CHAPTER 30

PRICING AND VALUATION OF FORWARD COMMITMENTS

1. (B) Currency swap.

Explanation

Notional principal is typically exchanged at initiation of a currency swap, but not in an interest rate swap or equity swap.

(Module 30.7, LOS 30.f)

Related Material

SchweserNotes - Book 4

2. (A) 1091

Explanation

The no-arbitrage price of a futures contract is based on the spot rate, the time to maturity, and the risk-free-rate.

$$FP = S_0 \times (1+R_f)^T$$

$$= 990(1.05)^2$$

$$= 1091$$

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

3. (C) 4.4477%.

Explanation

$$\frac{\left(1-\frac{1}{1.045}\right)}{\left(\frac{1}{1+0.042\left(\frac{180}{360}\right)}+\frac{1}{1+0.045\left(\frac{360}{360}\right)}\right)}$$

= 0.022239 x 2

= 4.4477%

(Module 30.8, LOS 30.g)

Related Material

SchweserNotes - Book 4

4. (B) **5.65%.**

Explanation

The fixed rate on the swap is:

$$= \frac{1-\frac{1}{1+0.06(3)}}{\frac{1}{1.05}+\frac{1}{1+0.055(2)}+\frac{1}{1+0.06(3)}}$$

$$= \frac{1-0.8475}{0.9524+0.9009+0.8475}$$

= 0.1525 / 2.7008 = 0.0565

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

5. (B) **does not change.**

Explanation

The price of a swap, quoted as the fixed rate in the swap, is determined at contract initiation and remains fixed for the life of the swap.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

6. (B) **5.318%.**

Explanation

The present values of 1 euro received in 180 days and 1 euro received in 360 days are:

1/(1 + 0.048 + (180/360)) = 0.9766 and 1/1.054 = 0.9488

The fixed rate in euros is (1 – 0.9488) / (0.9766 + 0.9488)

= 0.026592 x (360/180) = 5.318%.

The notional principal is 100,000/1.30 = 76.923 euros.

(Module 30.7, LOS 30.f)

Related Material

SchweserNotes - Book 4

7. (C) **the price that makes the values of the long and short positions zero at contract initiation.**

Explanation

The forward price is the contract price of the underlying asset under the terms of the forward contract, and is the price that makes the values of the long and short positions zero at contract initiation. It is not the amount it costs to purchase the forward contract. The forward price is expressed in terms of the underlying asset, and may be a dollar value, exchange rate, or interest rate. The value of a forward contract comes from the difference between the forward contract price and the market price for the underlying asset. These values are likely to be different at contract termination, which will result in a profit for either the long or the short position.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

8. (C) **$1,270.54.**

Explanation

$FP = 1{,}260 \times e^{(0.054 - (0.035) \times (160/365))} = 1{,}270.54$

(Module 30.2, LOS 30.a)

Related Material

SchweserNotes - Book 4

9. (C) **is determined at contract initiation.**

Explanation

The price of a forward contract is established at the initiation of the contract and is expressed in different terms, depending on the underlying assets. It is the price that makes the contract value zero, and depends on current interest rates through the cost-of-carry calculation.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

10. (C) **1,001.84.**

Explanation

The forward price is calculated as the bond price minus the present value of the coupon, times one plus the risk-free rate for the term of the forward.

$\left(1{,}000 - 35/1.05^{182/365}\right)1.05^{9/12} = \$1{,}001.84$

(Module 30.3, LOS 30.d)

Related Material

SchweserNotes - Book 4

The Isle of Nefer is a developing country with its stock and futures markets enjoying record trading volumes due to the influx of foreign funds. You are looking to invest in the stock and futures markets in the Isle of Nefer. The representative stock market index, Nefer Industrial Index (NII), is currently priced at 8,765 and the one year NII future contract is currently trading at 8,920.

You have experience in using forward contracts but not futures. You discuss the possibility of investing in the Isle of Nefer using futures contract with your supervisor, Peter Filler, and he makes the following comments.

Comment 1:	"A futures contract will have positive value after marking to market if the future price is up on that day."
Comment 2:	"Given a quoted clean bond price of the CTD, when looking at a bond future the full price of the bond must be used which equals the clean price of the bond plus accrued interest. The futures price can then be calculated as: QFP = $\{(\text{full price}) \times (1 + R_f)^T + AI_T - FVC\}(1 / CF)$ Where AI_T = accrued interest at futures maturity, R_f = risk-free rate, FVC = future value of coupon and CF = conversion factor

Peter Filler also suggests that you invest in Treasury bond futures. Exhibit 1 contains the relevant information.

