



SOCIETY OF ACTUARIES

ALM Seminar
June 12-13, 2008

Integrating Economic Capital and ALM

Gary Hatfield
Hubert Mueller

Moderator
Charles Gilbert

Integrating Economic Capital and ALM

ALM Seminar

Toronto, 2008

Gary Hatfield, Securian Financial Group

Agenda

- ALM
- Economic Capital
- Interaction of EC and ALM
- Issues and Challenges
- Conclusions

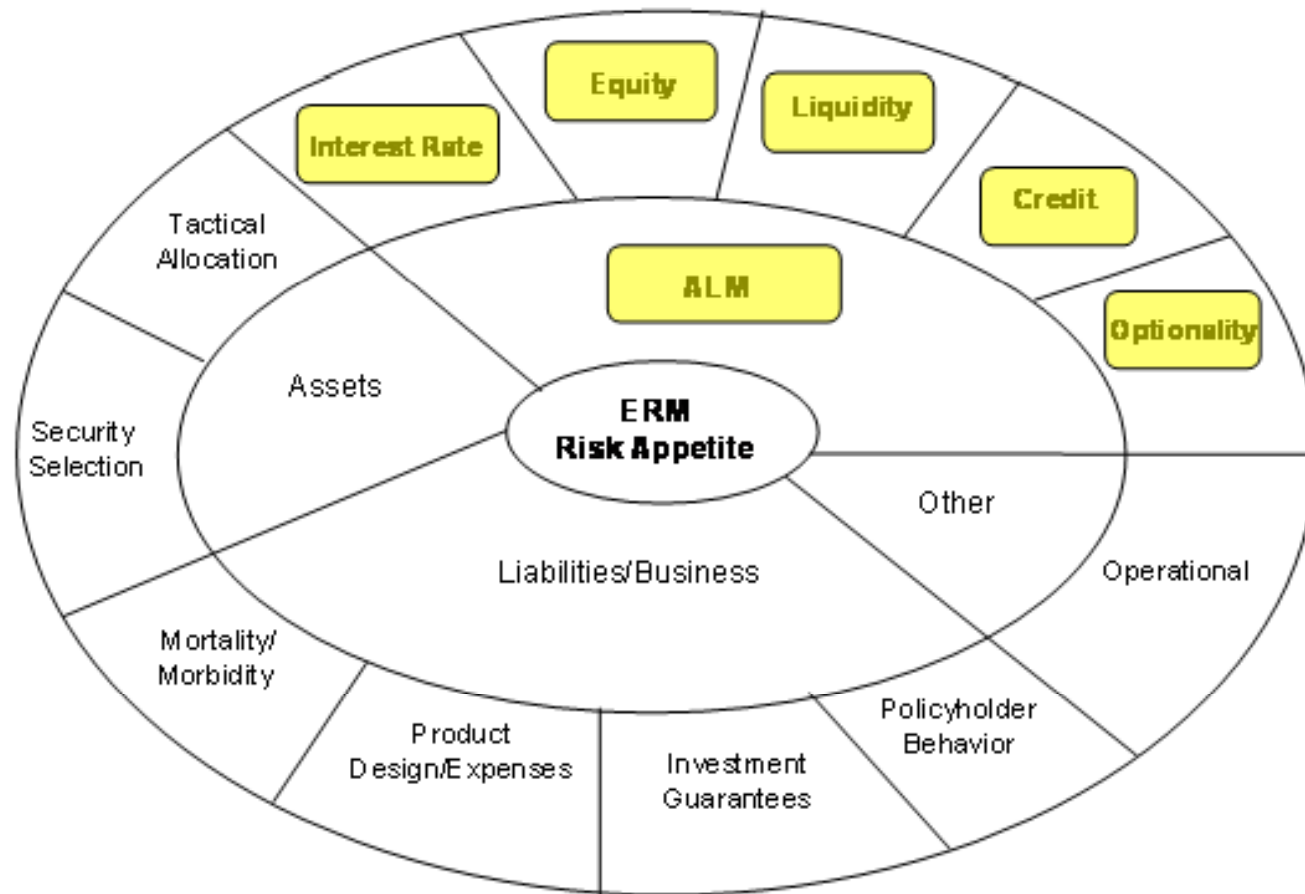
ALM

- Asset Liability Management evolving
- Traditional paradigm
 - M = “matching”
 - ALM means targeting durations and possibly convexities –
 - focus on interest rate risk
 - Risk mitigation is purpose
 - “Risk” = *reported* earnings volatility

ALM

- New Paradigm
 - M = “managing”
 - Risk optimization is purpose
 - Risks viewed in ERM context
 - Scope is wide
 - Interest rates, Credit, Equity, Optionality, Liquidity
 - “Risk” = uncertainty around economic value

Enterprise Risk Management (ERM)



Economic Capital

- Economic Capital (EC) a hot topic for insurers
- Most companies implementing some kind of EC model
- Generically, EC is the amount of assets to hold above your liabilities so that you have a high probability of remaining solvent over a given horizon

EC

- The key choices are in the details
 - What horizon?
 - What probability?
 - What does solvent mean?
- No clear standard, but typical answers are
 - One year
 - 99.97% for AA company
 - Market Value of Assets > Market Value of Liabilities

EC

- Key considerations
 - What will the EC calculation be used for?
 - Is it just something trendy to do that can bragged about to rating agencies
 - Or will it actually be used to drive decision making?

