**Hedging Financial Risk Using Derivatives**

**Answer Keys**

**Foreign Exchange Transactions at Haskell**

1. (1,200,000) (1.3206) = CAD 1,584,720
2. (800,000) (1.3202) = CAD 1,056,160
3. Cheese purchase (1,200,000) (.0004) = CAD 480

Cheese spread revenue (800,000) (.0004) = CAD 320

1. This is a direct quote. The domestic country’s currency (CAD) is the quote currency (numerator), and the foreign currency (USD) is the base currency (denominator). This ratio measures what a domestic Canadian trader would pay in CAD for one USD or receive in CAD for one USD.

**Foreign Exchange Transactions at Knight**

1. (30,500,000) (.73720) = USD 22,484,600

**Foreign Exchange Transactions at Koala**

1. (CAD / USD) (USD / AUD) = CAD / AUD

(1.2486) () = 0.9668

**Transaction Risk**

1.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| November 1 | | Purchases | CAD 165,506.25 |  |
|  | | 1Accounts payable |  | CAD 165,506.25 |
|  | | 1(125,000) (1.32405) |  |  |
|  | |  |  |  |
| December 31 | | 1Accounts payable | CAD 368.75 |  |
|  | | Foreign exchange gain |  | CAD 368.75 |
|  | | 1(125,000) (1.32405 – 1.32110) |  |  |
|  | |  |  |  |
| February 1 | | Accounts payable | CAD 165,137.50 |  |
|  | | 1Foreign exchange loss | CAD 498.75 |  |
|  | | 2Cash |  | CAD 165,636.25 |
|  | | 1(125,000) (1.32110 – 1.32509) |  |  |
|  | 2(125,000) (1.32509) |  |  |

**Hedging Exchange Rate Risk Using Forward Contracts**

1. Hartley would receive CAD 5,660,100 (USD 4,500,000 x CAD/USD 1.2578) from the other counterparty. The other counterparty would receive CAD 5,611,500 (USD 4,500,000 x CAD/USD 1.2470) from Hartley. Hartley successfully hedged this transaction, but the other counterparty or speculator lost CAD 48,600 (CAD 5,611,500 – CAD 5,660,100) as the spot rate on the settlement date fell below the delivery rate.
2. Hartley would receive CAD 5,611,500 (USD 4,500,000 x CAD/USD 1.2470) when it exchanged the amount at the spot rate on the settlement date. The counterparty or speculator would pay Hartley CAD 48,600 (CAD 5,660,100 – CAD 5,611,500), which will increase Hartley’s net proceeds to CAD 5,660,100 (CAD 5,611,500 + CAD 48,600). This is the same amount Hartley would have received in Part 1 if they had taken delivery of the currency. Again, Hartley successfully hedged this transaction, but the other counterparty or speculator lost CAD 48,600 (CAD 5,611,500 – CAD 5,660,100) as the spot rate on the settlement date fell below the delivery rate.

Hartley would receive CAD 5,672,250 (USD 4,500,000 x CAD/USD 1.2605) when it exchanged the amount at the spot rate on the settlement date, which is more than the CAD 5,660,100 (USD 4,500,000 x CAD/USD 1.2578) negotiated in the futures contract. The extra CAD 12,150 (CAD 5,672,250 – CAD 5,660,100) would be paid to the other counterparty or speculator, reducing Hartley’s net proceeds to CAD 5,660,100 as agreed to in the futures contract. The other counterparty or speculator would make a profit of CAD 12,150 because the spot rate on the settlement date rose above the delivery rate.