Exhibit 1

Price of underlying deliverable 16 year 5% Treasury bond (just paid coupon)	$1,030
Expiration of Treasury bond futures contract	0.7 year
Conversion factor	1.08
Risk free rate	3.0 percent

11. (A) **The futures price will converge to the future spot index price, with the basis reducing to zero.**

Explanation

The futures price will converge to the spot price over the lifetime of the contract, with the basis (difference between future and spot) reducing over this period to zero as an expiring futures contract is the same as a spot transaction. At expiration the futures and spot price will converge to prevent an arbitrage opportunity. Answer B is wrong, as it implies the future price will move in a straight line.

(Module 30.3, LOS 30.d)

Related Material

SchweserNotes - Book 4

12. (C) **incorrect as the value of the futures contract should be zero after marking to market.**

Explanation

The value of a futures contract will reset to zero after marking-to-market.

(Module 30.3, LOS 30.d)

Related Material

SchweserNotes - Book 4

13. (C) **incorrect as the accrued interest at expiration should be deducted from the future value of full bond price in arriving at the quoted futures price.**

Explanation

The quoted (clean) price of the futures contract is the future value of the full price of the cheapest to deliver bond less accrued interest (since last coupon) and the future value any coupon payment received during the life of the contract and then adjusted for the appropriate conversion factor.

QFP = {(full price) x $(1 + R_f)^T - AI_T$ – FVC)(1 / CF)

(Module 30.3, LOS 30.d)

Related Material

SchweserNotes - Book 4

14. (A) **$941.**

Explanation

An investor of the Treasury bond will receive one semi-annual coupon in 0.5 years from now (or 0.2 years before maturity). At expiration of the futures contract, the CTD bond will have 0.2 years of accrued interest.

$$\text{FV of coupon (FVC)} = \$25 \times 1.03^{(0.7-0.5)} = \$25.15$$

$$AI_T = 0.2 / 0.5 \times \$25 = \$10$$

$$QFP = \{(\text{full price}) \times (1 + R_f)^T - AI_T - FVC)(1/CF)$$

$$= [\$1030(1.03)^{0.7} - 10 - 25.15](1 / 1.08)$$

$$= \$941.10$$

(Module 30.3, LOS 30.d)

Related Material

SchweserNotes - Book 4

15. (B) **is the settlement price for the underlying asset.**

Explanation

The price of a forward contract is the price of the underlying asset that the long will pay to the short at settlement (for a deliverable contract). The value of a forward contract comes from the difference between the forward contract price and the market price for the underlying asset. This difference between price and value is a key concept to understand. A forward contract has only one price, which applies to both the long and to the short.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

16. (C) **A strip of three forward rate agreements, which obligates the party to pay a fixed rate of 6% and receive six-month MRR on a notional principal of $100,000,000.**

Explanation

In an interest rate swap, the first payment is known with certainty and will be made at month 6. The determination dates for the floating rate will be at months 6, 12, and 18 and the corresponding payment dates will be at months 12, 18, and 24. These correspond to the three forward rate agreements.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

Elodie Brodeur works in the finance department of a large fashion house in France. The international catwalk season will start in two months' time and Brodeur has worked out that the company will need a 3-month loan of €4m in two months' time. The company's lenders are typically retail banks offering loans at MRR plus 40 basis points. Brodeur is concerned that interest rates may rise during the next two months and wants to use a FRA to lock-in the borrowing cost. Brodeur has collected the rate information shown in Exhibit 1.

Exhibit 1: Current MRR Rates

60 day MRR	2.0%
90 day MRR	2.4%
150 day MRR	2.6%
210 day MRR	2.9%

One month after the initiation of the FRA the MRR rates are shows in Exhibit 2.

Exhibit 2: MRR Rates One Month Later

30 day MRR	1.8%
90 day MRR	2.5%
120 day MRR	2.8%
180 day MRR	3.0%

At the expiration of the FRA, 90-day MRR is 3.4%.

17. (A) **A short FRA can be used to lock into a fixed rate of borrowing commencing in two months' time and expiring in five months' time.**

Explanation

A long FRA will create the obligation to pay fixed and receive floating from months 2 to month 5. The floating payments will offset her bank loan leaving her with a pay fixed obligation, where the fixed rate is determined today.