EC

- Uses of EC
 1. Inform management of how much capital the firm ought to have
 2. Informs management of which risks/BU's are demanding the most EC
 3. Provides a method for risk adjusted performance evaluations (RORAC)
 4. May inform management of diversification opportunities

EC and ALM

- Clearly, ALM risks are important components of the EC
- Credit risk, for example, may be the largest single contributor to the companies total EC
- Conversely, ALM decision can be made to either reduce or increase the EC of the firm

EC and ALM

- Example:
 - MVA = \$100
 - MVL = \$70
 - EC is calculated to be \$20
 - But rating agencies and/or regulator require that \$100 of assets are held (so, no dividend)
 - \$10 of capital is “stranded”
 - Response: ALM Group increases amount of credit risk targeted and/or widens tolerances around active management

Issue and Challenges

- Organizational issues
 - Specific committee dedicated to ALM existed long before development of EC.
 - Committee may not even receive EC report (which goes to ERM committee) or may not care
 - Management Incentives may not relate to EC, which makes it unlikely for EC to inform decision making (ALM or otherwise)
- => Effort needs to be made to get alignment between EC based metrics and the goals of ALM function

Issues and Challenges

- Articulating risk appetite
 - Need to understand risk appetite in order to determine EC
 - ALM decision making requires an understanding of risk appetite
 - But, it can be difficult to get Senior Management to articulate risk appetite in a quantified manner
 - A well articulated risk appetite can guide both the EC implementation and the ALM decision making

Issues and Challenges

- The chicken and the egg
 - Difficult to get buy-in for linking EC to compensation until there is a good understanding of what drives EC
 - Difficult to get that understanding until it's been in use for a while and people are paying attention to it
 - Difficult to get anyone to pay attention to EC if it is not part of compensation
- => Iterative process where change management is an important consideration

Issues and Challenges

- Is EC the right risk measure for ALM?
 - EC is driven by tail events (1/2000)
 - ALM may be more concerned with “normal” risks (1 in 10)
 - ⇒ EC is just one input for ALM decision making
 - ⇒ Use information on the shape of the distribution

Issues and Challenges

- Consistency –
 - If ALM is done on an market/economic basis, but EC is based on book/accounting values, then it is difficult to use EC to inform ALM decision making
 - Similarly, if ALM primarily focuses on reported earnings volatility, then ALM practices may have little or no relevance to market based EC

Issues and Challenges

- Defining EC for ALM risks can be problematic
 - What does 1/2000 mean?
 - Typical argument:
 - Historically, the one year default probability for AA rated company is 1/2000
 - Since the insurer desires to be AA rated, the firm need to hold EC to protect itself with a 99.95% probability

Issues and Challenges

- But
 - Economic insolvency \neq default
 - What does a 1/2000 year credit cycle look like?
 - Truth is, no one knows what the tail looks like for most market risks
 - Mandelbrot's "Misbehavior of Markets" , Taleb's "The Black Swan", Rebonato's "Plight of the Fortune Teller"
 - A more honest statement might be:
 - Assuming that market conditions are consistent with what we have seen over the last 30 years or so, the probability of insolvency is 1/2000
 - i.e. We are protected against a tail event **provided we don't really get a tail event**
- => Scenario based stress tests

Issues and Challenges

- What about assets backing EC?
 - What should the targeted durations be?
 - How much credit risk is appropriate?
 - How much liquidity risk is appropriate?
- What about future business?
 - Clearly, a portion of firm value is related to future sales
 - To what extent should the risks and value of this be considered for EC and ALM?

