

Learning Module 6: Pricing and Valuation of Futures Contracts

Q.1059 In the case of a futures contract, the initial margin is *most likely*:

- A. The profits or losses settled daily.
- B. The minimum amount that must be maintained at any time.
- C. The amount that must be deposited before a trade may be made.

The correct answer is **C**.

The initial margin is the amount that must be deposited in the futures account before a trade may be performed.

B is incorrect. It describes the maintenance margin, which is the minimum amount of equity that must be maintained in the margin account.

A is incorrect. Settling of profits or losses is a mechanism used to reduce counterparty risk for future contracts called marking the market. This has the effect of resetting the contract price and cash flows to buyers and sellers.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.1143 If Michael Emery takes a long position in copper futures, which of the following parties will *most likely* take the opposite position in the contract?

- A. The clearinghouse.
- B. Another investor/trader.
- C. A large commercial bank.

The correct answer is **A**.

Options and futures are traded on exchange-traded markets. The clearinghouse act as the opposite party to each transaction in futures markets.

B is incorrect. In OTC markets, the counterparties are typically the actual buyers and sellers, which can include individuals, institutions, or banks. However, in the context of exchange-traded futures contracts, like the copper futures mentioned, the clearinghouse is the central counterparty, not an option for the opposite position.

C is incorrect. While a large commercial bank may participate in futures markets, either for hedging or speculative purposes, it is not automatically the counterparty to every futures contract. In the structured environment of exchange-traded futures, the clearinghouse assumes the role of the counterparty to all positions. Banks, like other market participants, engage in transactions with the clearinghouse as their counterparty. This ensures a level of neutrality and risk management that would not be possible if individual institutions were to directly take opposite positions in every contract. The role of banks and other financial institutions in the futures market is significant, but their participation is mediated through the clearinghouse system.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.1144 The everyday process of adjusting the margin to take into account the gains and losses on the value of futures contracts is known as:

- A. Clearing.
- B. Value adjusting.
- C. Marking to market.

The correct answer is **C**.

The process of adjusting the margin balance to reflect gains and losses on the value of futures contracts due to changes in the prices of underlying assets is called mark-to-market or marking-to-market, MtM.

A is incorrect. Clearing is the process by which the exchange verifies the execution of a transaction and records the participants' identities.

B is incorrect. While "value adjusting" might seem like a term that could describe the process of marking to market, it is not a recognized term within the financial industry for this specific process. Marking to market is the correct and widely used term for the daily adjustment of the margin account to reflect gains and losses on futures contracts. The term "value adjusting" does not capture the specific mechanisms and implications of this process, particularly its role in managing credit risk and ensuring the financial integrity of futures contracts.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.3361 Which of the following floor traders in a futures exchange is *more likely* to benefit from the bid-ask spread?

- A. Scalpers.
- B. Day traders.
- C. Position traders.

The correct answer is **A**.

Scalpers often try to buy at the bid and sell at the ask price. They purchase stocks and resell them after very small price increases. To be successful, a scalper monitors price movement with a keen eye and is therefore in a position to take advantage of sudden changes in the bid-ask spread. A pure scalper will make multiple trades each day—perhaps in the hundreds.

B is incorrect. Day traders adopt a more relaxed approach to trading and take a little more time before executing trades. A day trader pays close attention to price movement for several hours, but they will usually hold shares for more than eight hours.

C is incorrect. Position traders hold assets for long periods of time, such as months or years.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.3380 Long positions in futures contracts are more desirable than forward contracts when the correlation between futures prices and interest rates is:

- A. Zero.
- B. Positive.
- C. Negative.

The correct answer is **B**.

When the correlation between interest rates and futures prices is positive, futures contracts are more desirable to holders of long positions than forward contracts. That's because rising prices will lead to futures profits that are reinvested in periods of rising interest rates, and falling prices will lead to losses that occur during periods of falling interest rates. Therefore, it is far better to receive cash flows in the interim than the expiration under such conditions.

A is incorrect. A zero correlation between futures prices and interest rates implies that there is no predictable relationship between the two. In such a scenario, the advantage of receiving interim cash flows from futures contracts, which could potentially be reinvested at favorable interest rates, does not inherently exist. The lack of correlation means that futures and forward contracts may not differ significantly in terms of desirability based solely on the relationship between interest rates and price movements.

