

# Arbitrage&Pricing - Exercises Chapter 5

Université Paris Dauphine-PSL

Jérôme MATHIS (LEDa)

**Exercise 1.** *A financial institution has just sold 1,000 seven-month European call options on the Japanese yen. Suppose that the spot exchange rate is 0.80 cent per yen, the exercise price is 0.81 cent per yen, the risk-free interest rate in the United States is 8% per annum, the risk-free interest rate in Japan is 5% per annum, and the volatility of the yen is 15% per annum.*

*Calculate the delta, gamma, vega, theta, and rho of the financial institution's position. Interpret each number.*

**Exercise 2.** *A financial institution has the following portfolio of over-the-counter options on sterling:*

Type	Position	$\Delta$	$\Gamma$	$\nu$
Call	-1,000	0.5	2.2	1.8
Call	-500	0.8	0.6	0.2
Put	-2,000	-0.4	1.3	0.7
Call	-500	0.7	1.8	1.4

*A traded option is available with a delta of 0.6, a gamma of 1.5, and a vega of 0.8.*

- What are the delta, the gamma and the vega of the portfolio?*
- What position in the traded option and in sterling would make the portfolio both gamma neutral and delta neutral?*
- What position in the traded option and in sterling would make the portfolio both vega neutral and delta neutral? Assume that all implied volatilities change by the same amount so that vegas can be aggregated.*