AFIN8003 - Workshop 5

Banking and Financial Intermediation

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In this workshop, we will work together on some example questions to review the key concepts covered last week on Market Risk. Then we will work on some simple cases in Excel to prepare for your individual assignment.

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. 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.

3. 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

4. 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

5. 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 April 1, 2025. 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?

3 VaR and ES calculation in Excel

Download the Excel spreadsheet `Workshop5.xlsx` on iLearn.