L2DRR40-TB002-1610

LOS: LOS-9231

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: medium

If market interest rates at the expiration of a forward rate agreement (FRA) are higher than the FRA rate, the long holder of the FRA most likely:

Gains.

O Loses.

O Is unaffected.

Rationale



If Libor at FRA expiration is greater than the FRA rate, the long benefits. Effectively, the long has access to a loan at lower-than-market interest rates, while the short is obligated to give out a loan at lower-than-market interest rates.

L2R40PQ-ITEMSET-BS058-1609

LOS: LOS-9233 LOS: LOS-9234

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Use the following information to answer the next 2 questions:

Consider an equity swap between a portfolio manager and a dealer. The notional principal is \$50 million and payments will be made quarterly. The portfolio manager agrees to pay the dealer the total return on the S&P 500 in successive 3-month periods, while the dealer agrees to pay the portfolio manager an annualized fixed return of 5%. The S&P 500 starts off at 1,905.30 at swap initiation, and 3 months later it stands at 1,876.99. The fixed payment is made on the basis of 89 days in the settlement period and 365 days in a year.

i

The fixed payment is *closest to*:

- \$410,588
- \$609,589
- \$625,000

Rationale

This Answer is Correct

$$50,000,000 \times (0.05 \times 89/365) =$$
\$609,589

ii.

The net payment made by the dealer to the portfolio manager at the next settlement date is *closest to*:

- \$625,000
- \$609,589
- \$1,352,517

Rationale

This Answer is Correct

$$[(1,876.99/1,905.30) - 1] \times 50,000,000 = -\$742,927.62$$

The negative value indicates that the portfolio manager actually receives this amount.

As the return on the S&P 500 index is negative over the 3-month period, the fixed-rate payer will have to make the fixed-rate payment plus the variable payment, equal to the negative return on the equity index.

$$\$609,589 + \$742,928 = \$1,352,517$$

L2DRR40-TB007-1610

LOS: LOS-9233

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Difficulty: medium

Tim has engaged in an equity swap where he is the fixed-rate payer. In the first settlement period fixed rates increase by 10% and the equity index associated with the swap loses 10%. Based on this set of circumstances, Tim's cash flow on the first settlement date is most likely.

Acres 1					
()	N	Δ	ut	ra	

O Positive.

Negative.

Rationale



This Answer is Correct

Tim's cash flow on the first settlement date must be negative, as he will be responsible for the fixed-rate payment and a payment associated with the loss on the equity index. The changes in fixed interest rates on the first settlement date have no effect on his cash flows.

L2DRR40-TB001-1610

LOS: LOS-9231

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: medium

Based on the concept of convergence, a forward/futures contract price at expiration will *most likely* be:

- Cower than the spot price.
- Higher than the spot price.
- The same as the spot price.

Rationale



At expiration, both forward and futures contracts are equivalent to a spot transaction in the underlying asset. This is known as convergence, implying that at contract expiration, the forward/futures price will be the same as the spot price, or that $F_T(T) = F_T(T) = S_T$.

L2R40PQ-BS002-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: medium

Consider the following statements:

Statement 1: Given that changes in interest rates have a negligible impact on the underlying, an increase in the risk-free rate will lead to an increase in the forward price. **Statement 2**: An increase in the expected future price of the asset will result in an increase in the forward price.

Which of the following is most likely?

- Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale



Statement 1 is correct. An increase in the risk-free rate will lead to an increase in the forward price, and a decrease in the risk-free rate will lead to a decrease in the forward price. This relationship will generally hold as long as changes in interest rates do not influence the value of the underlying asset.

The forward price is not influenced by the expected future spot price. Any opinion that, in the future, the underlying will increase or decrease in value, even substantially, has no bearing on the forward price.

L2DRR40-TB008-1610

LOS: LOS-9234

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Difficulty: medium

Jerry entered into a \$20 million quarterly fixed-rate pay (8% annually) equity swap on the S&P 500 when its value was 1,000. Assume the value of the S&P 500 is 900 at the end of the first quarter of the swap. Jerry's net cash payment as a percentage of the \$20 million notional value is *closest* to which of the following?

- 0 -8%
- 0 -12%
- 12%

Rationale

This Answer is Correct

The net cash flow Jerry pays as a percentage of the notional amount at the end of the first quarter is 12%. This is composed of the 2% quarterly fixed pay rate and the loss of 10% on the index.

Ouestion 7

L2R40PQ-ITEMSET-BS008-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Use the following information to answer the next 5 questions:

Walter White owns an asset worth \$150, which he plans to sell in 6 months. To hedge against the possible decline in the price of an asset, he decides to take the short position in a forward contract on the asset. The risk-free rate is given as 5.925%.

i.

The no-arbitrage forward price of the contract is *closest to*:

- **\$150.00**
- \$154.38
- \$158.89

Rationale

This Answer is Correct

$$\begin{split} F_0(T) &= S_0(1+r)^T \\ F_0(6/12) &= \$150 \times (1+0.05925)^{6/12} = \$\textbf{154.38} \end{split}$$

ii.

