A13073W1

DEGREE OF MASTER OF SCIENCE IN FINANCIAL ECONOMICS

FINANCIAL ECONOMETRICS
MOCK FINAL

TRINITY TERM 2019

Tuesday, 23 April 2019, 14:30 – 17:00

Time allowed is TWO HOURS AND THIRTY MINUTES.

*Candidates should answer **ALL** questions in part A.*
*Candidates should answer **TWO** of four questions in part B.*

Examiners will place weight 2.5% on each
question in Part A and 25% on each question in part B.

*Use **three** booklets – one for Part A and one for each Part B question.*
Write the numbers for B questions answered on the cover of the relevant booklet.

Materials: Calculators.
Calculators must not be removed from the Examination Room.

Do not turn over until told that you may do so.

Note: This document provides a guide to the new format of the final this year. The final consists of two parts, A and B. Part A consists of 20 multiple choice questions divided into two sections. The first second has a single correct choice. The second between 0 and 5 correct answers per question. Part B is substantially similar to the Part B in past final exams except it will have 4 questions, rather than 3. You still must answer 2. This file has fewer questions than the actual final. This is intentional.

Part A: Multiple Choice

Answer ALL questions in this section.

Each question is worth 2.5% of the exam mark.

Single Answer Questions

Select a single answer for each question.

1. If
$$\begin{bmatrix} Y \\ Y \end{bmatrix} \sim N\left(\begin{bmatrix} \mu_X \\ \mu_Y \end{bmatrix}, \begin{bmatrix} \sigma_X^2 & \sigma_{XY} \\ \sigma_{XY} & \sigma_Y^2 \end{bmatrix}\right),$$
what is V $\left[Y|X\right]$ where $\beta = {}^{\sigma_{XY}}/_{\sigma_X^2}$?
   (a) σ_Y^2
   (b) $\sigma_Y^2 - \beta\sigma_X^2$
   (c) $\sigma_Y^2 - \beta^2\sigma_X^2$
   (d) $\mu_Y - \beta\mu_X + \beta X$

2. When performing a hypothesis test, what are Type I and Type II Errors?
   (a) A Type I is failing to reject a false null and a Type II is rejecting a true null.
   (b) On of these two errors always occurs when performing a test.
   (c) A Type I is rejecting a true null and a Type II is failing to reject a false null when the alternative is true..
   (d) Testers choose α to control the probability of a Type I error and β to control the chance of a Type II error

3. Additional single answer question

4. Additional single answer question

5. Additional single answer question
6. Additional single answer question
7. Additional single answer question
8. Additional single answer question
9. Additional single answer question
10. Additional single answer question

Multiple Answer Questions

Select all correct answers. Each question has between 0 and 4 correct answers.

11. If $\{y_t\}$ is a covariance stationary time series, then
    (a) $\mathrm{E}[y_t] = 0 \; \forall t$
    (b) $\mathrm{V}[y_t] = \sigma^2 < \infty \; \forall t$
    (c) $\mathrm{E}\left[y_t | y_{t-1}, y_{t-2}, \ldots\right] = y_t$
    (d) The autocorrelations ρ_j are all constants that only depend on j
12. Principal components extracted from a T by k set of returns:
    (a) Are orthogonal
    (b) Can be ordered from most important to least by measuring the R^2 of fitting the data onto each principal component
    (c) Are the linear combinations that maximize the explanatory power over the k variables in the sample
    (d) Are independent of each other
13. Additional multiple answer question
14. Additional multiple answer question
15. Additional multiple answer question
16. Additional multiple answer question
17. Additional multiple answer question
18. Additional multiple answer question
19. Additional multiple answer question
20. Additional multiple answer question

Part B: Long Answer

Answer TWO of the four questions in this section.

Each question is worth 25% of the exam mark (i.e., 1/2 of 50%). Within each question points sum to 100% and so will be scaled by 25% when combined in the final exam mark.

1. Answer the following questions:

   (a) Suppose $Y_i \overset{\text{i.i.d.}}{\sim}$ Exponential(λ), so that $\mathrm{E}[Y_i] = \lambda$.

      i. [10%] Write down the log-likelihood for this problem.

      ii. [10%] Find the MLE of the unknown parameter.

      iii. [20%] What is the asymptotic distribution of the parameter estimate?

      iv. [10%] Suppose $n = 10$, $\sum y_i = 19$. Test the null $H_0 : \lambda = 1$ against a 2-sided alternative with a size of 5% test using a t-test.

      v. [10%] Suppose $n = 10$, $\sum y_i = 19$. Test the null $H_0 : \lambda = 1$ against a 2-sided alternative with a size of 5% test using a likelihood-ratio.

   (b) [20%] Why are HITs useful for testing a Value-at-Risk model?

   (c) [20%] Define conditional Value-at-Risk. Describe two methods for estimating this and compare their strengths and weaknesses.

2. Additional long question

3. Additional long question

4. Additional long question