Strathmore
UNIVERSITY

STRATHMORE INSTITUTE OF MATHEMATICAL SCIENCES
BBS FINANCIAL ENGINEERING, BBS FINANCIAL ECONOMICS
END OF SEMESTER EXAMINATION
BSF 4126: FINANCIAL RISK MANAGEMENT

DATE: 8th September 2021 Time: 2 Hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

Question One

Part 1:

A chemical company is considering a project that has an estimated risk-adjusted return on capital (RAROC) of 17%. Suppose that the risk-free rate is 4% per year, the expected market rate of return is 12% per year, and the company's equity beta is 1.5. Using the criterion of adjusted risk-adjusted return on capital (ARAROC), should the company accept or reject the project and why?

[3 Marks]

Part 2:

A specialist finance company only trades derivatives on rare commodities. The company and a handful of other firms, all of whom have large notional outstanding contracts with the company, dominate the market for such derivatives. The company's management would like to mitigate its overall counterparty exposure, with the goal of reducing it to almost zero. Two methods have been suggested for implementation:

a. Ensuring that sufficient collateral is posted by counterparties
b. Purchasing credit derivatives, such as credit default swaps

Justify which method is optimal.

[2 Marks]

Part 3:

A large commercial bank is using VaR as its main risk measurement tool. Expected shortfall (ES) is suggested as a better alternative to use during market turmoil.

Describe economic capital

[2 Marks]

What should be understood regarding VaR and ES before modifying current practices with regard to economic capital

[2 Marks]

Part 4:
You are back testing a bank's VaR model. Currently, the bank calculates a 1 -day VaR at the 99% confidence level, and you are recommending that it switch to a 95% confidence level. Justify why this would be the right thing to do.

[3 Marks]

Part 5
You are leading a discussion with bank interns on the financial crisis. You go over the issues associated with liquidity and repo failure in a crisis of confidence. One intern asks if the crisis was driven by bank failure or bank insolvency. What is the difference between the two?

[4 Marks]

Part 6
During a review of the credit book, you want to do a spot check of the loss given default (LGD) assumptions and calculations associated with credit default swaps. Describe the meaning of LGD.

[3 Marks]

Part 7
In a meeting with a client, you ask how the client calculates credit VaR. The client replies that they approximate credit VaR by making assumptions about the variance of expected losses. Describe credit VaR and its relationship to expected losses.

[3 Marks]

Part 8:
One of the challenges faced within the modern financial banking system is distinguishing between a bank experiencing stress because of solvency issues and a bank experiencing a macro shock. Despite what might seem an obvious difference, in the early stages of a crisis they are difficult to differentiate. How can a policy mix of liquidity regulation and LOLR (lender of last resort) lending be an optimal way to manage systemic risks?

[4 Marks]

Part 9:
With respect to correlation in credit risk, you need to evaluate the potential changes in correlation and the potential adverse impacts individually and within a portfolio. You also want to consider the type of correlation within credit risk sufficient for maximum diversification. Summarize nature of changing correlation for credit risks.

[4 Marks]

[Max 30 Marks]

Question Two

Part 1:

ABC is a large insurance company specializing in writing immediate annuity business. To match the long term and regular payment nature of its liabilities ABC invests in fixed interest securities. To maximize the return on its investments and to improve the competitiveness of its pricing in the market ABC invests in corporate bonds as they typically earn a higher yield than government securities.

ABC's credit risk policy is that all bonds must be rated A or higher. If a bond is downgraded below A then it will be sold and the proceeds re-invested in an appropriate bond.

I. Comment on the nature of ABC's credit risk exposure and the effectiveness of its credit risk policy to mitigate these risks.

[6 Marks]

For key individual bond holdings, such as that relating to Company DEF, ABC has decided to enter a credit default swap (CDS) with Bank GHI.

II. Describe how the cash flow arrangements would typically be structured under this CDS.

[4 Marks]

Part 2:

In Country Q all licensed banks are required to develop internal enterprise-wide capital assessment models. These models must be approved by the regulator. The regulator sets each bank's minimum capital requirement to be equal to the capital necessary to give the bank a 99.5% probability of having sufficient capital in the ensuing year. Unfortunately, this system appears to have failed as one licensed bank has just declared bankruptcy, and the regulator is under some pressure to change the minimum capital requirement approach.