Conclusions

- ALM has evolved from a narrow focus on mitigating interest rate risk to a broader, enterprise wide optimization focus
- EC is a key component to exercising this ERM oriented ALM approach
- There remain a number of issue and challenges - some technical, some organizational
- For many of the issues, a consensus view has yet to emerge



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Asset Liability Management ("ALM") Seminar

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Hubert Mueller
Principal

Overview

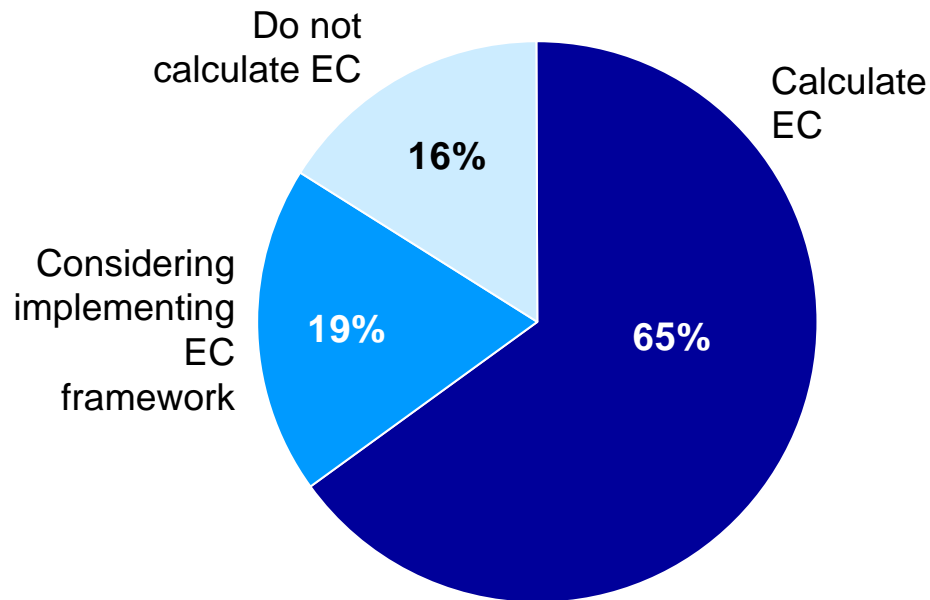
- Recent Market Trends
- Calculating Economic Capital (“EC”) using Stress Testing
- Link to Market-Consistent Financial Reporting

Recent Market Trends



The importance of an EC analysis within an active risk management framework has increased substantially over the past several years, although life insurers have been slower to institute EC frameworks

Prevalence of EC Calculation Globally



Prevalence of EC Calculation by Type of Insurers

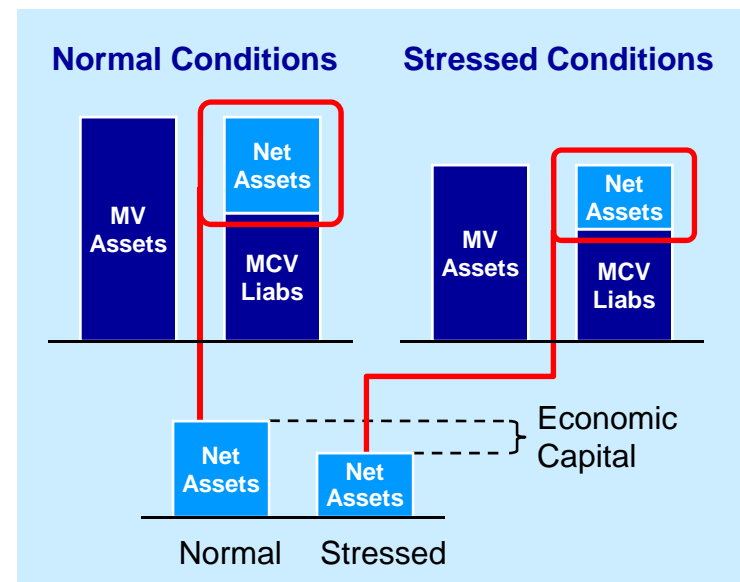


Source: Tillinghast 2006 ERM Survey.

Market-consistent balance sheet approach is becoming most common method to calculate EC

Economic Capital is...

- Measured as the difference in “market-consistent net assets” between normal conditions and stressed conditions
 - A set of stress tests is applied for each risk, calibrated to a probability level over a one-year time horizon, consistent with the company’s financial strength rating
- Separate stresses are applied to cover a variety of market, credit and insurance risks that might occur over the projected one-year time horizon
- Using a set of market-consistent scenarios
- Results are aggregated using a correlation matrix

