

# Analysis Of A Bank's Balance Sheet

Suresh Sankaran

# Agenda

- ✍ Overview of the banking business
- ✍ Types of assets and liabilities
- ✍ Modelling approaches
- ✍ Economic capital

# Asset & Liability Management (London)

# Director

of \$100 billion in 2000. , employs over 20,000 people worldwide, and achieved revenues in excess of \$100 billion in 2000. has more than 40 international offices located in 30 countries. Named "Most Innovative Company" for 6 consecutive years, and the top company for "Quality of Management" by Fortune magazine, is a true leader in its market.

The continued rapid growth of the company has created an unique opportunity for a motivated, creative individual to work within our London Treasury Department.

## The Opportunity:

The opportunity involves the management and development of the asset & liability analytic function. This includes responsibility for capital planning, funding and balance sheet risk management, together with the development of US GAAP compliant structures to help optimise the deployment of capital.

## The Individual:

- Proven career in consultancy/investment banking (10 years experience)
- Undergraduate qualification (top tier university)
- MBA qualification preferred
- Superior quantitative and qualitative finance skills
- Proven ability to successfully lead a team
- Highly motivated self-starter who excels in an intense, fast-paced environment.

To apply, please send a covering letter and copy of your CV to londonjobs@ quoting reference FT921

Salary : GBP150,000 base plus significant stock options and annual bonus

Capital planning, funding and balance sheet risk management .....  
..... structures to help optimise the deployment of capital  
US GAAP compliant structures ...

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Capital planning, funding and balance sheet risk management .....  
..... **structures to help optimise the deployment of capital**  
**US GAAP Compliant structures ...**

# Definition Of Banking

- ✂ Banking is the art of assuming risk
- ✂ In the exchange of money between customers...
- ✂ Undertaken in the quest of increasing bank shareholder wealth

# Views Of Financial Institutions

- ✎ 1930s
- ✎ 1970s and 1980s
- ✎ 1990s
- ✎ 21st century

# Views Of Financial Institutions: Views Of The 1930s

- ✎ Concern about the safety and soundness of financial institutions
  - Laws that limited the activities of financial institutions
- ✎ Managers engaged in specific, legally permissible activities
  - Charged prices with legally mandated maximums
  - Incurred legally determined costs

# Views Of Financial Institutions: Views Of The 1970s And 1980s

- ✎ Depositors withdrew their funds in search of higher returns elsewhere as interest rates rose in the 1970s
- ✎ Many financial institutions could not respond because laws of the 1930s limited interest rates they could offer
- ✎ Volatile interest rates created profitability problems for many financial institutions



# Views Of Financial Institutions: Views Of The 1970s And 1980s

- ✎ Technology expanded competition by facilitating the direct sale of securities by firms to investors on a global basis
- ✎ Lower profits led some financial institutions to increase lending to riskier customers
- ✎ Regional recessions in the late 1980s resulted in many bank failures and severe losses at US savings institutions

# Views Of Financial Institutions: Views Of The 1990s

- ✗ New regulations were imposed on banks and savings institutions and deposit insurance funds were recapitalised
- ✗ Mergers occurred to take advantage of new technology that allowed greater economies of scale and cross-selling opportunities
- ✗ Globalisation resulted in profit opportunities
  - Consulting, selling products to customers abroad, and international trading activities
- ✗ Technology increased the use and trading of derivatives such as futures, options, and swaps

# Views Of Financial Institutions: Views Of The 1990s

- ✂ Mergers between different types of institutions
- ✂ Increased opportunities for synergies and non-interest revenues
- ✂ Increased risk and culture management problems

# Opportunities For The 21st Century

- ✂ Interstate branching
- ✂ New technology
- ✂ Demographics
- ✂ Globalisation
- ✂ Less reliance on on-balance sheet products
- ✂ Increased trade-finance activities

# How Do Real Physical Assets Differ From Financial Assets?

- ✎ Real, tangible assets are those expected to provide benefits based on their fundamental qualities
- ✎ A financial asset is a contract that offers a promise of payment in the future from the party that issued the contract

# Key Difference

- ✎ The key difference between financial institutions and other firms is that most of the assets financial institutions hold are financial assets
- ✎ Financial institutions have much higher financial leverage than non-financial firms
- ✎ Liquidity problems result from depositors' ability to withdraw funds at any time
  - Embedded optionality, one of the most crucial elements within the A/LM framework

# Asset & Liability Management

Is a *co-ordinated* Approach  
to the Management of

**Loans**

**Investments**

**Liquidity**

**Fixed Assets**

**Deposits**

**Borrowings**

**Long-Term Debt**

**Capital**

to Achieve the Institution's Desired  
Objectives within Prudent Risk Limits

# Primary Purpose Of A/LM

**Meet regulatory requirements?**



*Or*

**Actively  
manage the  
balance sheet?**



# The Business Case For Risk Management

**"To preserve and protect"**



- ✎ Protect the firm's capital from extraordinary losses
- ✎ Stabilise earnings within a range by managing potentially volatile positions
- ✎ Mechanism for limits
- ✎ Meet regulatory reporting and capital requirements
- ✎ Develop common firm-wide language to communicate risk

# An Effective A/LM Process

- ✎ Improves financial performance
- ✎ Controls risk exposures
- ✎ Solidifies management team
- ✎ Facilitates organisation change

# Management Of Sources And Uses Of Funds

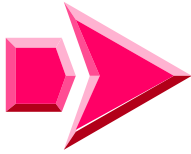
## ✎ Asset uses

- ❑ How much?
- ❑ How long?
- ❑ What price?
- ❑ Risk of not receiving when due

## ✎ Liability sources

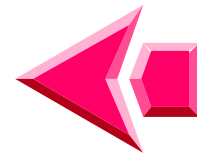
- ❑ How much?
- ❑ How long?
- ❑ What price?
- ❑ Risk of having to pay when not due

