



Asset Liability Management

Craig Roodt

Australian Prudential Regulation
Authority



- 1. ALM Defined**
- 2. Role of ALM in the Organisation**
- 3. Some History**
- 4. Main Approaches - Measurement**
- 5. General Difficulties**
- 6. Dealing with the Mismatch**
- 7. The Broader Context**



- **Managing the mismatch between assets and liabilities**
- **Why?**
- **Mismatch creates risk**

- Sensitivity of earnings and firm value to changes in interest rates (interest rate risk)
- Sensitivity to changes in financial factors that do not affect both sides of the balance sheet equally
- Banks tend to focus on interest rate risk entirely, as this is where the bulk of their risk mismatch risk is
- Insurers are also affected by movements in other factors eg *annuities backed with equities - a fall in equities will adversely affect the insurer*

Can be categorised as:

Mismatch (Repricing) Risk

- Assets and liabilities reprice at different times and at different rates

Yield Curve Risk

- Risk from changes in the shape of the curve

Basis Risk

- Risk that instruments with same or similar maturities won't move together

Options Risk

- Risk that option holders will exercise when market conditions make it advantageous

Financial institutions make money through their management of:

- Assets and asset risks
- Liabilities and liability risks
- Asset-liability interaction

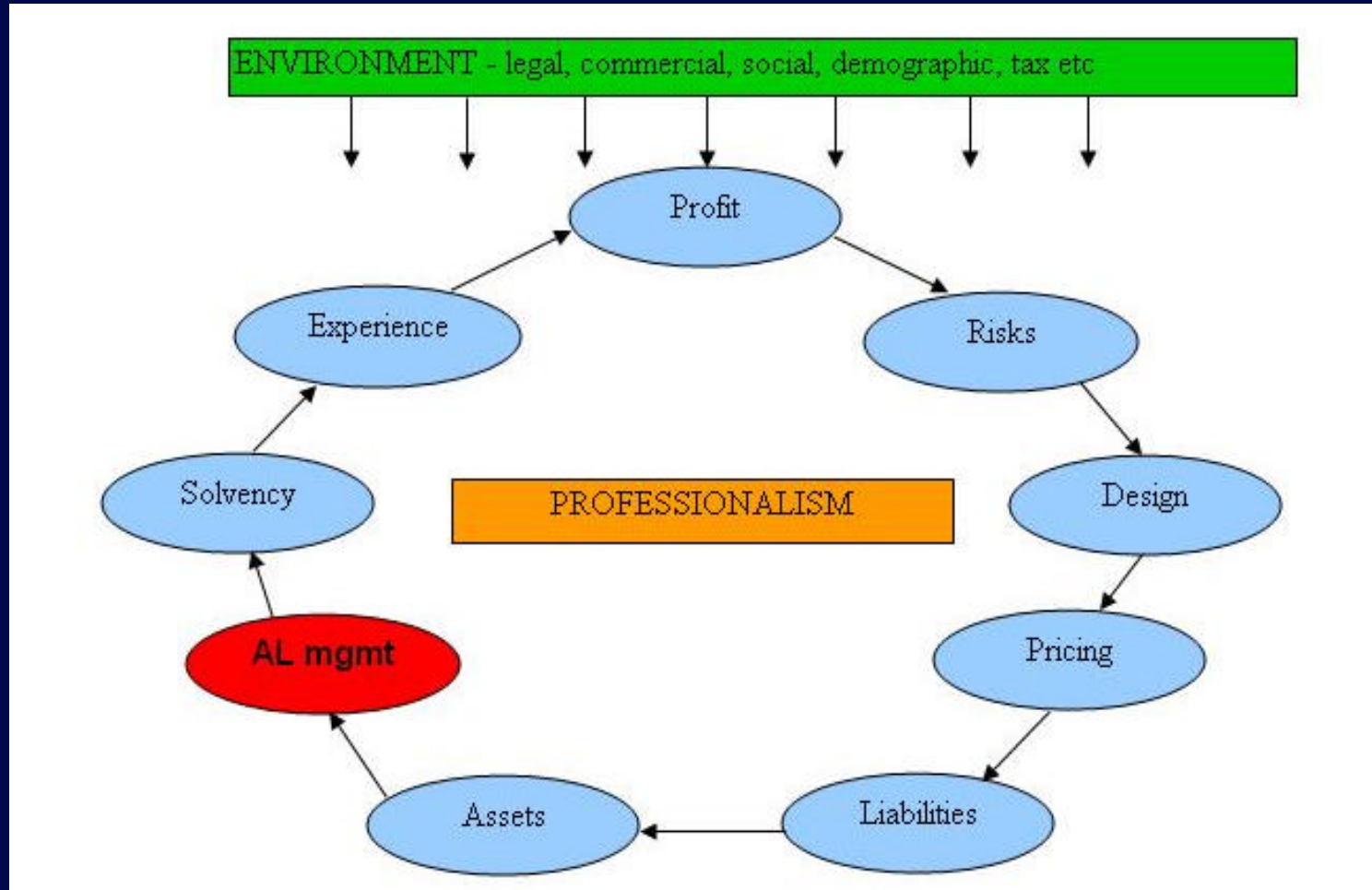
It is possible to manage each side of the balance sheet well, yet to still perform poorly

