**RISK ANALYSIS AND MANAGEMENT**

**EXAM**

1. Explain the relevance of the following statements for the financial markets, particularly the banking sector:
2. Risk is good; but too much risk is bad.

***Financial institutions and markets thrive on risk and without it there would be no reward which contributes greatly to economic growth across the world. For instance, banks take credit risk by lending to clients with the possibility of defaulting; depositors deposit their money with banks where there is the risk of banks failing and depositors loosing their money; financial markets note the risk return relationship that the higher the risk the higher the reward; and classically insurers do business taking other people’s risk at a premium.***

***However, when banks take positions that have a high level of risks this becomes bad for the bank. Banks must be risk averse in taking the appropriate level of risk for a good return.***

1. Risk should be retained.

***A policy of zero tolerance to risk is definitely not cost effective. As a result one must decide what risks they are going to retain and at what cost. The rule is risk management is to mitigate the risks with the greatest impact and then manage the rest. In this manner banks will avoid lending to other clients which are more risky while retaining others that are less risky. No banking institution will insure against the risk of failure because it is so big and the cost would be so huge.***

1. Banks should take risks.

***To gain business and indeed stay in business one must take risks. Actually the reward that people get out of business is for taking risk. However people are only going to be considered unsafe when their risk taking profile is not in line with that of the firm. All banking institutions are involved in setting their own risk appetites that determines the acceptable levels of risk that they can accept. All officers taking on risk above this risk appetite are the ones considered unsafe. As a result balance sheets of banks have a high volume of risky assets.***

1. List the two different categories of risk and define each giving practical examples.

***The two main categories of risk are:***

***Pure risk – this is a single direction risk with only one outcome when it does occur. For instance the risk of being involved in an accident can only result in an accident when it does happen.***

***Speculative risk – this is a two directional risk which can result into a positive or negative outcome when the event occurs. A person sitting an exam can either pass it or fail it; one can either make a profit or loss out of an investment.***

Identify the ways that can be used to manage the risk categories identified above and what will influence such decisions, once an investor decides to hold them?

***Pure risk can be insured against so that when the event occurs and the loss can be recovered from the insurer. However, one of the main determinants for insuring against a risk is the premia involved in the insurance policy. If it is too expensive then the investor might choose to just hold the risk and not insure against it. That is why sometimes other investors will choose to self insure certain pure risks because the premia may appear greater than the loss that they may suffer.***

***Investors can only manage against speculative risks mainly because, even if they wanted to, they would not be able to find an insurer to take on that risk. With speculative risk the likelihood of something good happening is as much as the likelihood of something bad happening. Risk management in this case seeks to manage or reduce the variability of outcomes to minimize the risk.***

1. Define the term Large Exposure and discuss the rationale of the Directive on Large Exposure and how such exposures can be avoided.

***A large exposure is when a bank investment into a single asset is large in relation to its own equity capital. The directive on Large Exposures is aimed at ensuring that banks’ exposure to a single client does not reach high levels of concentration. This is done to prevent banks from suffering losses that would impair their viability as any such losses would not be able to be absorbed by the capital of the bank.***

***As a result these concentrations are avoided through observing the credit concentration limits, which specifies the maximum amount a banking institution can lend to a single borrower as a proportion of its capital. Banks can increase their credit concentration limit by increasing the capital level.***

***Furthermore, credit concentrations can be avoided through syndication where the business is shared amongst several banks to ensure that no single banking institution is exposed to heavy losses. High concentration of credit to a single borrower would also in denial of credit to smaller entities.***

Discuss the rationale and main provisions of the Asset Classification Directive.

***The directive on Asset Classification is meant to provide guidance to banks on the appropriate treatment of assets that are non–performing. Non-performing assets are those where the counterparty has ceased to operate in line with the agreed terms and conditions, and therefore have ceased to earn income. As such, any income accrued on such facilities must be suspended from interest income while making provisions on the principal amount of the classified facility.***

***The principle reasoning behind such recognition of any non-performing assets is prudence. Banks must be prudent to recognize any expected losses and provide for them before such losses materialize. Failure to recognize such losses would lead to fictitious profits and misleading balance sheets which will be used by all stakeholders.***

1. An institution exposed to risk has an option of five standard responses to the risk. List and explain the five responses that the institution can make to the risk, giving practical examples of each response in real case.

