## Question #1 of 10

Question ID: 1587629

A European investor holds a diversified portfolio. From the euro perspective, the portfolio is weighted 60% and 40% in U.S. and U.K. investments.

Additional information:

| Assets: | Returns measured in foreign currency: | Returns measured from investor's perspective: | Standard deviation of asset's returns measured in foreign currency: | Stand deviation of the foreign currency's returns: |
|---|---|---|---|---|
| U.S. | 5% | 6% | 4.5% | 3.7% |
| U.K. | 7% | 8% | 3.5% | 4.7% |

The correlation between the foreign-currency asset's returns and returns on the foreign currency are 0.81 and 0.67, respectively, for the U.S. and U.K. assets. Which of the following is the standard deviation of returns for the investor in the U.K. assets?

**A)** 7.8%.

**B) 60.9%.**

**C)** 7.5%.

**Explanation**

It depends on the standard deviation of the asset returns measured in the foreign currency, the standard deviation of the currency's returns, and the correlation between these two sources of returns:

$$\text{Variance} = (1.0^2)(3.5^2) + (1.0^2)(4.7^2) + 2(1.0)(1.0)(0.67)(3.5)(4.7) = 56.38$$

Standard deviation = 7.5%

(Module 8.1, LOS 8.a)

## Question #2 of 10

Question ID: 1587650

Which of the following statements regarding hedging of emerging-market currencies is *least accurate*?

**A)** Hedging costs for managers who buy emerging-market currencies are increased by the relatively high interest rates in emerging markets.

**B)** **Tail risk and contagion both refer to relatively infrequent events that increase the difficulty of hedging emerging-market currencies.**

**C)** Hedging cost varies with normally large bid/ask spreads followed by infrequent periods of even higher spreads.

**Explanation**

The relatively high interest rates of emerging-market economies leads to an inverted pricing curve with forward prices of the emerging-market currencies below their spot prices. This raises hedging costs for sellers of the currency, not buyers; sellers receive negative roll yield, while buyers receive positive roll yield. EM currencies do have relatively high bid/ask spreads, which increase in periods of crisis. Contagion and tail risk refer to infrequent events. Contagion refers to all EM currencies tending to decline together in periods of crisis, and tail risk to the downside in those periods of crisis being large in relation to typical upside movement in the currencies.

(Module 8.6, LOS 8.i)

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## Question #3 of 10

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)** $31,250.

**B)** **$13,300.**

**C)** $13,136.

**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 = ($\sigma^2$ − $K^2$) × 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)

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## Question #4 of 10

Question ID: 1587573

Which of the following statements about short calendar spreads is *most accurate*?

**A)** A short calendar spread benefits from an increase in implied volatility.

**B)** **A trader benefits most if the shorter-dated option expires at the money (ATM).**

**C)** A short calendar spread is a credit spread, not a debit spread.

**Explanation**

A short calendar spread is a credit spread, meaning that a trader would receive a net income from entering into a position because the premium paid on the long shorter-dated option is less than the premium received from selling the longer-dated option.

A short calendar spread benefits from a *decrease* in implied volatility because it would make the short position more valuable. If the shorter-dated option expires ATM, the longer-dated premium would rise, which is a *loss* on the short position.

(Module 6.10, LOS 6.g)

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## Question #5 of 10

Question ID: 1587626

Oskar Dieter manages a fund with exposures to both German equity and fixed income. The fund has a market value of €450m, with 60% exposure to equity and 40% to fixed income. The equity portfolio has a beta of 1.4 relative to the DAX 30, and the fixed-income portfolio has a modified duration of 12.6.

Dieter wishes to adjust the asset allocation to 70% equity and 30% fixed income using the following futures contracts:

| **DAX 30 Futures** | | **Euro Bund Futures** | |
|---|---|---|---|
| Futures price | 13,400 | Futures price | €174.50 |
| Tick size | 0.5 points | Contract size | €100,000 |
| Tick value | €12.50 | CTD price | €99.90 |
| Multiplier | €25 | Conversion factor | 0.5723 |
| | | CTD modified duration | 9.86 |

Taking which of the following positions is *most likely* to achieve Dieter's required asset allocation?

**A) Long 188 Dax 30 Index futures, short 329 Euro Bund futures.**

**B)** Long 329 Euro Bund futures, short 134 Dax 30 Index futures.

**C)** Long 134 Dax 30 Index futures, short 576 Euro Bund futures.

**Explanation**

| Stock | Current | Target | Change in Exposure |
|---|---|---|---|
| Equity | €270m (60%) | €315m (70%) | +€45m |
| Fixed income | €180m (40%) | €135m (30%) | −€45m |
| Total | €450m | €450m | |

DAX 30 Futures

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

where:

$\beta_T$ = target portfolio beta

$\beta_P$ = current portfolio beta

$\beta_F$ = futures beta (beta of stock index)

$MV_P$ = market value of portfolio

F = futures contract value = futures price × multiplier

$$\text{Number of futures required} = \left(\frac{1.4 - 0}{1}\right)\left(\frac{€45{,}000{,}000}{13{,}400 \times €25}\right) = +188.06$$

Dieter will need to buy 188 futures contracts to achieve his target asset allocation.

Euro Bund Futures

$$\text{BPV HR} = \frac{\text{BPV}_{\text{Target}} - \text{BPV}_{\text{Portfolio}}}{\text{BPV}_{\text{CTD}}} \times \text{CF}$$

$BPV_{Portfolio}$ = $MD_{Portfolio}$ × 0.0001 × $MV_{Portfolio}$ = 12.6 × 0.0001 × €45,000,000 = €56,700

$BPV_{CTD}$ = $MD_{CTD}$ × 0.0001 × [Price / 100 × contract size] = 9.86 × 0.0001 × [(€99.90 / 100) × €100,000] = €98.50

$$\text{BPV HR} = \frac{€0 - €56{,}700}{€98.50} \times 0.5723 = -329.44$$

Dieter will need to sell 329.44 German Bund future contracts.