Given that 3 months into the term of the contract, the spot price of the underlying is \$145.45, the value of the short position is *closest to*:

- -\$6.72
- O-\$11.17
- \$6.72

Rationale

This Answer is Correct

$$\begin{split} V_t(T) &= S_t - F_0(T)/(1+r)^{T-t} \\ V_{3/12}(6/12) &= 145.45 - 154.38/(1.05925)^{6/12-3/12} = -\$6.72 \end{split}$$

The value of the short position is positive \$6.72.

iii.

Given that 5 months into the term of the contract, the spot price of the underlying is \$158.55, the value of the short position is *closest to*:

- -\$4.91
- \$7.83
- -\$7.83

Rationale

This Answer is Correct

$$V_{5/12}(6/12) = 158.55 - 154.38/(1.05925)^{6/12-5/12} = \$4.91$$

The investor is short; thus the value to the investor is negative \$4.91.

iv.

Given that at contract maturity, the spot price of the underlying asset is actually \$140, the value of the short position at expiration is *closest to*:

- -\$14.38
- 0 \$18.89
- \$14.38

Rationale

This Answer is Correct

$$egin{split} V_T(T) &= S_T - F_0(T) \ V_{6/12}(6/12) &= 140 - 154.38 = -14.38 \end{split}$$

The value of the short position is positive \$14.38.

٧.

Continuing from the previous question, the overall gain or loss to Walter on the entire transaction (spot and forward combined) is *closest to*:

- O-\$4.38
- \$8.89
- \$4.38

Rationale

This Answer is Correct

Gain on short position = \$14.38

Loss on spot = -\$10 (calculated as \$140 - \$150)

Net gain = 14.38 - 10 = \$4.38

L2R40PQ-ITEMSET-BS030-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: medium

Use the following information to answer the next 3 questions:

A company's treasurer wishes to hedge against an increase in future borrowing costs by entering into a 3×12 FRA.

The current term structure for LIBOR is:

Term (Days) Interest Rate (%)

30 days	5%
90 days	5.15%
270 days	5.60%
360 days	5.85%

i.

The no-arbitrage FRA rate for the 3 × 12 FRA is *closest to*:

- 6.01%
- 05.90%
- 0 4.50%

Rationale

This Answer is Correct

$$ext{FRA price} = \left[\left[rac{1 + 0.0585 \left(rac{360}{360}
ight)}{1 + 0.0515 \left(rac{90}{360}
ight)} - 1
ight] \left[\left(rac{360}{270}
ight) = extbf{6.01}\%$$

ii.

Suppose 45 days later, 45-day Libor is 5.55% and 315-day Libor is 5.95%. Given the notional principal of \$10 million, the *value* of the long position is *closest to*:

- ─ −2,250
- 05,731.34
- = 2,195.14

Rationale

This Answer is Correct

The annualized rate applicable on a 270-day loan, 45 days from today, equals:

$$\left[\left[rac{1+0.0595 \left(rac{315}{360}
ight)}{1+0.0555 \left(rac{45}{360}
ight)} - 1
ight]$$
 , $\left(rac{360}{270}
ight) = 5.98\%$

The value of the FRA equals:

$$rac{10,000,000 imes [0.0598-0.0601] \left(rac{270}{360}
ight)}{1+\left\lceil 0.0595 imes \left(rac{315}{360}
ight)
ight
ceil} = -\$\mathbf{2,195.14}$$

iii.

If, at FRA expiration, 270-day Libor is actually 6.25%, the value of the long position is *closest to*:

- 25,074.63
- 17,480.17
- 9,552.24

Rationale

This Answer is Correct

At expiration, the payoff to the long position based on the notional principal of \$10 million is:

$$rac{10,000,000 imes \left[0.0625 - 0.0601
ight] \left(rac{270}{360}
ight)}{1 + \left[0.0625 imes \left(rac{270}{360}
ight)
ight]} = \$17,\!480.17$$

The positive value represents a gain to long position. The treasurer would receive a payment from the short at FRA expiration.

L2R40PQ-BS007-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: easy

Consider the following statements:

Statement 1: FRAs are typically settled in arrears.

Statement 2: Interest rate swaps and interest rate options are typically advanced set, advanced settled.

Which of the following is *most likely*?

- Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale



FRAs are typically advanced set, advanced settled, which is why we need to compute the present value (as of the date of FRA expiration) of the interest savings to compute the payoff on an FRA.

Interest rate swaps and interest rate options are typically settled in arrears, where the settlement payment is made at the end of the settlement period.

Ouestion 10

L2R40PQ-BS004-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: hard

Consider the following statements:

Statement 1: A short forward rate agreement (FRA) position can be replicated by holding a longer-term Eurodollar time deposit and at the same time shorting on a shorter-term Eurodollar time deposit.

Statement 2: All other things remaining the same, the lower the credit rating on an FRA counterparty, the higher the FRA rate.

Which of the following is most likely?

- Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale



A **long** FRA position can be replicated by holding a longer-term Eurodollar time deposit and at the same time shorting on a shorter-term Eurodollar time deposit.

Since the loan amount is hypothetical (i.e., no actual loan is made at FRA expiration), there is no need to consider the creditworthiness of the parties in determining the FRA rate.

