



Enhancing Risk Management and Governance in the Region's Banking System to Implement Basel II and to Meet Contemporary Risks and Challenges Arising from the Global Banking System

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Session 4.2

Asset Liability and Management

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Interest Rate Risk Management



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Plan

- What is interest rate risk (IRR)?
- Where does interest rate risk come from?
- How can we measure interest rate risk in the banking book?
- Conclusion
- Next session we will work through a workshop example based on the Honk Kong Monetary Authority Return of Interest Rate Exposures (December 2003)
<http://www.info.gov.hk/hkma/eng/bank/spma/attach/IR-1-return.pdf>

What is Interest Rate Risk?

- Interest rate risk is the risk that a bank will experience a deterioration in its financial position as interest rates move over time
- Interest rate risk is typically split into
 - Traded interest rate risk
 - Non-traded interest rate risk (balance sheet)
- Interest rate risk in the banking book arises from a bank's core banking activities

Where does IRR come from?

- Repricing risk
 - Differences in maturity (fixed rate) and repricing periods (floating rate) for assets versus liabilities and off-balance sheet items (OBS)
 - Equal changes in all rates (parallel yield curve shift) affects bank value
- Yield curve risk
 - Differing dispersions of assets, liabilities and OBS could leave exposure to twist of yield curve (with no change in average rates)
- Basis risk
 - Positions with same maturity but priced off different market indicator rates
- Optionality
 - Some assets and liabilities have no contractual maturity or allow customers some option regarding maturity
 - Some assets and liabilities have administered rates –where dates and amount of repricing is at the bank's discretion

Regulation

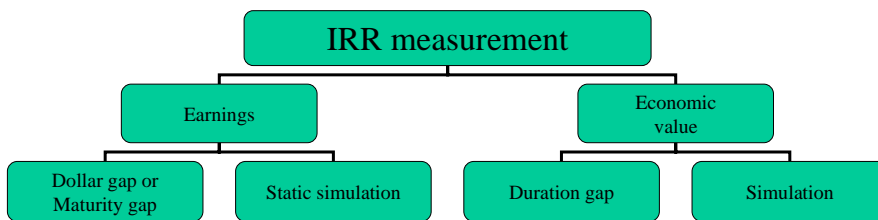
- Under the original Basel Accord banks were not required to hold capital against interest rate risk in the banking book
- But Basel 2 provides regulators with the discretion to require banks to hold capital for banking book interest rate risk
- The Basel Committee is of the view that this is a potentially significant risk and should be dealt with under Pillar 2 of the New Accord, particularly represented in Principles 12 to 15 and Annexes 3 and 4 of “Principles for the Management and Supervision of Interest Rate Risk” (July 2004)
- It will be up to individual regulators as to whether a bank will be required to hold capital against IRR in the banking book

Principles for Interest rate Risk Management

- There are 15 principles.
- Principles 1 to 11 are general and intended for management of both trading book and banking book interest rate risk
- Principles 12 to 15 specifically refer to interest rate risk in the banking book
- Rely on bank’s internal measurement systems
- Banks must provide the results of their internal measurement systems, expressed in terms of the threat to economic value, using a standardised interest rate shock
- Principle 15 gives supervisors the power to enforce remedial action if the bank is deemed to be not carrying adequate capital for the risk held

Techniques for Interest Rate Risk Measurement

- The technique used depends on whether the focus is on earnings or economic value as the indicator of financial position



Simple calculations of IRR

- Allocate assets, liabilities, off-balance sheet items according to repricing/maturity buckets
- Gap analysis – focus is on exposure of earnings
 - Calculate exposure by applying interest rate shock to size of gap
- Duration analysis – focus is on exposure of economic value
 - Calculate exposure by applying sensitivity weights (based on duration) within each bucket

Simple approaches - Gap

- The net interest income approach to measuring and managing interest rate risk is the primary focus of the majority of banks
- This approach quantifies the potential change in net interest income using a specified shift in interest rates, eg 200 basis points, or a simulated future path of interest rates.
- A negative or liability sensitive gap means that an increase in interest rates could cause a decline in net interest income

Traditional Gap analysis

Method: rearrange the balance sheet by time to next interest rate reset date

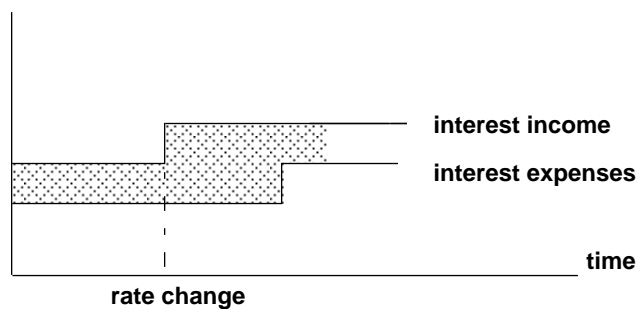
<u>Assets</u>	\$
At call and seven-day funds	50
Variable interest rate loans	30
Fixed rate 18-month loans	70
<u>Liabilities</u>	
One month deposits	20
Four month deposits	30
Floating rate notes: 6 month resets	100

Example

Reset date	(months)				
	0-3	3-6	6-12	12-24	24+
Assets	80	0	0	70	0
Liabilities	20	130	0	0	0
Gap	+60	-130	0	+70	0
Cumulative Gap	+60	-70	-70	0	0

Interpreting the Gap

- Positive gap:
 - Interest rate increase leads to net interest income increase. More assets than liabilities at new higher rates.



