

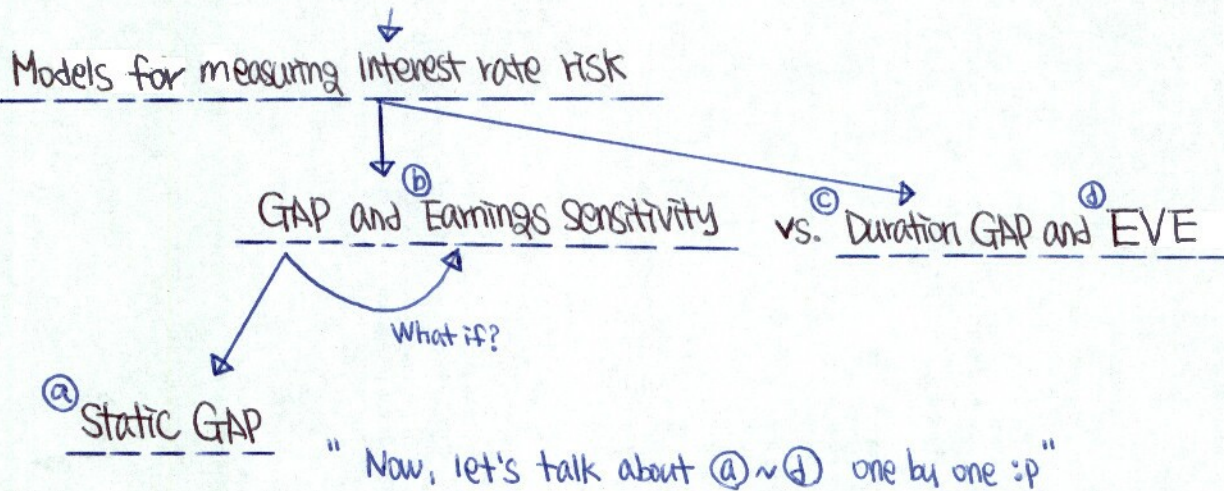
## "Managing interest rate risk"

- Federal and state regulators regularly assess the financial condition of each bank and specific risk faced via on-site examinations and periodic reports. Regulators rate banks based on the Uniform Financial Institutions Rating System; it has six categories \* CAMELS

(C) : Capital adequacy (E) : Earnings  
(A) : Asset quality (L) : Liquidity  
(M) : Management quality (S) : Sensitivity to market risk

- Bank managers are responsible for monitoring/managing interest rate risk, but...  
How to manage the risk? any measurement(s) exist? of course!!

- 1 Because no one can consistently forecast rates accurately, interest rate risk management is very important.
- To measure interest rate risk, banks employ and use GAP and Earnings Sensitivity analysis.
- Flow-chart for future reference! (Below)



### @ Traditional Static GAP Analysis

- Static GAP focuses on monitoring/managing net interest income in the short-term.
- The main object is to measure expected net interest income and then identify strategies to stabilize or improve it.



## Financial Reporting and Analysis

$$\text{GAP} = \text{RSAs} - \text{RSLs}$$

Rate-sensitive liabilities: \$ value of liabilities that either mature or can be repriced within a selected period.

Rate-sensitive assets: \$ value of assets that either mature or can be repriced within a selected time period.

\*\*\*

- Pros and Cons?

1. Easy to understand, calculate,
2. Possible to indicate specific items that are responsible for the risk

1. Measurement errors
2. ignores the time value of money
3. only through the short-term
4. ignores zero-interest pay liabilities.

\* GAP ratio?