Eg P&C Insurer backing short-tail liabilities with equities



- Another way of looking at this, especially for banks, is that one side of the balance sheet is funding the other
- Major portion of profit is the margin between assets and liabilities
- Therefore management and stability of this margin is critical to earnings maintenance, growth and stability

Actuarial Control Cycle





- **ALM needs to be incorporated as part of the feedback cycle**
- **It impacts on product design and investment decisions**
- **ALM cannot be performed in isolation - it is influenced by, and influences, these other areas**



- **ALM and the desired exposure to ALM needs to be determined based on the institution's risk appetite**
- **This incorporates the basic "risk for reward" principle**
- **Could be considered an extension of the application of Modern Portfolio Theory and the efficient frontier concept to both sides of the balance sheet**



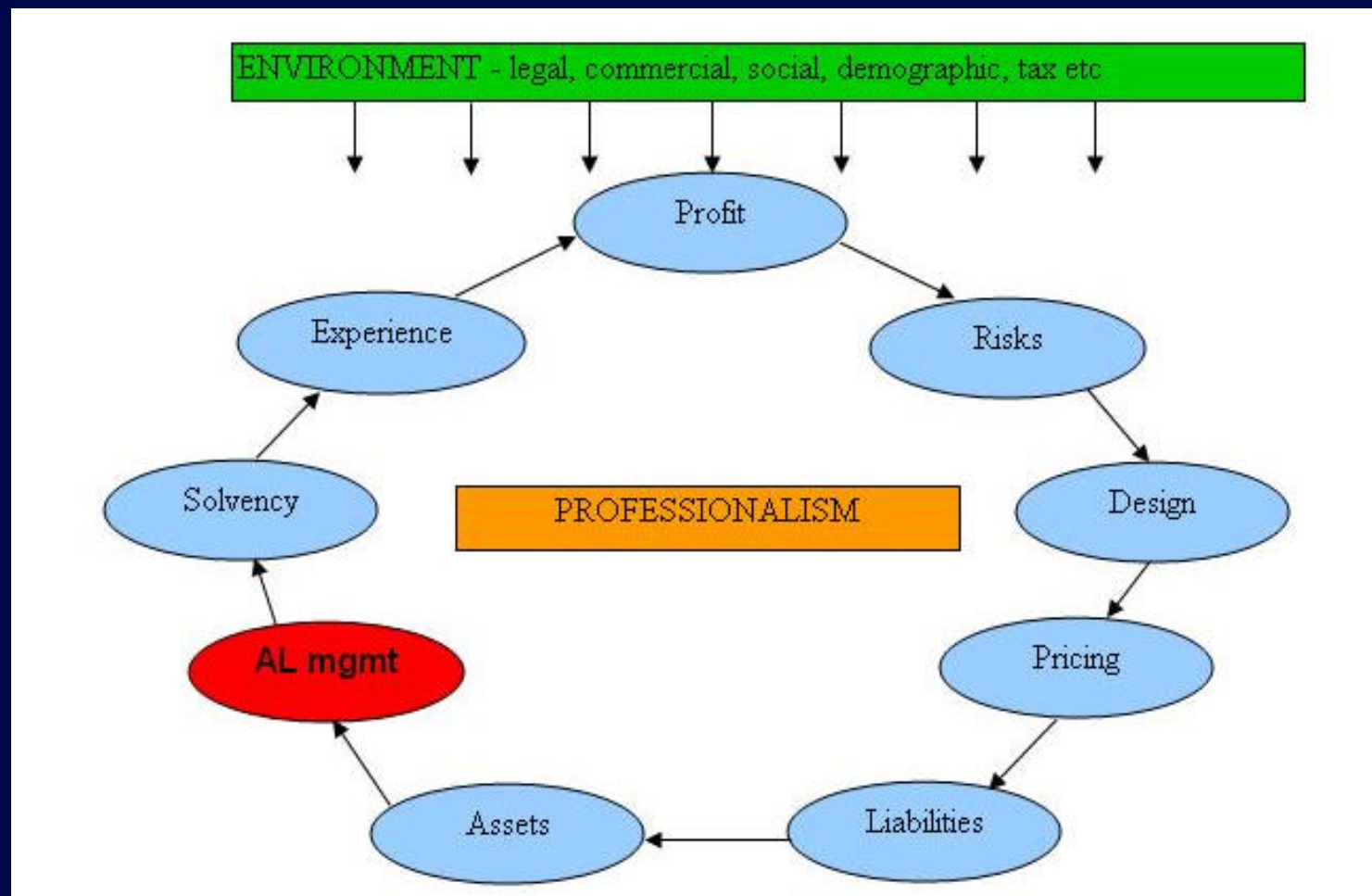
- **Started in earnest in 1970s due to increased interest rate risk**
- **This increase was due to the acceleration in interest rates (due to the rise in inflation) *and* the increased volatility of rates**
- **Increased deregulation and competition has also led to product development - this introduced products with greater optionality as well as other complex features**
- **Increased pressure from shareholders to generate profits and return capital**