**15 Marks**

***The following are the responses that an institution can make against the occurrence of a risk***

* ***Eradicate the risk*** *– Cases where the bank assumes a risk that is not beneficial or too high for the institution, management can decide to completely eliminate the risk. This may entail the termination of operations or shutting down a business line to completely do away with the source of risk*
* ***Reducing the likelihood of the risk occurring*** *– Risk management practices are aimed at establishing controls for the reduction of the possibility of the loss event occurring. Risk limits established by risk management functions are set primarily for this purpose.*
* ***Reduce the impact of risk*** *– Curtailing the size of risk events through limiting the size of exposure ensures that if the risk occurs, any loss suffered would be minimal enough to be fully absorbed without impairing the operations of the business. Large credit exposures limit is primarily meant to address this response.*
* ***Transfer of risk*** *– All losses that may arise out of events, which the bank is not willing to take on but is necessary for business purposes is simply transferred. Risk transfer is the most common form of risk management response as seen through the high volumes of insurance business that businesses and individuals enter in.*
* ***Accept the risk*** *– Risk taking is a central part of banking business. Banks are involved in taking credit risk, in the normal course of business. Banks also buy risky securities which offer a higher return as normal banking business.*

**SECTION B**

1. Explain the four reasons why banks need to measure cost of funding.

***8 Marks***

*The four reasons why banks need to measure the cost of funds are as follows:*

1. *The bank will seek the lowest cost mix of funds in order to maximize its Economic Value Added (EVA). When a bank’s risk is held constant then a lower cost mix of funding will increase a bank’s value.*
2. *A bank also needs a reasonably accurate estimate of its cost of funds in order to help decide its minimum target return on earning assets.*
3. *A bank may need an accurate cost of funds estimate for developing an internal transfer pricing system and for internal performance evaluation purposes.*
4. *The source and investment of a bank’s funds impact on the liquidity risk, interest rate risk and capital adequacy risk.*

Define Liquidity and discuss the three critical factors to be considered in liquidity discussion.

***12 Marks***

*Liquidity is defined as having cash when needed. For a commercial bank this is equivalent to the need to have sufficient funds (in the form of liquid assets) necessary to meet regulatory, contractual and relationship obligations when required and at reasonable cost.*

*The three practical factors are:*

1. *Time – The shorter the time to resolve a liquidity shortfall, the higher the liquidity risk. With longer time frames then the ability of the bank to acquire liquidity options is enhanced. With little time to recover from a liquidity squeeze, the cost of acquiring liquidity will be higher than when there is ample time for the bank to unwind position or liquidate other position in a fair market.*
2. *Costs – Every liquidity source has a cost. The initial cost of liquidity is the opportunity cost that arises through the tradeoff between liquidity and profitability. The bank can use its funds to issues high earning assets (like loans) but mostly the liquidity of such assets is low. Banks that use liability-side liquidity management also have to incur high costs to ensure they have liquidity as opposed to asset-side liability management. Furthermore, liability-side liquidity management may require the bank to incur costs for funds which may not be needed at the time. At times banks will borrow just to maintain activity on the market or else it will take deposits it may not require simply to ensure the continuation of the business with the client.*
3. *Sources – The sources of liquidity are the next critical component for consideration in the matter. The sources are categorized into two broad categories as asset-side and liability-side. The liability side sources are deposits and borrowings which directly incur costs for their acquisition. The asset side sources are liquid assets that earn lower returns but have a high capacity to be easily converted into cash at minimal cost. One aspect is the availability of a ready market for assets to easily qualify as liquid assets.*

1. Michella Bank operates the following balance sheet (in MK Billion):

**Asset Liability**

Cash 0.24 Demand Deposits 13.82

Loans (2.5 Yr @ 37%) 32.16 Time Deposits (0.38 Yr @ 9%) 9.25

Mortgages (19.25%) 23.65 Borrowings (3.22 Yr @ 15%) 11.50

* 0.5 Yr 8.00
* 2 Yrs 5.50
* 1 Yr 6.00
* 5 Yr 4.15 Equity 21.48

**TOTAL ASSETS 56.05 TOTAL LIAB AND EQ 56.05**

*Assume the loans and liabilities are monthly amortizing while the mortgages pay quarterly coupons and will pay bullet payment.*

Calculate the following:

1. The Maturity Gap of the balance sheet. ***5 Marks***
2. What will be the maturity gap if interest rates decreased by 500 basis points. What is the resultant effect on the value of equity? ***7 Marks***
3. Assess the solvency of the bank if liability interest rates went up by 600 basis points.