C is incorrect. A negative correlation between futures prices and interest rates suggests that when futures prices increase, interest rates tend to decrease, and vice versa. In this scenario, profits from futures contracts would be reinvested at lower interest rates, and losses would occur in an environment of rising interest rates. This could exacerbate the impact of losses and diminish the benefits of gains, making futures contracts less desirable compared to forward contracts for long position holders. Forward contracts, which do not involve daily settlement or the interim reinvestment of gains, would not be affected by this negative correlation in the same way, potentially making them a more stable choice in such market conditions.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (a): Compare the value and price of forward and futures contracts.

Q.4162 A stock that pays an annual dividend of \$5 is trading at a spot price of \$72. If the stock's futures price is \$75.6, assuming a risk-free rate of 5%, which of the following statements is *most likely* correct? The stock is trading

- A. at its no-arbitrage futures price.
- B. below its no-arbitrage futures price.
- C. above its no arbitrage futures price.

The correct answer is **C**.

We can obtain the stock's no-arbitrage futures price using the equation below.

$$F_0(T) = [S_0 - PV_0(I)](1 + r)^T$$

Where:

$F_0(T)$ = futures price.

S_0 = spot price.

$PV_0(I)$ = Present value of benefits

r = risk-free rate

T = Maturity time

We first obtain the present value of the benefit (dividend) and then substitute it into the equation to get the futures price.

$$PV_0(I) = \frac{\$5}{(1 + 0.05)^1} = \$4.76$$

So that,

$$F_0(T) = [72 - 4.76](1 + 0.05)^1 = 70.6$$

The stock's no-arbitrage futures price is \$70.6., yet it is trading at a futures price of \$75.6, meaning that it is trading at a price above its no-arbitrage futures price.

A is incorrect. It suggests that the stock is trading at its no-arbitrage futures price. However, as calculated, the no-arbitrage futures price is \$70.6, not \$75.6. This discrepancy indicates that the stock is not trading at its no-arbitrage price but rather above it.

B is incorrect. It implies that the stock is trading below its no-arbitrage futures price. The calculation shows that the actual futures price of \$75.6 is higher than the no-arbitrage futures price of \$70.6, indicating that the stock is trading above, not below, its no-arbitrage futures price.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (a): Compare the value and price of forward and futures contracts.

Q.4163 How do futures and forward prices *best* compare in situations where futures prices are positively correlated with interest rates over the contract's maturity period?

- A. They are the same.
- B. Futures prices exceed forward prices.
- C. Forward prices exceed futures prices

The correct answer is **B**.

Futures prices fluctuate depending on interest rates, whereas forward prices remain constant until contract maturity. Therefore, futures prices will exceed forward prices in situations where futures prices are positively correlated with interest rates.

The higher futures prices mean that futures profits will be reinvested at higher rates while losses will be refinanced at lower rates.

The opposite is true when the futures prices negatively correlate with interest rates over the contract's maturity period.

A is incorrect. The prices will be the same when interest rates are constant over the contract's maturity period.

C is incorrect. Forward prices will exceed futures prices in cases where futures prices are negatively correlated with interest rates

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.4164 Which of the following statements is *least likely* correct?

- A. Both futures and forward contracts have an initial value of zero.
- B. The futures price is obtained by compounding the spot price at the risk-free rate.
- C. The gains and losses of both futures and forward contracts are settled daily via a margin account.

The correct answer is C.

Since futures are traded on an exchange, their gains and losses are settled daily via a margin account. A trader gets a margin call once their margin account decreases below the minimum amount. The daily settlement of gains and losses of futures accounts resets the futures value to zero at the current futures price, a process that continues until maturity. At maturity, the futures value converges to the spot price.

On the other hand, forward contracts trade in the OTC market. Their gains and losses are not settled daily.

A and B are incorrect. They are correct statements. Both futures and forwards have an initial value of zero. The value may change during the life of the contract. The futures price, like the forward price, is obtained by compounding the spot price at the risk-free rate.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.4165 The 90-day futures price of a barrel of oil is EUR 500. At the end of the second trading day, the spot price of the barrel of oil is EUR 525. Assuming that trading opens at the former day's closing spot and future prices and taking a risk-free rate of 4%, the contract's MTM value on day three is closest to:

- A. EUR 0.
- B. EUR 29.71.
- C. EUR 495.24.

The correct answer is **B**.

The MTM value is obtained by subtracting the current spot price from the present value of the futures price.