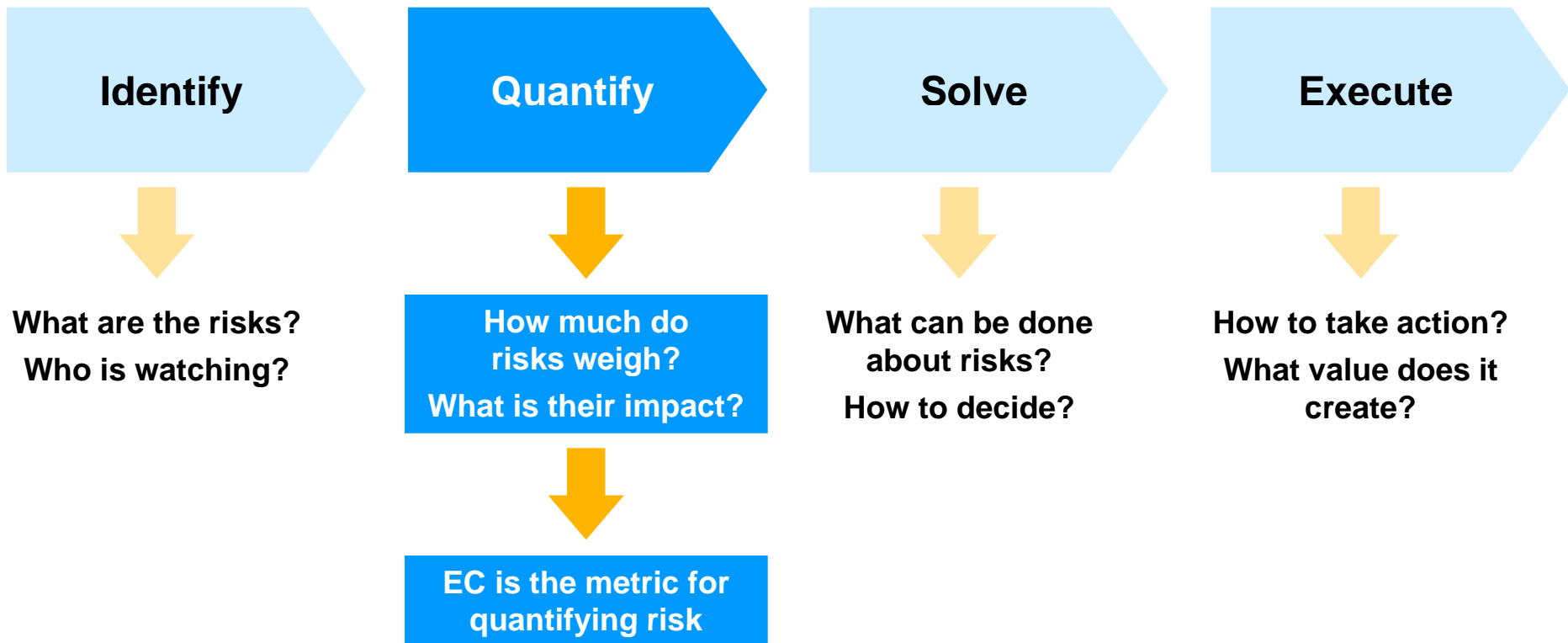


Commonly used in Europe, increasingly used among life insurers in North America

Why EC now?

- Multinational companies and large domestic companies have adopted EC following adoption of European solvency regulations in selected markets requiring use of EC
 - Expected adoption of Solvency II in 2011 (2012) is having global impact, particularly with the subsidiaries of multinationals in North America
 - A suggested approach for minimum regulatory capital in Solvency II model is to use the 99.5 percentile, with a one-year observation period
- EC has proven to be effective in quantifying risk in an ERM framework and measuring appropriate capital needs, and is being used by more and more companies
 - SOA is undertaking a market study on EC (conducted by Tillinghast)
- Because it has proven effective, more insurance companies globally are implementing and considering implementing EC:
 - Rating agencies agree and are starting to incorporate EC models into their view of insurance companies' capital adequacy
 - Regulatory developments in Europe (Solvency II) and North America (Principles-based Regulation) further encourage companies to develop EC models now
 - EC is the common approach for defining required capital in a market-consistent embedded value ("MCEV") framework
 - Peer pressure from competitors is prompting companies to act now