# Financial Objectives



Short Term  
Net Income

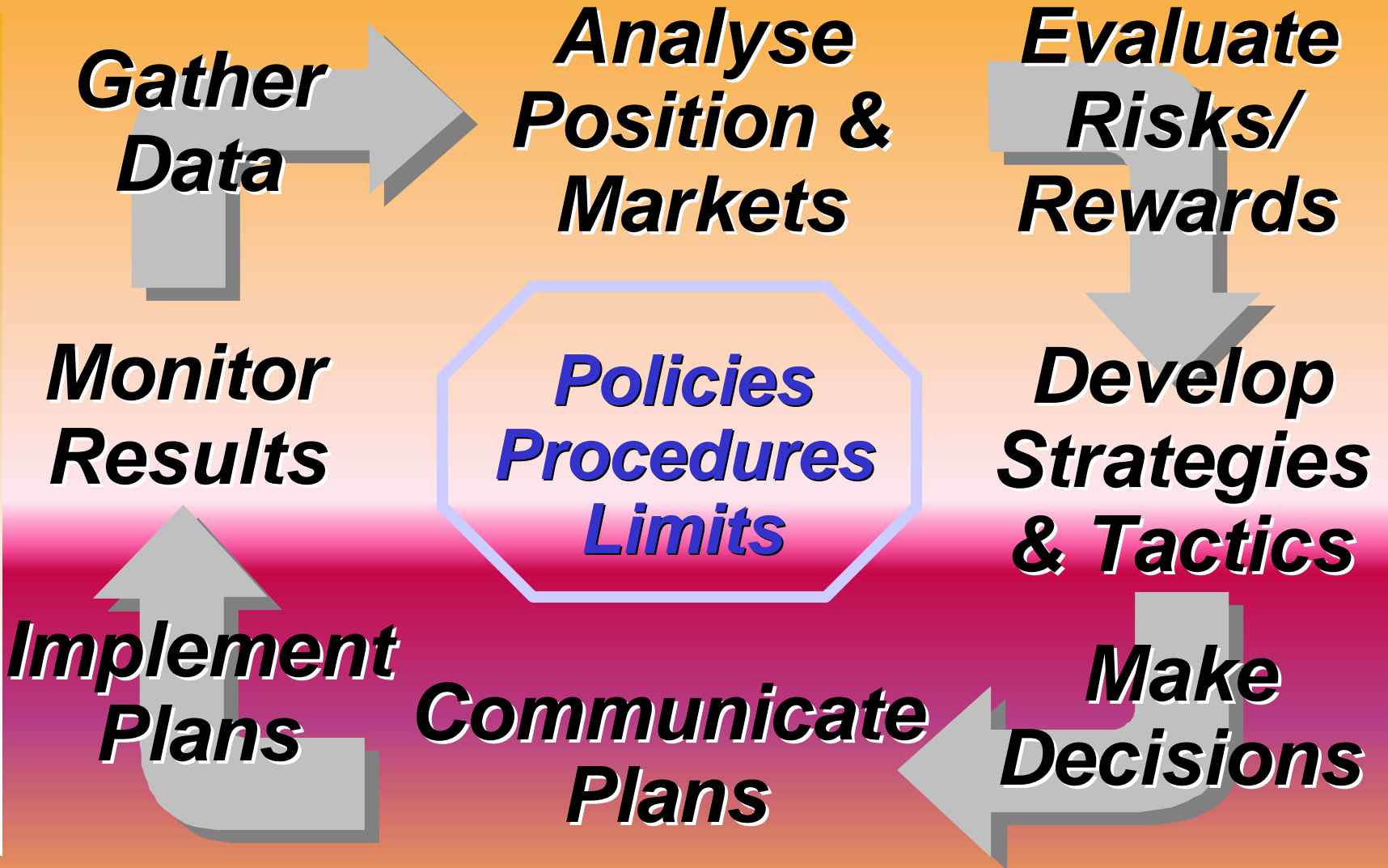
Long Term  
Value  
of Capital



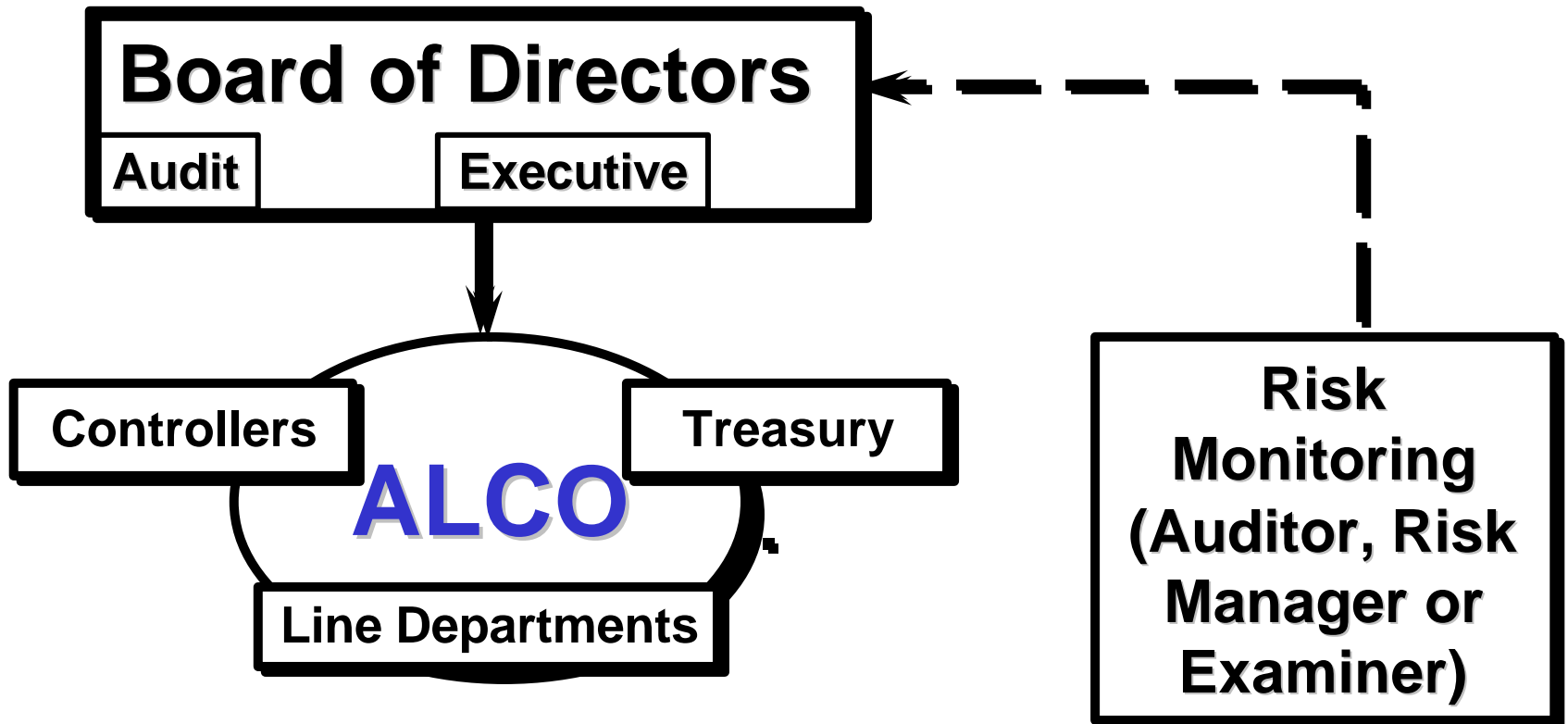
# Other Objectives

- ✂ Balance sheet growth targets
- ✂ Capital growth and dividends
- ✂ Markets served - markets ignored
- ✂ Product offerings and pricing strategies
- ✂ Desired image of organisation

# The A/LM Process



# Independence Of Risk Measurement From Rewards



# The Subtlety Of ALM

- ✗ A/LM becomes a balancing act of all financial risks assumed to achieve the institutional objectives within board-approved risk limits





# Financial Risks

- ✂ Market risk
- ✂ Credit risk
- ✂ Liquidity risk
- ✂ Interest-rate risk
- ✂ Basis risk
- ✂ Operations risk
- ✂ Currency risk

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**Risk Is The Variability Of Possible  
Returns That Can Be Expected To Be  
Achieved In The Future**

**Returns Can Be Measured In  
Terms Of Changes In Both  
Earnings And Capital Value**

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# Reward Measurements

- ✎ Earnings are measured in terms of net interest income
  - Current return
- ✎ Capital returns are measured in terms of changes in economic value of capital
  - Total return

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# Interest-rate Risk

The Potential Variability Of Earnings And  
Economic Value Of Equity Resulting From  
Changes In Market Rates Of Interest

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# Sources Of Interest-rate Risk

Timing of repricing

*(Mismatch risk)*



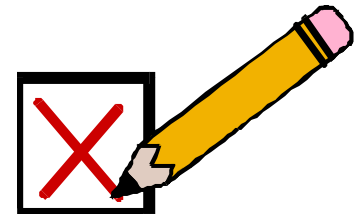
Varying spread relationships

*(Basis risk)*



Embedded options

*(Option risk)*



# NII Risk Determined By The Short-term Balance Sheet

**Today**

**1 Year**

- ✘ Timing of repricing of short-term assets and liabilities primarily determine how NII changes as rates vary
- ✘ Prepayments and repricing limits can also be an influence

# Interest-rate Risk Modelling Tools

- ✂ Accounting perspective  
**risk to net interest income**
  - Repricing gap analysis
  - Simulation of net interest income
  
- ✂ Economic perspective  
**risk to value of capital**
  - Duration analysis
  - Simulation of economic value

# Risk Measurement Requirements

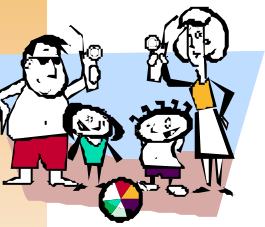
- ✂ Understand the focus and usage of the risk analysis
- ✂ Accurate financial information
- ✂ Explicitly-identified assumptions about the behaviour of customers, assets and liabilities
- ✂ Desire to act upon analysis
  - Hedge exposures
  - Leave exposures unhedged
  - Take a view!