Problems with Gap Analysis

- Categorisation of “buckets” is ad-hoc.
- It does not take account of variations within each time band
- It focuses solely on transactions exposure and ignores likely future balance sheet movements.
- It ignores other influences on interest rates, such as increased default risk, demand for new loans, etc.
- It ignores differences in the sensitivity of income from option-related positions

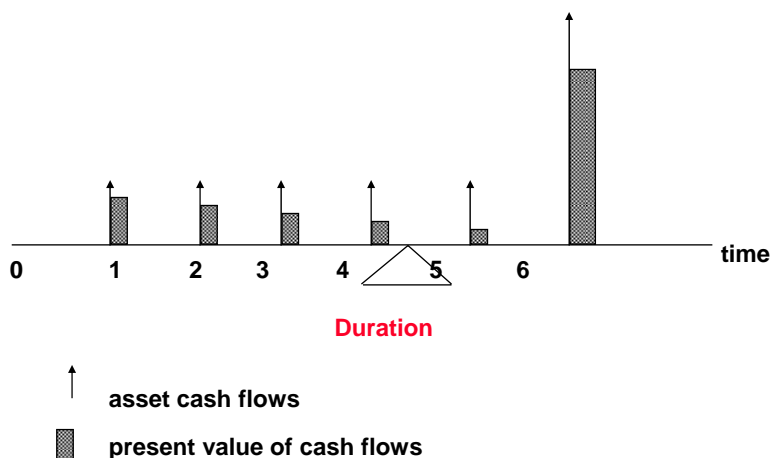
Gapping and equity value

- For our example will the relative share price rise or fall when interest rates increase?
- Answer: probably fall because the near cumulative gap is negative.
- But, gapping will not provide a definitive answer.

Duration based approach

- A maturity/repricing schedule can also be used to evaluate the effect of changing interest rates on a bank's economic value by applying sensitivity weights to each time band
- Weight can be based on estimates of the duration of assets and liabilities falling into each time band
- Duration is a measure of the percent change in the value of a position that will occur for a small change in the level of interest rates

Duration - A Graphic Depiction



Duration and Bond Price Sensitivity

- Duration directly measures the sensitivity of a bond's price to small yield changes (i.e price elasticity).

$$\Delta P/P = - [D/(1+r)]\Delta r$$

- $D^* = D/(1+r)$ is the modified duration
- Risk weight = $D^* \diamond$ yield change
- Risk weight \diamond asset size gives change in economic value

Simulation approaches

- Detailed assessment of potential effects of interest rate changes on both earnings and economic value can be made using simulations
- Usually involve a breakdown of products so that assumptions about product behavior can be incorporated into the analysis
- Static simulations focus on cash flows from the current on and off balance sheet positions
- Dynamic simulations model interest rates and expected changes in the balance sheet
- The use of third party modelling software is common

Conclusions

- IRR in the banking book constitutes a significant proportion of the overall risk that banks carry
- In Australia APRA intends to require banks using sophisticated modeling techniques to calculate regulatory capital for credit and operational risks to also hold capital against interest rate risk in the banking book.
- Most international regulators plan to accept only the economic value approach to measure IRR in the banking book

**Enhanced Risk Management and Governance
AFDC and MAFC (Shanghai)
Sessions 4.2 and 4.3**

Web Resources for Interest Rate Risk in the Banking Book

Bank for International Settlements, Basel Committee on Banking Supervision:
Principles for the Management and Supervision of Interest Rate Risk (July 2004):

<http://www.bis.org/publ/bcbs108.pdf?noframes=1>

Hong Kong Monetary Authority Supervisory Policy Manual for Interest Rate Risk
Management (December 2003):

<http://www.info.gov.hk/hkma/eng/bank/spma/attach/IR-1.pdf>

HKMA Return of Interest rate Exposures (December 2003):

<http://www.info.gov.hk/hkma/eng/bank/spma/attach/IR-1-return.pdf>

FDIC Law, Regulations, Related Acts: Joint Agency Policy Statement on Interest
Rate Risk (May 1996):

<http://www.fdic.gov/regulations/laws/rules/5000-4200.html>

Monetary Authority of Singapore: Guidelines on Sound Risk Management Practices
(October 2002):

http://www.mas.gov.sg/resource/publications/consult_papers/2002/riskguidelines.pdf

APRA has a nice short article on interest rate risk in the banking book:

<http://www.apra.gov.au/Policy/upload/Technical-paper-Interest-rate-risk-on-the-banking-book-May-2003.pdf>

Questions to think about

1. How is interest rate risk on the balance sheet defined?
2. Think of a couple of examples of how fee income might be subject to interest rate risk.
3. The standardized approach to measuring interest rate risk involves subjecting the balance sheet to a shock. What is the size of the shock? How would you go about determining whether the size of the shock is appropriate?
4. Should a financial institution be focusing on earnings or economic value when measuring interest rate risk on the balance sheet?
5. Give two examples of 'embedded optionality' that are affected by interest rate risk.
6. What is the difference between static and dynamic gap analysis?