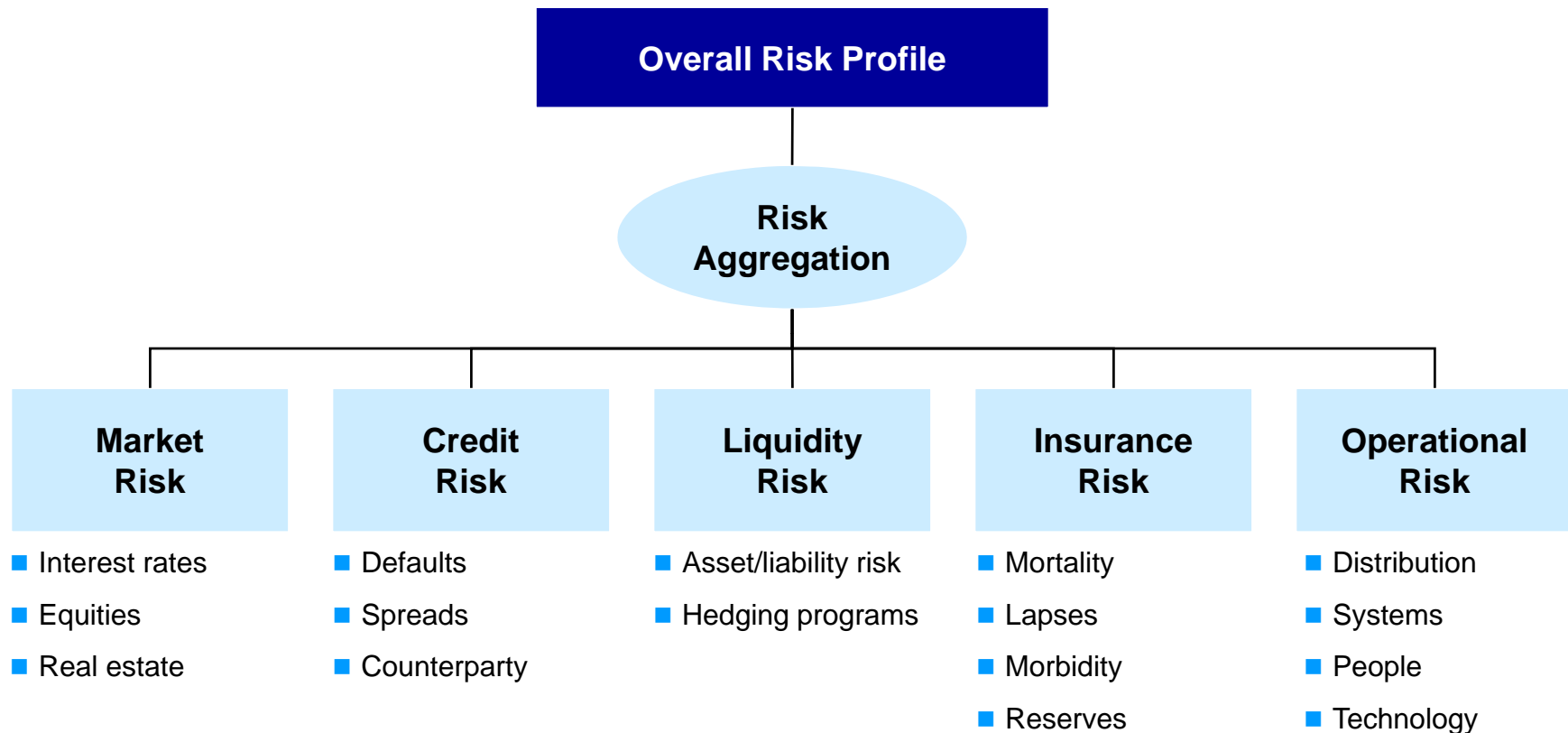
EC is a key metric for quantifying risk in an ERM framework



Insurance companies and regulators use a range of different confidence levels

- Most European insurers are using one-year confidence levels ranging from 99.5% to 99.99%
- European regulators and CRO Forum are advocating a one-year 99.5% confidence level for minimum regulatory capital under Solvency II
- Confidence levels are typically linked to a target risk appetite and financial strength rating
 - Typically, “AA” rated companies using confidence levels of 99.93% to 99.95%
- Rating agencies are evaluating tail risk like bond default risk, using CTE or percentile criteria
 - S&P is using a five-year observation period: AA is at 99.7%
- Where longer time horizons are used, a lower multi-year confidence level can be justified (e.g., AA over five years vs. AA over one year)

The calculation of EC should include all material risks



When building an EC model, six key decisions need to be made

Decision 1: Period for Assessment	Decision 2: Definition of Capital	Decision 3: Measure of Risk	Decision 4: Risks to Include	Decision 5: Quantification Methodology	Decision 6: Aggregation
One year	Statutory	Risk of ruin	Market	Stochastic Modeling	Additive
n years	GAAP	VAR	Credit	Stress Testing	Variance/ Covariance
Run-off of portfolio	Economic	TVaR or CTE	Insurance	Factor-based	Stochastic
			Operational		
			Liquidity		

The approach taken should reflect the nature of the company and management's objectives