# The Golden Aphorisms



- ✎ Giving capital to a bank is like giving a gallon of beer to a drunk
  - You know what will become of it, but you can't know which wall he will choose

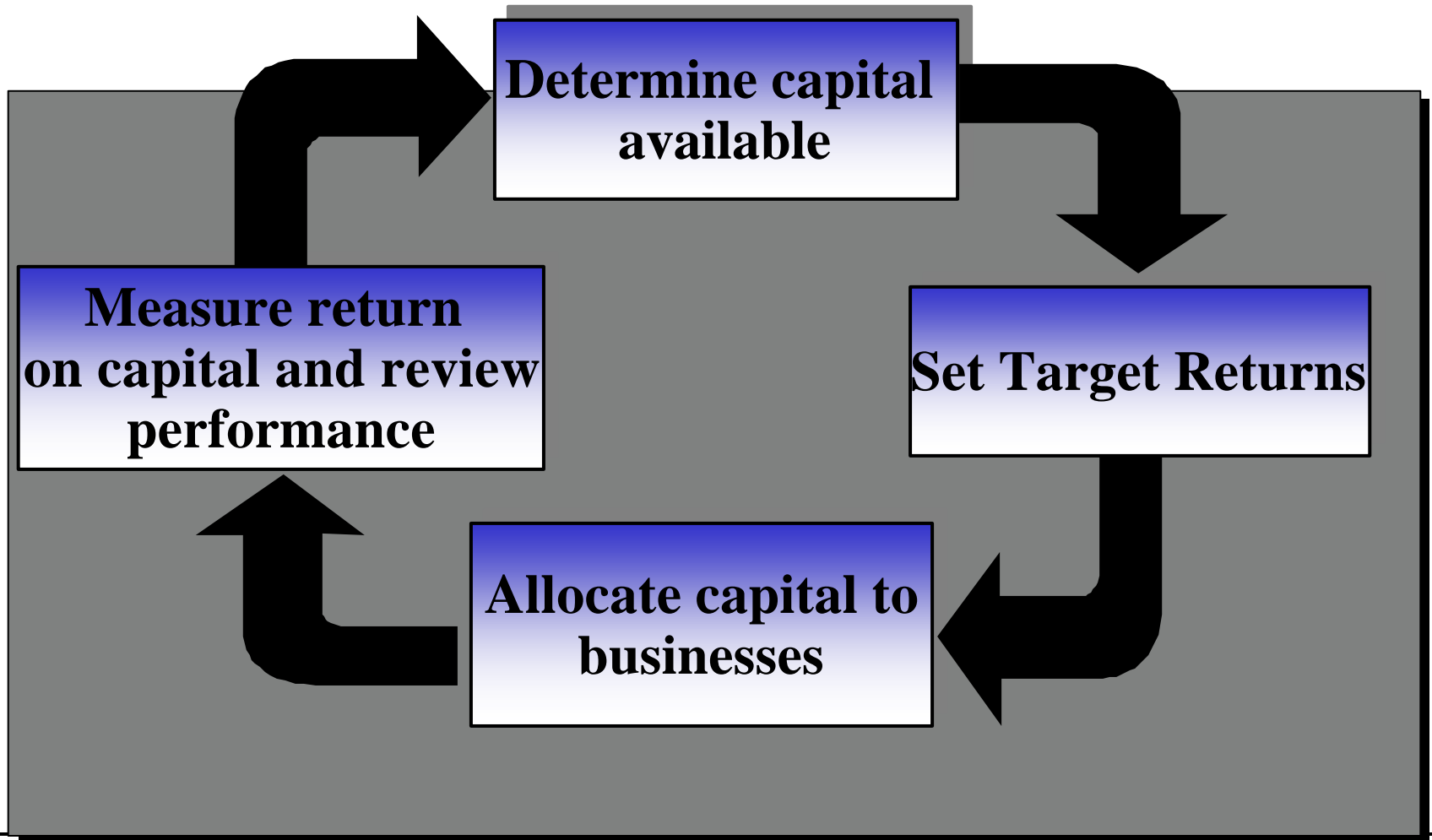


The highest use of capital is not to make more money

- But to make money do more for the betterment of life



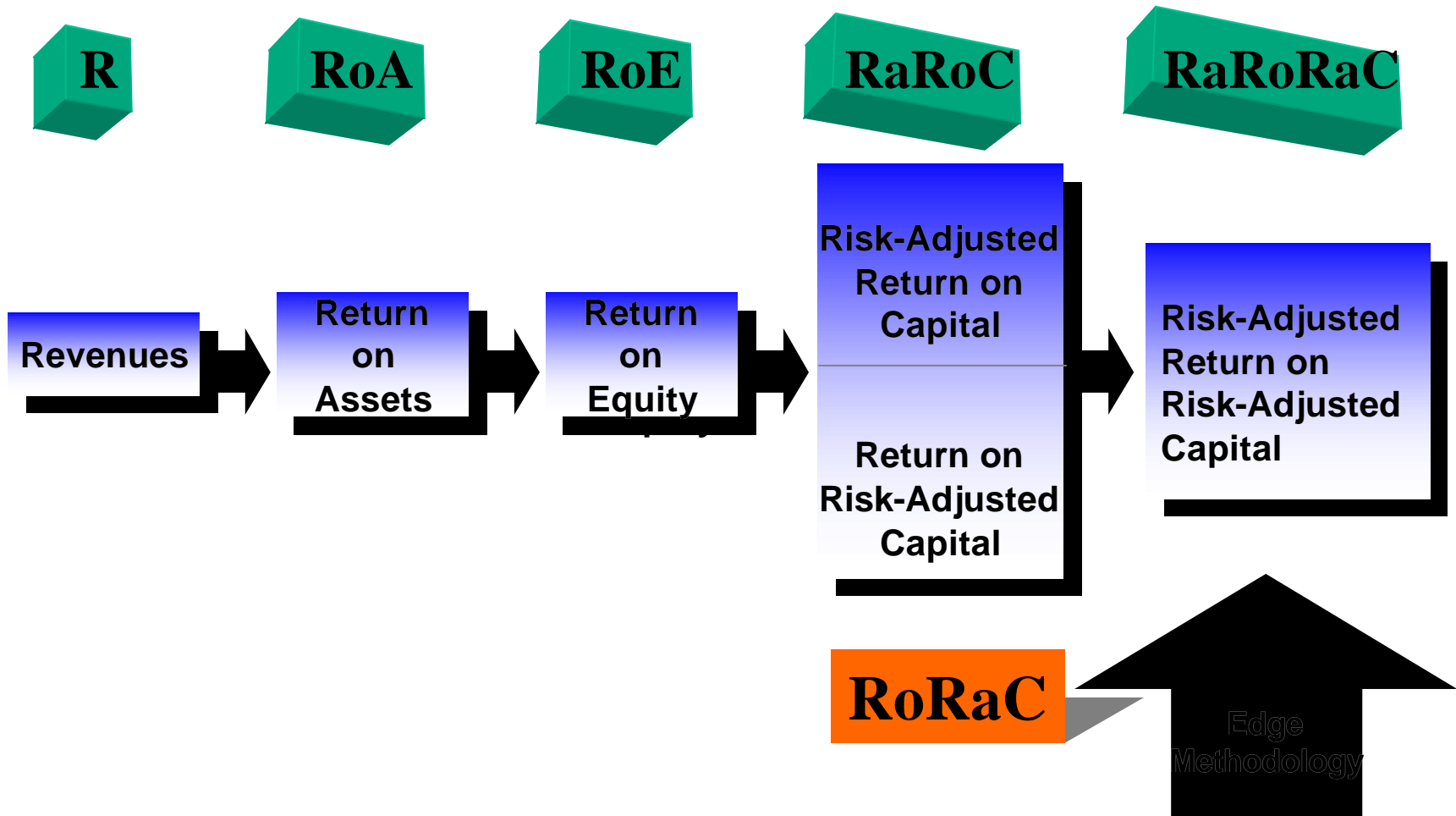
# How Should Capital Be Allocated?