L2R40PQ-ITEMSET-BS046-1609

LOS: LOS-9233 LOS: LOS-9234

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Difficulty: medium

Use the following information to answer the next 3 questions:

Consider a plain-vanilla interest rate swap with a notional principal of \$20 million. Suppose Company X makes semiannual fixed payments at the rate of 6%, while Company Y makes semiannual floating payments at LIBOR, which was 5.5% at the last payment date and is 6.5% at the current payment date (today). The fixed payments are made on the basis of 180 days in the settlement period and 365 days in a year. The floating payments are made on the basis of 180 days in the settlement period and 360 days in a year.

i.

The fixed payment due today is *closest to*:

- \$591,781
- \$600,000
- \$1,200,000

Rationale



$$\$20,000,000 \times (0.06 \times 180/365) = \$591,780.82$$

ii.

The floating payment due today is *closest to*:

- \$450,000
- \$550,000
- \$650,000

Rationale

This Answer is Correct

$$\$20,000,000 \times (0.055 \times 180/360) = \$550,000$$

iii.

Which of the following is *most likely*?

- The fixed-rate payer makes a payment of \$41,781 at the next settlement date.
- The floating-rate payer makes a payment of \$58,219 at the next settlement date.

The fixed-rate payer makes a payment of \$50,000 at the next settlement date.

Rationale



This Answer is Correct

The floating-rate payer makes the **net** payment to the floating-rate payer.

$$\$650,000 - \$591,781 = \$58,219$$

L2R40PQ-BS044-1609

LOS: LOS-9233 LOS: LOS-9234

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Difficulty: hard

Which of the following is *least likely* regarding currency swaps?

- Periodic settlement payments are not netted.
- There is an exchange of notional principal at initiation and expiration of the swap.
- There is no element of counterparty credit risk.

Rationale



For currency swaps, settlement payments are not netted, and there is an exchange of notional principal at initiation and expiration of the swap. There is substantial counterparty credit risk in currency swaps, as notional amounts are actually exchanged.

L2R40PQ-ITEMSET-BS019-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: easy

Use the following information to answer the following questions:

An investor owns a dividend-paying stock currently worth \$100. He plans to sell it in 200 days. In order to avoid the price uncertainty, he takes a short position on a forward contract on the stock that expires in 200 days. The stock is expected to pay three dividends of \$1 each in 30, 80, and 150 days. The risk-free rate of return is 6%.

i.

The no-arbitrage forward price for the contract today is *closest to*:

- \$97.04
- \$100.19
- \$102.86

Rationale

This Answer is Correct

$$egin{aligned} \gamma_0 &= 1/(1.06)^{30/365} + 1/(1.06)^{80/365} + 1/(1.06)^{150/365} = \$2.96 \ &\mathrm{F}_0(200/365) = (100-2.96) imes (1.06)^{200/365} = \$\mathbf{100.19} \end{aligned}$$

ii.

Assuming that 60 days into the forward contract the stock price is actually \$105, the value of the investor's position is *closest to* a:

- \$5.04
- \$5.04
- \$5.16

Rationale

This Answer is Correct

$$\begin{split} &\gamma_{60/365}=1/(1.06)^{20/365}+1/(1.06)^{90/365}=\$1.98\\ &F_{60/365}(200/365)=(105-1.98)(1+0.06)^{200/365-60/365}=\$105.3483\\ &V_t(T)=PV_{t,T}[F_t(T)-F_0(T)]\\ &V_{60/365}(200/365)=(\$105.3483-\$100.19)/(1+0.06)^{(200/365-60/365)}=-\$\textbf{5.04} \end{split}$$

This is the value to the long. Since the investor is short the forward contract, the investor has a profit of −\$5.04.

iii.

Given that the stock price rises to \$110 at maturity, the value of the investor's position at contract expiration is *closest to*:

- 0 \$12.96
- -\$9.81
- \$9.81

Rationale

This Answer is Correct

$$V_{200/365}(200/365) = 110 - 100.19 = \$9.81$$

The investor is short, so the value to investor is negative \$9.81.

Ouestion 14

L2R40PQ-ITEMSET-BS049-1609

LOS: LOS-9233 LOS: LOS-9234

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Use the following information to answer the next 4 questions:

Consider a 1-year swap that is initiated today between Company A and Company B. The terms of the deal require that the two companies make quarterly payments based on a notional principal of \$20 million. LIBOR spot rates today are as follows:

 $L_0(90) = 0.0028$

 $L_0(180) = 0.0044$

 $L_0(270) = 0.0058$

 $L_0(360) = 0.0073$

LIBOR rates 90 days later are as follows:

 $L_{90}(90) = 0.0031$

 $L_{90}(180) = 0.0048$

 $L_{90}(270) = 0.0061$

i.

The quarterly swap fixed rate is *closest to*:

0.18%

0.72%

0.0018%

Rationale

This Answer is Correct

$$B_0(90) = \frac{1}{1 + [0.0028 \times (90/360)]} = 0.9993$$

$$B_0(180) = \frac{1}{1 + [0.0044 \times (180/360)]} = 0.9978$$

$$\mathrm{B}_0(270) = rac{1}{1 + [0.0058 imes (270/360)]} = 0.9957$$

$$B_0(360) = \tfrac{1}{1 + [0.0073 \times (360/360)]} = 0.9928$$

Quarterly swap fixed rate =
$$\frac{(1-0.9928)}{(0.9993+0.9978+0.9957+0.9928)} = \textbf{0.0018}$$

ii.