The floating receipt on the FRA and the floating payment on the loan she will need to take out will offset leaving a net payment of 40 basis points. Overall, she will now pay the fixed rate on the swap plus the 40 basis points on the loan.

The use of a long FRA will lock Elodie into paying fixed interest rate on the FRA (the FRAs forward price) plus the basis points on her loan above MRR. Elodie will no longer benefit from interest rate declines but will be protected from interest rises.

(Module 30.4, LOS 30.c)

Related Material

SchweserNotes - Book 4

18. (C) 3.0%.

Explanation

Step 1: Identify the correct MRR rates.

We will require the MRR rate until FRA expiry (day 60) and also the MRR rate at the end of the borrowing/lending period (day 150).

The 90-day MRR rate is a distractor. Elodie will borrow for 90 days but not from current date (T0). Elodie requires a 90-day loan commencing in 60 days' time.

Step 2: Unannualize the quoted rates.

$$\text{MRR60 day} = 2\% \times \frac{60}{360} = 0.3333\%$$

$$\text{MRR150 day} = 2.6\% \times \frac{150}{360} = 1.0833\%$$

Step 3: Compute the annualized forward price (fixed rate) starting in 60 days and lasting for 90 days.

Forward rate = ((1 + long rate) / (1 + short rate) – 1)(360 / 90) = 2.99%

(Module 30.4, LOS 30.c)

Related Material

SchweserNotes - Book 4

19. (A) +€2,300.

Explanation

The value of a FRA before expiry can be calculated by comparing the fixed rate on the original FRA to the fixed rate on a new FRA covering the same borrowing and lending period.

Step 1: Identify the correct MRR rates.

After 1 month has passed there is now 1 month until the original FRAs expiry and 4 months to the end of the borrowing and lending period. So we will require 30 day and 120 day MRR (i.e., (1 x 4) FRA price)

Step 2: Unannualize rates.

$$\text{MRR30 day} = 1.8\% \times \frac{30}{360} = 0.15\%$$

$$\text{MRR120 day} = 2.8\% \times \frac{120}{360} = 0.9333\%$$

Step 3: Compute the fixed rate (forward price) on a new FRA with the same expiry as the original FRA.

Forward rate = ((1 + long rate) / (1 + short rate) – 1)(360 / 90) = 3.1286%

Step 4: Compute the gain/(loss) on FRA at the end of the borrowing/ lending period.

Gain to long = (new fixed rate – original fixed rate)(day/360) (national)

= (0.0313 – 0.029) (90/360) (4m) = 2,300

Step 5: Discount the gain/(loss) from the end of borrowing and lending to the valuation date (120 days).

$$\frac{€2{,}300}{1.009333} = €2{,}278$$

(Module 30.4, LOS 30.c)

Related Material

SchweserNotes - Book 4

20. (A) €4,958.

Explanation

Step 1: Compute gain/(loss) at end of borrowing and lending period.

$$(\text{floating rate} - \text{fixed rate}) \left(\frac{90}{360}\right) (\text{notional principal})$$

$$(0.034 - 0.029) \left(\frac{90}{360}\right) (€4m) = €5{,}000$$

Step 2: Discount the gain/(loss) back to FRA expiry (90 days).

$$MRR90\ day = 3.4\% \times \frac{90}{360} = 0.85\ \%$$

$$\frac{€5{,}000}{1.0085} = €4{,}958$$

(Module 30.4, LOS 30.c)

Related Material

SchweserNotes - Book 4

21. (C) **$11,500.**

Explanation

CDN principal = 1,000,000/0.83 = CDN 1,204,819.

CDN payments = (0.053/2) x 1,204,819 = CDN 31,928.

USD payment = 1,000,000 x (0.0552/2) = USD 27,600

Value of CDN payments = 31,928 x 0.98814 + (1,204,819 + 31,928) x 0.96108 = CDN 1220162

Value in USD = 1220162 x 0.84 = USD 1,024,936.

Value of USD payments = 27,600 x 0.98717 + 1,027,600 x 0.95969 = USD 1,013,423

Value to USD interest payer = $1,024,936 – $1,013,423 = $11,513

(Module 30.7, LOS 30.f)

Related Material

SchweserNotes - Book 4

22. (B) **is typically zero regardless of the price of the underlying asset.**

Explanation

Due to the no-arbitrage principle, the price of a forward contract is calculated to make the value of the contract zero at contract initiation. Neither the long nor the short typically makes any payment to enter into the forward agreement. A special case is an off-market forward where, for whatever reason, the contract price is not set equal to the no-arbitrage price, and the long or short position makes a payment to the opposite counterparty to offset the difference.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

23. (A) **coupon rate on a 2-year par bond with the same credit risk as the reference rate.**

Explanation

The fixed-rate on a swap is calculated using the yield curve for the floating rate reference. Therefore, the fixed rate reflects the credit spread of that rate over the riskless rate of return.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

24. (A) equal to the futures price at futures expiration.

