Derivative Instruments
Paris Dauphine University - Master IEF (272)

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Exercises Chapter 1

Exercise 1 *An investor enters into a short forward contract to sell* $100,000$ *British pounds for US dollars at an exchange rate of* 1.4000 *US dollars per pound.*

How much does the investor gain or lose if the exchange rate at the end of the contract is :

(a) 1.3900 *? ;*

(b) 1.4200 *?*

Exercise 2 *A trader enters into a short cotton futures contract when the futures price is* 50 *cents per pound. The contract is for the delivery of* $50,000$ *pounds.*

How much does the trader gain or lose if the cotton price at the end of the contract is :

(a) 48.20 *cents per pound ? ;*

(b) 51.30 *cents per pound ?*

Exercise 3 *Suppose that you write a put contract with a strike price of* $\$40$ *and an expiration date in three months. The current stock price is* $\$41$ *and the contract is on* 100 *shares.*

(a) *What have you committed yourself to ?*

(b) *How much could you gain or lose if the price of the stock is* $\$30$ *(resp.* $\$20$*) ?*

(c) *What is the maximal possible loss ?*

Exercise 4 *You would like to speculate on a rise in the price of a certain stock. The current stock price is* $\$29$*, and a three-month call with a strike of* $\$30$ *costs* $\$2.90$*. You have* $\$5,800$ *to invest.*

(a) Identify two alternative strategies, one involving an investment in the stock and the other involving investment in the option.

(b) What are the gains and losses from each if the share price goes up to $\$40$ *(resp. falls to* $\$25$*) ?*

(c) Conclude.

Exercise 5 (Done) *Suppose that a March call option to buy a share for $50 costs $2.50 and is held until March. Draw a diagram showing how the profit on a long position in the option depends on the stock price at the maturity of the option.*

Exercise 6 (Done) *Suppose that a June put option to sell a share for $60 costs $4 and is held until June. Draw a diagram showing how the profit from a short position in the option depends on the stock price at the maturity of the option.*

Exercise 7 *A US company expects to have to pay 1 million Canadian dollars in six months. Explain how the exchange rate risk can be hedged using **(a)** a forward contract; **(b)** an option.*

Exercise 8 *"Options and futures are zero-sum games." What do you think is meant by this statement?*

Exercise 9 *Consider the following portfolio : a long forward contract on an asset and a long European put option on the asset with the same maturity as the forward contract and a strike price that is equal to 20€ which correspond to the forward price of the asset at the time the portfolio is set up. Draw a diagram showing how the profit of this portfolio depends of the asset at maturity.*

Exercise 10 *On July 1, a US-company enters into a forward contract to buy 10 million Japanese yen on next year January 1. On September 1, it enters into a forward contract to sell 10 million Japanese yen on next year January 1. Describe the payoff from this strategy.*

Exercise 11 *In the 1980s, Bankers Trust developed index currency option notes (ICONs). These are bonds in which the amount received by the holder at maturity varies with a foreign exchange rate. One example was its trade with the Long Term Credit Bank of Japan. The ICON specified that if the yen-U.S. dollar exchange rate, S_T, is greater than 169 yen per dollar at maturity (in 1995), the holder of the bond receives $1,000. If it is less than 169 yen per dollar, the amount received by the holder of the bond is*

$$1,000 - \max\left(0; 1,000\left(\frac{169}{S_T} - 1\right)\right)$$

When the exchange rate is below 84.5, nothing is received by the holder at maturity.

Show that this ICON is a combination of a regular bond that pays $1,000 and two options.