The quarterly fixed-rate payment is *closest to*:

- \$3,600,000
- \$144,000
- \$36,000

Rationale

This Answer is Correct

$$20,000,000 \times 0.0018 = 36,000$$

iii.

The next floating-rate payment is closest to:

- \$14,000
- 0 \$15,500
- \$56,000

Rationale

This Answer is Correct

$$20,000,000 \times 0.0028 \times 90/360 = $14,000$$

iv.

The value of this swap on Day 90 of its tenor for the fixed-rate receiver is closest to:

- _\$15,738.97
- \$62,955.88
- \$15,738.97

Rationale

This Answer is Correct

$$\mathrm{B}_{90}(90) = rac{1}{1 + [0.0031 imes (90/360)]} = 0.9992$$

$$\mathrm{B}_{90}(180) = rac{1}{1 + [0.0048 imes (180/360)]} = 0.9976$$

$$\mathrm{B}_{90}(270) = rac{1}{1 + [0.0061 imes (270/360)]} = 0.9954$$

Quarterly swap fixed rate
$$=rac{1-0.9954 imes100}{0.9992+0.9976+0.9954}=0.1537\%$$

 $V = NA \times (PSFR_0 - PSFR_t) \times Sum \ of \ PV \ factors \ of \ remaining \ coupon \ payments \ as \ of \ t =$

$$V = \$20,000,000 \times (0.0018 - 0.001537) \times (0.9992 + 0.9976 + 0.9954) = \$\textbf{15,738.97}$$

L2R40PQ-BS005-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: hard

Susan Parker goes long on a forward contract on shares of XYZ Ltd on January 1, 2016. The contract expires on June 30, 2016. On May 21, XYZ announces a dividend of \$1.00 per share, which will be paid within 1 month. Given that this announcement does not affect the value of XYZ stock, the value of Susan's forward contract will *most likely*:

Fall.

Rise.

O Remain unchanged.

Rationale



If a dividend payment is announced between the forward's valuation and expiration dates, assuming that the news announcement does not change the price of the underlying, the value of the original forward will fall.

L2DRR40-TB006-1610

LOS: LOS-9233

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Difficulty: medium

If Susan is the fixed-rate payer on an interest swap and fixed interest rates increase, she will *most likely*:

- Benefit from the increase.
- O Lose out due to the increase.
- Remain unaffected by the increase.

Rationale



The value of the fixed-rate bond decreases as interest rates increase, but the value of the floating-rate bond remains at par. Because the fixed-rate payer is long on the floating-rate bond and short on the fixed-rate bond, she benefits from the increase in interest rates.

L2R40PQ-BS045-1609

LOS: LOS-9233 LOS: LOS-9234

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Difficulty: hard

Which of the following statements regarding the pricing and valuation of swaps is *most accurate*?

- If a swap is priced fairly, then the expected payment at each settlement date will be zero.
- O A fairly priced swap will have a payment of zero at the end of the first period.
- A fairly priced swap will have a fixed side that has a present value equal to the present value of the floating side.

Rationale

This Answer is Correct

A fairly priced swap will have a net present value of zero to both sides of the swap—this means that the present value of the fixed side will be equal to the present value of the floating side.

Answer A is incorrect since each individual settlement payment may be expected to be nonzero; it is the sum of them in present value terms that will be zero.

Similarly, Answer B is also incorrect since the first payment could have a nonzero value that is offset in present value terms by other expected settlement payments.

L2R40PQ-ITEMSET-BS023-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Use the following information to answer the next 2 questions:

Exactly 125 days ago, Nabila Rao purchased a fixed-income security having a maturity of 1 year. The security pays a quarterly coupon of \$25 and is currently trading at a full price of \$1,100. She plans to sell it 35 days after the third coupon is received. The risk-free rate is 6%. The schedule of coupon payments is as follows:

Coupon Days after Purchase

First 90

Second 180

Third 270

Fourth 365

Nabila takes the short position on the appropriate forward contract on the fixed-income security.

i.

The no-arbitrage forward price at which Nabila entered into the forward contract is *closest to*:

- 0 1,025.71
- 0 1,075.39
- 1,081.42

Rationale

This Answer is Correct

$$egin{aligned} \gamma_0 &= 25/(1.06)^{180/365-125/365} + 25/(1.06)^{270/365-125/365} = \$49.2094 \ &\mathrm{F}_0(180/365) = (1,\!100-49.2094) imes (1.06)^{180/365} = \$\mathbf{1,}\mathbf{081.42} \end{aligned}$$

ii.

At 60 days into the forward contract, the price of the bond is \$1,150 and the risk-free rate has fallen to 5%. The value of forward contract is *closest to*:

- Gain of 61.07
- Gain of 128.41
- Loss of 61.07

Rationale

This Answer is Correct

$$\begin{split} \gamma_t &= 25/(1.05)^{85/365} = \$24.72 \\ F_{60/365}(180/365) &= (1,150-24.72)(1+0.05)^{180/365-60/365} = \$1,143.4757 \\ V_t(T) &= PV_{t,T}[F_t(T)-F_0(T)] \\ V_{60/365}(180/365) &= (\$1,143.4757-\$1,081.42)/(1+0.05)^{180/365-60/365} = -\$61.07 \end{split}$$

L2R40PQ-ITEMSET-BS053-1609

LOS: LOS-9233 LOS: LOS-9234

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Difficulty: hard

Use the following information to answer the next 5 questions:

Consider a 1-year currency swap with semiannual payments. The two currencies are the USD and the EUR. The current exchange rate is \$1.20/€.