Explanation

The difference between the spot and the futures price must be zero at expiration to avoid arbitrage.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

25. (C) pay C$1,428,571 at the beginning of the swap.

Explanation

The party that is entering the swap to hedge existing exposure to C$-denominated fixed-rate liability will want to receive-fixed C$. They will pay 1,000,000/0.7 = C$1,428,571 (principal) at swap inception (in exchange for USD 1 million) and get the same amount (C$1,428,571) back at termination (in exchange for paying back the USD 1 million).

(Module 30.7, LOS 30.f)

Related Material

SchweserNotes - Book 4

26. (A) -$58,114.

Explanation

Sum of the discount factors for the three settlement dates remaining (180.360 and 540 days away) = 0.98522 + 0.96899 + 0.95148 = 2.9057

Value to payer = 2.9057 x [(0.034 –0.038)/2] × $10million = -$58,114

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

27. (B) 2-month implied forward rate 3 months from today.

Explanation

The notation for FRAs is unique. There are two numbers associated with an FRA: the number of months until the contract expires and the number of months until the underlying loan is settled. The difference between these two is the maturity of the underlying loan. For example, a 3 x 5 FRA is a contract that expires in three months (90 days), and the underlying loan is settled in five months (150 days). The price of the 3 x 5 FRA is calculated by annualizing the implied forward rate. The implied forward rate is calculated from the 3-month rate and the 5-month rate.

(Module 30.4, LOS 30.c)

Related Material

SchweserNotes - Book 4

28. (B) fixed rate of interest.

Explanation

The price of an interest rate swap is quoted as the rate on the fixed-rate payments. The floating rate is a known reference rate but does not need to be quoted.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

29. (B) 5.4234%.

Explanation

$$\frac{\left(1-\frac{1}{1.055}\right)}{\left(\frac{1}{1+0.052\left(\frac{180}{360}\right)}+\frac{1}{1+0.055\left(\frac{360}{360}\right)}\right)}$$

= 0.027117 x 2

= 5.4234%

(Module 30.8, LOS 30.g)

Related Material

SchweserNotes - Book 4

30. (B) off-market FRAs.

Explanation

Since the fixed rate on the swap is the same at every settlement date, a series of FRAs at those fixed rates will have values that differ from zero to the extent the fixed rate and the zero-value rate differ. This makes them off-market FRAs.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

31. (A) U.S. pays firm F 160.000 FC units.

Explanation

Firm U.S. pays fixed 4% on FC = 0.04 x $2,000,000 x 2 FC units per $1 = 160,000 FC units.

(Module 30.6, LOS 30.f)

Related Material

SchweserNotes - Book 4

32. (C) **the difference between the spot price and the present value of the forward price of the underlying asset.**

Explanation

The value of a forward contract on an asset with no cash flows during its term is equal to spot – (forward price) / $(1 + R_f)^t$), the difference between the spot price and the present value of the forward price of the underlying asset.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

33. (A) **an equity swap as the equity return payer.**

Explanation

By entering an equity swap as the equity return payer, the manager can protect the portfolio value from a short-term decline in equity prices while keeping ownership of the equities for the longer term. A short straddle costs the investor when the price of the underlying moves up or down.

(Module 30.1, LOS 30.g)

Related Material

SchweserNotes - Book 4

34. (A) **7.63%.**

Explanation

A 1x4 FRA is a 90-day loan, 30 days from today.

The actual rate on the 30-day loan is: R30 = 0.05 x 30/360 = 0.004167

The actual rate on the 120-day loan is: R120 = 0.07 x 120/360 = 0.02333

FR (30,90) = [(1+ R120)/(1+ R30)] – 1 = (1.023333/1.004167) – 1 = 0.0190871

The annualized 90-day rate = 0.0190871 x 360/90 = .07634 = 7.63%

(Module 30.4, LOS 30.c)

Related Material

SchweserNotes - Book 4

35. (A) **receive a net payment greater than the loss of value on the equity portfolio.**

Explanation

The equity return payer will receive the periodic interest payment and "pay" the negative return on the portfolio, resulting in a net payment to the equity return payer that is greater than the loss on the equity portfolio.