- **In the late 1990s significant problems arose due to backing fixed liabilities (annuities) with an asset that could vary significantly in value (equities)**
- **When equity markets dropped sharply many insurers found themselves unable to meet capital requirements/solvency targets**



- The emergence of these problems required a focus on measurement of the problem, which would also aid in clarifying corrective action for any mismatch.
- Product amendments - introduction of participating life insurance policies, prepayment penalties
- Product changes are limited by the competitive environment
- Amend pricing to include the value of embedded options (which had increased due to the now greater volatilities in interest rates)





- **Initial measurement techniques focussed on measuring repricing buckets and cash flows**
- **Whilst still used, these methods are being augmented with more sophisticated mathematical modelling approaches**
- **Developments have been driven by:**
 - increased product complexity increasing the need for more sophisticated approaches
 - improvements in computing resources facilitate more complex approaches



- **Regulators instituted requirements to address mismatch risks**
- **NY Insurance Commission introduced requirement for cash flow testing (1986)**
- **Australian Insurance and Superannuation Commission - Capital Adequacy Standard (1995)**
- **Basel Committee - Amendment to Capital Accord to incorporate Market Risk (1996)**
- **Basel Committee - Principles for Measurement of Interest Rate Risk (1997)**
- **Basel Committee - Principles for Management and Supervision of Interest Rate Risk (2004)**



- Board and senior management oversight
- clear policies and procedures to capture all sources of I/R risk
- segregation of duties
- establishing and enforcing appropriate limits
- regular stress testing
- adequate information systems for measuring, monitoring, controlling and reporting I/R risk
- internal controls reviewed independently, regularly
- Capital must be held commensurate with the risk taken
- There should be disclosure of the level of interest rate risk
- Supervisors must assess the measurement systems within the institution

Gap Analysis

Cash Flow Testing

Cash Flow Matching

Immunisation

Net Interest Income (NII)

Market Value of Equity (MVE)