The term structures of interest rates for USD and EUR at initiation of the swap are:

Days LIBOR Euribor

180 days 6.2% 5.0% 360 days 7.5% 5.6%

The term structures of interest rates for USD and EUR on Day 60 of the swap are:

Days LIBOR Euribor

120 days 6.8% 5.8% 300 days 7.9% 6.1%

i.

The annualized USD swap fixed rate is closest to:

- 3.67%
- 0 3.73%
- 7.34%

Rationale



$$B_0(180) = \frac{1}{1 + [0.062 \times (180/360)]} = 0.9699$$

$$B_0(360) = \frac{1}{1 + [0.075 \times (360/360)]} = 0.9302$$

Semiannual swap fixed rate = $\frac{(1-0.9302)}{(0.9699+0.9302)} = 0.0367$

The annualized swap fixed rate equals $0.0367 \times (360/180) = 0.0734$ or **7.34**%.

ii.

The annualized EUR swap fixed rate is *closest to*:

- 5.52%
- 0 2.76%

Rationale

This Answer is Correct

$$B_0(180) = \frac{1}{1 + [0.05 \times (180/360)]} = 0.9756$$

$$B_0(360) = \frac{1}{1 + [0.056 \times (360/360)]} = 0.9470$$

Semiannual swap fixed rate =
$$\frac{(1-0.9470)}{(0.9756+0.9470)} = 0.0276$$

The annualized swap fixed rate equals $0.0276 \times (360/180) = 0.0552$ or 5.52%.

iii.

Given a notional principal of \$15 million, the semiannual cash flows for the pay \$ fixed, receive € fixed side of the swap are *closest to*:

- Pay \$550,500 and receive €345,000.
- Pay \$559,500 and receive €690,000.
- Pay \$550,500 and receive €414,000.

Rationale

This Answer is Correct

Semiannual fixed rate on the USD leg of swap = 3.67%

The pay \$ fixed side would pay 3.67% on \$15 million, which amounts to \$550,500

Semiannual fixed rate on the EUR leg of swap = 2.76%

Notional principal in EUR = \$15 million ÷ \$1.2/€ = €12.5 million

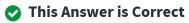
The pay \$ fixed side would receive 2.76% on €12.5 million, which amounts to €345,000.

iv.

Given a notional principal of \$15 million, the cash flows at t = 180 for the pay \$ floating, receive € floating side of the swap would *most likely* be:

- Pay \$930,000 and receive €625,000.
- Pay \$465,000 and receive €312,500.
- Pay \$465,000 and receive €375,000.

Rationale



Floating rate payment based on LIBOR:

$$= ext{NP in USD} imes ext{L}_0(180) \ = \$15,000,000 imes 0.062 imes (180/360) = \$465,000$$

Floating rate payment based on Euribor:

= NP in EUR ×
$$E_0(180)$$

= €12,500,000 × 0.05 × (180/360) = €312,500

The pay \$ floating would pay \$465,000 and receive €312,500.

٧.

Given that the exchange rate on Day 60 of the swap is \$1.1/€, the value of the swap to the pay \$ fixed and receive € fixed side of the swap is *closest to*:

- \$53,661.60
- \$1,309,836.30
- \$2,566,011.00

Rationale

This Answer is Correct

USD

$$egin{aligned} B_{60}(120) &= 0.9778 \ B_{60}(300) &= 0.9382 \ Sum &= 1.916 \ PSFR_{USD} &= 0.0367 \end{aligned}$$

EUR

$$egin{aligned} &B_{60}(120)=0.9810 \ &B_{60}(300)=0.9516 \ ∑=1.9326 \ &PSFR=0.0276 \end{aligned}$$

$$\begin{split} V &= NA_{PC} \times (PSFR_{PC} \times Sum \ of \ PV \ factors \ of \ remaining \ coupon \ payments_t + PV \ factor \ fo \\ V &= \$15m \times (0.0367 \times 1.916 + 0.9382) - (\$1.1/\textcircled{1}.5m) \times (0.0276 \times 1.9326 + 0.9516) \\ &= \$15,127,758 - 13,817,921.7 = \$1,309,836.30 \end{split}$$

>

L2R40PQ-BS001-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: easy

Consider the following statements:

Statement 1: The price of a forward commitment fluctuates in response to changes in the price of the underlying through the term of the contract.

Statement 2: Typically, no money changes hands at forward contract initiation.

Which of the following is most likely?

- Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale



The **value** of a forward commitment fluctuates in response to changes in the price of the underlying through the term of the contract. The price is fixed at initiation of the contract.

Statement 2 is correct for most forward contracts.

L2R40PQ-BS003-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: medium

Consider the following statements:

Statement 1: All other things remaining the same, the value of a futures contract during its life will be the same as the value of an otherwise identical forward contract. **Statement 2**: Carrying benefits result in a decrease in the forward price.

Which of the following is most likely?

- Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale



Futures contracts are marked to market, so the value of a futures contract will typically be different from the value of an otherwise identical forward contract. The value of a futures contract equals zero once it has been marked to market.