(Module 30.8, LOS 30.g)

Related Material

SchweserNotes - Book 4

36. (A) **zero.**

Explanation

A market-rate swap is priced so that the value to either side is zero at the inception of the swap.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

37. (B) **a series of short FRAs.**

Explanation

The floating-rate payer has a liability/gain when rates increase/decrease above the fixed contract rate; the short position in an FRA has a liability/gain when rates increase/decrease above the contract rate.

(Module 30.5, LOS 30.c)

Related Material

SchweserNotes - Book 4

38. (B) **equal to the difference between the price of a newly issued contract and the settle price at the most recent mark-to-market period.**

Explanation

Between the mark-to-market account adjustments, the contract value is calculated just like that of a forward contract; it is the difference between the price at the last mark-to-market and the current futures price, (i.e. the futures price on a newly issued contract). The mark-to-market of a futures contract is the payment or receipt of funds necessary to adjust for the gains or losses on the position. This adjusts the contract price to the 'no-arbitrage' price currently prevailing in the market.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

39. (C) **short interest-rate puts and long interest-rate calls.**

Explanation

The fixed-rate payer has profits when short rates rise and losses when short rates fall, equivalent to writing puts and buying calls.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

40. (A) short the asset, invest at the risk-free rate, and buy the futures.

Explanation

If the futures price is too low relative to the no-arbitrage price, buy futures, short the asset, and invest the proceeds at the risk-free rate until contract expiration. Take delivery of the asset at the futures price, pay for it with the loan proceeds and keep the profit. For Treasury bill (T-bills), shorting the asset is equivalent to borrowing at the T-bill rate.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

41. (A) -$15,154.

Explanation

FRAs are entered in to hedge against interest rate risk. A person would buy a FRA anticipating an increase in interest rates. If interest rates increase more than the rate agreed upon in the FRA (5% in this case) then the long position is owed a payment from the short position.

Step 1: Find the forward 90-day MRR 60-days from now.

[(1 + 0.054(150 / 360)) / (1 + 0.05(60 / 360)) - 1](360 / 90) = 0.056198. Since projected interest rates at the end of the FRA have increased to approximately 5.6%, which is above the contracted rate of 5%, the short position currently owes the long position.

Step 2: Find the interest differential between a loan at the projected forward rate and a loan at the forward contract rate.

(0.056198 - 0.05) x (90 / 360) = 0.0015495 x 10,000,000 = $15,495

Step 3: Find the present value of this amount 'payable' 90 days after contract expiration (or 60 + 90 = 150 days from now) and note once again that the short (who must 'deliver' the loan at the forward contract rate) loses because the forward 90-day MRR of 5.6198% is greater than the contract rate of 5%.

[15,495 / (1 + 0.054(150 / 360))] = $15,154.03

This is the negative value to the short.

(Module 30.5, LOS 30.c)

Related Material

SchweserNotes - Book 4

42. (C) **being the fixed-rate payer in an interest rate swap.**

Explanation

A short position in interest rate puts will have a negative payoff when rates are below the exercise rate; the calls will have positive payoffs when rates exceed the exercise rate. This mirrors the payoffs of the fixed-rate payer who will receive positive net payments when settlement rates are above the fixed rate.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

43. (A) **6.37%**

Explanation

The price of an FRA is the fixed rate. To determine the FRA's fixed rate, the following formula should be used:

$$\text{FRA price} = \left(\frac{P_{Y_{1+r}}}{P_{X_{1+r}}} - 1\right)\left(\frac{360}{Y-X}\right)$$

$$= \left[\frac{1+.0595\left(\frac{270}{360}\right)}{1+.0565\left(\frac{180}{360}\right)} - 1\right]\left(\frac{360}{90}\right) = 0.0637$$

The FRA's fixed rate would be quoted as 6.37%.