Value at Risk

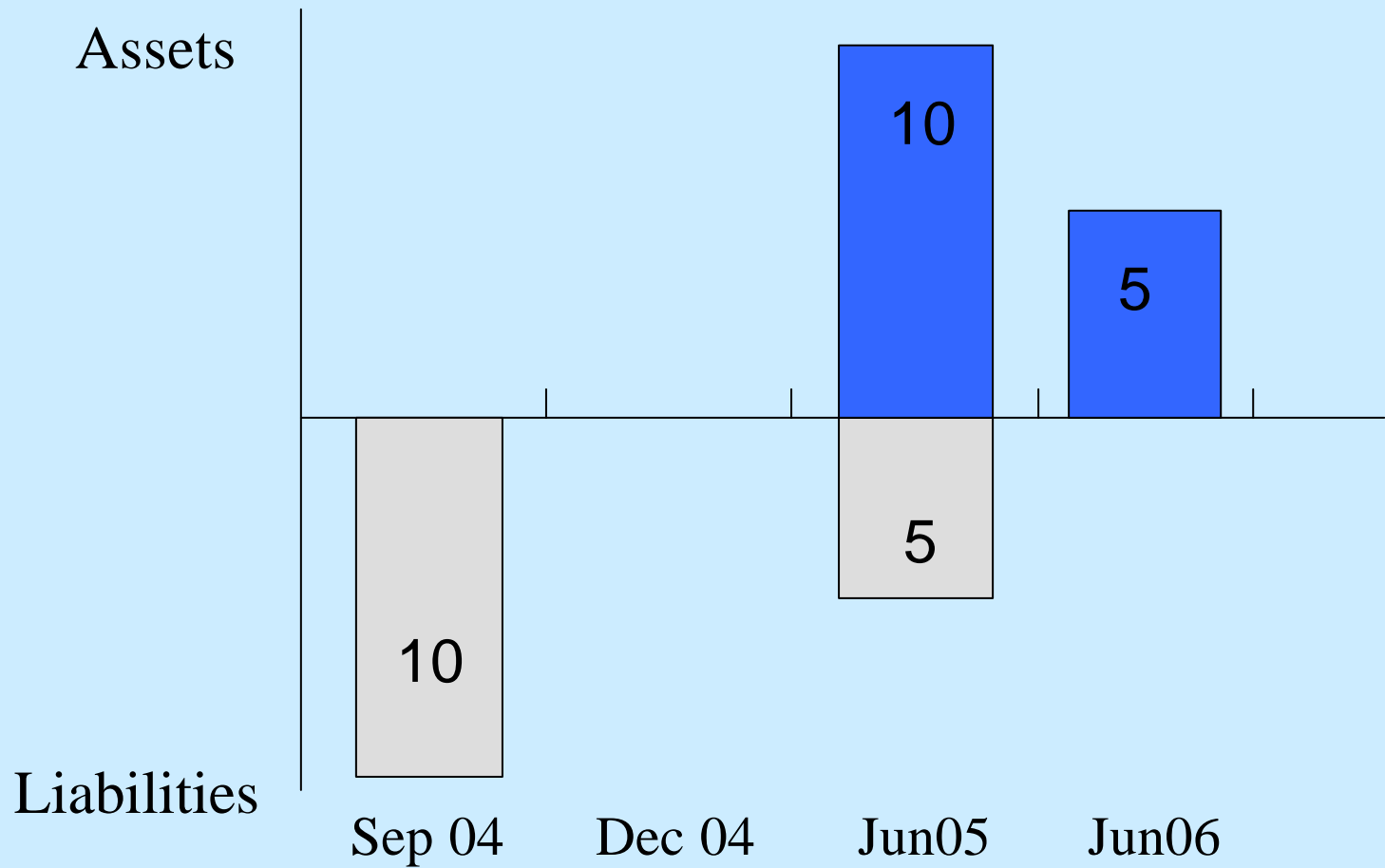
Dynamic Financial Analysis

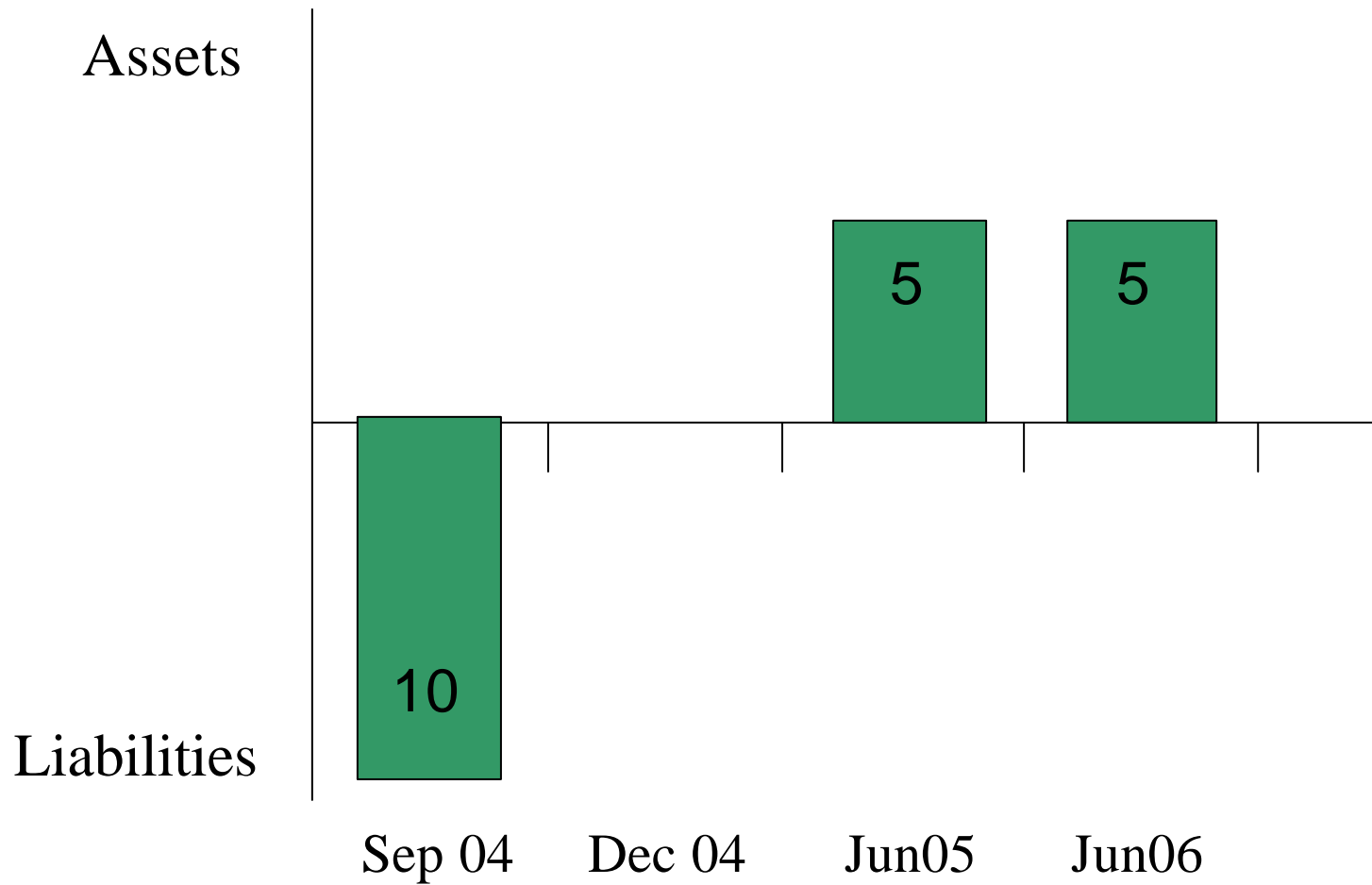
It is important to use a combination of approaches!



Gap Analysis

- repricing schedule that distributes assets, liabilities and off-balance sheet positions into “time bands” according to their next repricing date
- a static analysis, ie a snapshot of the balance sheet at a point in time
- can be used to generate simple indicators of the sensitivity of (i) earnings and (ii) economic value to changes in interest rates.
- Doesn't address optionality well



