down to 69 (absolute value). Since the goal is to decrease beta, the manager should go short which is also indicated by the negative sign.

(Module 7.5, LOS 7.e)

Question #9 of 12

Question ID: 1587607

David Climo purchased a 12-month variance swap on the S&P 500 with a vega notional of $60,000 and a strike of 6%. Seven months have passed, and the S&P has a realized volatility of 6.5% over this period. The strike of a variance swap with five months to maturity is quoted at 5.8% at this time, and the 5-month USD LIBOR is 3%. The current value of the swap is *closest* to:

A) $13,300.

B) $13,136.

C) $31,250.

Explanation

Step 1: Compute the expected variance at maturity = $\left(42.25 \times \frac{7}{12}\right) + \left(33.64 \times \frac{5}{12}\right)$ = 24.65 + 14.02 = 38.66.

where: 6.5^2 = 42.25 and 5.8^2 = 33.64

Note that expected variance is simply the time-weighted average of realized variance to date and implied variance over the remaining life of the contract.

Step 2: Compute the expected payoff at maturity.

$$\text{variance notional} = \frac{\text{vega notional}}{2 \times \text{K}} = \frac{\$60{,}000}{2 \times 6} = \$5{,}000$$

expected payoff at maturity = (σ^2 − K^2) × variance notional

where: K^2 = 6^2 = 36

expected payoff at maturity = (38.66 − 36) × $5,000 = $13,300

Step 3: Discount expected payoff from maturity to valuation date (five months).

$$\text{unannualize the interest rate} = 3\% \times \frac{5}{12} = 1.25\%$$

$$\text{current value of swap} = \frac{\$13{,}300}{1.0125} = \$13{,}136$$

This is a gain to David (the purchaser).

(Module 7.4, LOS 7.d)

Question #10 of 12

Question ID: 1587591

Samantha Holly is the fund manager of a German fixed-income fund. The fund has a market value of €90m and a modified duration of 14. Holly believes that the European central bank will end its policy of lower target interest rates and would like to reduce the duration of her portfolio. Holly has identified the following Bund future, which she would like to use:

Government Bond Futures	German Bund
Contract size	€100,000
Future price	€174.50
CTD price	€104.83
CTD conversion factor	0.5955
CTD modified duration	15.81

How many contracts will Holly need to sell to achieve a target duration of 8?

A) Sell 453 contracts.

B) Sell 194 contracts.

C) Sell 326 contracts.

Explanation

Holly wishes to achieve a target duration of 8 for her portfolio.

Step 1: Compute the basis point value of the portfolio ($BPV_{portfolio}$):

$$BPV_{portfolio} = 14 \times 0.0001 \times €90,000,000 = €126,000$$

Step 2: Compute the basis point value of the target duration:

$$BPV_{Target} = 8 \times 0.0001 \times €90,000,000 = €72,000$$

Step 3: Compute the basis point value of the CTD (BPV_{CTD}):

$$BPV_{CTD} = 15.81 \times 0.0001 \times [(€104.83/100 \times €100,000] = €165.74$$

Step 4: Compute the basis point value hedge ratio:

$$\text{BPV HR} = \frac{\text{BPV}_{\text{Target}} - \text{BPV}_{\text{Portfolio}}}{\text{BPV}_{\text{CTD}}} \times \text{CF} = \frac{€72{,}000 - €126{,}000}{€165.74} \times 0.5955 = -194.02 \approx -19$$

Holly will need to sell 194 Bund futures to achieve her target duration.

(Module 7.1, LOS 7.a)

Question #11 of 12

Question ID: 1587590

David Lizotte wishes to completely hedge his $40m U.S. fixed-income portfolio against parallel movements in the yield curve. David is considering using the following U.S. Treasury bond future:

U.S. Treasury Bond Future	
Futures price	$154.88
Futures contract size	$100,000
CTD	3.7%, 20 years to maturity
CTD price	$113.71
CTD conversion factor	0.7342
CTD modified duration	14.51

Lizotte's fixed-income portfolio currently has a modified duration of 12. The *most* appropriate futures contract transaction to fully hedge the portfolio would be to:

A) sell 291 contracts.

B) buy 291 contracts.

C) sell 214 contracts.

Explanation

To reduce portfolio duration, Lizotte will need to sell Treasury bond futures.

Step 1: Compute the basis point value of the portfolio ($BPV_{portfolio}$):

$BPV_{portfolio}$ = 12 × 0.0001 × $40,000,000 = $48,000

Step 2: Compute the basis point value of the CTD (BPV_{CTD}):

BPV_{CTD} = 14.51 × 0.0001 × [($113.71 / 100 × £100,000] = $164.99

Step 3: Compute the basis point value hedge ratio:

$$\text{BPV HR} = \frac{\text{BPV}_{\text{Target}} - \text{BPV}_{\text{Portfolio}}}{\text{BPV}_{\text{CTD}}} \times \text{CF} = \frac{\$0 - \$48{,}000}{\$164.99} \times 0.7342 = -213.6 \approx -214$$

To fully hedge the portfolio, the BPV_{target} is set equal to $0.

(Module 7.1, LOS 7.a)

Question #12 of 12

Question ID: 1587579

A company has substantial bank loans and pays interest at LIBOR +80 bp. The central bank has signaled its intention to increase target interest rates over the next 12-month period. What type of interest derivatives would the company *most appropriately* enter into to mitigate its floating rate exposure?

A) Short FRA contracts.

B) Long short-term interest rate futures.

C) A payer swap.

Explanation

Short FRA positions will lose value when interest rates rise. As interest rates rise, the fixed rate that the short party receives looks less attractive as the fixed rate in new FRAs, covering the same notional borrowing and lending period, increases.

A payer swap is an agreement to pay fixed and receive floating. As interest rates rise, the floating payments received increase in size relative to the constant fixed payments. With a properly constructed interest rate swap, the net receipt on the payer swap will offset the increased interest payments on the company's bank debt.

Long short-term interest rate futures will decrease in value as interest rates rise. The pricing convention (IMM index convention) used for the future is 100 − 30-day annualized forward interest rate at maturity. As interest rates rise and the forward rate increases, the futures price will decline.

(Module 7.1, LOS 7.a)