Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities

Q.1052 The party to a forward contract who agrees to buy the financial or physical asset has a:

A. Long call position.

B. Long forward position.

C. Short forward position.

The correct answer is **B.**

The party that takes the long forward position agrees to buy the underlying asset at a specified future date for a specified price. The party holding the long position is said to be “long.”

A is incorrect. A long call position is a term used when talking about options, not forward contracts. It is a term used to describe a bullish investor gets into an option contract to purchase an underlying asset in the hope of making a profit when the price increases.

C is incorrect. A short forward position is a term used to describe the seller, not the buyer, in a forward contract. The “short” pledges to sell the underlying asset at a specified future date for a specified price.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.3346 A U.S. based company has a subsidiary in Germany from which it expects to receive €8 million in the next 3 months. If the company's management is concerned about foreign currency, it will *most likely* enter into a:

A. Currency forward contract by taking a short position in the $.

B. Currency forward contract by taking a short position in the €.

C. Forward rate agreement (FRA) by taking a long position in the €.

The correct answer is **B.**

The company is basically long the €, so it needs to sell those € to convert them into $. The company will *most likely* enter into a currency forward contract by taking a short position in the € and a long position in the $. That will give the company the right to exchange the euros for dollars at a pre-determined rate.

A is incorrect. Taking a short position in the dollar would imply that the company is committing to sell dollars in the future, which does not align with its need to convert euros into dollars. This action would not protect the company against the risk of the euro depreciating against the dollar. Instead, it would expose the company to potential losses should the dollar strengthen against the euro, as the company would be obligated to sell dollars at a rate potentially less favorable than the market rate.

C is incorrect. A Forward Rate Agreement (FRA) is a financial contract that is used to hedge against interest rate risk, not currency risk. Taking a long position in the euro through an FRA would not address the company's need to manage the currency risk associated with its euro receivables. Furthermore, FRAs do not involve the actual exchange of currencies, which is what the company requires to convert its euro receivables into dollars. Therefore, entering into an FRA would not be an appropriate strategy for managing the company's exposure to currency risk.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (b): Explain how forward rates are determined for an underlying with a term structure and describe their uses.

Q.3393 Which of the following statements is *most likely* correct regarding the value of a forward contract to a short party at expiration?
The value of the forward contract is:

A. Zero.

B. Equal to the value to the long party multiplied by -1.

C. Positive if the spot price of the underlying exceeds the forward price.

The correct answer is **B.**

The value of the forward contract to a party holding a short position can be calculated by multiplying the value to the long party by -1.

A is incorrect. The forward contract most likely has a value at expiration, and this value is equal to the difference between the forward price and the underlying current spot price.

C is incorrect. The value of the forward contract to the party with a short position is positive if the futures price exceeds the spot price. In these circumstances, the short position delivers the asset in return for a price that's higher than the asset would fetch if it was to be sold today in the open market.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4150 From a forward contract seller's perspective, what will *most likely* happen to the contract's MTM value if the risk-free rate increases?

A. The MTM value will increase.

B. The MTM value will decrease

C. The MTM value will remain the same.

The correct answer is **B.**

The contract's marked-to-market (MTM) value will decrease. From the forward contract seller's perspective, the MTM value is;

$$V_0(T) = F_0(T)(1+r)^{-(T-t)} - S_t$$

Therefore, an increase (decrease) in the risk-free rate will decrease (increase) the forward price and the forward contract's MTM value.

From the forward contract buyer's perspective, an increase (decrease) in the risk-free rate will increase (decrease) the forward price and the forward contract's MTM value.

A and C are incorrect. The forward contract's MTM value will decrease, as explained above.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4151 Assuming that trading and transaction costs are negligible, which of the following derivatives *least likely* has an initial valuation value of zero?

A. Options.

B. Swap contracts

C. Forward contracts.

The correct answer is **A.**

All forward commitments (forwards, futures, and swap contracts) have an initial value of zero since no money changes hands at contract inception.

However, for contingent claims like options, traders have to part with an option premium to secure the right but not the obligation to buy (call option) or sell (put option) the underlying at a fixed price at the specified maturity date. Therefore, unlike forward commitments, options have a value at contract initiation.

