

Stochastic Methods for Finance: Report 2

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From the <https://finance.yahoo.com/> website I've chosen the dividend paying asset Mastercard Incorporated (MA). My aim was to deduce the term structure of implied dividends, based on the ones at different maturities.

1) GENERAL DESCRIPTION OF THE COMPANY

Mastercard Incorporated, a technology company, provides transaction processing and other payment-related products and services in the United States and internationally. It facilitates the processing of payment transactions, including authorization, clearing, and settlement, as well as delivers other payment-related products and services. The company offers integrated products and value-added services for account holders, merchants, financial institutions, businesses, governments, and other organizations, such as programs that enable issuers to provide

consumers with credits to defer payments; payment products and solutions that allow its customers to access funds in deposit and other accounts; prepaid programs services; and commercial credit, debit, and prepaid payment products and solutions. It also provides value-added products and services comprising cyber and intelligence solutions for parties to transact, as well as proprietary insights, drawing on principled use of consumer, and merchant data services. In addition, the company offers analytics, test and learn, consulting, managed services, loyalty, processing, and payment gateway solutions for e-commerce merchants. Further, it provides open banking and digital identity platforms services. The company offers payment solutions and services under the MasterCard, Maestro, and Cirrus. Mastercard Incorporated was founded in 1966 and is headquartered in Purchase, New York.

Previous Close	354.62
Open	355.56
Bid	0.00 x 800
Ask	0.00 x 900
Day's Range	352.80 - 355.88
52 Week Range	276.87 - 390.00
Volume	549,124
Avg. Volume	2,871,248
Market Cap	338.868B
Beta (5Y Monthly)	1.11
PE Ratio (TTM)	34.81
EPS (TTM)	10.21
Earnings Date	Apr 26, 2023 - May 01, 2023
Forward Dividend & Yield	2.28 (0.64%)
Ex-Dividend Date	Apr 05, 2023
1y Target Est	426.75

2) FIXING A MATURITY

I've set $T=2$ months, and I've chosen four option with the same maturity, one call in the money with strike price 345 and one put out of the money with the same strike price; and one call out of the money with strike price 355 and one put in the money with the same strike price, I've made this to applying the box spread strategy. So, with this $K1$ and $K2$, the $ck1$, so the call mid-price between bid and ask, is 20,925 and the $pk1$ is

12,425; instead $ck2$ and $pk2$ respectively are 15,075 and 16,475.

3) DISCOUNT FACTOR

Having these we can compute the discount factor with the formula:

$$D(0,T) = \frac{ck1 - ck2 + pk2 - pk1}{K2 - K1}$$

That gives as result 2,2325.

4) DIVIDEND FOR MATURITY T

Using the put and call parity formula ($C+K=P+S$), I've chosen new call and put with strike at the money. To have the dividends for maturity T , I've computed the q formula:

$$q = \frac{-1}{T} \ln\left(\frac{ck - pk + KD(0,T)}{S}\right)$$

$q=-4,82974565$. The definition of $\text{div}(T)$ is:

$$e^{qT}$$

So equal to 0,447.

5) DIFFERENT MATURITIES

MATURITIES	T (in months)	D(0,T)	DIV(T)
April 2023	1	0,97	1,027782
May 2023	2	2,2325	0,447107
June 2023	3	0,99	1,000868
September 2023	6	1	0,982481
January 2024	10	0,1275	6,287528

The last dividend is much larger than the others and there is no specific pattern or level off. This could indicate a one-off event that resulted in a high dividend payout.

This is the distribution of a significant portion of the company's profits to shareholders in the form of dividends. If the dividend amount is higher than usual or exceeds the previous year's payout, it is considered a large payout. A high payout can be a sign of a company's financial strength and profitability, but it can also indicate a lack of investment opportunities or growth potential.

It is important to examine the reasons for the high dividend payout to assess whether it is an ongoing trend or a one-off event.

But the original problem is that the Box-Spread strategy principle works with European options.