**Hedging Exchange Rate Risk Using Swap Contracts**

1. Wiley should borrow the funds from its Canadian bank and then have a swap dealer at the bank arrange an offsetting transaction with another company or dealer. Wiley will borrow CAD 4,186,325 (USD 2,750,000 x CAD/USD 1.5223) and then swap it for a USD 2,750,000 loan. It will make any interest payments on this loan in USD and then pay back CAD 4,228,950 (USD 2,750,000 x CAD/USD 1.5378) to its bank in three months.
2. Wiley and the other party to the currency swap can borrow in their home countries, where they are more familiar with lenders and can likely borrow at a lower rate with fewer lending restrictions. These benefits are then shared when the loans are swapped. Lending costs are lower than if the parties tried to borrow in an unfamiliar country. Both parties can also lock in the forward rate and incur lower transaction costs compared to using a forward contract.

**Hedging Exchange Rate Risk Using Call Option Contracts**

1. Cranston will pay CAD 31,437,500 (USD 25,000,000 x 1.2575) for the land in three months. The acquisition is more expensive than the original cost of CAD 31,257,500 (USD 25,000,000 x 1.2503) because the CAD has depreciated against the USD. The call option allows Cranston to purchase the land at CAD/USD 1.2503 instead of CAD/USD 1.2575, so the writer of the option must pay Cranston CAD 180,000 (USD 25,000,000 x (1.2575 – 1.2503)). This reduces the net cost of purchasing the land from CAD 31,437,500 to CAD 31,257,500, which is the original cost.
2. Cranston will pay CAD 31,140,000 (USD 25,000,000 x 1.2456) for the land in three months. The acquisition is less expensive than the original cost of CAD 31,257,500 (USD 25,000,000 x 1.2503) because the CAD has appreciated against the USD. The call option allows Cranston to purchase the land at CAD/USD 1.2503, but why would they if the spot rate is CAD/USD 1.2456? The net cost of purchasing the land is CAD 31,140,000.

**Hedging Exchange Rate Risk Using Put Option Contracts**

1. Superior will receive CAD 63,050,000 (USD 50,000,000 x 1.2610) for the land in three months. The proceeds are less than the amount originally expected of CAD 63,215,000 (USD 50,000,000 x 1.2643) because the CAD has appreciated against the USD. The put option allows Cranston to sell the land at CAD/USD 1.2643 instead of CAD/USD 1.2610, so the writer of the option must pay Cranston CAD 165,000 (USD 50,000,000 x (1.2643 – 1.2610)). This increases the net proceeds from the sale of the land from CAD 63,050,000 to CAD 63,215,000, which was the amount originally expected.
2. Superior will receive CAD 63,650,000 (USD 50,000,000 x 1.2730) for the land in three months. The proceeds are more than the amount originally expected of CAD 63,215,000 (USD 50,000,000 x 1.2643) because the CAD has depreciated against the USD. The put option allows Superior to sell the land at CAD/USD 1.2643, but why would they if the spot rate is CAD/USD 1.2730? The net proceeds from the sale of the land are CAD 63,650,000.

**Hedging Exchange Risk Using a Natural Hedge**

1. One USD currently buys CAD 1.2521, but this is expected to fall to CAD 1.2444 over the next year. One USD is expected to buy fewer CAD, so the USD is depreciating against the CAD, which means the CAD is appreciating against the USD.
2. Yes, the USD is depreciating against the CAD, so fewer CAD will be recognized when converting USD sales into CAD.

(5,500,000) (1.2444 – 1.2521) = CAD 42,350 decline in sales

1. Delisle purchases all its inputs in CAD in Canada, but it could source USD 5,500,000 from the U.S. instead. It will take fewer CAD to purchase these inputs if the CAD appreciates. CAD sales and expenses will each fall by the same amount, so net income is unaffected.

(5,500,000) (1.2444 – 1.2521) = CAD 42,350 decline in expenses

This assumes cash inflows and outflows are uniform, but this is not likely. Cash flows should be matched monthly to ensure gains and losses cancel out.