B is incorrect. The terms of the swap are structured in such a way that the present value of the expected benefits to each party is equal at the outset of the agreement. Therefore, neither party is required to make an initial payment to the other, leading to an initial value of zero. Swap contracts involve the exchange of cash flows based on specified variables (e.g., interest rates, currency exchange rates, or commodity prices), and the initial equality in value is a fundamental aspect of their design.

C is incorrect. The forward price is set in such a way that the contract has no net value at the time of inception. The forward price is calculated based on the spot price of the underlying asset, adjusted for factors such as time to maturity, interest rates, and storage costs (in the case of physical commodities). As a result, the initial exchange in a forward contract involves no immediate payment, leading to an initial valuation of zero.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4153 Lisa Junior owns 10,000 shares of Unifier Limited. She enters into a six-month forward contract to sell 3,500 shares at a forward price of $70 per share. The contract value at maturity from the buyer's perspective, assuming the spot price at maturity is $100 per share, is *closest* to:

A. -$105,000.

B. $105,000.

C. $300,000.

The correct answer is **B.**

At contract initiation, the value is zero to both the buyer and the seller since no money exchanges hands. At contract maturity, the buyer and seller's value equals the contract's settlement value. From the buyer's perspective, the value can be obtained using the equation;

$$\begin{aligned} V_T(T) &= S_T - F_0(T) \\ &= 100 - 70 = \$30 \end{aligned}$$

Instead of purchasing the shares at the current price of $100, the buyer buys them at the lower forward price of $70, making a return of $30 per share. For the 3,500 shares;

$$3,500 \times 30 = \$105,000$$

A is incorrect. -$105,000 is the contract's value at initiation from the seller's (Lisa's) perspective, i.e.,

$$V_0(T) = F_0(T) - S_T = \$(70 - 100) \times 3,500 = -\$105,000$$

C is incorrect. It assumes that Junior sold all the shares so that from the buyer's perspective, the profit is:

$$\begin{aligned} V_T(T) &= S_T - F_0(T) \\ &= (100 - 70) \times 10,000 \text{ Shares} = \$300,000 \end{aligned}$$

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4154 A trader enters into a one-year forward contract to purchase ABC Company's shares at a forward price of INR 528.01 per share. The current spot price of the shares is INR 502.87 per share. Assuming that the spot price increases instantaneously to INR 504.66 per share at contract inception and assuming a risk-free rate of 5%, the forward contract MTM from the trader's perspective is *most likely*:

A. -INR 1.79

B. INR 0

C. INR 1.79

The correct answer is **C.**

As the forward contract buyer, the MTM value at any time $T = t$ will be given by the equation;

$$V_t(T) = S_t - F_0(T)(1+r)^{-(T-t)}$$

At contract inception (t=0), $F_0(T)(1+r)^{-(T-t)}$ can be rewritten as

$$F_0(T)(1+r)^{-T} = S_0$$

.
Therefore, the value of the contract from the trader's perspective simplifies to:

$$V_t(T) = S_t - S_0$$

where,
S_t = the spot price after the instantaneous change, and
S_0 = the original spot price.

$$V_0(T) = \text{INR}(504.66 - 502.87) = \text{INR } 1.79$$

A is incorrect. The value is positive from the seller's (ABC Company's) perspective.

B is incorrect. The value is not zero because of the instantaneous change in the spot prices at contract inception.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS a: Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4155 XYZ shylock gives out fixed-interest loans to borrowers. It obtains the money to lend by borrowing at the one-month variable MRR.To protect itself against interest rate risk, it enters into a one-month forward FRA contract on the one-month MRR. Which of the following *best* describes XYZ's interest rate exposure and the position it should take in the FRA contract?

A. Exposed to a rise in the one-month MRR and should therefore be the fixed-rate payer

B. Exposed to a rise in the one-month MRR and should therefore be the fixed-rate receiver.

C. Exposed to a decline in the one-month MRR and should therefore be the floating rate receiver.

The correct answer is **A.**

XYZ loans its borrowers at a fixed interest rate but obtains its loans at a floating interest rate. Therefore, it faces a risk if the floating interest rate it pays rises relative to the fixed interest rate it receives from borrowers. In other words, if the floating interest rate increases, it will pay more than it receives. To hedge against this risk, it should enter into an FRA and pay the fixed rate while receiving the floating rate.

