

REPLACE PAGE 3 (AFTER LINE 2) WITH THE FOLLOWING

Assuming that an investor allots \$1000 for this portfolio, after items 1–3 have been incorporated into the portfolio, how much cash is left over for other investments?

Consider this portfolio: the 500 digital call options, the put option, the zero coupon bond. Make charts of the values of this portfolio on the following dates: date of portfolio generation, 5 years after portfolio formation, 10 years after portfolio formation. Do this for the range of S&P 500 values in the range $700 < S < 1000$.

The Cash Flows. Find the current value of the discounted cash flows that this security delivers under that assumptions that (1) after year 1, all interest payments are equal to the $5 \times$ (the historical average of the difference between Sw_{30} and Sw_2), and (2) the cash flow t years from now is discounted by the factor $e^{-0.0544t}$. Note that the variable t ranges over the set $\{0.25, 0.50, 0.75, 1.00, \dots, 14.25, 14.50, 14.75, 15.00\}$. This valuation assumes that the S&P 500 index never falls below 1008.

Now incorporate the possibility of the index falling below 1008 by multiplying each cash flow by the probability that the index is above 1008 at the start of the quarter. In this case, note that since the probability formula involves the risk-free rate, you will have to estimate risk free rates by interpolation in the CMT curve. Linear interpolation is fine.

If you are really ambitious, you can try to replace the discount factors $e^{-0.0544t}$ by $e^{-r_t t}$ where r_t is the rate obtained by adding 2.58% to the current CMT rate. You will need to interpolate again.

EXPECTATIONS CONCERNING PROGRAMMING

The input for the program should come from a file which has one parameter per line. The input parameters should include S_0 , B , and all parameters necessary for the option, bond, and cash flow valuations. You should create a README.txt file that describes the format of the input file (that is, the order of the parameters). The outputs for the program will consist of data to import into a spreadsheet for charting as well as output to the console for that communicates answers to the basic questions.

Your code should be separated into at least four independent .cpp files:

- (1) A file called BSE.cpp which holds the implementation of the option pricing formulas used. There should also be a BSE.h which holds only the names of the functions and their signatures.
- (2) A file called CashFlow.cpp which holds the code for calculating the required cash flows.
- (3) A file called Main.cpp which runs the program.