

NPTEL
INDUSTRIAL AND MANAGEMENT ENGINEERING DEPARTMENT, IIT KANPUR
QUANTITATIVE FINANCE
ASSIGNMENT-8 (2015 JULY-AUG ONLINE COURSE)

NOTE THE FOLLOWING

- 1) There are four questions and you are required to answer all of them.
- 2) Deadline for submission is Saturday; 6th September, 2015
- 3) The total marks is 40.
- 4) To get full credit do your calculations carefully.

Question 1:

- a) Suppose that a thrift institution has average asset duration of 2.5 years and average liability duration of 3.0 years. If the bank holds total assets of \$560 million and total liabilities of \$467 million, does it have a significant duration gap? If interest rates rise, what will happen to the value of the bank's net worth?
- b) Stilwater Bank and Trust Company has average asset duration of 3.25 years and an average liability duration of 1.75 years. Its liabilities amount to \$485 million, while its assets total \$512 million. Suppose that interest rates were 7 percent and then rise to 8 percent. What will happen to the value of the Stilwater Bank's net worth as a result of a decline in interest rates?

Question 2:

- a) The First State Bank of Ashfork reports a net interest margin of 3.25 percent in its most recent financial report with total interest revenues of \$88 million and total interest costs of \$72 million. What volume of earning assets must the bank hold? If the bank's net interest margin doubles and its total assets, which stood originally at \$545 million, rise by 40 percent, what change will occur in the bank's net interest income?
- b) First National Bank of Barnett currently has the following interest-sensitive assets and liabilities on its balance sheet:

Interest-Sensitive Assets	Interest-Sensitive Liabilities
Federal fund loans \$65	
Security holdings \$42	Interest-bearing deposits \$185
Loans and leases \$230	Money-market borrowings \$78

What is the bank's current interest-sensitive gap? Suppose its Federal funds loans carry an interest-rate sensitivity weight of 1.0 while its investments have a rate-sensitivity weight of 1.15 and its loans and leases display a rate-sensitivity weight of 1.35. On the liability side First National's rate-sensitivity weight is 0.79 for interest-bearing deposits and 0.98 for its

moneymarket borrowings. Adjusted for these various interest-rate sensitivity weights, what is the bank's weighted interest-sensitive gap? Suppose the Federal funds interest rate increases or decreases one percentage point. How will the bank's net interest income be affected (i) given its current balance sheet make up and (ii) reflecting its weighted balance sheet adjusted for the foregoing rate-sensitivity weights?

Question 3:

- a) Leland Thrift Association reports an average asset duration of 4.5 years, an average liability duration of 3.25 years. The bank has total assets of \$1.8 billion and liabilities totalling \$1.5 billion. If interest rates rise from 7 percent to 9 percent, how will Leland's net worth change? What if interest rates fall from 7 to 5 percent?
- b) Casio Merchants and Trust Bank, N.A., has a portfolio of loans and securities expected to generate cash inflows for the bank as follows:

Expected Cash Receipts	Period in Which Receipts Are Expected
\$1,385,421	Current year
746,872	Two years from today
341,555	Three years from today
62,482	Four years from today
9,871	Five years from today

Deposits and money market borrowings are expected to require the following cash outflows:

Expected Cash Receipts	Period in Which Receipts Will be Made
\$1,427,886	Current year
831,454	Two years from today
123,897	Three years from today
1,005	Four years from today
-----	Five years from today

If the discount rate applicable to the above cash flows is 8 percent, what is the duration of the bank's portfolio of earning assets and of its deposits and money market borrowings? What will happen to the bank's total returns, assuming all other factors are held constant, if interest rates rise? If interest rates fall? Given the size of the duration gap you have calculated, what type of hedging should the bank engage in? Please be specific about the hedging transactions that are needed and their expected effects.

Question 4:

The West Fund is a portfolio of 42% fixed-income investments and 58% equity investments. The manager of the Westover Fund recently estimated that the annual VAR (5%), assuming 250-day year, for the entire portfolio was \$1367000 based on the portfolio's market value of \$12428000 and a correlation coefficient between stocks and bonds of zero. If the annual loss in the equity position is only expected to exceed \$1153000; 5% of the time, then the daily expected loss in the bond position that will be exceeded 5% of the time is closest to:

- i) \$72623
- ii) \$46445
- iii) \$21163
- iv) \$55171