CRO Forum recommendations regarding EC time horizon

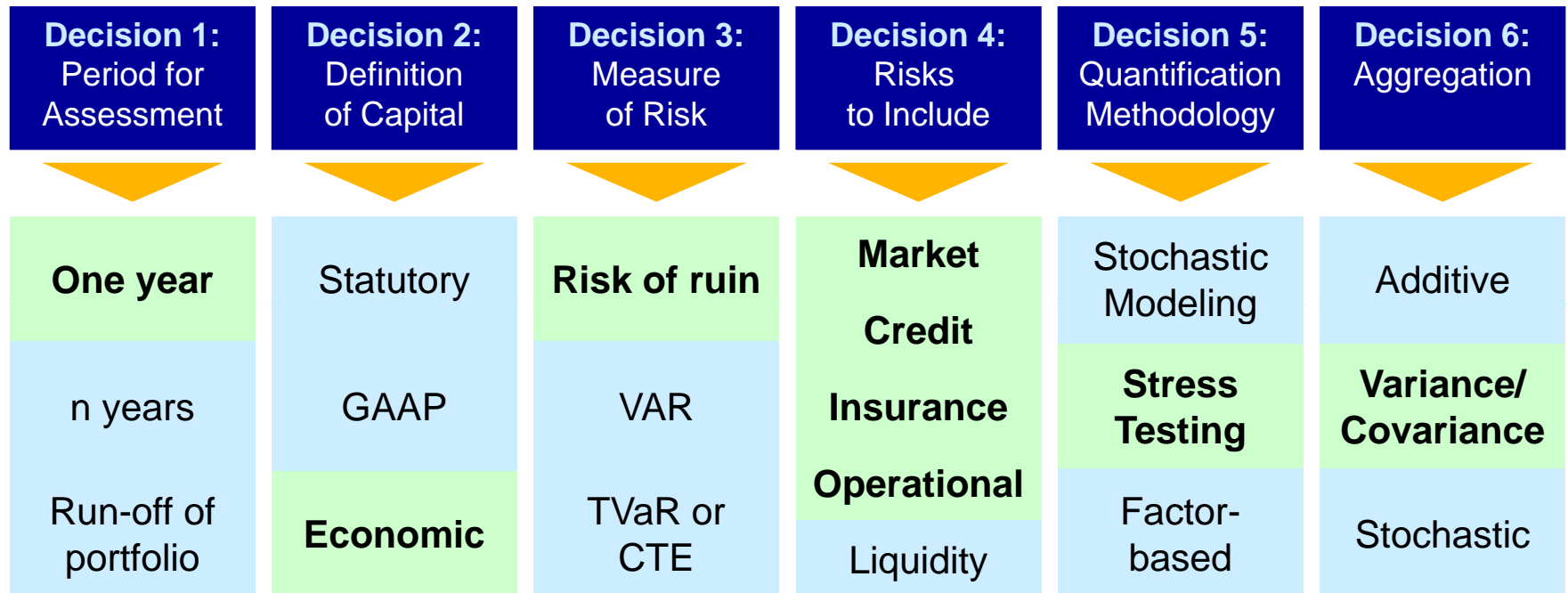
- “ There is a trade off between choosing a long time horizon (where portfolio characteristics far out from the valuation date can be brought into consideration in a more satisfactory way) and choosing a short time horizon (based on funding changes in market-consistent liability values over a one year time horizon).
- Market consistent liability valuations already take into account the lifetime of the business and associated risks. The traditional actuarial approach to risk modeling (i.e. choosing a long time horizon) comes at a cost – that of lower confidence in the calibration of parameters that far out into the future.
- The CRO Forum does not advocate one time horizon over another but rather believes that it should be appropriate to the business model and also the period of time over which management can deploy risk management strategies that can significantly impact the risk profile of the firm. Often running a model on more than one time horizon provides useful insight that is important for shaping enduring risk management or risk mitigation strategies.
- Nevertheless, the length of the period covering the worst-case loss should be longer than the risk measurement cycle of the company as measurement and decisions take time.
- Since the CRO Forum supports market consistent models, for external capital adequacy assessment purposes, our preferred time horizon for losses is generally one year and assumes a quarterly risk management cycle.”

Source: CRO Forum, Response to A.M.Best “Draft: Risk Management and the Rating Process for Insurance Companies”; April 6, 2007