Since trading opens at the former day's spot and future prices, we first have to calculate the present value of the future price on day 2.

At the contract inception date, day 1, the contract has 90 days until maturity. Therefore, at the end of day 2, there are 88 days remaining until maturity.

$$F_0(T) = 500(1 + 0.04)^{-\frac{88}{365}} = 495.29$$

So that,

$$\text{MTM value} = \text{EUR } (525 - 495.29) = \text{EUR } 29.71$$

A is incorrect. The MTM value would have been zero if the current spot price had been equal to the present value of the futures price.

C is incorrect. EUR 495.24 is the present value of the forward price.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (a): a: Compare the value and price of forward and futures contracts.

Q.4166 The implied six-month forward rate for an interest rate futures contract initiated at time t=0 with a maturity period of one year, trading at \$89.10, is *closest to*:

- A. 0%
- B. 8.9%
- C. 10.9%

The correct answer is C.

The interest rate futures trade on a price basis given by:

$$f_{A, B-A} = 100 - (100 \times MRR_{A, B-A})$$

Where;

$f_{A, B-A}$ = Futures price for a market reference rate for B-A periods that begin at period A.

$MRR_{A, B-A}$ = Implied forward rate.

Therefore,

$$\begin{aligned} 89.10 &= 100 - (100 \times MRR_{6,12-6}) \\ -10.9 &= -(100 \times MRR_{6,6}) \\ \Rightarrow MRR_{6,6} &= 0.109 \end{aligned}$$

The implied six-months forward rate for an interest rate futures contract initiated at time 0 with a one-year maturity period is 10.9%

A is incorrect. Suggesting a 0% implied six-month forward rate does not align with the calculation based on the futures trading price of \$89.10. This option fails to account for the inverse relationship between futures prices and implied interest rates, which is fundamental to understanding how futures contracts are priced in relation to interest rate expectations.

B is incorrect. The calculation based on the given futures price of \$89.10 directly leads to an implied rate of 10.9%, not 8.9%. This option does not accurately reflect the mathematical relationship between the futures price and the implied forward rate as dictated by the formula.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (a): Compare the value and price of forward and futures contracts.

Q.4167 Which of the following statements is *most likely* correct regarding a futures and forwards contract?

- A. MTM gains and losses are settled daily.
- B. The contract price is constant throughout the contract period.
- C. The presence of benefits will reduce the difference between the spot and the forward commitment contract price.

The correct answer is **C**.

Benefits in both forward and futures contracts will reduce the forward/ futures price. With a lower forwards/futures price, the difference between the spot price and the forward commitment contract price will also decrease.

On the other hand, costs will increase the forward commitment contract price in both forward and futures contracts. A higher forward commitment contract price will increase the difference between the spot price and the forward commitment contract price.

A is incorrect. The daily settlement of MTM gains and losses happens only for futures but not forward contracts.

B is incorrect. Only forward contracts will have a constant price throughout the contract period. A futures contract's price will change depending on interest rate changes over the contract period.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.4168 In cases of rising interest rates, which of the following positions should a trader who wishes to hedge his liability of paying MRR in the future *most likely* take?

- A. Long FRA.
- B. Short FRA.
- C. Long futures contract.

The correct answer is **A**.

An FRA (Forward Rate Agreement) is a financial contract between two parties where one party agrees to pay a fixed rate of interest on a specified notional amount at a future date while the other party agrees to pay the floating market rate of interest (MRR) on that date. In the context of rising interest rates, a trader who wishes to hedge his liability of owning a market reference rate (MRR) in the future should take a long position in an FRA. By doing so, the trader agrees to receive a fixed rate of interest and pay the floating MRR. This allows the trader to hedge against the risk of rising interest rates by locking in the current fixed rate, thereby protecting against the cost of future liability.

B is incorrect. A short position in an FRA means that the trader agrees to pay the fixed rate of interest and receive the floating MRR on a specified date in the future. In a rising interest rate environment, the MRR would increase, which would be unfavorable for the trader who is paying the fixed rate.

C is incorrect. A long position in a futures contract means that the trader agrees to buy the underlying asset at a specified price on a future date. This does not directly hedge the interest rate risk associated with owning an MRR in the future. In a rising interest rate environment, the cost of financing the purchase of the underlying asset would increase, which is not the desired outcome for hedging interest rate risk.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.