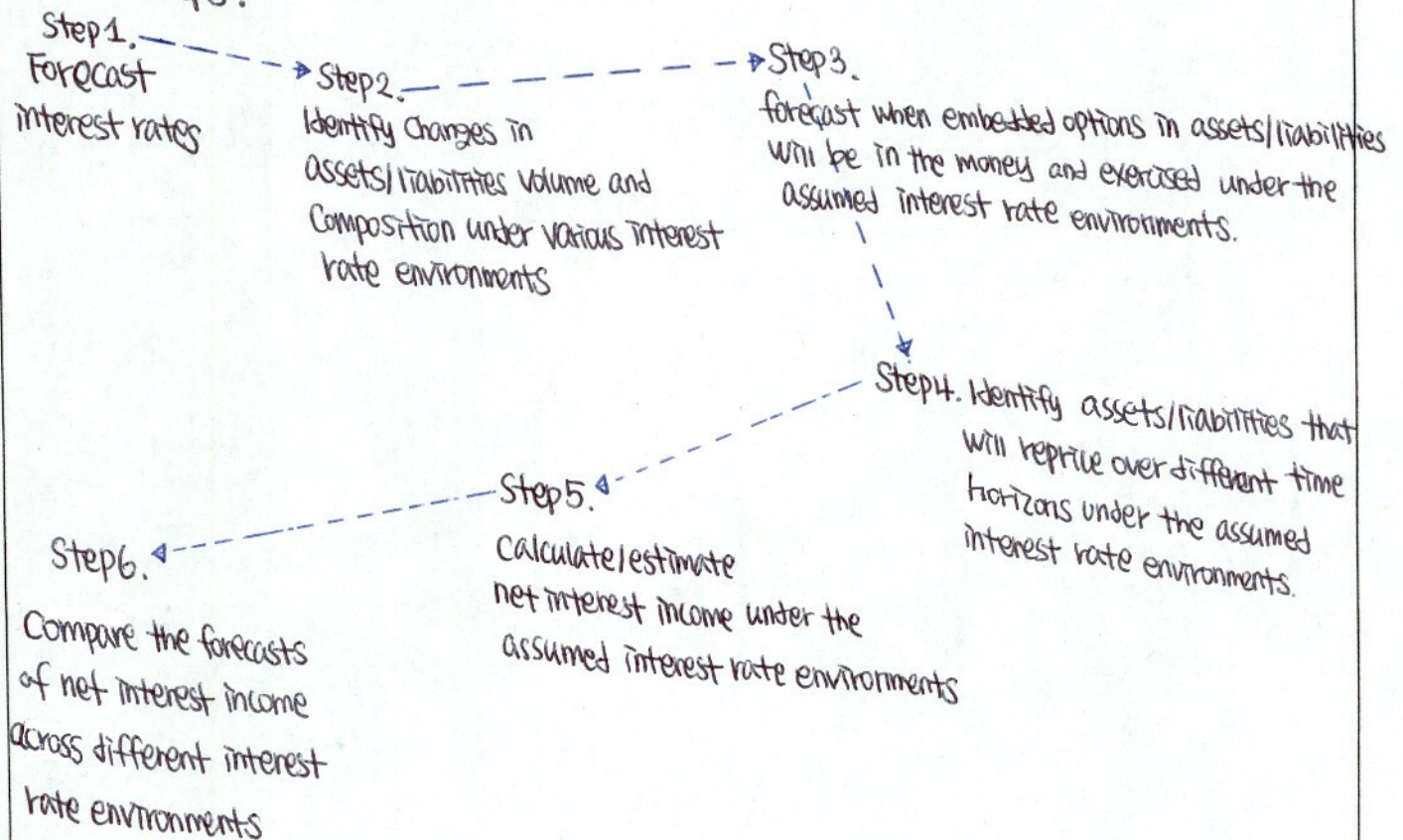
$$= \text{RSAs} / \text{RSLs}$$

### (b) Earnings Sensitivity Analysis

- This expands GAP analysis to focus on the sensitivity of bank profits across different interest rate environments

\* What-if forecasting provides information regarding how much net interest income changes when interest rates are assumed to increase/decrease by various amounts

- Steps?



Attention!!

\* Let's discuss "fixed-income risk and return" a little bit, and then deal with (c) and (d) we good?



## \*\*\* Fixed-Income Risk and Return

Let's start with one simple(?) question!!

A 3-year, 7% annual-pay bond has a face value of \$1,000. What is the price of the bond if it has YTM of 11%?

N	I/Y	PV	PMT	FV
3	11	?	70	1000

< Financial calculator >

$$PV_{\text{bond}} = \frac{70}{(1+11\%)^1} + \frac{70}{(1+11\%)^2} + \frac{70}{(1+11\%)^3} + \frac{1000}{(1+11\%)^3}$$

< Your brain >

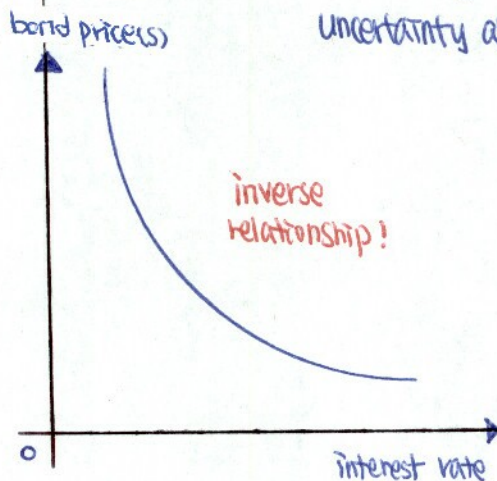
• There are three sources of returns from investing in fixed-rate bond

- ① Coupon and principal payments,
- \* ② Interest earned on coupon payments that are reinvested over the investor's holding period for the bond,
- ③ Any capital gain/loss if the bond is sold before its maturity.

Here, we assume that 1) There is no \* Credit risk; 2) Interest rate earned on reinvested coupon payments is the same as the YTM on the bond.

→ Default Risk and Loss Severity  
(borrowers fail to pay interest/principal) (value a bond investor would lose from issuers defaults)

\*\*\* Changes in YTM produce market price risk and reinvestment risk. An increase in YTM decreases a bond's price, but increases its reinvestment risk.



uncertainty about a bond's price.

uncertainty about income from reinvesting coupon payments.

- \* (Market Price Risk > Reinvestment risk in short investment
- Market Price Risk < Reinvestment risk in long investment

"Duration GAP = Macaulay duration - investment horizon"



\*\*\* How to calculate the amount earned from reinvestment of the coupon payment?

$N=3$   
 $I/Y=11$   
 $PMT=70$   
 $FV=1000$

Step 1) Find the future value of 3-year coupon payments

$$70 + 70(1+11\%)^1 + 70 \cdot (1+11\%)^2 = 233.9470$$

Step 2) Calculate the 3-year coupon payments total

$$70 \times 3 = 210$$

$$\text{Step 3) } 233.9470 - 210 = 23.9470$$

\*\*\*  
Duration

• Duration is a measurement of a bond's interest rate risk. It is also referred as a responsiveness/sensitivity of a bond's full price to a change in its yield.