**“The Role Of Capital In A Bank Is To Act As A Buffer Against Future, Unidentified, Even Relatively Improbable Losses, Whilst Still Leaving The Bank Able To Operate At The Same Level Of Capacity”**

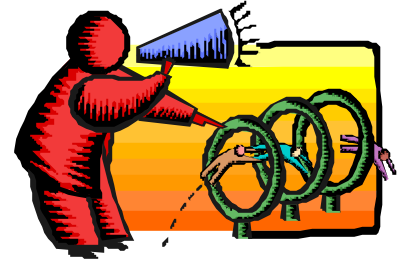
**Chris Matten, *Managing Bank Capital*, 1996**

# Evolution Of Performance Measures



# From Roe To RAPM

- ✗ Deregulation of the banking industry
- ✗ Regulatory requirements
- ✗ More demanding shareholders
  - Focus on businesses which generate superior returns
- ✗ More experienced rating agencies



# Capital Management



- ✎ Ensure that the bank has a commensurate overall capital level
  - ❑ Expectations of ratings agencies
  - ❑ Internal assessment of risk taken
  - ❑ Regulatory requirements
  - ❑ Returns expected by shareholders
    - ⇒ Not just dividends but capital appreciation and better returns



# Role Of Capital



## ✂ Buffer

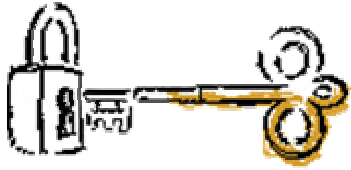
- ❑ Buffer to absorb those outcomes which fall below the expected value
- ❑ More than a cushion against “normal” losses in any period
- ❑ Important signal to potential creditors

# Capital - A Generic Definition

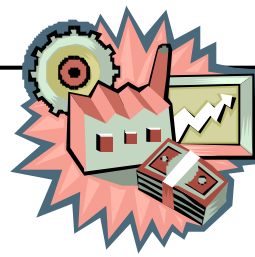
- ✂ The amount required to be held to
  - Manage the risk of loss in value of exposures and thereby
    - ⇒ Protect the depositors / creditors against loss







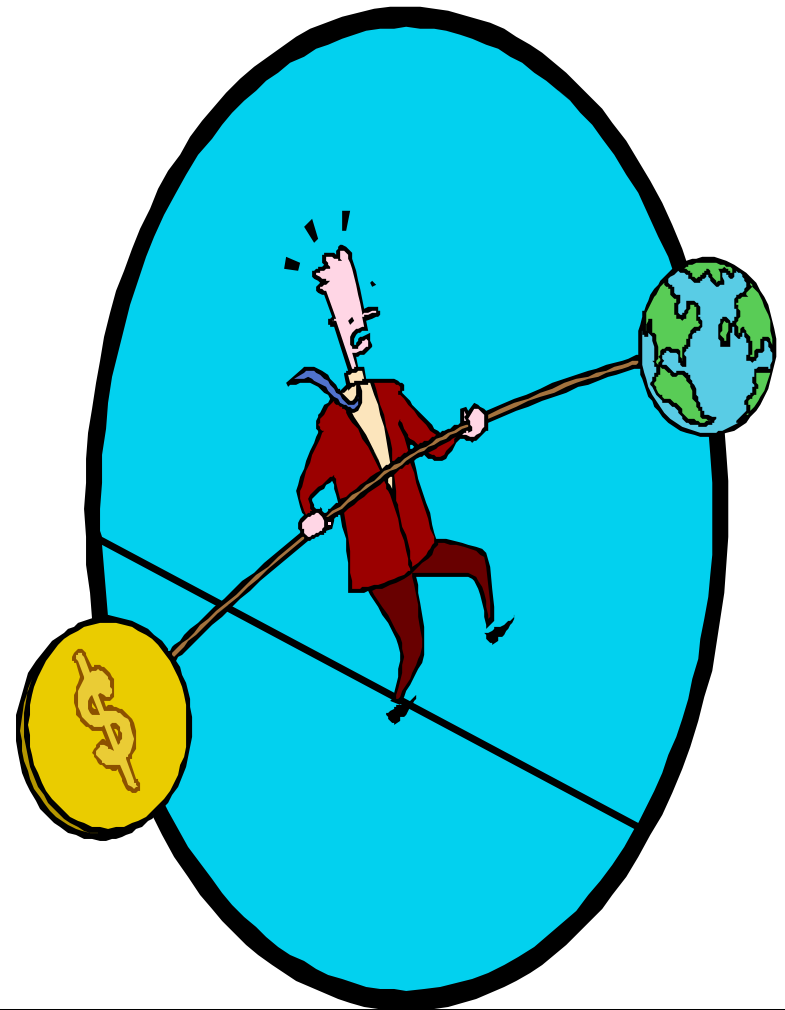
# How Much Capital?



- ✂ Most banks hold equity far in excess of requirements
- ✂ Conservative approach?
- ✂ Pressure from rating agencies?
- ✂ Arisen by accident?
- ✂ Bad trend
  - Banks now under-pricing loans
    - ⇒ Nothing else in which to invest surplus capital

# Capital Management Techniques

- ✂ More art than science
- ✂ No clear answer to “how much”?
- ✂ Changes with management goals



# Capital Allocation - Does It Help?

## ✂ Bankers Trust

- Pioneered RAROC in the late 1970s

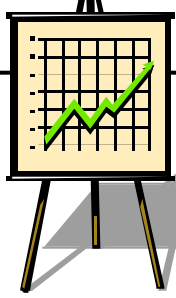
## ✂ No substitute for loss of reputation

- Derivatives “\*\*\*\* ups”

## ✂ Could not prevent takeover by Deutsche Bank

## ✂ “The technocrat trap”

# Making The Most Of Capital



- ✂ Increase amount of return earned per unit of capital
- ✂ Decrease the amount of capital required per unit of return
- ✂ Focus not revolutionary
  - Non-existent in boardrooms of most banks



# Allocation - Driven By Constraint

✍ “Capital is a major business constraint”

- ❑ This is superior to an approach which leaves this to chance
- ❑ Any method will produce superior returns
  - ⇒ “Some risk adjustment is better than none”
- ❑ Allocation will not automatically result in better performance
- ❑ No or poor allocation will certainly result in inferior performance



# RAPM

- ✗ RORAA
- ✗ RAROA
- ✗ RORAC
- ✗ RAROC
- ✗ RARORAC?!?!?

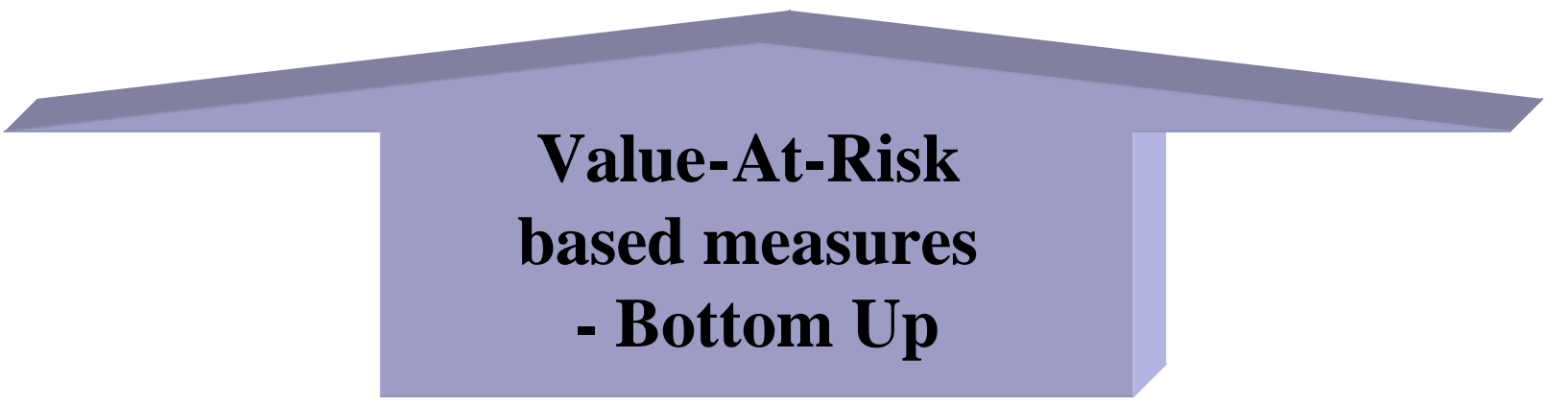


**All these techniques are based on the potential volatility of the present value of a particular transaction. All these approaches can be classified as “asset-volatility” based techniques**

