Math 5422 - Quantitative Hedge Fund Strategies

Project 6: Convertible Bond Pricing
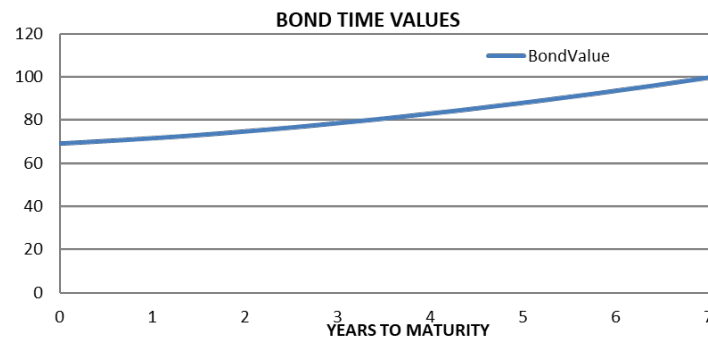## Using QuantLib

Due Date: Match 1, 2023

Project Description

1. Using QuantLib to price a convertible bond
   - Ideally, we should use the actual swap curve as the yield curve. If that is too difficult, you can use a constant yield curve
   - Dividend is 0
   - Soft calls will be ignored
   - Outputs should include prices, accrued, and the Greeks.

2. Calculate the bond floor curve (on the time grids) using a risky yield curve = swap curve + 400bp, this is simply a cashflow discount from maturity back to valuation date.

BOND TIME VALUES

http://gouthamanbalaraman.com/blog/value-convertible-bond-quantlib-python.html

Bond Description

Calls / Puts / Soft Calls

Schedules
51) Call 53) Put 54) Softcall 61) Cash Tender

Call with minimum 30 days notice

Callable on and anytime after date(s) shown

Date	Price
02/01/2019	100.000

Schedules
51) Call 53) Put 54) Softcall 61) Cash Tender

Discrete Put minimum 1 days notice

Date	Price
02/01/2019	100.000
02/01/2023	100.000
02/01/2028	100.000

Schedules
51) Call 53) Put 54) Softcall 61) Cash Tender

Soft calls are options for the issuer to repurchase or force a conversion which are activated only if the underlying stock price equals or exceeds a trigger determined at the time of issue.

Current Prov Price (Stock Currency)	None
Current Prov Price (Bond Currency)	None
Current Call Price	None
Trigger Type	Percent
Accrual Rate	None
Quote Type	Close
Day Type	20 out of 30 Business Days

Date Range	Call Price (%)	Call Prc (USD)	Trigger (%)	Notes
02/01/2017 - 02/01/2019	100	1000	130	

Bond Description

Q&A

1. Greeks:
   – Delta: Change of value for 1% stock move. Use central difference on +/-1% stock price move. **Note that the denominator should be parity, i.e. 15.422. (Delta should be < 1)**
   – Gamma: Change of Delta for 1% stock move, calculate along with Delta.
   – Vega: Change of bond value for 1% volatility change
   – Rho: change of bond value for +100bp yield curve changes (calculated as 100 * (change of bond value for 1bp of yield curve changes)

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