

UCI-School of Business
Financial Risk Management
Sample Final Examination

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(Updated May 20, 2018)

1. (28 x 3 points) Multiple Choice--3 points each. Please mark answers on last page

1. A \$10 million 10-day VAR figure with 95% confidence means:
 - (a) there is only a 5% chance that we will gain more than \$10 million in 10 days.
 - (b) the VAR over the next day is \$1 million with 95% confidence.
 - (c) the loss over the next 10 days is expected to be at most \$10 million in 95% of the cases.
 - (d) the minimum loss over the next 10 days is expected to be at least \$10 million in 95% of the cases.

2. A bank reports a daily 95% VAR as \$15 million. Assuming daily and 10-day returns follow a normal distribution, the 99% 10-day VAR is
 - (a) \$15m
 - (b) \$47m
 - (c) \$212m
 - (d) \$67m

3. Given this information, the Conditional VAR (daily, 95%) should be around
 - (a) \$10m
 - (b) \$15m
 - (c) \$19m
 - (d) \$21m

4. The expected number of daily exceptions for the bank over the last year should be about:
 - (a) 0
 - (b) 5
 - (c) 13
 - (d) 50

5. The actual number of daily exceptions for the bank over the last year should be:
 - (a) exactly 5
 - (b) exactly 13
 - (c) most of the time between 0 and 10
 - (d) most of the time between 6 and 20

The following questions are about mapping

6. Consider a long position of \$100 million in a par 10-year note, with duration and modified duration of 7.80 and 7.36 years. Convexity is 69.74 year-squared. Payments are annual. Interest rates are at 6% and the volatility of changes in interest rates is 0.25% over the next month. Assuming normal distributions for yields, the monthly 95% VAR of yield changes is
 - (a) 0.25%
 - (b) 0.41%
 - (c) 0.58%
 - (d) 1.4%

7. Ignoring convexity, the VAR of the position is:

- (a) \$1.84m
- (b) \$3.03m
- (c) \$3.21m
- (d) \$3.99m

8. With convexity, the VAR of the position is:

- (a) \$2.97m
- (b) \$3.09m
- (c) \$2.91m
- (d) \$3.03m

9. Consider a \$100 million 10-year interest rate swap where you pay a fixed amount in exchange for floating payments. Market conditions are as in the previous question. Assume the floating payment is about to be reset. Payments are annual. Ignore convexity. The change in value of the swap if rates go down by 0.58% is

- (a) a gain of about \$4.3m
- (b) a loss of about \$4.3m
- (c) a gain of about \$4.5m
- (d) a loss of about \$4.5m

10. Assume now that the floating payment has just been reset. The change in the value of the swap if rates go down by 0.58% is

- (a) a gain of about \$4.3m
- (b) a loss of about \$4.3m
- (c) a gain of about \$3.7m
- (d) a loss of about \$3.7m

11. Consider a long position in one European call option on an asset worth \$100. The option is at-the-money, with a delta of 0.50 and a gamma of 0.04. The underlying asset volatility is 3% over the next month. The 99% monthly VAR is, using the delta approximation:

- (a) \$7.0
- (b) \$3.5
- (c) \$3.0
- (d) \$0.3

12. Continuing the previous question, the 99% monthly VAR is, using the delta-gamma approximation:

- (a) \$1.0
- (b) \$2.5
- (c) \$3.5
- (d) \$4.5

13. For which of the following purposes is a high confidence level advisable?

- (a) for backtesting purposes
- (b) as a benchmark measure of downside risk for trading desks
- (c) for capital adequacy purposes
- (d) none of the above

14. For which of the following purposes is a long time horizon advisable when computing the VAR?
- (a) for portfolio of derivatives with delta changing quickly
 - (b) in order to provide a more accurate measurement of the VAR
 - (c) for capital adequacy purposes
 - (d) for backtesting purposes

15. Which method would be best advisable for measuring the risk of a portfolio of exotic options:
- (a) Delta-normal
 - (b) Delta-gamma-delta
 - (c) Delta-gamma Monte Carlo
 - (d) Full Monte Carlo

16. Under the 1996 rules, the Basel Committee on Banking Supervision requires commercial banks to carry enough capital to cover (assuming zero specific charge):

- (a) The minimum of the previous day's VaR and the average of the last 60 day VaRs multiplied by factor k
- (b) The maximum of the previous day's VaR and the average of the last 60 VaRs multiplied by k
- (c) The previous day's VaR or the average of the last 60 VaRs, whichever is higher
- (d) The maximum of the average of the last 60 VaRs and the last day's VaR multiplied by a factor k

17. The 95%, 1-day RiskMetrics VAR for a bank trading portfolio is \$1,000,000.

What is the approximate general market risk charge, as defined in 1996?

- (a) \$3,000,000
- (b) \$9,500,000
- (c) \$4,200,000
- (d) \$13,400,000

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18. Which of the following is true about stress testing?

- (a) It is used to evaluate the potential impact on portfolio values of unlikely, although plausible, events or movements in a set of financial variables.
- (b) It is a risk management tool that directly compares predicted results to observed actual results. Predicted values are also compared with historical data.
- (c) Both a) and b) above are true.
- (d) None of the above are true.

