1a. You enter into a futures contract to buy €125,000 at $1.28 per euro. The spot exchange rate when you enter the contract is 1.16. Your initial performance bond is $6,800 and your maintenance level is $2,700. At what settle price will you get a demand for additional funds to be posted to your account?

1b. You enter into a futures contract to sell €125,000 at $1.52 per euro. The spot exchange rate when you enter the contract is 1.39. Your initial performance bond is $5,600 and your maintenance level is $2,200. At what settle price will you get a demand for additional funds to be posted to your account?

2a. Four days ago you entered into a futures contract to buy €125,000 at $1.56 per euro. The spot exchange rate when you entered the contract was 1.59. Your initial performance bond was $6,400 and your maintenance level was $2,600. Over the past four days (in order) the contract has settled at $1.58, $1.51, $1.57, and $1.51. How much in total have you made or lost?

2b. Four days ago you entered into a futures contract to sell €125,000 at $1.43 per euro. The spot exchange rate when you entered the contract was 1.39. Your initial performance bond was $6,100 and your maintenance level was $2,400. Over the past four days (in order) the contract has settled at $1.42, $1.45, $1.39, and $1.48. How much in total have you made or lost?

3a. Four days ago you entered into a futures contract to buy €125,000 at $1.44 per euro. The spot exchange rate when you entered the contract was 1.41. Your initial performance bond was $8,600 and your maintenance level was $3,400. Over the past four days (in order) the contract has settled at $1.46, $1.47, $1.38, and $1.41. What should your performance account balance be at the end of the four days? (Assume you do not withdraw excess funds and only add funds if required.)

3b. Four days ago you entered into a futures contract to sell €125,000 at $1.13 per euro. The spot exchange rate when you entered the contract was 1.11. Your initial performance bond was $7,000 and your maintenance level was $2,800. Over the past four days (in order) the contract has settled at $1.14, $1.12, $1.18, and $1.17. What should your performance account balance be at the end of the four days? (Assume you do not withdraw excess funds and only add funds if required.)

4a. The current spot exchange rate is $1.53 = €1.00 and the three-month forward rate is $1.56 = €1.00. You buy a call option on €62,500 with a strike price of $1.50 = €1.00 and pay an option premium (price) of $2500. At expiration, at what exchange rate will you break-even?

4b. The current spot exchange rate is $1.26 = €1.00 and the three-month forward rate is $1.23 = €1.00. You buy a put option on €62,500 with a strike price of $1.31 = €1.00 and pay an option premium (price) of $4375. At expiration, at what exchange rate will you break-even?

5a. The current spot exchange rate is $1.21 = €1.00 and the three-month forward rate is $1.26 = €1.00. You buy a call option on €62,500 with a strike price of $1.18 = €1.00 and pay an option premium (price) of $0.06 per euro. If the exchange rate at expiration is $1.13 = €1.00, what is your profit or loss from the option position?
5b. The current spot exchange rate is $1.55 = €1.00 and the three-month forward rate is $1.52 = €1.00. You buy a put option on €62,500 with a strike price of $1.60 = €1.00 and pay an option premium (price) of $0.06 per euro. If the exchange rate at expiration is $1.52 = €1.00, what is your profit or loss from the option position?

Answers:

1a. You entered into a long futures contract (obligation to buy euros at $1.28 per euro). You gain value when the dollar depreciates (it takes more dollars to buy euros than the futures price). This is true because you could buy the euros for the lower price (in dollars) and then sell them at the higher realized price (in dollars) and you would have more dollars than you had in the beginning. You lose value when the dollar appreciates (it takes less dollars to buy euros than the futures price).

To trade futures, you are required to post an initial performance bond which is placed in an account effectively under the control of the clearinghouse. Your account is then marked-to-market daily (meaning gains/losses are added/subtracted from your account daily). If your account value falls to the maintenance performance bond amount, you are required to deposit funds to return the account to the level of the initial performance bond. In this case, the initial performance bond is $6,800 and the maintenance performance bond is $2,700. The contract covers €125,000, so the price must change by ($6,800 – $2,700)/(125,000) = $0.0328 from the initial value for you to be required to deposit additional funds. Since falling exchange rates are bad for you, the futures price would have to fall to $1.28 - $0.0328 = $1.2472 for you to be required to deposit additional funds.

1b. You entered into a short futures contract (obligation to sell euros at $1.52 per euro). This is opposite of question 1a. You gain value when it takes less dollars to buy euros and lose value when it takes more dollars to buy euros. You will have to deposit additional funds if you lose $5,600 - $2,200 = $3,400 or ($3,400)/125,000 = $0.0272 per euro from the initial future price. Since rising exchange rates are bad for you, the futures price would have to rise to $1.52 + $0.0272 = $1.5472 for you to be required to deposit additional funds.

2a. You entered into a long futures contract (obligation to buy euros at $1.56 per euro). You gain value when the exchange rate ($/€) goes up and lose value when the exchange rate ($/€) goes down.

Total dollar gain = (“selling price” – “buying price”) X (number of euros in contract)

In this case, you are buying based on the initial futures rate and selling based on the subsequent rates.

Total dollar gain = (final rate – initial futures rate) X (number of euros in contract)

Total dollar gain = ($1.51 - $1.56) X (125,000) = -$6,250 (a loss of $6,250)

2b. You entered into a short futures contract (obligation to sell euros at $1.43 per euro). You gain value when the exchange rate ($/€) goes down and lose value when the exchange rate ($/€) goes up.