I. Discuss whether such a change would be an appropriate reaction.

[6 Marks]

A politician has suggested that the various banks' internal capital models are far too complex and might easily fail to predict the range of foreseeable future outcomes. He has suggested that instead of setting capital at the 99.5% probability of sufficiency, capital should be set equal to five times the standard deviation estimated by the internal model.

II. Discuss this suggestion.

[4 Marks]

Solution:

[Max 20 Marks]

Question Three

Part 1:

Outline the benefits of applying ERM to a mature corporation.

[5 Marks]

Part 2:

Explain what is meant by:

a. Stress testing
b. Sensitivity analysis
c. Scenario testing

[6 Marks]

Part 3:

A life insurance company specializes in writing term assurance and income protection (health) business. It is concerned about the impact that a pandemic event could have on its business and is developing a series of pandemic scenario tests to evaluate its exposure. A critical factor in developing a pandemic scenario is the recognition that a single event could trigger losses from many different risks.

I. List six different risks that should be included in the tests and explain how these risks could result in losses from a pandemic.

[6 Marks]

Part 4:

Much of the risk from a pandemic stems from currently unknown viruses and diseases meaning that the additional impact on mortality and morbidity cannot be estimated with any degree of accuracy. As such the usual approach of building a model to forecast losses based on inputs does not work because the inputs are not known. Accordingly, the life insurance company has decided to use the model in reverse. It will choose a total loss amount and then analyze the inputs and processes that would produce it.

I. Explain the insights that the insurance company should gain from using the model in this way.

[3 Marks]

[Max 20 Marks]

Question Four

Part 1:

A major heavy goods repair company has contracts with several suppliers on which it relies for the timely supply of quality parts at agreed prices. The chief buyer for the repair company has asked the group risk function if it can recommend changes to these contracts that will impose some aspects of ERM onto the suppliers, to improve and de-risk the supply chain. The changes must be practical, proportionate and reflect the fact that the suppliers are unrelated third parties.

I. Suggest terms and conditions that should be included in the supply contracts.

[4 Marks]

Some input goods are very large, very expensive, take many weeks to manufacture and, whilst only needed rarely, are then needed very quickly.

II. Outline the risks and costs that the company must consider when purchasing such goods.

[4 Marks]

III. Describe ways in which the company could transfer or mitigate these risks and costs.

[4 Marks]

Part 2:

I. Distinguish between the terms economic capital and economic value.

[2 Marks]

Company X is a life insurance company which uses an economic approach to support its enterprise risk management framework. Under this framework it defines economic profit as the change in economic value over the period.

I. Comment on the use of economic profit as a key performance indicator.

[3 Marks]

II. At the end of each year Company X carries out an analysis of the change in the economic value over the year. Under this process, each source of profit or loss is compared with the amount expected and allocated to a high-level risk category (e.g., credit, market, insurance, operational etc.). Discuss the advantages and disadvantages of presenting the economic profit in this way.

[3 Marks]

[Max 20 Marks]

Question Five

Part 1:

Country X is a large free market economy with a sophisticated financial system. More than 3,000 stocks are listed on the main stock exchange. For the past several years the main stock exchange has required that all listed companies publish risk reports as a part of their quarterly financial statements.

I. Describe the likely content of such a risk report

[4 Marks]

An equity analyst plans to construct a new risk measure using the information contained in the risk reports and financial statements. Its purpose is to produce risk- adjusted returns for all the companies listed on the main stock exchange on a quarterly basis.

II. Explain how this risk measure could be constructed, including the information that would be used.

[8 Marks]

Part 2:

Scilly Sandals plc makes Olympics sandals, flip flops and other seasonal footwear. It is experiencing severe liquidity pressures. Discuss the options available to the company that may be utilized to help ease these pressures

[8 Marks]

[Max 20 Marks]