The price of an FRA is given as a rate percentage, never as a dollar amount. (Module 30.4, LOS 30.c)

Related Material

SchweserNotes - Book 4

44. (B) **the price that makes the contract a zero-value investment at initiation.**

Explanation

The contract price can be an interest rate, discount, yield to maturity, or exchange rate. The forward price is the future value of the spot price adjusted for any periodic payments expected from the asset. An example of when the forward price may be less than the spot price is in the case of an equity index contract where the dividend yield is greater than the risk-free rate.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

45. (A) $22,564

Explanation

$$= \frac{982}{985} - \frac{\frac{0.044}{2}}{1+\left(0.046 \times \frac{90}{360}\right)} - \frac{\frac{0.044}{2}}{1+\left(0.048 \times \frac{270}{360}\right)} - \frac{1}{1+\left(0.048 \times \frac{270}{360}\right)}$$

$$= \frac{982}{985} - \frac{0.022}{1.0115} - \frac{0.022}{1.036} - \frac{1}{1.036}$$

= 0.996954 – 0.021750 – 0.021236 – 0.965251

= –0.0112821 x 2,000,000 = –$22,564

–$22,564 is the value to the fixed-rate payer, thus $22,564 is the value to the equity return payer.

(Module 30.8, LOS 30.g)

Related Material

SchweserNotes - Book 4

46. (C) $2,937

Explanation

CHF periodic coupon (per 1 CHF) = 0.048/2 = 0.024

DF for 180 day CHF = 1 / (1 + 0.054 x (180/360)) = 1/1.027 = 0.9737

PV of CHF cash flows (per 1 CHF) = 0.9737 x 1.024 = 0.9971

At the current exchange rate the value is 0.9971 x 0.35 = USD 0.3490

The notional amount is 100,000/0.34 = 294,118 CHF so the dollar value of the CHF payments is 0.3490 x 294,118 = $102,647.

USD periodic coupon (per 1 USD) = 0.05/2 = 0.025

DF for 180 day USD = 1 / (1 + 0.056 x (180/360)) = 1/1.028 = 0.9728

PV of USD cash flows (per 1 USD) = 0.9728 x 1.025 = 0.9971

Value (for notional = $100,000) = 0.9971 x 100,000 = $99,710.

The value of the swap to the dollar payer is 102,647 - $99,710 = $2,937.

(Module 30.7, LOS 30.f)

Related Material

SchweserNotes - Book 4

47. (A) long interest-rate puts and short interest-rate calls.

Explanation

The fixed-rate receiver has profits when short rates fall and losses when short rates rise, equivalent to buying puts and writing calls.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

48. (B) $1,305.22.

Explanation

Coupon = (1,000 x 0.08) / 2 = $40.00

Present value of coupon payment = $\$40.00 / 1.05^{150/365} = \$39.21$

Forward price on the fixed income security =

$(\$1,310 - \$39.21) \times (1.05)^{200/365} = \$1,305.22 = \$1,305.22$

(Module 30.3, LOS 30.d)

Related Material

SchweserNotes - Book 4

49. (C) 947.1.

Explanation

$FP = 876\, e^{(0.07-0.018)1.5} = 947.1.$

(Module 30.2, LOS 30.a)

Related Material

SchweserNotes - Book 4

50. (B) buying a floating-rate bond.

Explanation

Paying fixed and receiving floating in a swap is equivalent to issuing a fixed-rate bond and investing the proceeds in a floating rate bond.

(Module 30.2, LOS 30.e)

Related Material

SchweserNotes - Book 4

51. (A) three put-call combinations expiring on the first three settlement dates of the swap.

Explanation

Interest rate options pay one period after exercise. Options expiring on settlements at t = 1,2,3, will mimic the uncertain swap payments at t = 2,3,4.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

52. (A) –$3,520.

Explanation

For $100 notional, the value of the equity side is (767/760) x $100 = $100.921

Value of the semiannual -pay, fixed rate bond with 3.7% annual coupon

= [100 + 3.7/2] x 0.99157 = $100.9914

Value of pay-fixed side = value of equity - value of fixed rate bond

= $100.921 – $100.9914 – $0.0704 (per $100 notional).

For $5 million notional, value = 50,000 x –0.0704 = –$3,520

(Module 30.8, LOS 30.g)

Related Material

SchweserNotes - Book 4

53. (C) never equal.

Explanation

The price of a swap is the fixed rate specified in the swap and is the same for the payer and the receiver. The value is the dollar value of the contract to the fixed-rate payer and is the opposite of the value to the floating-rate payer.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

54. (A) is the no-arbitrage price.

Explanation

The theoretical price of a forward contract is the future price of the underlying asset imposed by the no-arbitrage conditions. It can be less than the current price of the asset if the cost-of-carry is negative. Accrued interest is paid by the long at delivery under a bond forward, but is not included in the price quote, which is usually in terms of yield to maturity at the settlement date.

(Module 30.6, LOS 30.b)

Related Material

SchweserNotes - Book 4

55. (C) A long position in a EUR bond coupled with the issuance of a USD-denominated floating rate note.

