Stochastic methods for finance, Report 2

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1 Company overview, Crédit Agricole S.A.

Crédit Agricole S.A. is one of the leading European banking groups and is the leading financial backer of the French economy. Net Banking Product breaks down by activity as follows:

- retail banking (30.1%): activities in France (Crédit Lyonnais) and abroad. Furthermore, the group is present in France via its 39 regional networks of branches (making it the biggest French banking network);
- finance, investment and market banking (30.1%): standard and specialized bank financing activities (financing for acquisitions, projects, aeronautical and maritime assets, etc.), stock operations, consulting in mergers and acquisitions, investment capital, etc.;
- asset management, insurance and private banking (25.9
- specialized financial services (13.9%): consumer loan, leasing and factoring (No. 1 in France).

At the end of 2023, Crédit Agricole S.A. managed EUR 835 billion in current deposits and EUR 516.3 billion in current credits. NBP is distributed geographically as follows:

- France (46%),
- Italy (20%),
- European Union (14.3%),
- Europe (7.2%),
- North America (6%),
- Japan (1.3%),
- Asia and Oceania (3 .5%),
- Africa and Middle East (1.3%),
- Central America and South America (0.4%).

2 Implicit Dividends Calculation

I choose this company since it pays dividends and it is one of the most traded European type stock options in the European markets, so it is one of the most liquid assets, with reasonable prices to estimate the implicit dividends.

Using the box spread strategy, I estimated the forward price at 1, 3, 6 and 12 months. The box spread strategy consists in:

- buying a Call with strike K_-, selling a Call with strike K_+
- buying a Put with strike K_+, selling a Put with strike K_-

with K_+ ¿ K_-. So that the price of the Box Spread is a multiple of the discount factor at maturity T: $D_0(T)(K_+ - K_-)$. So we can deduce the discount factor (thus the interest rates) as:

$$C_{K_-} - C_{K_+} + P_{K_+} - P_{K_+} = (K_+ - K_-)D_0(T) \tag{1}$$

Then, we can calculate the price of the Forward as :

$$F_0(T) = Se^{RT} - DIV \tag{2}$$

And using the call-put parity :

$$Call - Put = D_0(T)(F_0(T) - K) \tag{3}$$

This allow us to obtain the Forward price equating the two formulas, so that $DIV = \frac{S_0}{D_0(T)} - F_0(T)$, and then using the formula for the implicit dividends q:

$$q = DIV \frac{D_0(T)}{S_0} \tag{4}$$

3 Results

	1 month	3 months	6 months	12 months
$D_0(T)$	0,967	0,988	0,984	0,967
q	0,0154	0,0597	0,0573	0,0541

The results obtained are not quite in accordance with the nominal values of q found on the option analytics (7%), it could be due to the lack of information relative to option prices found online, especially for the option with maturity at one month.