Computer Programming in Financial Engineering

Midterm Project

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Question 1

(a)

maturity	mean	standard deviation
1	98.76	0.78
2	97.46	1.56
3	96.14	2.32
4	94.83	3.02
5	92.23	4.38
6	89.64	5.56
7	87.06	6.64
8	84.48	7.62
9	79.48	9.25
10	74.70	10.50
11	65.78	12.13
12	54.38	13.06

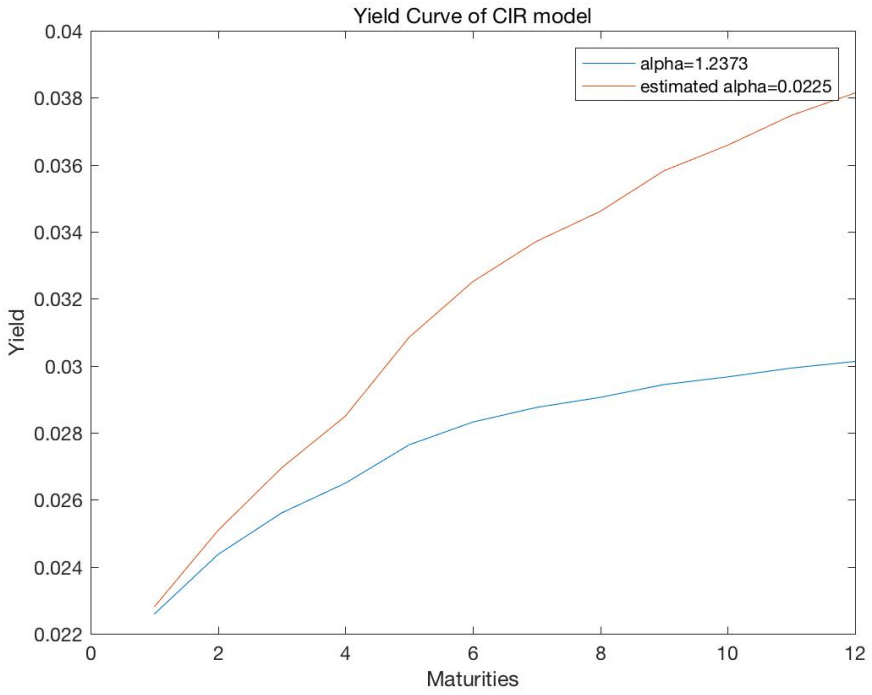
(b)

rbar_hat equals to 0.44923

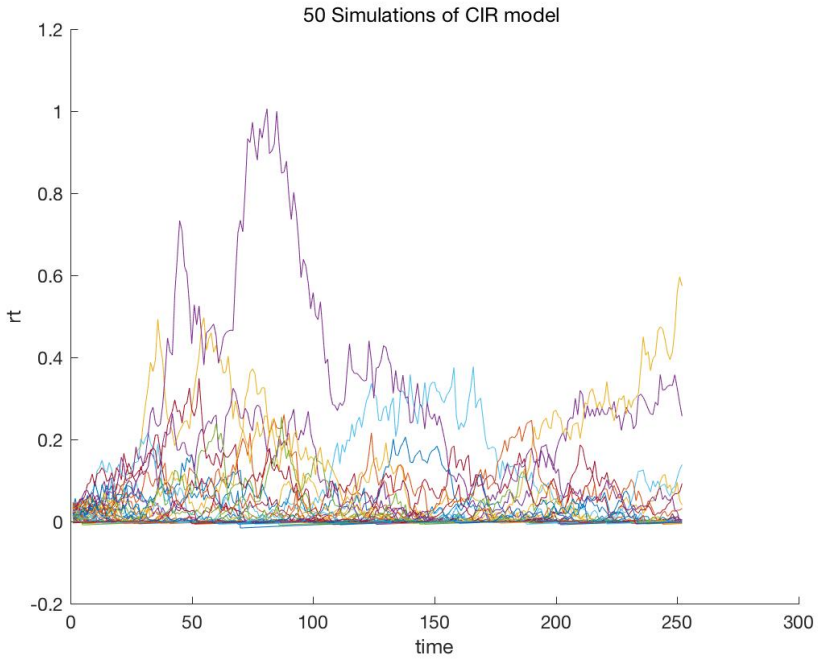
gamma_hat equals to 0.01534

alpha_hat equals to 0.02246

(c)



(d)



mean	std
3.4094e-05	0.0034

(e) ‘

-------Relative Pricing Errors--------

2007.01	0.0525
2007.02	0.0279
2007.03	0.0182
2007.04	0.0440
2007.05	0.0601
2007.06	0.0786
2007.07	0.0426
2007.08	0.0467
2007.09	0.0172
2007.10	-0.0055
2007.11	-0.0216
2007.12	-0.0184
2008.01	-0.0841

(f)

time	hedge ratio	maturity of most overpriced(year)
1990.06	0.6716	3.00
1990.07	0.1405	0.50
1990.08	0.0712	0.25

1990.09	0.0697	0.25
1990.10	0.0695	0.25
1990.11	0.0689	0.25
1990.12	0.0659	0.25

Bonus Part:

(Return means return rate here)

Mean and Std of Historical Returns of the Dynamic Strategy

mean	std
-0.0008	0.0172

(g)

Non-callable part can be seemed as a ZCB with face value 102.5 and maturity 5 years, also 10 ZCBs with face value 100*5%/2=2.5, and maturity relatively 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5,5.

By CIR formula and Monte Carlo Simulation, the results are as follows.

Noncallable part: 108.0002

Callable part: 4.0312

Callable Bond Price: 103.9689