Dear Markus. Dear Andrea.

We discussed on Thursday that I wanted to come up maybe with another idea on an interesting application of our our model.

We discussed to plot the different valuations and their relation to each other - an I believe that would be a sufficient application to finalise the thesis.

However, I have another one here, and it is quite nice and of practical interest.

1 Valuation of Cancelable Loan

So we start with the question: "What is the value that both counterparties see for a cancelable loan?"

The bank offers the client a loan. The client pays back the predefined cash flow stream $X(t_i)$.

Seen from Creditor we have:

$E(\sum_{t_I} X(t_i) \cdot Q^d(t_i)/N^c(t_i))$

Seen from Debtor we have:

$E(\sum_{t_i} X(t_i)/N^d(t_i))$

He just factors in the cost the get the loan somewhere else, of course, the value of $N^d(t)$ is such that his zero bond is the value of his defaultable bond, so $E(1/N \cdot Q^d)$ and $E(1/N^d)$ are actually the same thing.

2 Valuation of Option

The client has the right (option) to pay back the full loan by an amount K at some time t^*.

We assume that the amount K is fixed in the beginning.

The two parties will value the option differently.

If the just consider the optimal exercise, they will check if

$K > E(\sum_{t_I > t^*} X(t_i) \cdot Q^d(t_i)/N^c(t_i) \mid \mathcal{F}_{t^*})$

or

$K > E(\sum_{t_I > t^*} X(t_i)/N^d(t_i))$

Note that his is a conditional expectation.

Now the interesting part is: If the creditor assumes that the debtor exercises the option optimal (so uses the second condition), does this make the option cheaper from the deptors point of view?

How does this gap depend on - relative position of the two curve - volatility of the two curves - correlation?

For a cancelable loan with general payoffs X you would have to use a regression to determine the optimal exercise. This can be done with the class implementing "ConditionExpectationEstimator" - see the BermudanSwaption example.

However, if this is too much - we could also just investigate the above question for a caplet or - if X are just constants - calculate the conditional expectation analytically on path (in time t^*). This means you calculate the value using

$getForwardRate(t, T1, T2)$ where $t = t^*$. This does not require a conditional expectation then. Doing so, you just need to simulate all quantities up to time t^* and then calculate the different values and check if K is larger or smaller.

Does this make sense? - It is actually also very close to the behavioural aspect. The client will exercise the option according to a different criteria and adding the shadow barrier would be easy. But here your thesis can show that this effect exists even without a shadow barrier.

Liebe Grüße Christian