# Approaches To Measuring Economic Capital

**Earnings-at-Risk  
based measures  
- Top Down**

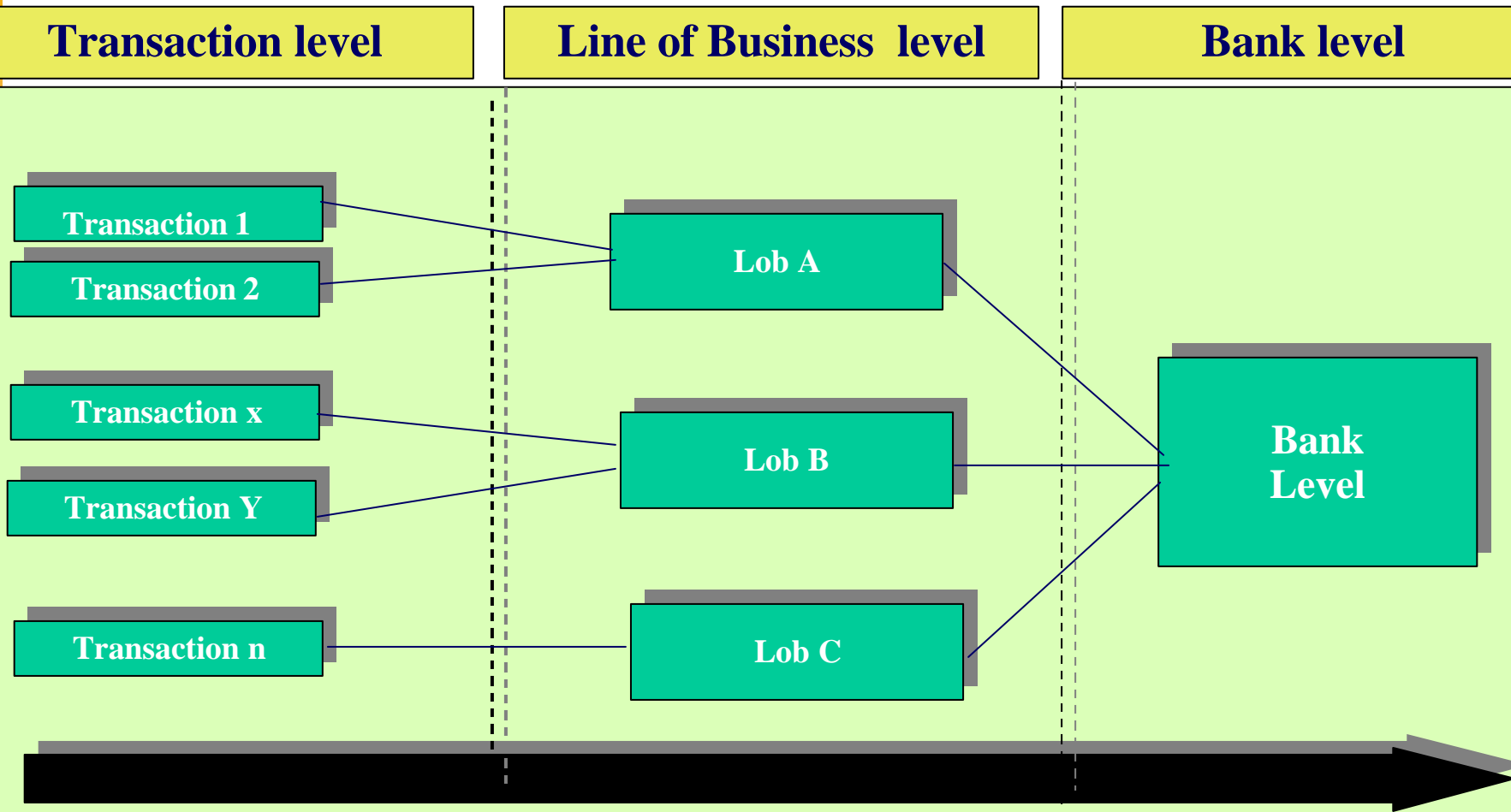
**Risk Capital**



**Value-At-Risk  
based measures  
- Bottom Up**

# The Bottom-up Approach

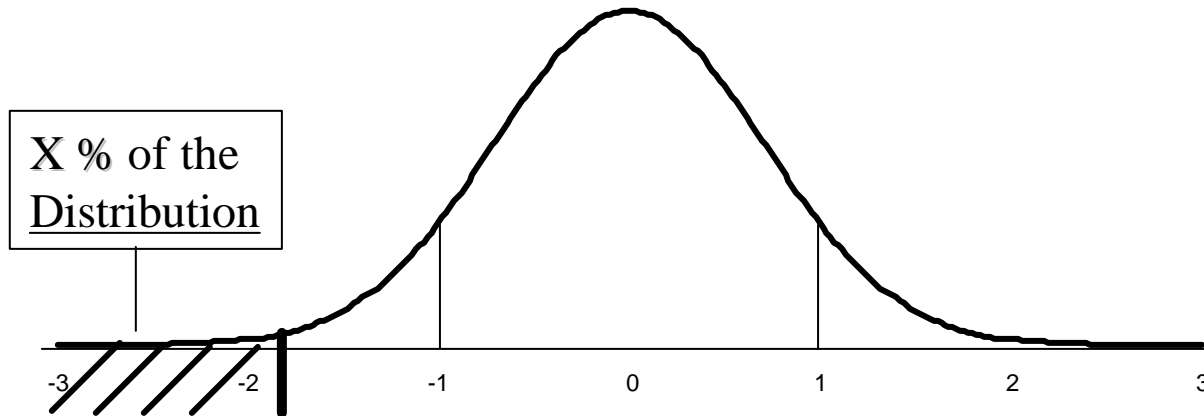
*In a Bottom-up approach, risk capital is measured at transactional level and aggregated up to a total bank level*





# Value-at-risk (V@R) Based Measures

*A probability statement about the potential change in value of a portfolio resulting from changes in market factors over a specified time interval*



