Advanced Tools for Risk Management and Asset Pricing

May 2016 Exam for Non Attending Students
Time Allowed: 100 minutes

Family Name (Surname)	First Name	Student Number (Matr.)

Please answer all questions by choosing the most appropriate alternative(s) and/or by writing your answers in the spaces provided. You need to carefully justify and show your work in the case of "open" questions. There is only one correct answer(s) for each of the multiple choice questions. Correct answers not selected and questions that have been left blank will receive zero points. Only answers explicitly reported in the appropriate box will be considered. No other answers or indications pointing to potential answers will be taken into consideration. In the case of "open" questions, the maximum number of points is indicated.

Question 1 (1.5 pts.) Which of the following statements about base correlations is TRUE?

☐ (A) Typically, base correlation presents a smile
☐ (B) It depends on pairs of detachment points
☐ (C) It is consistent at the level of single tranche
☐ (D) None of the above

Question 2 (1.5 pts.). Which of the following statements about Analytically Tractable First Passage (AT1P) models is TRUE?

☐ (A) AT1P models assume the existence of a time-dependent stochastic barrier
☐ (B) Default is described by means of an endogenous process
☐ (C) AT1P models always allow to determine consistently short term credit spreads
☐ (C) None of the above

Question 3 (1.5 pts.) What does the following formula represent?

$$N \left(\frac{N^{-1}(p_i) - \sqrt{\rho_i}\, y}{\sqrt{1 - \rho_i}} \right)$$

☐ (A) A single name probability of default in the single factor model
☐ (B) A single name probability of default conditional on the systematic factor
☐ (C) The limiting portfolio loss distribution according to Vasicek
☐ (D) The quantile of the loss distribution at level $q = N(y)$ in the Vasicek portfolio loss model

Question 4 (1.5 pts.). Which of the following statements about the One Factor Gaussian Copula model is FALSE?

☐ (A) Estimation of the correlation matrix for n names involves $n(n-1)/2$ estimates of pairwise correlation
☐ (B) The model relies on the assumption of independence of single names
☐ (C) The expected tranched loss coincides with the tranched loss ☐
☐ (D) All of the above

Question 5 (1.5 pts.). Which of the following statements about Mapping methods for bespoke portfolios is FALSE?

☐ (A) The overlap between the bespoke portfolio and the standard index is irrelevant to the pricing of the bespoke tranches
☐ (B) The correlation used to price the bespoke tranche is taken to be the correlation at the equivalent standard strike
☐ (C) The ATM method is based on the first moment of the portfolio loss
☐ (D) Both the TLP and the PM methods take into account the portfolio dispersion

Question 6 (1.5 pts.) Which of the following statements about different approaches to price CDOs is TRUE?

☐ (A) The Implied Copula approach by Hull and White is not able to capture the phenomenon of clustered (sector) defaults associated to masses in the far right tail of the loss distribution
☐ (B) The Implied Copula approach by Hull and White solves the problems of inconsistencies across both the capital structure and maturities
☐ (C) Dynamic(al) Loss approaches do not allow partial hedges with respect to single names
☐ (D) None of the above

Question 7 (1.5 pts.). Which of the following statements about diffusion processes is TRUE?

☐ (A) The Geometric Brownian Motion process is a martingale
☐ (B) The Vasicek and the CIR processes have the same mean
☐ (C) The Vasicek process is distributed as a χ^2 distribution
☐ (D) The CIR process is distributed as a Gaussian

Question 8 (1.5 pts.) Which of the following statements about Basel III is TRUE?

☐ (A) The CVA capital charge has been introduced to take into account default risk
☐ (B) The Credit risk capital charge is the same as in Basel II
☐ (C) The CCR capital charge is the same as in Basel II
☐ (D) None of the above

Question 9 (1.5 pts.). Which of the following statements about the close-out amount is TRUE?

☐ (A) The close-out amount and the exposure are the same thing
☐ (B) The close-out amount must be calculated as a risk-free quantity
☐ (C) Assuming the point-of-view of the non-defaulting party, if the close-out amount is negative, the party is exposed to counterparty risk
☐ (D) None of the above

Question 10 (1.5 pts.) Which of the following statements about Reduced Form (Intensity) models is FALSE?

☐ (A) In deterministic intensity models, survival probabilities have the same structure as zero coupon bonds in short rate models
☐ (B) Survival probabilities obtained through calibration to CDS quotes can increase with time
☐ (C) In a time inhomogeneous Poisson process, the survival probability is given by: $P(\tau < T) = e^{-\Gamma(T)}$
☐ (D) A time homogeneous Poisson process is a unit-jump increasing, right continuous process, with stationary independent increments and zero initial value

Question 11 (6 pts.)