Calculating EC Using Stress Testing

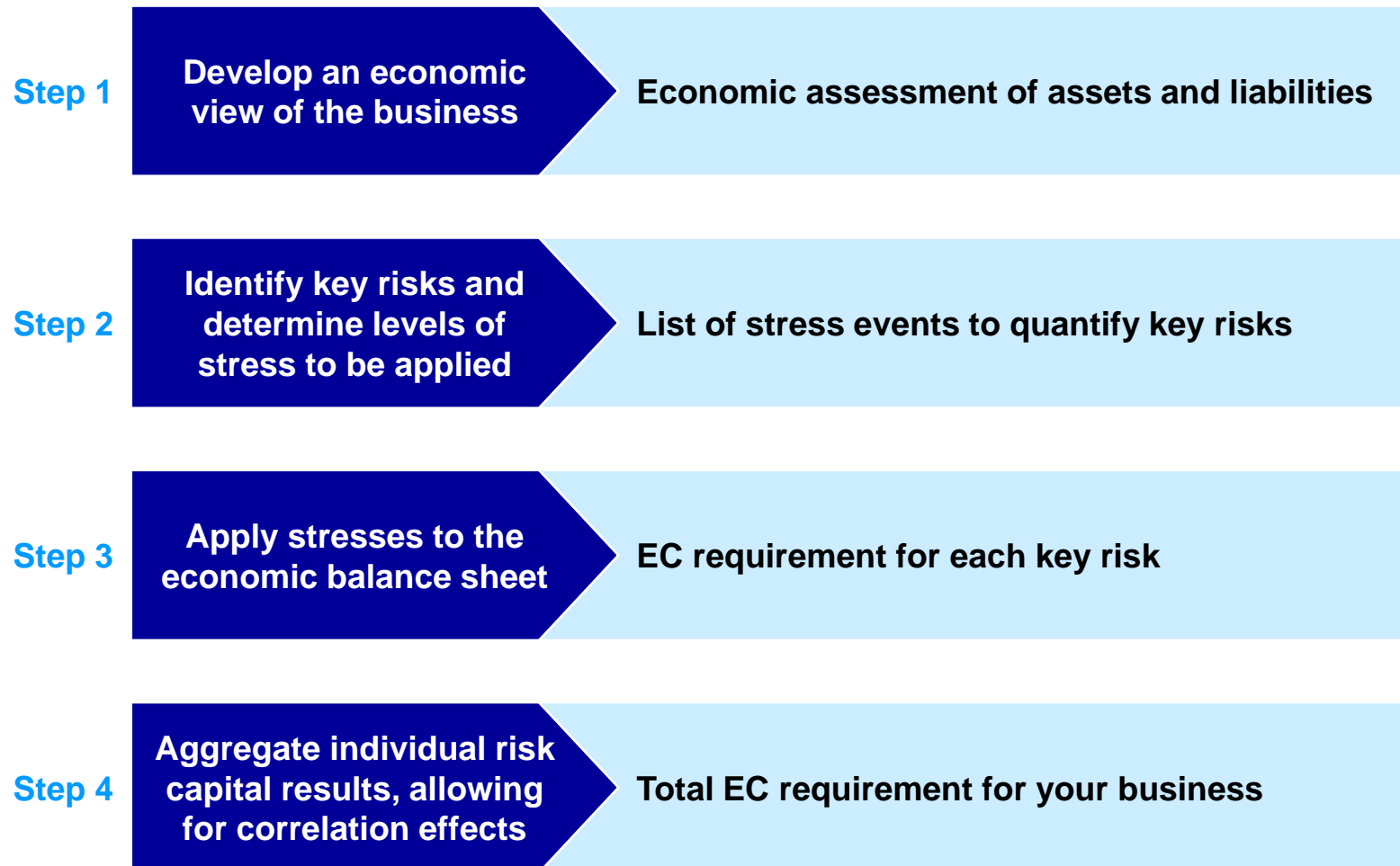


Towers Perrin's FastTrack EC approach follows a well researched and thoroughly tested path



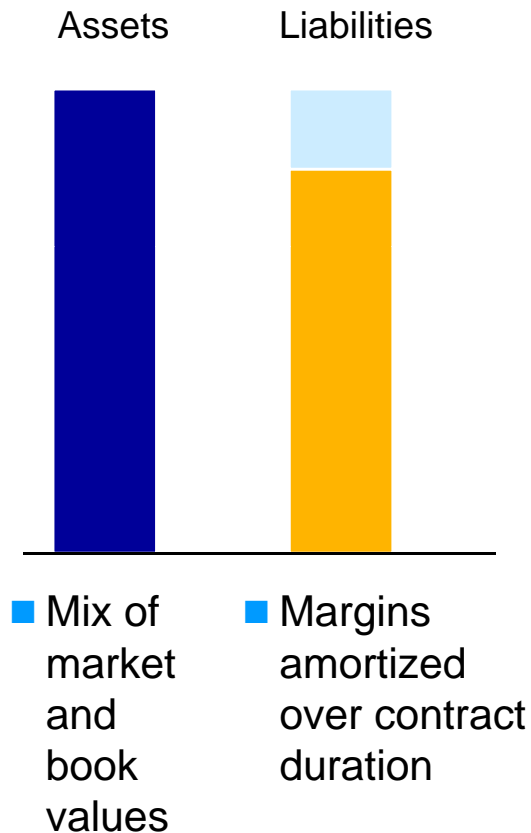
Implemented by a majority of multinational insurers, a growing number of North American companies, and adopted/proposed for: UK ICA regime, Swiss Solvency Test, EU Solvency II

*Calculating EC via stress testing:
Four stages to implementing the FastTrack EC approach*