**VAR**

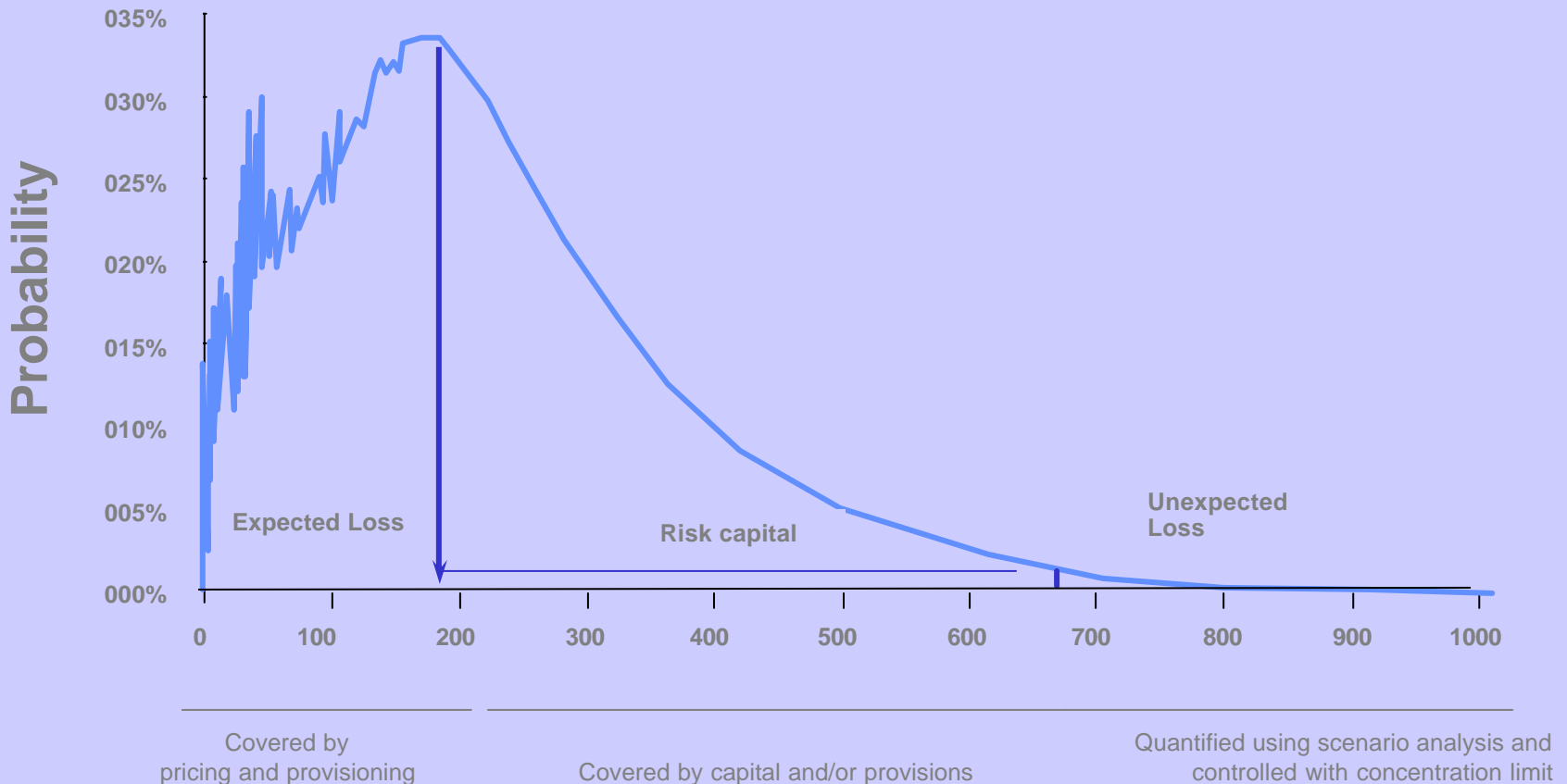
**Distribution of Changes in Value**

# Economic Capital

**“...Capital is required as a cushion for a bank’s overall risk of unexpected loss ... adequate pricing and reserves should provide sufficient earnings to absorb expected loss ...”**

*US Office of the Comptroller of the Currency*

# Frequency Distribution Of Default Rates



**RAPM**

**Return**

**Economic  
Capital**

**Revenues**

-

**Credit provisions**

-

**Direct costs**

-

**Allocated costs**

-

**Funding credit**

**Credit risk capital**

+

**Market risk capital**

+

**Operational risk capital**

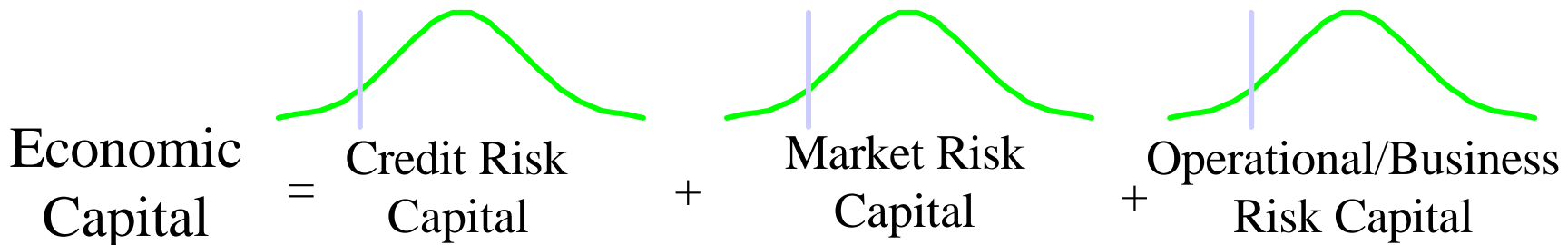
+

**New business/other capital**

# Value At Risk Based Measures

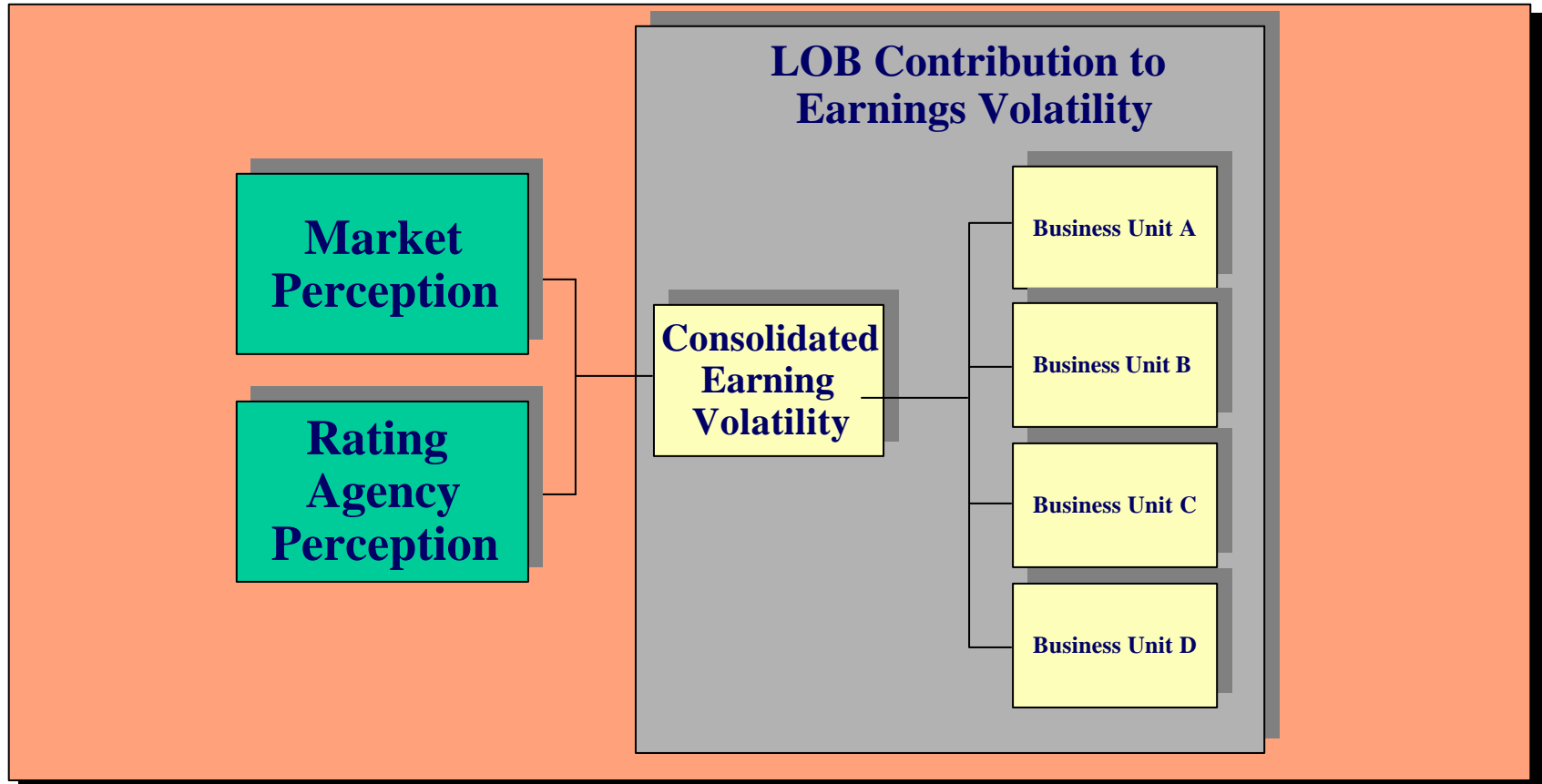
## Disaggregated Risk Approach


- ✗ Consider the risks separately
- ✗ Use existing credit risk measure to obtain “credit risk capital”
- ✗ Use VAR to obtain “market risk capital”
- ✗ Convert operational risk measure to “operational/business risk capital”



# Evaluating The Alternatives: Top-down

*In a Top-down approach, risk capital is measured at consolidated level as a function of Rating Agency perception and allocated to each Lob on the basis of the Lob's contribution to consolidated Earning Volatility*



A close-up photograph of a person's hand resting on their chin, suggesting deep thought or contemplation. The person is wearing a light-colored shirt and a dark tie. A large, teal-colored thought bubble is superimposed on the right side of the image, containing a question. The background is dark and out of focus.