1. What is CVA? How is it defined? (2 pts)

2. What are the risk factors generally affecting CVA? (1 pt)

3. What is collateral? Describe, also including formulas, how collateral works both in theory and in practice (3pt)

Question 12 (1.5 pts). Considering two different Bonus Cap with the characteristics below, which statement is *the most plausible one*:

Bonus Cap A	
Bonus	113%
Cap	113%
Barrier Type	American
Tenor	3 years

| Bonus Cap B	
Bonus	113%
Cap	113%
Barrier Type	European
Tenor	3. years

☐ (A) Bonus Cap A has a Barrier equal to 70% and Bonus Cap B has a barrier equal to 80%
☐ (B) Bonus Cap B has a Barrier equal to 70% and Bonus Cap A has a barrier equal to 80%
☐ (C) Both Bonus Cap A and Bonus Cap B have a barrier equal to 80%
☐ (D) Both Bonus Cap A and Bonus Cap B have a barrier equal to 70%

Question 13 (1.5 pts). Consider a Bonus Cap certificate with Bonus and Cap both equal to Eur 120, and an American Barrier equal to 75% of the Strike. When there is one month left to the expiry date, the underlying breaches the Barrier Level. Considering that the closing price of the certificate in the previous day was equal to Eur 85, which is likely to be the price of the certificate after that the barrier is breached?

☐ (A) The price of the certificate will not change, because there is still one month left to the maturity

☐ (B) There will be a steep drop in the price of the certificate, which will start trading around Eur 75

☐ (C) The price of the Certificate will drop to zero, because the investor is no more able to get the Bonus

☐ (D) None of the above

Question 14 (1.5 pts). The following plots,
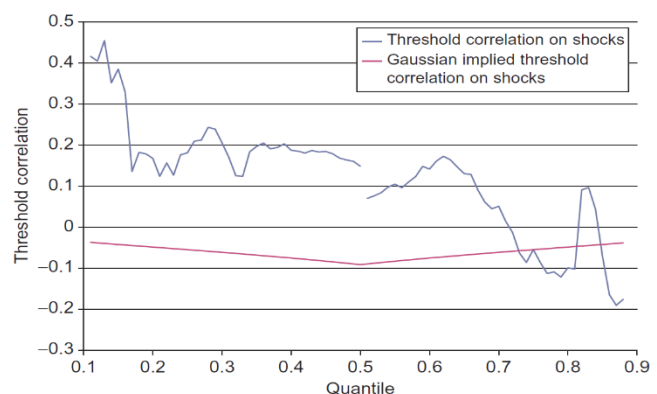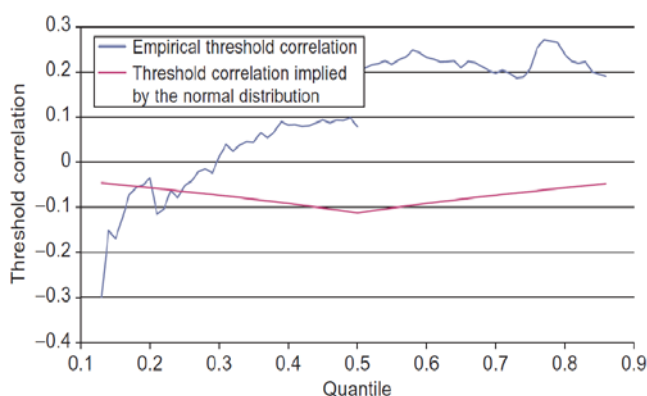
imply that:

☐ (A) Raw data correlations deviate from a bivariate normal because the data show positive excess correlation in the left tail and negative excess correlation in the right tail; the standardized residuals of a GARCH modelling exercise show instead the opposite pattern but fail to be fitted by a bivariate Gaussian model

☐ (B) While the raw data deviate from a bivariate Gaussian model, the standardized residuals of a GARCH modelling exercise do not

☐ (C) Raw data correlations deviate from a bivariate normal because the data show negative excess correlation in the left tail and positive excess correlation in the right tail; the standardized residuals of a GARCH modelling exercise show instead the opposite pattern but fail to be fitted by a bivariate Gaussian model

☐ (D) None of the above

Question 15 (1.5 pts). Which of the following statement is correct?

☐ (A) A Leverage certificate implies a leverage that is function of the level of the underlying, given a fixed strike

☐ (B)The major drawback of a Turbo Certificate is the "compounding effect"

☐ (C)A Turbo certificate is characterized by a constant leverage ratio

☐ (D)None of the above

Question 16 (3 pts.)

Bank Tribeax is structuring a one-year equity protection certificate (with protection equal to 90%). The structuring team is looking at all the stocks of the S&P 500 Index to find the most suitable underlying to offer to their client a high participation to the index performance. To make the task easier, Esteban, one of the smartest and largest structurers in the bank, gives the following suggestion: "we may sort the stocks by the implied dividend and exclude the stocks that pay low dividends". After having described and drawn the payoff of an equity protection certificate (including a detailed decomposition into the different options and securities that compose/replicate it), explain the reasons behind Esteban's reasoning.