

# AFIN8003 - Workshop 5

## Banking and Financial Intermediation

Dr. Mingze Gao

2024-08-21

### 1 MCQ

1. The risk related to the uncertainty of an FI's earnings on its trading portfolio caused by changes in market conditions is:
  - liquidity risk
  - interest rate risk
  - credit risk
  - market risk
2. The establishment of economically logical position minimums and maximums per security trader, as part of market risk management, is known as:
  - management information
  - performance evaluation
  - setting limits
  - resource allocation
3. Market risk, as measured by daily earnings at risk (DEAR), includes which of the following components?
  - potential adverse move in yield
  - price sensitivity of the position
  - dollar market value of the position
  - All of the listed options are correct.
4. Price volatility includes which of the following components?
  - potential adverse move in yield and price sensitivity of the position
  - potential favourable move in yield and price sensitivity of the position
  - potential adverse move in yield and dollar market value of the position
  - potential favourable move in yield and dollar market value of the position
5. A firm has \$21 500 daily earnings at risk for seven days. What is its seven day market value at risk?
  - \$56 884
  - \$150 500
  - \$1026
  - \$388
6. Which of the following is often criticised for its need to assume a normal or symmetric distribution for all asset returns?
  - back simulation
  - RiskMetrics

- Monte Carlo simulation
- CreditMetrics

7. The expected shortfall (ES) approach to measuring market risk has the advantage that it:

- measures tail risk precisely
- is less comprehensive than VAR
- will not be considered in Basel III
- measures credit risk

## 2 Short answer questions

### 2.1 Q1

The mean change in the daily yields of a 15-year, zero-coupon bond has been 5 basis points (bp) over the past year with a standard deviation of 15 bp. Use these data and assume the yield changes are normally distributed.

- (a) What is the highest yield change expected if a 99 per cent confidence limit is required; that is, adverse moves will not occur more than one day in 100?
- (b) What is the highest yield change expected if a 95 per cent confidence limit is required?

### 2.2 Q2 - DEAR

Bank Alpha has an inventory of AAA-rated, 15-year zero-coupon bonds with a face value of \$400 million. The bonds are currently yielding 9.5% in the over-the-counter market.

- (a) What is the modified duration of these bonds?
- (b) What is the price volatility if the potential adverse move in yields is 25 basis points?
- (c) What is the DEAR?
- (d) If the price volatility is based on a 99% confidence limit and a mean historical change in daily yields of 0.0%, what is the implied standard deviation of daily yield changes?

### 2.3 Q3 - VaR and ES

Consider the following discrete probability distribution of payoffs for two securities, A and B, held in the trading portfolio of an FI:

Probability	A	Probability	B
50%	\$80m	50%	\$80m
49%	\$60m	49%	\$68m
1%	-\$740m	0.6%	-\$740m
		0.4%	-\$1393m

Which of the two securities will add more market risk to the FI's trading portfolio according to the VaR and ES measures?

### 2.4 Extra

Today is August 21, 2024. Suppose you are the head of risk management of a financial institution (FI) that engages in fixed-income securities investment. The FI is financed by long-term borrowings and equity. The balance sheet (in millions) of the FI today is as below.

Assets		Liabilities and Equity	
Treasury bonds	\$300	Long-term borrowings	\$350
Corporate bonds	\$200	Equity	\$150
Total	\$500	Total	\$500

The risk management team estimates that the standard deviation of the Treasury bonds' daily returns is 2% and the standard deviation of the corporate bonds' daily returns is 5%. The mean return of both bonds is 0%. The correlation between the daily returns of Treasury and corporate bonds is estimated to be 0.7.

- (a) What is the 5-day Value at Risk (VaR) of the bond portfolio at a 99% confidence level? Assume that returns follow a normal distribution.
- (b) How to interpret the calculated VaR from (a)? What is conditional VaR or Expected Shortfall?