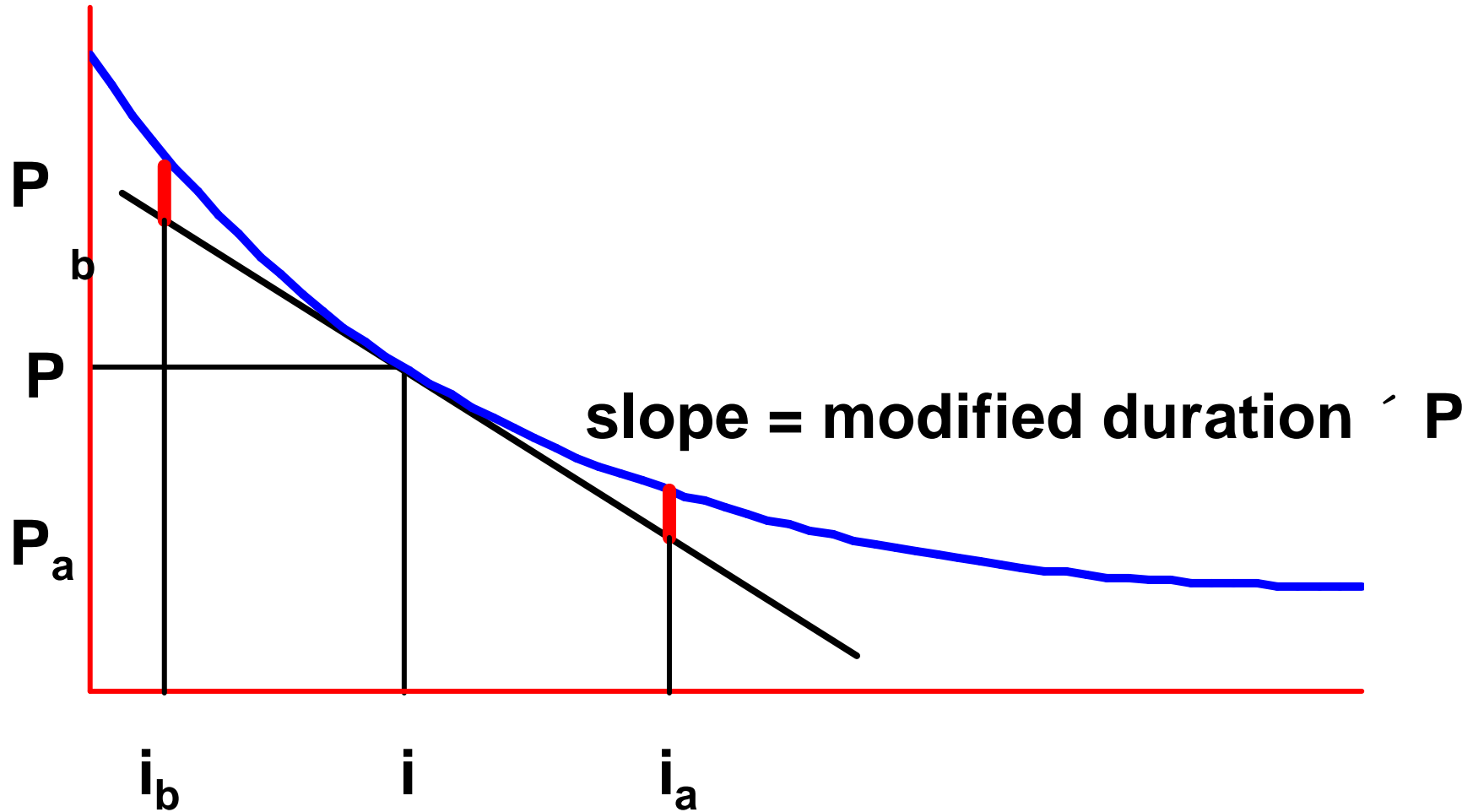


- Mapping out net cash flows
- Can be done for a range of scenarios
- Required by some regulators - “New York Seven”
- Look at results to ensure able to remain cash positive
- Simplistic but will quickly highlight existing or potential liquidity shortfalls
- Only addresses interest rate risks
- Assumes static product mix going forward
- Ignores behavioural responses

- Matching up the cash flows from assets and liabilities
- Pity it is not so easy
- Difficult because of product optionality
- Can be expensive, and will limit the scope to make returns through the judicious acceptance of risk

- Also Fair Value Matching
- Addresses the balance sheet impact
- Effectively duration matching
- In highly volatile environments need to match convexity as well
- Addresses interest rate risk but deals inadequately with other mismatches
- Can ignore cash flow effects