Explanation

A long position in a fixed rate EUR bond will receive fixed coupons denominated in EUR. The short floating rate note requires USD denominated floating-rate payments. Combined, these are the same cash flow as a pay-floating USD receive-fixed EUR currency swap.

(Module 30.7, LOS 30.f)

Related Material

SchweserNotes - Book 4

56. (B) **the difference between the contract price and the market value of the underlying asset.**

Explanation

In a forward contract, the long is obligated to buy, and the short is obligated to sell, the underlying asset at the contract price. The difference between the contract price and the market price of the asset is what gives the contract value. The contract has a positive value at expiration to the long/short only if the contract price is below/above the market price.

(Module 30.1, LOS 30.b)

Related Material

SchweserNotes - Book 4

57. (A) **$49.49.**

Explanation

The present value of expected dividends is:

$\$0.50 / \left(1.05^{30/365}\right) + \$0.60 / \left(1.05^{75/365}\right) = \$1.092$

Future price = $(\$50.00 - 1.092) \times 1.05^{90/365} = \$49.49$

(Module 30.2, LOS 30.a)

Related Material

SchweserNotes - Book 4

58. (C) **$745.76.**

Explanation

The current 90-day forward rate at the settlement date, 20 days from now is:

([1+(0.0615 x 110/360)]/[1+ (0.0605 x 20/360)]–1) x 360/90 = 0.061517

The interest difference on a $2 million, 90-day loan made 20 days from now at the above rate compared to the FRA rate of 6.0% is:

[(0.061517 x 90/360) - (0.060 x 90/360)] x 2,000,000 = $758.50

Discount this amount at the current 110-day rate:

758.50/[1+ (0.0615 x 110/360)] = $745.76

(Module 30.5, LOS 30.c)

Related Material

SchweserNotes - Book 4

Abel Smith works in the Treasury Department of OTS Ltd. OTS is an international construction firm, based in the United States. OTS hopes to raise €100 million through the issuance of a €100 million one-year fixed rate bond but is concerned about the currency risk exposure.

TNA Bank proposed a one year EUR-USD currency swap with semi-annual settlements to OTS to mitigate the exchange rate risk. The notional principal would be €100 million. The bank provides the following information:

Exhibit 1: MRR Spot Rate (annualized)

Days	$ MRR	PV Factors	Days	MRR	PV Factors
180	0.70%	0.9965	180	1.50%	0.9926
360	1.00%	0.9901	360	2.00%	0.9804

Using the information in Exhibit 1, the bank calculates that the currency swap's fixed rates are 0.85% on the USD and 1.75% on the euro.

The term structure of MRR and MRR spot rates three months after the swap initiation is shown in Exhibit 2:

Exhibit 2: MRR Spot Rate (annualized)

Days	$ MRR	PV Factors	Days	MRR	PV Factors
90	0.85%	0.9979	90	1.30%	0.9968
270	1.20%	0.9911	270	2.30%	0.9830

Exhibit 3: Exchange Rates

Time	Exchange Rate	Time	Exchange Rate
Swap initiation	€1: USD1.43	1st settlement date	€1: USD1.55
90 days after swap initiation	€1: USD1.48	2nd settlement date	€1: USD1.55

OTS has an investment portfolio with similar weighting as the S&P500. Smith believes that the U.S. equity market could suffer further declines and OTS could hedge the equity risk using an equity swap. Smith obtained the outlook of the U.S. equity market in Exhibit 4.

Exhibit 4: Performance of S&P500 for the Next Three Quarters

Time	S&P Index Level
Swap initiation	1,190
1st quarter	1,000
2nd quarter	980
3rd quarter	1,050
4th quarter	1,130

Smith is proposing for OTS to be the party paying the equity return on a USD500 million one-year equity swap. OTS will be receiving fixed rate of 1% on a semi-annual basis.

Smith makes two comments:

Comment 1:	A fixed-rate payer in an equity swap would not have to pay more than the fixed rate each period.
Comment 2:	Compared to an interest rate swap, the first payment in an equity swap will not be known at initiation.

59. (A) **Both fixed rates are incorrectly calculated.**

Explanation

Fixed rate for the USD:

$$\frac{1-0.9901}{0.9965+0.9901} = 0.00498 = 0.498\%$$

In annual terms, the fixed rate for the USD = $0.498\% \times \frac{360}{180} = 0.997\%$

Fixed rate for the euro:

$$\frac{1-0.9804}{0.9926+0.9804} = 0.00993 = 0.993\%$$

In annual terms, the fixed rate for the euro = $0.993\% \times \frac{360}{180} = 1.987\%$

The fixed rates quoted by the bank are both incorrectly calculated.