L2R40PQ-ITEMSET-BS016-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Use the following information to answer the next 3 questions:

An investor wishes to purchase a particular stock in 225 days. The stock is currently selling for \$50. It is expected to pay a dividend of \$0.80 in 50 days, a \$0.75 dividend in 120 days, and a \$0.70 dividend in 240 days. To hedge the interim price risk, the investor takes the long position on the forward contract on the stock today. The risk-free rate equals 5%.

i.

The present value of the dividends to be paid on the stock during the term of the forward contract is *closest to*:

- \$1.53
- 0 \$1.56
- 0 \$2.21

Rationale



$$\gamma_0 = 0.80/(1.05)^{50/365} + 0.75/(1.05)^{120/365} = \$1.53$$

ii.

The no-arbitrage forward price at which the investor would enter the contract is *closest to*:

- \$48.47
- \$49.95
- \$49.25

Rationale

This Answer is Correct

$$F_0(225/365) = (50 - 1.53) \times (1.05)^{225/365} = \$49.95$$

iii.

Given that 75 days into the term of the forward contract the stock price is \$45, the value of the long position in the forward contract is *closest to*:

- \$3.94
- \$4.80
- -\$4.70

Rationale

This Answer is Correct

Since we are now 75 days into the contract (t = 75/365), the first dividend worth \$0.80 has already been paid. The \$0.75 dividend is still to be paid (in another 45 days).

$$\gamma_{
m t} = 0.75/(1.05)^{45/365} = 0.7455$$

The forward price of a contract initiated at t = 75 for expiration at t = 225 is computed as:

$$\mathrm{F}_{75/225}(225) = (45-0.7455) \quad (1+0.05)^{225/365-75/365} = \$45.1508$$

Now we can compute the value of the forward contract as the present value of the differences in forward prices:

$$\begin{split} V_t(T) &= PV_{t,T} & \quad [F_t(T) - F_0(T)] \\ &= (\$45.1508 - \$49.95)/(1 + 0.05)^{225/365 - 75/365} = -\$\textbf{4.70} \end{split}$$

L2R40PQ-ITEMSET-BS013-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: easy

Use the following information to answer the next 3 questions:

Jill Prady wishes to purchase a security in 9 months that is currently worth \$95. To hedge against possible increase in price, she decides to take the long position on a forward contract on the security that expires in 9 months. The risk-free rate is given as 4%.

i.

The no-arbitrage forward price of the contract is *closest to*:

- \$98.80
- \$97.84
- \$95.94

Rationale

This Answer is Correct

$$\mathrm{F}_0(9/12) = 95 imes (1.04)^{9/12} = \$ 97.84$$

ii.

Given that 5 months into the term of the contract, the spot price of the underlying is \$96, the value of the long position is *closest to*:

- -\$0.57
- -\$0.28
- 0 \$0.28

Rationale

This Answer is Correct

$$V_{5/12}(0,9/12) = 96 - 97.84/(1.04)^{9/12-5/12} = -\$ 0.57$$

We can also compute the value of the position as the present value (PV) of the difference in forward prices.

$$F_{5/12}(9/12) = \$96 \times (1+0.04)^{9/12-5/12}$$

$$F_{5/12}(9/12) = \$97.2633$$

$$\begin{split} V_t(T) &= PV_{t,T} & [F_t(T) - F_0(T)] \\ V_{5/12}(9/12) &= (97.2633 - 97.84)/(1 + 0.04)^{9/12 - 5/12} \\ V_{5/12}(9/12) &= -\$\textbf{0.57} \end{split}$$

iii.

If at contract maturity the spot price of the underlying asset is actually \$100, the overall gain or loss to Jill on the forward position is *closest to*:

- O \$7.16
- \$2.16
- -\$2.84

Rationale

This Answer is Correct

As calculated in part I, the original forward price is $$95(1.04)^{(9/12)} = 97.84$.

Gain on the long forward = Underlying price at delivery – Original forward price = \$100 – \$97.84 = \$2.16

L2R40PQ-ITEMSET-BS033-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: medium

Use the following information to answer the next four questions:

A U.K.-based importer of goods from Switzerland expects the value of the Swiss franc to increase against the pound over the next 60 days. The importer will be making payment on the shipment of imported goods in 60 days and wants to hedge his currency exposure. The U.K. risk-free rate is 5% and the Swiss risk-free rate is 3.2%. These rates are expected to stay the same over the next 4 months. The current spot rate is 1.75 GBP/CHF.

i.

The U.K.-based importer will most likely.

- Buy Swiss francs forward.
- Sell Swiss francs forward.
- Not enter into any forward contract.

Rationale



The risk to the U.K. entity is that the value of the Swiss franc will increase over the 60-day period, and since it has to make a payment in CHF, it would buy CHF forward.

ii.

The no-arbitrage forward price at which the importer would enter into the 60-day forward contract is *closest to*:

- 1.720 GBP/CHF
- 1.745 GBP/CHF
- 1.755 GBP/CHF

Rationale

This Answer is Correct

$$\mathrm{F_0(T)} = \left[rac{1.75}{(1.032)^{60/365}}
ight] (1.05)^{60/365} = extbf{1.755}$$

iii.

