

# Derivative Instruments

## Paris Dauphine University - Master IEF (272)

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### Exercises Chapter 3

**Exercise 1** *Suppose that you enter into a six-month forward contract on a non-dividend-paying stock when the stock price is \$30 and the risk-free interest rate (with continuous compounding) is 12% per annum.*

*What is the forward price ?*

**Exercise 2** *A stock index currently stands at 350. The risk-free interest rate is 8% per annum (with continuous compounding) and the dividend yield on the index is 4% per annum.*

*What should the forward price for a four-month contract be ?*

**Exercise 3 (Done)** *A one-year long forward contract on a non-dividend-paying stock is entered into when the stock price is \$40 and the risk-free rate of interest is 10% per annum with continuous compounding.*

*a) What are the forward price and the initial value of the forward contract ?*

*b) Six months later, the price of the stock is \$45 and the risk-free interest rate is still 10%. What are the forward price and the value of the forward contract ?*

**Exercise 4** *The risk-free rate of interest is 7% per annum with continuous compounding, and the dividend yield on a stock index is 3.2% per annum. The current value of the index is 150.*

*What is the six-month forward price ?*

**Exercise 5** *Assume that the risk-free interest rate is 9% per annum with continuous compounding and that the dividend yield on a stock index varies throughout the year. In February, May, August, and November, dividends are paid at a rate of 5% per annum. In other months, dividends are paid at a rate of 2% per annum. Suppose that the value of the index on July 31 is 1,300.*

*What is the forward price for a contract deliverable on December 31 of the same year ?*

**Exercise 6** Suppose that the risk-free interest rate is 10% per annum with continuous compounding and that the dividend yield on a stock index is 4% per annum. The index is standing at 400, and the forward price for a contract deliverable in four months is 405.

What arbitrage opportunities does this create?

**Exercise 7 (Done)** The two-month interest rates in Switzerland and the United States are 2% and 5% per annum, respectively, with continuous compounding. The spot price of the Swiss franc is \$0.8000. The forward price for a contract deliverable in two months is \$0.8100.

What arbitrage opportunities does this create?

**Exercise 8** The spot price of silver is \$15 per ounce. The storage costs are \$0.24 per ounce per year payable quarterly in advance.

Assuming that interest rates are 10% per annum for all maturities, calculate the forward price of silver for delivery in nine months.

**Exercise 9 (Difficult)** Show that the growth rate in an index forward price equals the excess return of the portfolio underlying the index over the risk-free rate. Assume that the risk-free interest rate and the dividend yield are constant.