"How much capital must I invest, at the risk-free rate, in order to generate a return sufficient to offset the potential downside in earnings?"

**Capital Planning -  
Earnings volatility  
based approach**

**RAPM**

**Return**

**Economic  
Capital**

**Revenues**

-

**Credit provisions**

-

**Direct costs**

-

**Allocated costs**

-

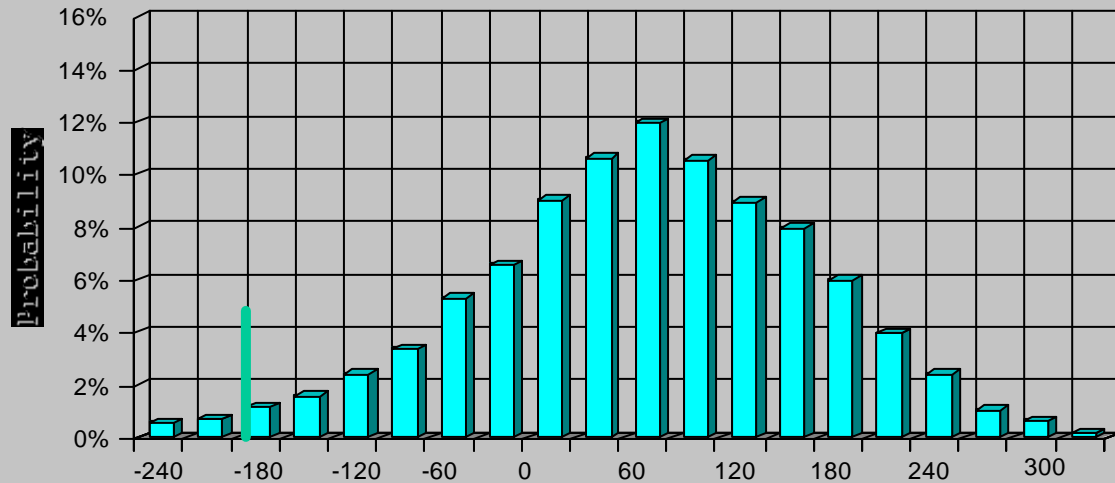
**Funding credit**

**EAR**

**r**



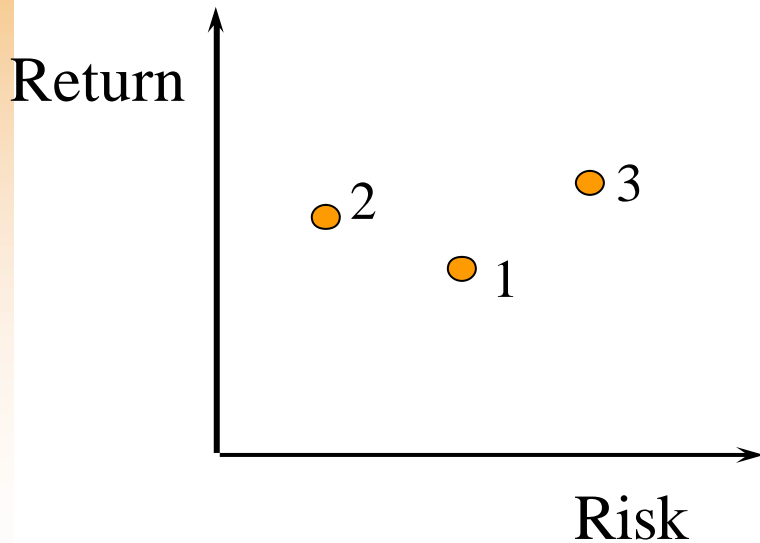
# Earnings-at-risk: Historical Distribution



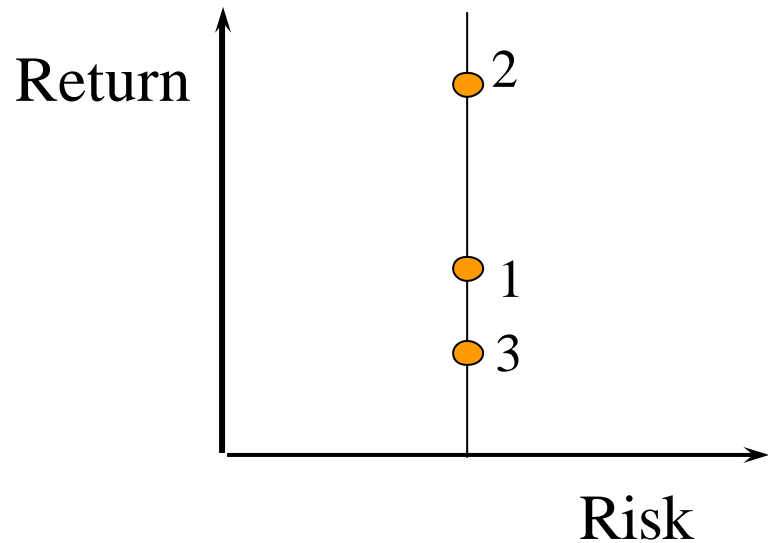
Earnings at Risk

# A Measure That Moves From Many Dimensions To One

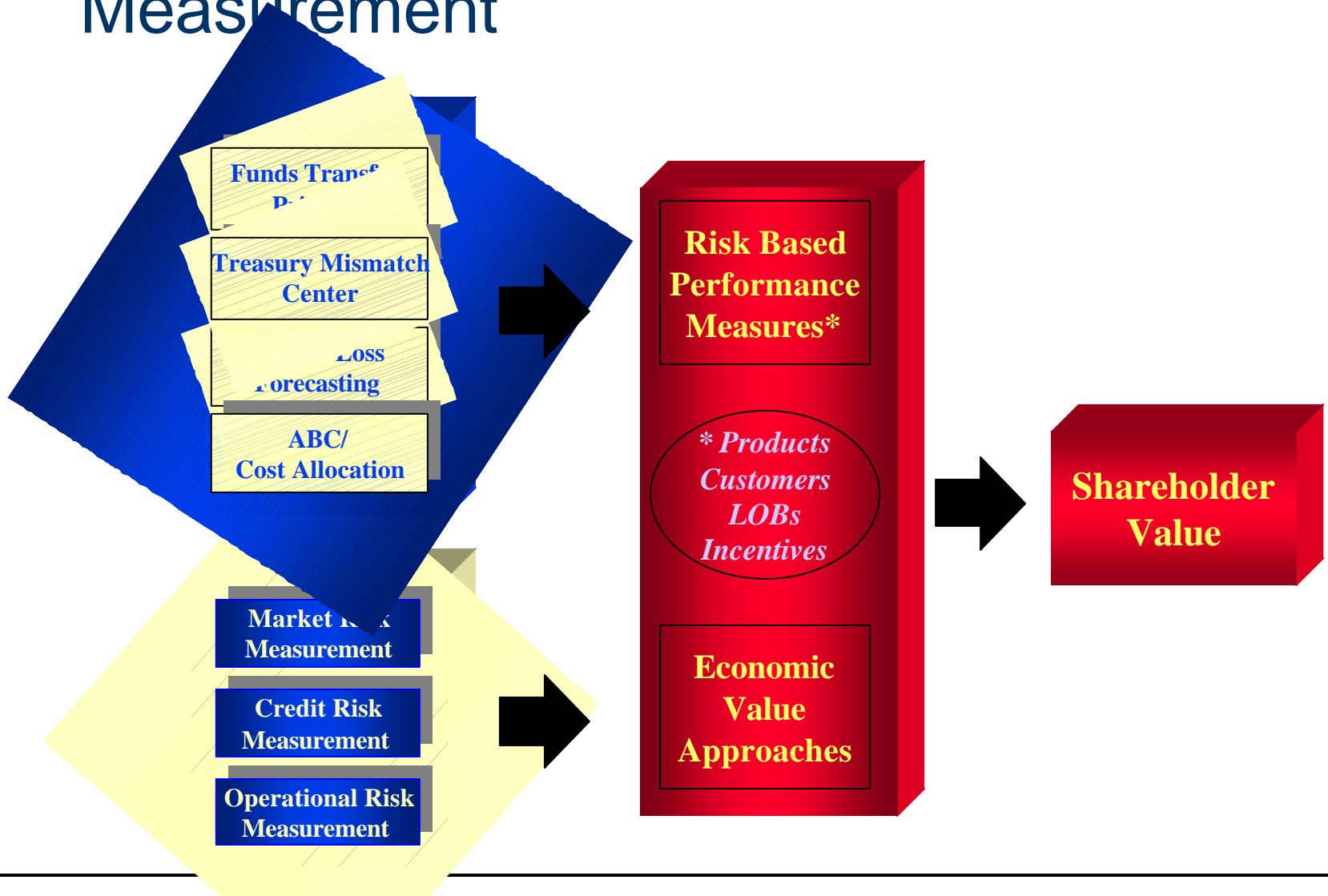
Unadjusted returns  
cannot be directly compared