B is incorrect. If XYZ receives the fixed rate, it will increase its exposure to interest rate risk.

C is incorrect. The exposure is to an increase, not a decline, in the one-month MRR.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS b: Explain how forward rates are determined for an underlying with a term structure and describe their uses.

Q.4156 Elliot Ltd. enters into a six-month forward contract with a financial intermediary to sell 800 shares in its possession at a forward price of $80.25 per share. The spot price at the initiation is $75.12 per share, and the risk-free rate of return is 4%. The forward contract MTM value from Elliot Ltd.'s perspective after four months, if the share price falls to $70.10, is *closest to:*

A. $9.11

B. $9.63

C. $10.68

The correct answer is **B.**

Elliot is a seller (short position). We know that for a seller, the value of the forward contract at any time t is given by:

$$V_t(T) = F_0(T)(1+r)^{-(T-t)} - S_t$$

Where,

S_t = Spot price of the underlying at time t, during the contract's life.

r = Risk-free rate of return.

$F_0(T)$ = Forward price (satisfies the no-arbitrage conditions).

Therefore,

$$\begin{aligned} V_t(T) &= F_0(T)(1+r)^{-(T-t)} - S_t = \$80.25(1.04)^{-\left(\frac{6}{12}-\frac{4}{12}\right)} - \$70.10 \\ &= \$80.25(1.04)^{-\left(\frac{2}{12}\right)} - \$70.10 \\ &= \$9.63 \end{aligned}$$

A is incorrect. It does not accurately reflect the calculation based on the given formula and parameters. The MTM value must consider the time value of money, the agreed forward price, the current spot price, and the risk-free rate of return.

C is incorrect. It overestimates the MTM value.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturties. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4157 Consider a two-year forward contract purchased on the Japanese Yen. The short position has to deliver one Japanese Yen in exchange for a Canadian dollar. Assume the interest rates in Japan and Canada are 4% and 7%. Suppose the exchange rate of the Japanese Yen against the Canadian dollar is 1.80; the forward price is *closest to:*

A. 1.4572

B. 1.5572

C. 1.6952

The correct answer is **C.**

For foreign exchange forward,

$$F_{0,f/d}(T) = S_{0,f/d}e^{(r_f - r_d)T}$$

Where:

$F_{0,f/d}(T)$ = Forward price

$S_{0,f/d}$ = Spot price

r_f= Risk-free foreign rate

r_d= Risk-free domestic rate

T = Time to maturity. Therefore,

Therefore,

$$F_{\{0,f/d\}} = 1.80e^{(0.04-0.07)2} = 1.6952$$

A is incorrect. It suggests a forward price of 1.4572, which does not align with the calculation based on the given interest rates and the spot exchange rate.

B is incorrect. It indicates a forward price of 1.5572, which also does not match the calculated forward price using the correct formula and given data.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturtities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4158 Paul Nasir plans to enter a forward contract to purchase gold, whose spot price is $120, both at initiation and maturity. The net present value cost of carry for the gold is $15. Suppose the risk-free rate is 4%; the value of a two-year-long forward contract on the asset at expiration is *closest to*:

A. $4.00

B. $16.40

C. $6.43

The correct answer is **C.**

We know that:

$$F_{0(T)} = [S_0 - PV_0(I) + PV_0(C)]\,(1 + r)^T$$

Where,

$PV_t(I)$= Present value of income or benefits at any time t.

$PV_t(C)$= Present value of costs at any time t.

I= income.

C= cost of carry.

S_0 = Spot price of the underlying at the initiation.

r = Risk-free rate of return.

$F_0(T)$ = Forward price (satisfies the no-arbitrage conditions).

We can rewrite the above equation as:

$$F_{0(T)} = [S_0 - (PV_0(I) - PV_0(C))]\,(1 + r)^T$$

Now recall that the cost of carry is defined as "net of the costs and benefits related to owning an underlying asset for a specific period"

Therefore, the above equation can be written as:

$$\begin{aligned} F_0(T) &= (S_0 - \text{Cost of carry})\,(1 + r)^T \\ &= (\$120 - \$15)\,(1 + 0.04)^2 \\ &= \$113.56 \end{aligned}$$

Therefore,

$$V_0(T) = S_T - F_0(T) = 120 - 113.56 = \$6.43$$

A is incorrect. A value of $4.00 for the forward contract at expiration does not correctly account for the given parameters, including the cost of carry and the risk-free rate applied over the two-year term. This calculation likely omits the compounding effect of the risk-free rate over the contract's duration.