Total dollar gain = (“selling price” – “buying price”) X (number of euros in contract)

In this case, you are selling based on the initial futures rate and buying based on the subsequent rates.

Total dollar gain = (initial futures rate – final rate) X (number of euros in contract)

Total dollar gain = ($1.43 - $1.48) X (125,000) = -$6,250 (a loss of $6,250)

3a. Remember you initially post the initial performance bond amount to your account. Gains/losses are added/subtracted daily. If the account reaches or goes below the maintenance performance bond amount, you must deposit funds to return the account balance to the initial performance bond amount.

Here you enter into a long futures contract (obligation to buy euros). You gain value when the exchange rate ($/€) goes up and lose value when the exchange rate ($/€) goes down.
If you buy or sell euros for a lower dollar rate (strike price below the exchange rate ($/€)), you must deposit funds to return the account balance to the initial performance bond amount. Here you enter into a short futures contract (obligation to sell euros). You gain value when the exchange rate ($/€) goes down and lose value when the exchange rate ($/€) goes up.

<table>
<thead>
<tr>
<th>Futures rate</th>
<th>Gain/loss</th>
<th>Number of euros</th>
<th>Total dollar gain/loss</th>
<th>Balance minus gain/loss</th>
<th>Additional funds</th>
<th>Account Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.13</td>
<td>-0.01</td>
<td>125,000</td>
<td>-$1,250</td>
<td>$-7,000</td>
<td></td>
<td>$7,000</td>
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<tr>
<td>$1.14</td>
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<td>125,000</td>
<td>+$2,500</td>
<td>$5,750</td>
<td></td>
<td>$5,750</td>
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<tr>
<td>$1.12</td>
<td>+0.06</td>
<td>125,000</td>
<td>+$7,500</td>
<td>$3,000</td>
<td></td>
<td>$8,250</td>
</tr>
<tr>
<td>$1.18</td>
<td>-0.09</td>
<td>125,000</td>
<td>-$1,250</td>
<td>$1,100**</td>
<td>+($7,000 – $1,100)</td>
<td>$8,600</td>
</tr>
<tr>
<td>$1.17</td>
<td>+0.03</td>
<td>125,000</td>
<td>+$3,750</td>
<td>$1,250</td>
<td></td>
<td>$8,250</td>
</tr>
</tbody>
</table>

**Balance would be below maintenance performance bond level, so we must return to initial level.

4a. You bought a call option (right to buy euros at $1.50 per euro). You gain value when the exchange rate ($/€) goes up since you will be able to buy at $1.50 but sell at the higher price. Your option does not have value if the exchange rate falls below $1.50 since you would not purchase at $1.50 if you could get euros for a lower dollar rate elsewhere. Since you must pay for the option (option premium or price), you must make at least the cost of the option to break-even.

Rate change necessary to break-even = (option premium)/(number of euros in contract)

Rate change necessary to break-even = ($2,500)/(62,500) = $0.04

You gain value when the rate increases, so the rate must go to $1.50 + $0.04 = $1.54 for you to break-even.

4b. You bought a put option (right to sell euros at $1.31 per euro). You gain value when the exchange rate ($/€) goes down since you will be able to buy at lower realized price but sell at $1.31 using the option. Your option does not have value if the exchange rate rises above $1.31, since you would not sell at $1.31 using the option if you could sell euros for a higher dollar rate elsewhere. Since you must pay for the option (option premium or price), you must make at least the cost of the option to break-even.

Rate change necessary to break-even = (option premium)/(number of euros in contract)

Rate change necessary to break-even = ($4,375)/(62,500) = $0.07

You gain value when the rate decreases, so the rate must fall to $1.31 - $0.07 = $1.24 for you to break-even.

5a. You bought a call option (right to buy euros at $1.18 per euro). You gain value when the exchange rate ($/€) goes up since you will be able to buy at $1.18 but sell at the higher price. Your option does not have value if the exchange rate falls below $1.18, since you would not purchase at $1.18 if you could get euros for a lower dollar rate elsewhere. You must pay for the option (option premium or price) in the beginning.

Profit on call:
If rate exceeds strike price: (Final rate – strike price)(number of euros) – (call price per euro)(number of euros)
If rate is less than strike price, you lose price of option which equals (call price per euro)(number of euros)

OR:

Profit on call:
MAX{(final rate – strike price – call price per euro)(number of euros); –(call price per euro)(number of euros)}

In this problem, the final rate is less than the strike price, so the option is worthless at expiration. We lose the price of the option which was ($0.06)(62,500) = $3,750.

5b. You bought a put option (right to sell euros at $1.60 per euro). You gain value when the exchange rate ($) goes down since you will be able to buy at lower realized price and sell at the strike price. Your option does not have value if the exchange rate rises above the strike price, since you would not sell at the strike price if you could sell euros for a higher dollar rate elsewhere. You must pay for the option (option premium or price) in the beginning.

Profit on put:
If rate is less than strike price: (Strike price – final price)(number of euros) – (put price per euro)(number of euros)
If rate exceeds strike price, you lose price of option which equals (put price per euro)(number of euros)

OR:

Profit on put:
MAX{[(strike price – final rate – put price per euro)(number of euros); –(put price per euro)(number of euros)}

In this problem, the final rate is less than the strike price, so the option has value. The profit is calculated as below.

Profit = (strike price – final rate – put price per euro)(number of euros)
Profit = ($1.60 - $1.52 - 0.06)(62,500) = $1,250