Convexity – Need to Consider



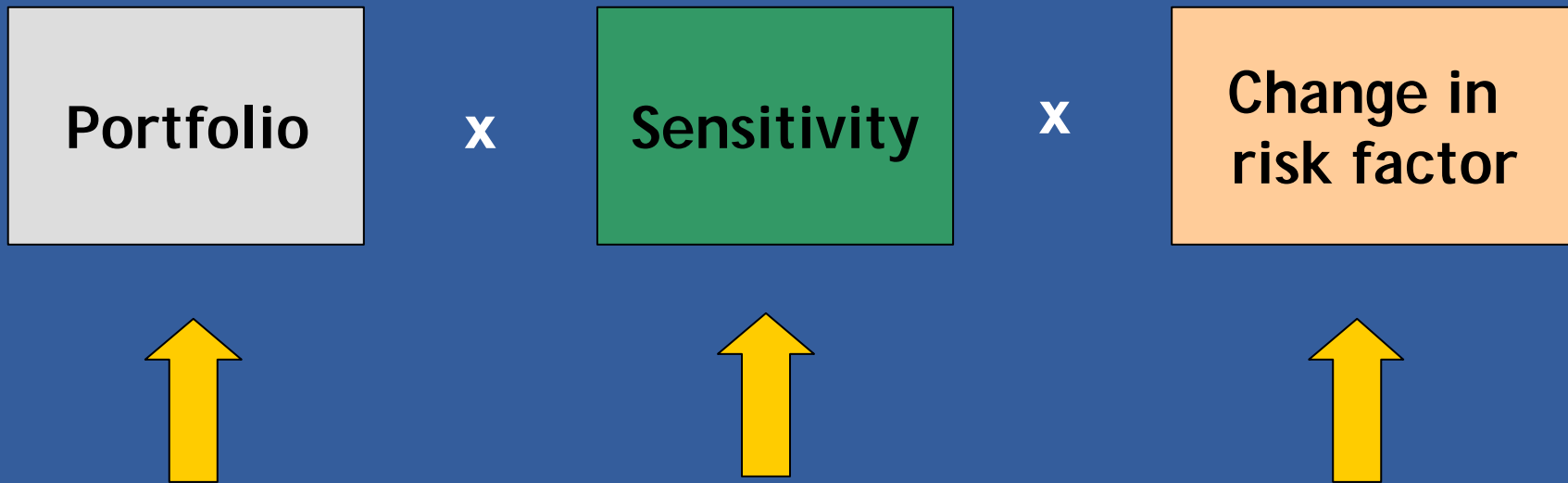
- Also known as Earnings at Risk (EaR)
- Measures sensitivity of NII to changes in interest rates
- Typically over a 1-2 year horizon
- Stress testing can be applied to the NII calculated
- This can incorporate parallel yield curve shifts, twists of the curve, steepening or flattening of the curve
- Mainly used by banks, however can be applied to an annuities business

Market Value of Equity is...

- the present value of an institution's *assets* minus the present value of its *liabilities*
- quantification of the sensitivity of the market value of a institution's equity to a change in interest rates
- a *long term* focus (whereas NII is short term)

Also known as Economic Value of Equity (EVE)

- Applies the VaR concept to interest rate scenarios
- An estimate (a “dollar” amount) of how much a portfolio may lose due to market movements over a particular time horizon (holding period) and for a given probability (confidence level)
- Calculate the impact on the balance sheet



- how much will the portfolio change in value if the risk factor changes by 1%?

- how much might the factors change over a given period?

- Recent development
- Sophisticated statistical modelling for a range of scenarios
- Models assets, liabilities and cash flow over future time period
- Calculations are Stochastic rather than Deterministic
- Aim to model variability of all key risk factors
- Requires significant investment in data collection

- Can be used for multiple purposes - ALM, setting investment strategy, reinsurance strategy, determining capital needs
- Demonstrates clearly the links between ALM and other aspects of the business
- Deals with optionality
- DFA can be used to select the strategy, and then to evaluate the strategy on an ongoing basis
- Can also be used to project likely impact of changes

Measurement Difficulties

- Insurance Liabilities
- Optionality
- Incorporating the effect of these into the projections



- **Amend product mix**
- **Balance Sheet Management**
- **Derivatives**
- **Hold capital**

Product mix can be adjusted by:

- *Altering existing products eg introducing prepayment penalties on fixed rate loans*
- *Introducing new products eg introduction of participating life endowment policies*
- *Pricing mechanism eg change rates offered on term deposits or annuities*
- Drawback is the potential time taken for mismatches to correct

- Amend asset liability mismatch by changing the strategic asset allocation of the investment portfolio (if due to structural problem)
- Amend tactical asset allocation or liquidity levels if problem is shorter term in nature
- Amend funding structure *eg redeem long-term fixed rate debt and replace with shorter term or floating rate debt*

Derivatives can be used to:

- Change duration - *eg use of futures*
- Otherwise hedge the risk of adverse movements - *eg use of swaps to change the exposure from fixed to floating*
- Offsetting options to hedge optionality built into products *eg warrant issuer purchasing back to back options*

Hold capital against adverse movements

It can be argued that this should be based on the *risk* of an adverse situation *not* the expectation of an adverse situation