B is incorrect. A value of $16.40 for the forward contract at expiration significantly overestimates the impact of the cost of carry and the risk-free rate over the two-year period.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Matrutities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4159 Paul Nasir plans to enter a forward contract to purchase gold, whose spot price is $120. The net cost of carry for the gold is $15. Suppose the risk-free rate is 4%; the value of a two-year-long forward contract on the asset at expiration is *closest to*:

A. $4

B. $6.4

C. $8.5

The correct answer is **B.**

We know that:

$$F_{0(T)} = S_0(1+r)^T - (PV_0(I) - PV_0(C))(1+r)^T$$

Where,

$PV_t(I)$= Present value of income or benefits at any time t.

$PV_t(C)$= Present value of costs at any time t.

I= income.

C= cost of carry.

S_0 = Spot price of the underlying at the initiation.

r = Risk-free rate of return.

$F_0(T)$ = Forward price (satisfies the no-arbitrage conditions).

Therefore.

$$
\begin{aligned}
F_0(T) &= (S_0 - \text{Cost of carry})(1+r)^T \\
&= (\$120 - \$15)(1+0.04)^2 \\
&= \$113.568
\end{aligned}
$$

Therefore,

$$V_0(T) = S_T - F_0(T) = 120 - 113.568 = \$6.432$$

A is incorrect. A value of $4 for the forward contract at expiration does not accurately reflect the calculation based on the given spot price, net cost of carry, and risk-free rate. This option underestimates the impact of the cost of carry and the compounding effect of the risk-free rate over the two-year period.

C is incorrect. A value of $8.5 for the forward contract at expiration overestimates the outcome of the calculation.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4160 Steph Ellie enters into a forward contract on a non-dividend paying stock that matures in 3 months. Suppose the current stock price is $84 and the risk-free rate of 2.5% per year. The forward price is *closest to:*

A. $81.25

B. $83.14

C. $84.52

The correct answer is **C.**

We know that:

$$F_0(T) = S_0(1 + r)^T$$

Where:

S_0 = Spot price of the underlying at the initiation.

r= Risk-free rate of return.

$F_0(T)$ = Forward price (satisfies the no-arbitrage conditions).

T= Time to maturity.

Therefore,

$$F_0(T) = \$84(1 + 0.025)^{\frac{3}{12}} = 84.52$$

< A is incorrect. It suggests a forward price of $81.25, which would imply a decrease in the stock's value over the contract period. This does not align with the formula for calculating the forward price of a non-dividend paying stock, which accounts for the risk-free rate of return over the time to maturity.

B is incorrect. It indicates a forward price of $83.14, which is also not in line with the calculated forward price using the given formula.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4161 A portfolio manager purchases a two-year zero coupon bond with a par value of $84.96. The two-year zero rate is *closest to*

A. 1.34%

B. 2.62%

C. 8.49%

The correct answer is **C.**

Recall that the discount factor is given by:

$$DF_i = \frac{1}{(1 + Z_i)^i}$$

Where:

DF_i= The discount factor for a given period.

Z_i= The zero rate for a given period.

i= The period.

We need z_2. To solve for the two-year zero rate z_2, solve the equation:

$$84.96 = \frac{100}{(1 + z_2)^2}$$

Usind BA II Plus financial calculator, $z_2 = 8.49$.

A is incorrect. A rate of 1.34% would result in a much higher present value for the bond, given the formula for calculating the present value of a zero-coupon bond. A lower interest rate means the discounting effect is less pronounced, leading to a present value closer to the bond's par value. This does not align with the given purchase price of $84.96.

B is incorrect. A rate of 2.62% also does not provide the correct present value for the bond. Similar to option A, a rate of 2.62% would result in a present value that is higher than $84.96, as the discounting effect would be less significant than what is observed with an 8.49% rate. The calculation process clearly shows that only an 8.49% rate accurately reflects the relationship between the bond's purchase price and its par value, considering the time until maturity.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (b): Explain how forward rates are determined for an underlying with a term structure and describe their uses.