(Module 30.5, LOS 30.f)

Related Material

SchweserNotes - Book 4

60. (B) **The value of the euro payments is €100.27m and converting the euro value to USD using €1: USD1.48, the swap has a positive to OTS.**

Explanation

To mitigate currency risk, OTS would be the party paying the fixed rate on USD and receiving the fixed rate on euro. The notional principal is €100m to USD143 million. Note this is using the $/€ of 1.43 at swap initiation.

The value of the USD fixed payments is equivalent to the value of a USD143m fixed rate bond that pays a coupon in 90 days' time and a coupon plus face value in 270 days' time. The coupon rate would be 0.997% as computed in the solution to question 1.

The coupons on the bond = 0.00997 x (180 / 360) x $143m = $712,855

Maturity	$ MRR	Discount Factor	CF	DCF
90 270	0.85% 1.20%	0.9979 0.9911	$712,855 $143,712,855	711,358 142,433,811
			PV € Fixed	**$143,145,169**

The value of the Euro fixed payments is equivalent to the value of a €100m fixed rate bond that pays a coupon in 90 days' time and a coupon plus face value in 270 days' time. The coupon rate would be 1.987% as computed in the solution to question 1.

The coupons on the bond = 0.01987 x (180 / 360) x €100m = €993,500

Maturity	$ MRR	Discount Factor	CF	DCF
90 270	1.30% 2.30%	0.9968 0.9830	993,500 € 100,993,500	990,321 99,276,61
			PV € Fixed	**€ 100,266,932**

OTS is based in the U.S. but has borrowed in €s. OTS would therefore take the position of receiving €s and paying $'s in the currency swap.

Convert the € fixed coupon bond into $'s at the date of the valuation using the exchange rate $/€ = 1.48

€100,266,932 x 1.48 = $148,395,059

The value to the party paying $'s and receiving €s = $148,395,059 – $143,145,169 = $5,249,890

Note that no actual computations were required to answer this question if you spotted that answer B was the only solution to use the correct exchange rate.

(Module 30.7, LOS 30.f)

Related Material

SchweserNotes - Book 4

61. (A) +USD80.35 million.

Explanation

OTS is paying the equity return and the value is:

(1000 / 1190) x USD500m = USD420.17 million

The value of fixed payments is equivalent to the value of a one-year fixed coupon bond with 0.5% semi-annual coupon. The value of bond is the present value of the two coupon payments and the par value:

[(0.005 x 0.9979) + (1.005 x 0.9911)] x 500m = USD 500.52 million.

Value to OTS: USD500.52m – USD420.17m = USD80.35 million.

(Module 30.8, LOS 30.g)

Related Material

SchweserNotes - Book 4

62. (B) One comment is correct.

Explanation

When the index declines, the fixed rate payer would pay the negative return in addition to the fixed rate and, hence, will suffer a loss greater than the fixed rate. There is no way of knowing the first payment on an equity swap because we do not know the value of the equity index on the payment date. The floating rate for the first settlement also known at time 0 (known as advance set, paid in arrears).

(Module 30.8, LOS 30.g)

Related Material

SchweserNotes - Book 4

63. (C) A long position in a bond coupled with the issuance of a floating rate note.

Explanation

A long position in a fixed rate bond receives fixed coupons. The short floating rate note requires floating-rate payments. Together, these are the same cash flow as a receive-fixed swap.

(Module 30.6, LOS 30.e)

Related Material

SchweserNotes - Book 4

64. (A) 991.4.

Explanation

The futures price FP = $S_0 e^{-\delta T}(e^{RT})$

$= S_0 e^{(R-\delta)T} = 965e^{(.05-.023)} = 991.4$

(Module 30.2, LOS 30.a)

Related Material

SchweserNotes - Book 4

65. (C) $110.06.

Explanation

In the formulation below, the present value of the dividends is subtracted from the spot price, and then the future value of this amount at the expiration date is calculated.

$$\left(110 - 2/1.08^{85/365} - 2.20/1.08^{176/365}\right)1.08^{182/365} = \$110.06$$

Alternatively, the future value of the dividends could be subtracted from the future value of the stock price based on the risk-free rate over the contract term.

(Module 30.2, LOS 30.a)

Related Material

SchweserNotes - Book 4