***8 Marks***

*Solution*

1. *Asset Maturity = (2.5x32.16/56.05) + (0.5x8/56.05) + (2x5.5/56.05) + (1x6.60/56.05) + (5x4.15/56.05) = 2.19 years*

*Liability Maturity = (0.38x9.25/56.05) + (3.32x11.50/56.05) = 0.74 years*

***Maturity Gap = Asset Maturity – Liability Maturity = 2.19 – 0.74 = 1.4461 years***

1. *The maturity gap would not change due to a change in interest rates. However the value of equity would be*

*Asset Value*

*Loans = PV(1.6585, N=30, I=31 percent) = 32.3999*

*Mortgage = PV(23.65, N=$%, I =31, C=19.25) = 25.8957*

*Liability Value*

*Time Deposits = 9.3890*

*Borrowings = 13.0774*

***Equity Value = 35.8292***

1. *Liability Value = 9.0128 + 9.8950 = 18.9078. The liability value has declined by 1.8422. The decline in liability interest rates amounts to an increase in equity by the liability decline amount.* Expand solution

1. Define Duration and Convexity in Interest Rate Risk and show the relationship between the two aspects.

***5 Marks***

*Duration is the sensitivity of the price of financial instruments to small changes in interest rates. This is only representative at the point of estimation and assumes a linear relationship between interest rates and price.*

*Convexity measures the rate of change of price to small changes in interest rates. This measures the sensitivity of the price of financial instruments to duration.*

Two bonds issued by the same issuer have the following characteristics:

* Bond A: Tenure 10 years, Annual Coupon 9.3 percent, Price 97.65 percent
* Bond B: Tenure 8 years, Annual Coupon 0.0 percent, Price 87.45 percent

For each bond calculate the following:

1. Yield to Maturity ***5 Marks***
2. Duration ***10 Marks***

*Solution*

*Bond A YTM = 9.6772 percent*

*Bond B YTM = 8.2559 percent*

***Duration Bond A***

|  |  |  |  |
| --- | --- | --- | --- |
| **Period** | **CF** | **PVCF** | **TxPV** |
| 1 | 9.3 | 8.4794 | 8.4794 |
| 2 | 9.3 | 7.7313 | 15.4625 |
| 3 | 9.3 | 7.0491 | 21.1473 |
| 4 | 9.3 | 6.4271 | 25.7085 |
| 5 | 9.3 | 5.8600 | 29.3002 |
| 6 | 9.3 | 5.3430 | 32.0580 |
| 7 | 9.3 | 4.8716 | 34.1010 |
| 8 | 9.3 | 4.4417 | 35.5338 |
| 9 | 9.3 | 4.0498 | 36.4484 |
| 10 | 109.3 | 43.3967 | 433.9669 |
|  |  | **97.6498** | **672.2061** |
|  |  |  |  |
|  | **Duration** |  | **6.8838** |

***Duration Bond B***

|  |  |  |  |
| --- | --- | --- | --- |
| **Period** | **CF** | **PVCF** | **TxPV** |
| 1 | 0 | 0.0000 | 0.0000 |
| 2 | 0 | 0.0000 | 0.0000 |
| 3 | 0 | 0.0000 | 0.0000 |
| 4 | 0 | 0.0000 | 0.0000 |
| 5 | 0 | 0.0000 | 0.0000 |
| 6 | 0 | 0.0000 | 0.0000 |
| 7 | 0 | 0.0000 | 0.0000 |
| 8 | 100 | 47.7605 | 382.0843 |
|  |  |  |  |
|  |  |  |  |
|  |  | **47.7605** | **382.0843** |
|  |  |  |  |
|  | **Duration** |  | **8.0000** |

1. Discuss the one key similarity and difference between a futures and forward contract in foreign currency. ***5 Marks***

Provide solution

A Malawian tea exporter enters into a contract for the delivery of US$75,000 of tea tonnage to a client in US for settlement in six months. The spot rate for the MWK/US$ is MK650 to the dollar. Define the forward contract hedge the tea exporter would enter into to ensure her revenue is MK52.5 million, outlining the position the exporter has.

If the exporter wished to use a Money Market Hedge by borrowing US$72,000, what is the annual compounded interest rate that would achieve this? ***7 Marks***

*The client has a long position in dollars as she will be taking delivery of dollars in six months. The forward exchange rate to realize that revenue will be MKW700/US$.*

*The hedge would be for a borrowing to be fully (principal plus interest) settled by US$75,000. The compounded annual interest to realize this is 8.5201 percent.*

Expound solution

The following parameters apply:

* Spot rate: MWK/US$ = 648
* Dollar interest rate = 2.0 percent
* MWK interest rate = 37.0 percent
* Number of days = 180 days

Calculate the Forward Spot Rate ***8 Marks***

*Forward Rate for the Dollar = 648 x [1+(0.37x180/360)]/[1+(0.02x180/360)] = 760.28*