(Module 7.5, LOS 7.f)

## Question #6 of 10

Question ID: 1587572

In May, BCA shares are trading at $43.50. An investor enters into a long calendar spread on BCA by buying an October 45 call for $5.50 and selling a July 45 call for $2.50. In July, the short call expires out of the money. At the time of the short call expiry, the investor would have an overall gain on the spread only if:

**A)** the BCA stock price did not fall below $40.50.

**B) the October call is worth more than $3.**

**C)** the BCA stock price increased above $45.

**Explanation**

In May, the investor paid a net cost of $5.50 − $2.50 = $3.00 for the calendar spread (premium income from the short call subsidized a portion of the long call premium). In July, the investor would have a profit if the October long call value is at least $3.00, which is the investor's initial net cost.

Because this is a calendar spread, there is no ownership of the BCA shares; the investor did not buy the BCA shares for $43.50. As a result, the share price does not need to increase above $45 or avoid falling below $40.50 for the investor to generate a profit.

(Module 6.10, LOS 6.g)

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## Question #7 of 10

Question ID: 1587613

A portfolio manager knows that a $10 million inflow of cash will be received in a month. The portfolio under management is 70% invested in stock with an average beta of 0.8 and 30% invested in bonds with a duration of 5. The most appropriate stock index futures contract has a price of $233,450 and a beta of 1.1. The most appropriate bond index futures has a duration of 6 and a price of $99,500. How can the manager pre-invest the $10 million in the appropriate proportions?

**A)** Take a long position in 25 of the stock futures and 28 of the bond futures.

**B) Take a long position in 22 of the stock futures and 25 of the bond futures.**

**C)** Take a short position in 25 of the bond futures and 22 of the stock futures.

**Explanation**

The goal is to create a $7 million equity position with a beta of 0.8 and a $3 million bond position with a duration of 5:

number of stock futures = 21.8 = (0.8 − 0) × ($7,000,000) / (1.1 × $233,450)

number of bond futures = 25.13 = (5 − 0) × ($3,000,000) / (6 × $99,500)

The manager should take a long position in 22 of the stock index futures and 25 of the bond index futures.

(Module 7.5, LOS 7.e)

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## Question #8 of 10

Question ID: 1551804

A *risk reversal* strategy that combines a short put with a long call creates:

**A)** a neutral exposure in the underlying shares. ✗

**B)** a short exposure in the underlying shares. ✗

**C) a long exposure in the underlying shares.** ✓

**Explanation**

Combining a short put (which obligates the seller to buy the shares if the put option is exercised) and a long call (which gives the right to buy) creates a long exposure in the underlying shares.

(Module 6.11, LOS 6.h)

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## Question #9 of 10

Question ID: 1587605

The VIX futures market is currently in backwardation. The VIX is currently at 40, front-month futures are priced at 35, and second-month futures are priced at 30. Assuming the term structure remains constant over the next two months, which of the following trades is *most likely* to result in a position that benefits from roll yield?

**A)** Buy the second-month future and sell the VIX spot. ✗

**B)** Buy the front-month future and sell the second-month future. ✗

**C) Buy the second-month future and sell the front-month future.** ✓

**Explanation**

The futures price is an expectation of 30-day S&P 500 volatility from futures expiration. The VIX itself is a measure of current 30-day implied forward volatility on the S&P 500.

VIX futures will experience convergence at futures maturity because the future settles against spot VIX at expiration.

The VIX index is normally in contango (futures price > spot VIX), resulting in an upwards sloping term structure. Holding the term structure constant, this means that the futures prices for a specific maturity will decrease overtime. This typically causes negative roll yield. This means purchasers of the VIX futures will make a loss when closing out their position, all else being equal apart from the passage of time.

In times of financial stress, the VIX will spike and can cause backwardation. The backwardation is caused by high levels of expected 30-day volatility, which are expected to decrease overtime. The VIX index is considered mean reverting over time.

In contango markets, the futures price will be pulled down toward the spot, but in a backwardated market, it will be pulled up toward the spot.

Assuming a constant term structure in a backwardated market, the futures price will rise as the basis narrows. The current spread on the second-month future is 40 − 30 = 10. The spread on front-month future is 40 − 35 = 5.

The terms *front-month*, *second-month*, and so on refer to the maturity date of the futures contract.

The strategy in a backwardated market should be to purchase long dated futures and benefit from the convergence to spot over their life (i.e., the decline in basis). This strategy is at risk from sudden changes in the spot volatility of the VIX. The exposure to the spot VIX can be mitigated by selling short dated futures, leaving the investor exposed only to the difference in basis between the two contracts.

The strategy of buying the second-month future and selling the VIX spot is unfeasible as the VIX spot cannot be directly invested in.

The strategy of buying the second-month future and selling the front-month future is profitable in a backwardated market.

The strategy of buying the front-month future and selling the second-month future is profitable in a contango market.

(Module 7.4, LOS 7.d)

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## Question #10 of 10

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)** 50 contracts.

**B)** 44 contracts.

**C) 37 contracts.**

**Explanation**

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

$\beta_P$ = current portfolio beta of cash position = 0 (note that cash has a beta of 0)

$MV_P$ = cash position

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

$\beta_T$ = 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)