This is ensuring that the entity will survive even after an adverse shock

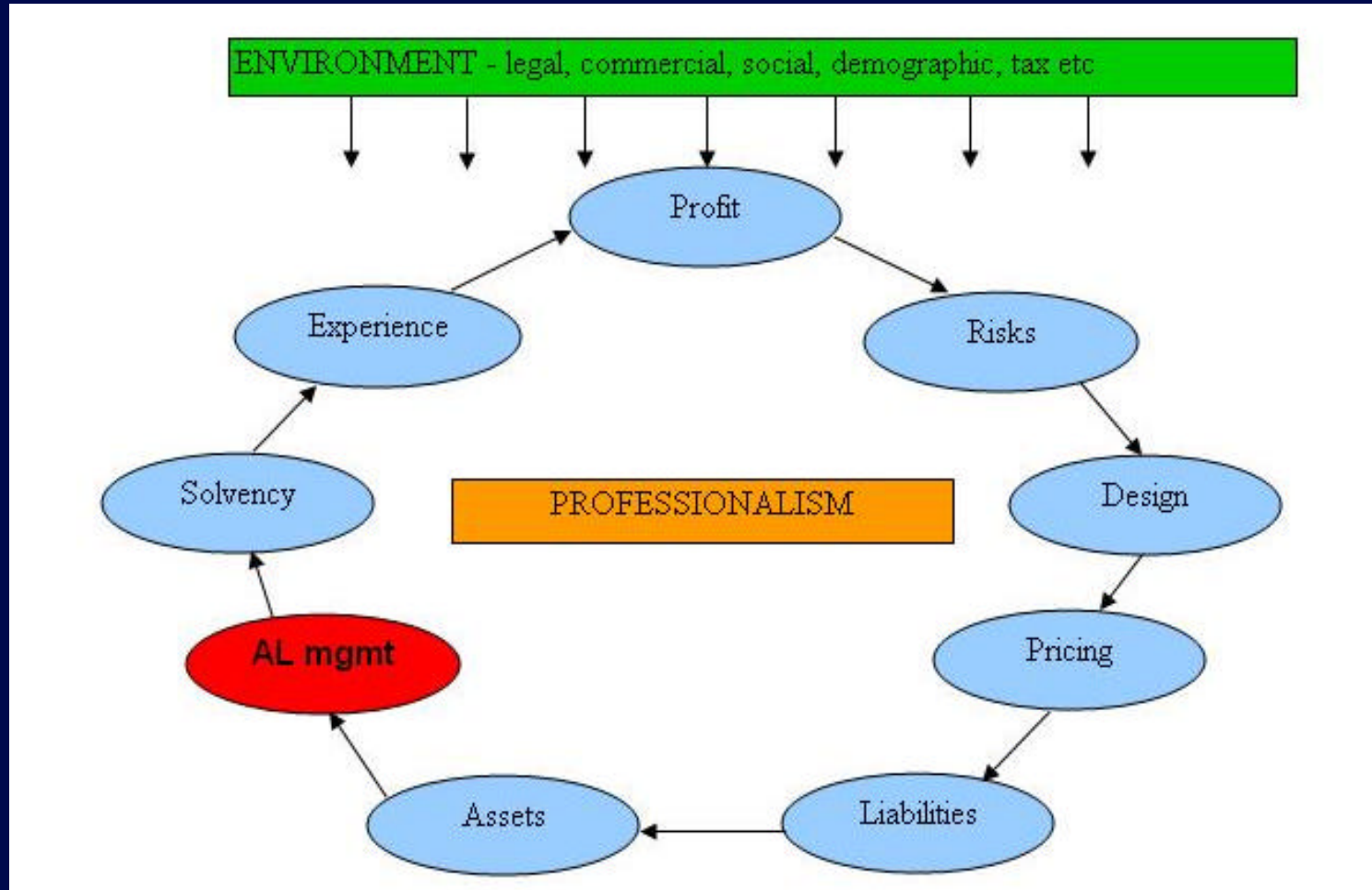
Can be done by setting a buffer, or use a simulation based model (eg DFA)

In addition to measurement tools, there must also be:

- **The right management structure and culture**
- **Sufficient management attention**
- **A robust compliance and reporting framework**
- **ALM does not happen in isolation!**

- There should be an active Asset-Liability Committee reviewing the ALM reports that are being generated
- Committee should also lay down limits, responsibilities and risk appetite
- Investment mandates should be regularly reviewed to ensure consistency with ALM view
- There should be regular reporting to the Committee

The Feedback Loop



- A strategic function
- Another risk factor to be managed
- Has developed as economies and markets have become more unpredictable, and as new financial products developed
- Methods have developed as computing power has facilitated more advanced approaches
- Should be considered when designing products, and when choosing investment and funding strategies



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