Unit 13 - Week 11: Risk-Neutral Pricing in Continuous-Time (Part 1)

Course outline

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Week 1: Introduction to Financial Markets and Instruments

Week 2: Time Value of Money and Riskfree Assets

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Week 11: Risk-Neutral Pricing in Continuous-Time (Part 1)

- Quiz : Assignment 11
- Lec 31: Black-Scholes-Merton (BSM) Model, BSM Equation, BSM Formula
- Lec 32: Greeks, Put-Call Parity, Change of Measure
- Lec 33: Girsanov Theorem, Risk-Neutral Pricing of Derivatives, BSM Formula
- Feedback Form
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Week 12: Risk-Neutral Pricing in Continuous-Time (Part 2)

Text Transcripts

Live Session

Assignment 11

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-10-16, 23:59 IST.

1) In the classical BSM model (with given parameters α, σ and r), which of the following is/are true? *2 points*

- ☐ The stock price process $\{S_t\}$ is a martingale under the risk-neutral probability measure $\widetilde{P}$.
- ☐ $E(S_T) = S_0 e^{\alpha T}$, for $T > 0$ (under the actual probability measure P).
- ☐ $Var\left(\ln \frac{S_T}{S_t}\right) = \sigma^2(T-t)$, for $0 \le t \le T$ (under the actual probability measure P).
- ☐ The risk-neutral probability measure $\widetilde{P}$ can be obtained by taking any constant value for θ in the Girsanov theorem.

No, the answer is incorrect.
Score: 0

Accepted Answers:
$E(S_T) = S_0 e^{\alpha T}$, for $T > 0$ (under the actual probability measure P).
$Var\left(\ln \frac{S_T}{S_t}\right) = \sigma^2(T-t)$, for $0 \le t \le T$ (under the actual probability measure P).

2) State whether the following statement is TRUE or FALSE: *1 point*
In the classical BSM model (with given parameters α, σ and r), if $R_T = \frac{1}{T}\ln\frac{S_T}{S_0}$ is the continuously compounded rate of return per annum realized between times 0 and T, then $R_T \sim \mathcal{N}\left(\alpha - \frac{\sigma^2}{2}, \sigma^2\right)$ under the real-world probability measure P.

- ○ TRUE
- ○ FALSE

No, the answer is incorrect.
Score: 0

Accepted Answers:
FALSE

3) State whether the following statement is TRUE or FALSE: *1 point*
In the classical BSM model (with given parameters α, σ and r), the Delta of the European put option is always positive.

- ○ TRUE
- ○ FALSE

No, the answer is incorrect.
Score: 0

Accepted Answers:
FALSE

4) In the classical BSM model (with given parameters α, σ and r), if the mean rate of return of the stock is twice that of the return on the riskfree asset, $\sigma = 20\%$ and the market-price-of-risk equals 0.4, then the riskfree rate of return (in percentage) equals:

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 8

1 point

5) State whether the following statement is TRUE or FALSE: *1 point*
In the classical BSM model (with given parameters α, σ and r), an European derivative with payoff $V_T = \left(S_T - \frac{1}{T}\int_0^T S_u du\right)^+$ is a path-independent derivative.

- ○ TRUE
- ○ FALSE

No, the answer is incorrect.
Score: 0

Accepted Answers:
FALSE

6) State whether the following statement is TRUE or FALSE: *1 point*
In the classical BSM model (with given parameters α, σ and r), the Delta and Gamma of a forward contract with exchange price K is $\Delta_f = 1$ and $\Gamma_f = 0$.

- ○ TRUE
- ○ FALSE

No, the answer is incorrect.
Score: 0

Accepted Answers:
TRUE

7) State whether the following statement is TRUE or FALSE: *1 point*
In the classical BSM model (with given parameters α, σ and r), the discounted price process of the riskfree asset is a martingale under both P and $\widetilde{P}$.

- ○ TRUE
- ○ FALSE

No, the answer is incorrect.
Score: 0

Accepted Answers:
TRUE

8) State whether the following statement is TRUE or FALSE: *2 points*
In the classical BSM model (with given parameters α, σ and r), we have that $\widetilde{P}(S_T > K) = N(d_-)$, where $d_- = \frac{1}{\sigma\sqrt{T}}\left[\ln\frac{S_T}{K} + \left(r - \frac{1}{2}\sigma^2\right)T\right]$.

- ○ TRUE
- ○ FALSE

No, the answer is incorrect.
Score: 0

Accepted Answers:
TRUE