Twenty days into the contract, the spot rate is 1.78 GBP/CHF and the interest rates have remained unchanged. The value of the forward contract is *closest to*:

- 0.0282 GBP/CHF
- 0.0315 GBP/CHF
- 0.0630 GBP/CHF

Rationale

This Answer is Correct

$$\begin{split} F_{20/365,PC/BC} &= \frac{s_{20,PC/BC}}{(1+r_{BC})^T} \times (1+r_{PC})^T \\ F_{20/365,PC/BC} &= 1.78 \times (1.05/1.032)^{60/365-20/365} \\ &= GBP\,1.7834/\,CHF \\ V_{20/365}(60/365) &= (F_{t,PC/BC} - F_{0,PC/BC})/(1+r_{PC})^{T-t} \\ V_{20/365}(60/365) &= (1.7834-1.755)/(1+0.05)^{60/365-20/365} \\ &= \textbf{0.0282\,GBP}\,/\,\textbf{CHF} \end{split}$$

iv.

If, at expiration of the forward contract, the spot rate is actually 1.73 GBP/CHF, the value of the forward contract to the importer is *closest to*:

- 0 +0.020 GBP/CHF
- -0.015 GBP/CHF
- -0.025 GBP/CHF

Rationale

This Answer is Correct

$$V_0(T) = 1.73 - 1.755 = -0.025$$

L2R40PQ-BS038-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts Difficulty: easy

An investor plans to enter into a 120-day forward contract on the S&P 500 index. The current value of the index is 2,121. Given a continuously compounded risk-free rate of 1.5% and a continuously compounded dividend yield of 0.75%, the no-arbitrage price of the forward contract assuming a 365-day year is *closest to*:

- 0 2,115.78
- 2,126.18
- 2,126.24

Rationale

This Answer is Correct

$$\begin{split} F_0(T) &= S_0 \times e^{(rc-\gamma c)T} \\ F_0(120/365) &= 2{,}121 \times e^{(0.015-0.0075)\times 120/365} = \textbf{2,126.24} \end{split}$$

L2DRR40-TB005-1610

LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: medium

Assume an investor wants to enter into a 160-day forward contract on the S&P 500 index and the continuously compounded risk-free rate is 5%. Which of the following continuously compounded dividend rates would most likely produce the highest value for the forward contract?

- 1%
- O 2%
- 3%

Rationale



This Answer is Correct

Given that the equation for valuing a forward contract on an equity index is $F_0(T) = S_0 \times e^{(rc-t)}$ $^{\mathrm{yc})\mathrm{T}}$, a dividend rate of 1% would produce the highest value; that is, (rc – yc) becomes a smaller value the higher the dividend rate assumed.

L2R40PQ-BS043-1609

LOS: LOS-9233 LOS: LOS-9234

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Difficulty: easy

Which of the following is *least likely* regarding plain-vanilla interest rate swaps?

- Periodic settlement payments are netted.
- There is no exchange of notional principal.
- There is no element of counterparty credit risk.

Rationale



This Answer is Correct

Interest payments are not exchanged in full at each settlement date. Interest payments are netted, and the party that owes more in interest at a particular settlement date makes a payment equal to the difference to the other.

There is no exchange of notional principal at initiation or expiration of the swap. The notional principal is simply used to determine the interest payment on each leg of the swap.

As with forward contracts, there is an element of counterparty credit risk in swaps, as the party that owes the lower amount can default.

L2R40PQ-BS037-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: medium

Consider the following statements:

Statement 1: If the forward rate is higher than the spot rate, it means that the price-currency risk-free rate is lower than the base-currency risk-free rate.

Statement 2: In bond futures contracts, the cheapest-to-deliver (CTD) option favors the long position.

Which of the following is *most likely*?

- Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale



If the forward rate is higher than the spot rate, it means that the price-currency risk-free rate is higher than the base-currency risk-free rate.

The conversion factor adjustment typically does not make all deliverable bonds exactly equal in value, so the option to deliver the cheapest-to-deliver bond favors the short position.

L2DRR40-TB004-1610

LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: medium

Suppose the price of an underlying asset is \$300 and the risk-free rate is 6%. If you were to calculate the no-arbitrage price of forward contracts on this asset, which of the following would *most likely* have the highest price?

- Three-month contract
- Six-month contract
- Nine-month contract

Rationale



Given that the equation to calculate the no-arbitrage price of a forward contract is $F_0(T) = S_0(1+r)^T$, the contract with the longest maturity date will have the highest value; that is, $(1+r)^T$ is the highest for a nine-month contract.

L2DRR40-TB003-1610

LOS: LOS-9231

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: medium

The value of the long position in a currency forward contract at any time prior to maturity can *most likely* be calculated as which of the following?

- The future value of the difference in foreign exchange forward prices.
- The current value of the difference in foreign exchange forward prices
- The present value of the difference in foreign exchange forward prices

Rationale

This Answer is Correct

The value of the long position in a currency forward contract at any time prior to maturity can be calculated as the present value of the difference in foreign exchange forward prices.

L2R40PQ-BS006-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Difficulty: hard

Consider the following statements:

Statement 1: The long position in an FRA can be viewed as the party that has committed to take a hypothetical loan at the fixed FRA rate.

Statement 2: If LIBOR at FRA expiration is lower than the FRA rate, the short benefits, as it has taken the pay fixed/receive floating side of the contract.