Risk adjustment allows returns  
to be directly compared



# Integrated Risk Adjusted Performance Measurement



Risk Capital for:

Market Risk

**m**

900.00

Credit Risk

**l**

1100.00

Operational Risk

**h**

500.00

Total Risk Capital calculated by:

Simple aggregation

$\mu + \lambda + \eta$

2500.00

Square root of sum of squares

**A**

1506.65

$$A = \sqrt{(m)^2 + (l)^2 + (h)^2}$$

# Converting E@R To Economic Capital

- ✂ If E@R = CHF2667k
- ✂ How much capital invested at a risk-free rate
  - Will generate E@R?
- ✂ Economic capital = 
$$\frac{E @ R}{r}$$
  - Where  $r$  = risk-free rate
  - At 5%, economic capital = CHF53.32m

# RORAC Calculations

RORAC (A)

$$\frac{\text{Return}}{\text{Total Available Equity} * \frac{\text{EAR of business}}{\text{Ear of bank}}}$$

RORAC (B)

$$\frac{\text{Return} - \text{Opportunity cost of Regulatory Capital}}{\text{Earnings at Risk}}$$

RORAC (C)

$$\frac{\text{Return}}{\text{Earnings at Risk} * \frac{100}{\text{Risk-free rate}}}$$

**$(\text{E@R} / \text{Risk-free Rate}) * 100 = \text{Economic Capital}$**

# Economic Capital As Insurance

- ✎ Normal insurance, provided in the form of equity capital
  - Cost = excess return over the risk-free rate
- ✎ Adversity insurance, provided by debt holders
  - Cost = excess yield which debt holders require over the risk-free rate



# Economic Capital As Insurance

- ✂ Calamity insurance, provided by depositors
  - Difference between interest rate offered on deposits
    - ⇒ covered by statutory reserves and
  - that offered on similar deposits
    - ⇒ not covered by statutory reserves



# RAROC *Versus* RORAC!



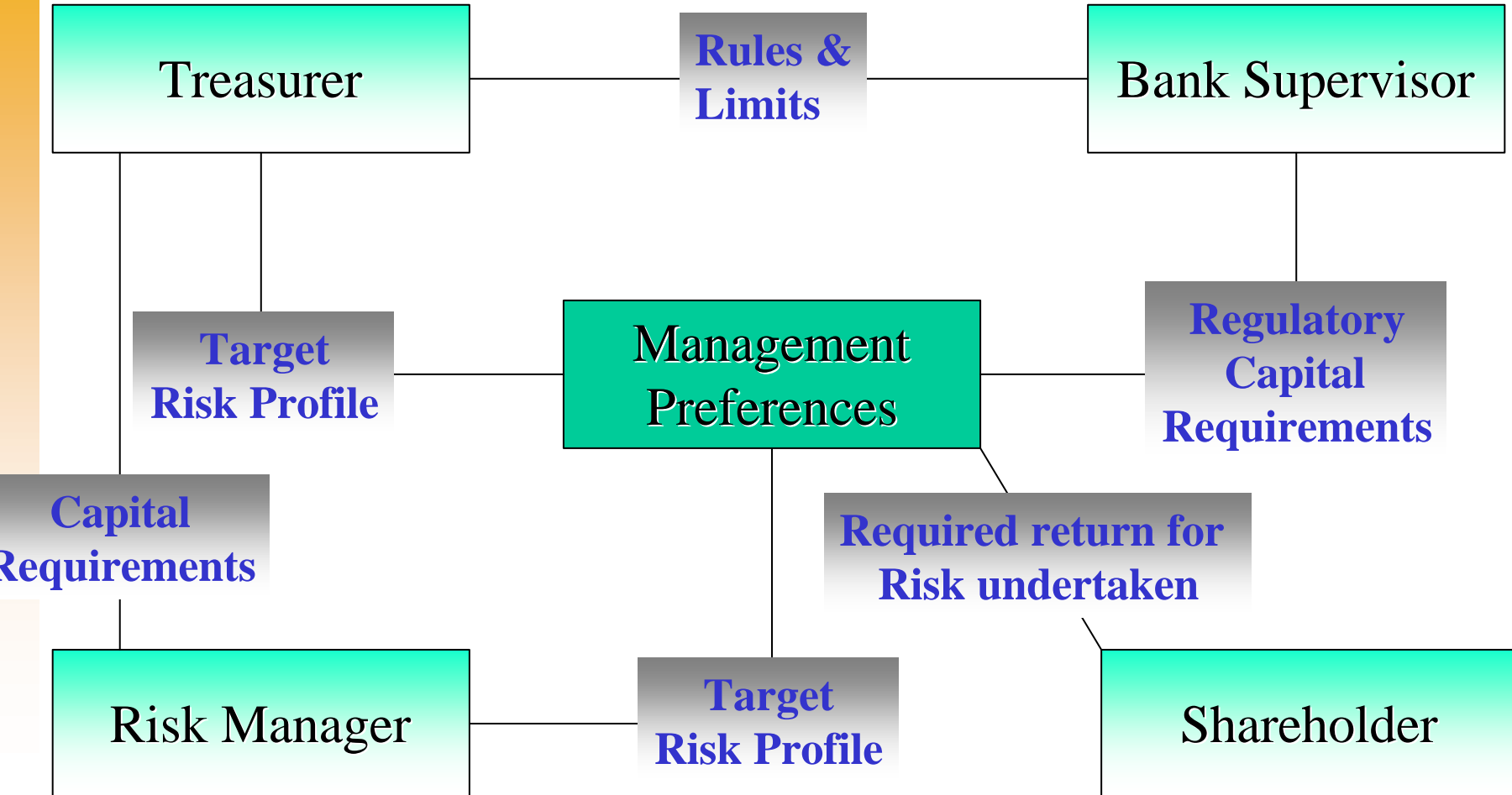
- ✗ No really correct answer as to which is better
- ✗ Best approach a synthesis of the two approaches
  - E@R as a generic tool to allocate capital to business units
  - V@R for understanding the volatility within individual divisions



# RAROC/RORAC - A Comparison

<u>Asset-Volatility</u>	<u>Earnings-Volatility</u>
Intuitive	Not intuitive
Can be used in pricing tools	Cannot be used for pricing
Forward looking	Backward looking
Provides levers for control	Provides no such levers
Requires explicit modelling of all risks	Covers all business risks
Heavy reliance on statistics	Little statistical appreciation
Expensive to build and run	Inexpensive, easy to calculate
Questionable aggregation of heterogeneous risks	Directly linked to shareholders' perspective of risk

# The Four Perspectives Of Capital



# Bringing It All Together

- ✎ Assess the overall risk appetite
  - Take a decision as to the risk profile
- ✎ Allocate capital targets
  - Use an admixture of top-down and bottom-up
- ✎ Optimise available capital
- ✎ Measure capital usage and returns

# Analysis Of A Bank's Balance Sheet

Suresh Sankaran