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19. A pension fund has a portfolio with \$1 billion invested each in US stocks and Japanese stocks. The 99% 1-week VAR analysis reveals a VAR of \$112 million. The risk manager, however, is concerned about extreme moves not reflected in VAR. She constructs:

- A univariate scenario where US stocks fall by 20%
- A univariate scenario where Japanese stocks fall by 25%
- A prospective scenario where US stocks fall by 20% and Japanese stocks by 15%
- A prospective scenario where US stocks fall by 5% and Japanese stocks by 25%

The prospective scenarios are equally likely. The most realistic stress loss estimate to worry about is:

- (a) \$200 million
- (b) \$250 million
- (c) \$300 million
- (d) \$350 million.

20. John Flag, the manager of a \$150 million distressed bond portfolio, conducts stress tests on the portfolio. The portfolio's annualized return is 12%, with an annualized return volatility of 25%. In the last two years, the portfolio encountered several days when the daily value change of the portfolio was more than 3 standard deviations. If the portfolio would suffer a 4-sigma daily event, estimate the change in the value of this portfolio.

- (a) \$9.48 million
- (b) \$23.70 million
- (c) \$37.50 million
- (d) \$150 million

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21. Risk managers can model time variation in risk using MA, EWMA or GARCH models. Generally

- (a) these models are not useful because volatility is constant over time
- (b) Moving Average (MA) models are superior to others
- (c) EWMA and GARCH forecasts fit the data rather well
- (d) EWMA model forecasts are very different from those from GARCH models

22. Consider simulations from a normal $(0, \sigma)$ model where the volatility is known. Define s as the estimated volatility from K simulations.

- (a) Simulations can be used to measure volatility without sampling error
- (b) The quantile forecast from $\alpha\sigma$ is less precise than that from the sample quantile
- (c) Increasing K by a factor of 10 will increase precision of s by a factor of 10
- (d) Increasing K by a factor of 100 will increase precision by 10

Credit Risk

23. Your bank makes a \$100m loan to an AAA-rated company. The interest rate (net of expected default losses) is 6%. The bank's funding cost is 5.65%. The bank is subject to the current Basel capital requirement. Based on this information, the return to equity capital would be:

- (a) 10%
- (b) 8%
- (c) 6%
- (d) 5.65%

24. A bank invests in a 1-year loan with a CCC credits. The default probability is 24.27%. Assume the recovery rate is 40%, and the risk-free 1-year spot rate is 6%, using annual compounding (pay attention to compounding). The minimum yield spread should be

- (a) 10%
- (b) 15%
- (c) 24%
- (d) 40%

25. Define PD as the (expected) probability of default and LGD as the loss given default. Take EAD, exposure at default, as fixed and ignore it. At a portfolio level, **expected** credit losses are driven by:

- (a) PD only
- (b) expected LGD only
- (c) PD and expected LGD only
- (d) neither of the above

26. Continuing, at a portfolio level, **unexpected** credit losses are driven by:

- (a) PD only
- (b) the distribution of LGD
- (c) PD, LGD, correlations across defaults
- (d) PD, LGD, correlations across defaults and LGD

2. Market Risk (write answer below)

Suppose you have a portfolio with a long position of \$2 million in BAA bonds and short \$1m in T-notes. Volatilities are 1.58% and 1.90% per month, respectively, with a correlation of 0.9654.

- a) Compute the 95% monthly VAR for each position individually
- b) Compute the 95% portfolio VAR and diversification effect
- c) Compute the component VAR and discuss whether some positions hedge the portfolio risk.

Sample Final Examination: Answers

May 2018

1. Multiple Choice Answers

| | a | b | c | d |
|-----|-----|-----|-----|-----|
| 1. | () | () | (x) | () |
| 2. | () | () | () | (x) |
| 3. | () | () | (x) | () |
| 4. | () | () | (x) | () |
| 5. | () | () | () | (x) |
| 6. | () | (x) | () | () |
| 7. | () | (x) | () | () |
| 8. | (x) | () | () | () |
| 9. | () | (x) | () | () |
| 10. | () | () | () | (x) |
| 11. | () | (x) | () | () |
| 12. | () | (x) | () | () |
| 13. | () | () | (x) | () |
| 14. | () | () | (x) | () |
| 15. | () | () | () | (x) |
| 16. | () | (x) | () | () |
| 17. | () | () | () | (x) |
| 18. | (x) | () | () | () |
| 19. | () | () | () | (x) |
| 20. | (x) | () | () | () |
| 21. | () | () | (x) | () |
| 22. | () | () | () | (x) |
| 23. | (x) | () | () | () |
| 24. | () | (x) | () | () |
| 25. | () | () | (x) | () |
| 26. | () | () | () | (x) |

2. Market Risk

- a) Individual VAR= \$52,140 \$31,350
b) Portfolio VAR= \$23,352 --diversification benefit is (\$60,138)
c) Component VAR= \$48,841 (\$25,488) the latter is a hedge