Which of the following is most likely?

- Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale



Statement 1 is correct. The long position in an FRA can be viewed as the counterparty that has committed to take a hypothetical loan, and the short can be viewed as the party that has committed to give out a hypothetical loan, at the fixed FRA rate.

Statement 2 is only partially correct. If LIBOR at FRA expiration is lower than the FRA rate, the short benefits. Effectively, the short position is able to invest funds at higher-than-market interest rates, while the long is obligated to take a loan at higher-than-market interest rates. The short benefits as the fixed receiver and floating payer.

L2DRR40-TB009-1610

LOS: LOS-9234

Lesson Reference: Lesson 2: Pricing and Valuation of Swap Contracts

Difficulty: medium

Annualized Libor spot rates for the 90, 180, 270, and 360 days are 3%, 4%, 5%, and 6%, respectively. The annualized fixed rate on a one-year, quarterly-pay, plain-vanilla interest rate swap is *closest* to which of the following?

- 0 4.62%
- 05.00%
- 5.88%

Rationale

This Answer is Correct

To calculate the annualized fixed rate on the swap, we first need to compute present value factors based on the current term structure of interest rates.

$$B_0(90) = 1/1 + (0.03 * (90/360)) = 0.993$$

$$B_0(180) = 1/1 + (0.04 * (180/360)) = 0.980$$

$$B_0(270) = 1/1 + (0.05 * (270/360)) = 0.964$$

$$B_0(360) = 1/1 + (0.06 * (360/360)) = 0.943$$

Then we apply the equation for the quarterly swap fixed rate:

$$\mathrm{Swap}\,\,\mathrm{fixed}\,\mathrm{rate} = \left\lceil \frac{1 - \mathrm{B}_{0}\left(\mathrm{N}\right)}{\mathrm{B}_{0}\left(1\right) + \mathrm{B}_{0}\left(2\right) + \mathrm{B}_{0}\left(3\right) + \ldots + \mathrm{B}_{0}\left(\mathrm{N}\right)} \right\rceil \times 100$$

Quarterly swap fixed rate = [(1 - 0.943) * 100]/(0.993 + 0.980 + 0.964 + 0.943) = 1.47%

Annualised fixed rate = $1.47\% \times (360/90) = 5.88\%$

L2R40PQ-ITEMSET-BS026-1609

LOS: LOS-9231 LOS: LOS-9232

Lesson Reference: Lesson 1: Pricing and Valuation of Forward and Futures Contracts

Use the following information to answer the next 4 questions:

An investment manager wants to hedge against a possible decline in interest rates. She therefore plans to take a short position on an FRA that expires in 60 days, based on a 150-day Euribor. The current term structure for Euribor is as follows:

Term (Days) Euribor (%)

60 days 6% 210 days 7.25%

i.

The FRA that the investment manager has *most likely* committed to is a:

- 2 × 7 FRA
- 2 × 5 FRA
- 7 × 2 FRA

Rationale

This Answer is Correct

FRAs are quoted as " $x \times y$ "; "x" represents the number of months until the FRA expires, and "y" equals the number of months until the hypothetical loan matures, starting from the date of inception of the FRA. This manager has likely committeed to a 2 × 7 FRA.

ii.

The price of an FRA expiring in 60 days based on the 150-day Euribor is closest to:

- 0 1.01%
- 2.83%
- 7.67%

Rationale

This Answer is Correct

$$ext{FRA price} = \left[\left[rac{1 + 0.0725 \left(rac{210}{360}
ight)}{1 + 0.06 \left(rac{60}{360}
ight)} - 1
ight] \left[\left(rac{360}{150}
ight) = ext{7.67} \%$$

Suppose that 40 days into the term of the FRA, 20-day Euribor is 6.45% and 170-day Euribor is 7.70%. Given a notional principal of \$20 million, the value of the short position on the FRA is *closest to*:

- \$4,951.52
- = \$13,292.59
- \$4,951.52

Rationale

This Answer is Correct

The annualized rate applicable on a 150-day loan 20 days from today equals:

$$\left[\left[rac{1+0.077\left(rac{170}{360}
ight)}{1+0.0645\left(rac{20}{360}
ight)} - 1
ight]$$
 | $\left(rac{360}{150}
ight) = 7.84\%$

The value of the FRA equals:

$$\frac{20,\!000,\!000 \times [0.0784 - 0.0767] \left(\frac{150}{360}\right)}{1 + \left\lceil 0.077 \times \left(\frac{170}{360}\right) \right\rceil} = \$13,\!292.59$$

Since the manager is short on the FRA, the value of the FRA for her is negative 13,292.59.

iv.

Assume that at FRA expiration, 150-day Euribor is actually 7.50%. Given a notional principal of \$20 million, the *value* of the short position is *closest to*:

- \bigcirc -14,166.67
- 14,001.40
- -14,001.40

Rationale

This Answer is Correct

At expiration, the payoff based on notional principal of \$20 million is:

$$rac{20,000,000 imes \left[0.075 - 0.0767
ight] \left(rac{150}{360}
ight)}{1 + \left[0.075 imes \left(rac{150}{360}
ight)
ight]} = -\$14,001.40$$

The value of the short position would be positive 14,001.40.