**Hedging Interest Rate Risk Using Swaps**

1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Payer** | **Fixed Leg**  **Paid** | **Float Leg**  **Received** | **Net Swap Payment** | **Interest Payment** | **Net Interest Payment** |
| Year 1 | (21,000)1 | 20,1002 | (900)4 | (20,100)6 | (21,000)8 |
| Year 2 | (21,000)1 | 23,7003 | 2,7005 | (23,700)7 | (21,000)9 |

1 (600,000) (.035)

2 (600,000) (.031 + .0025)

3 (600,000) (.037 + .0025)

4 -21,000 + 20,100

5 -21,000 + 23,700

6 (600,000) (.031 + .0025)

7 (600,000) (.037 + .0025)

8 -20,100 + (-900)

9 -23,700 + 2,700

**Market to Market of Futures Contracts**

1.

|  |  |  |  |
| --- | --- | --- | --- |
| **Day** | **Spot Price** | **Daily Gain or Loss** | **Margin Account Balance** |
| 0 | 1,912.2 | 400 x 1,912.2 x 0.06 = 45,892.8 | 45,892.8 |
| 1 | 1,910.1 | 400 x (1,912.2 – 1,910.1) = 840.0 | 46,732.8 |
| 2 | 1,915.9 | 400 x (1,910.1 – 1,915.9) = -2,320.0 | 44,412.8 |
| 3 | 1,958.2 | 400 x (1,915.9 - 1,958.2) = -16,920.0 | 27,492.8 |
| Maintenance margin 45,892.8 x 0.75 = 34,419.6  Margin call 45,892.8 – 27,492.8 = 18,400.0 | | | 45,892.8 |
| 4 | 1,925.3 | 400 x (1,958.2 - 1,925.3) = 13,160.0 | 59,052.8 |

**Hedging Commodity Risk Using Short Hedges**

1. The spot price rose so Ponderosa lost USD 26,125 ((516.50 - 535.50) x ((27,500 x 50) / 1,000)) on the short hedge, but this was compensated for by a gain of USD 26,125 ((535.50 – 516.50) x (1,375,000 / 1,000) when the lumber was sold at above the final settlement price. Ponderosa successfully locked in the final settlement price of USD 516.50.

**Hedging Commodity Risk Using Long Hedges**

1. The spot price fell so Delicious Meats lost USD 800,000 ((159.30 – 179.30) x 100 x 40,000) / 100) on the long hedge, but this was compensated for by a gain of USD 800,000 ((179.30 – 159.30) x 4,000,000) / 100) when the live cattle were purchased at below the final settlement price. Delicious Meats successfully locked in the final settlement price of USD 179.30 cents per pound.

**Optimal Hedge Ratio for a Futures Contract**

1.

h\* == 0.475

n = 0.475 () = 169.64 or 170 contracts

**Hedging Commodity Risk Using Call Option Contracts**

1. The spot price rose above the strike price, so the contract is “in the money.” Mosaic would gain USD 305,625 ((1,150.0 – 870.0 – 35.5) x 50 x 25) on the call options contracts when the position is closed, which includes the premium costs. This approximately covers its losses of USD 350,000 ((1,150.0 – 870.0) x 50 x 25) from having to pay more when it buys the platinum at a higher spot price on the cash market.
2. The options contracts would be “out of the money,” so they would not be exercised. Mosaic would gain USD 36,875.0 ((870.0 – 805.0 – 35.5) x 50 x 25) when the spot price on the cash market fell below the strike price, including premium costs.

**Hedging Commodity Risk Using Put Option Contracts**

1. The spot price fell below the strike price, so the put option contracts are “in the money.” Hughes Oil would gain USD 6,095,000 ((82.52 – 68.21 – 2.12) x 1,000 x 500) on the put options contracts when the position is closed, which includes the premium costs. This approximately covers its losses of USD 7,155,000 ((68.21 – 82.52) x 1,000 x 500) when it sells the oil at a lower spot price on the cash market.
2. The put option contracts would be “out of the money,” so they would not be exercised. Hughes Oil would gain USD 6,055,000 ((96.75 – 82.52 – 2.12) x 1,000 x 500) when the spot price on the cash market rises above the strike price, including premium costs.