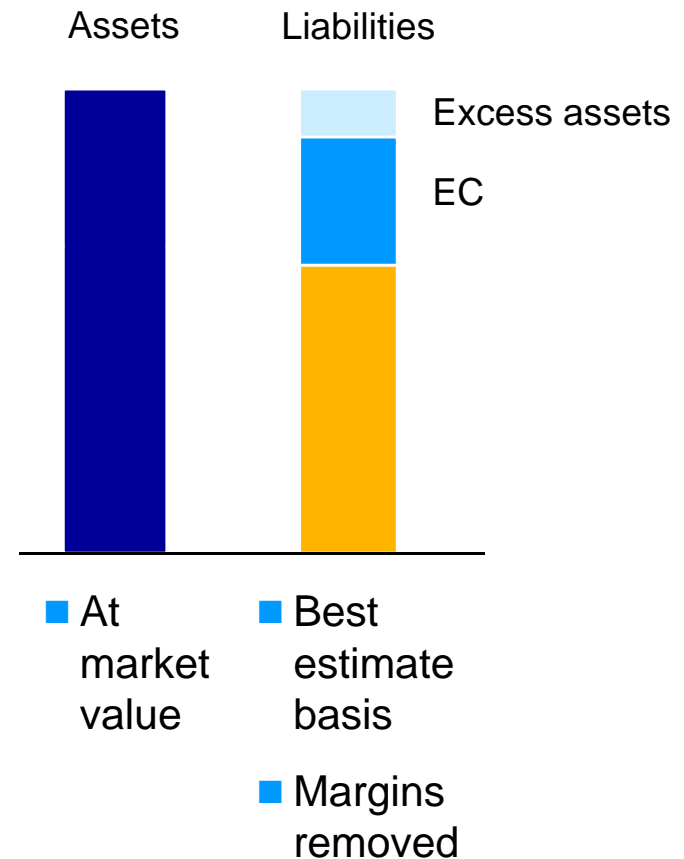


Step 1: Develop an Economic View of the Business
An "economic" view of the business is essential to the derivation of EC requirements

SAP/GAAP Balance Sheet



Economic Balance Sheet



Step 2: Stress Testing

Typical stress tests for FastTrack EC calculations

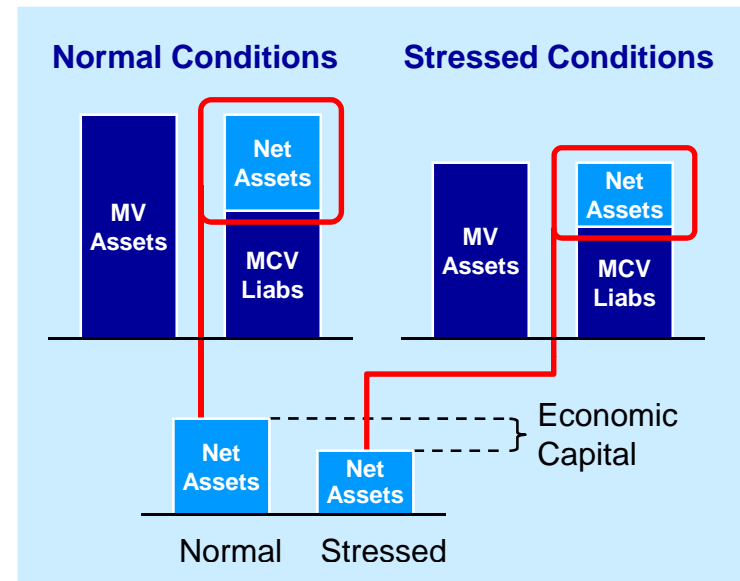
Testing for Parameter, Trend, Catastrophe and Volatility Risks:

- Insurance risk
 - Lapses
 - Mortality
 - Morbidity
- Interest rate risk
 - Up and down shifts of the yield curve
 - Tilt of the yield curve
 - Twist of the yield curve
- Equity market risk
 - Drop in equity market values
 - Increase in market volatility
- Credit risk
 - Tightening/widening of credit spreads
 - Default risk
 - Counterparty risk
- Operational risk
 - Often a percentage of total EC for financial risk (Basel II), or standalone stress
 - “System Dynamics” approach is increasingly used for simulations

Step 3: Apply Stresses to the Economic Balance Sheet

The EC required for each risk is derived by applying the corresponding stress test(s) to the economic balance sheet

- The impact of each stress test is assessed on the economic value of both assets and liabilities
- The EC requirement for the underlying risk is determined by the change in “economic net assets” as a result of the stress
- Using risk-neutral scenarios, calibrated to current market
- Calibration of stresses typically based on a one-year-time horizon



Step 4: Aggregate Individual Risk Capital Results
Capital requirements for each risk are aggregated formulaically, using a matrix of correlation factors

- Aggregate capital = $\sqrt{\sum_i \sum_j \rho_{ij} C_i C_j}$
- Where C_i is the capital required for the i th risk at the required confidence level and ρ_{ij} is the correlation coefficient between i th and j th risk
- Correlation factors are based on historical data analysis, combined with expert judgment (illustrative figures):

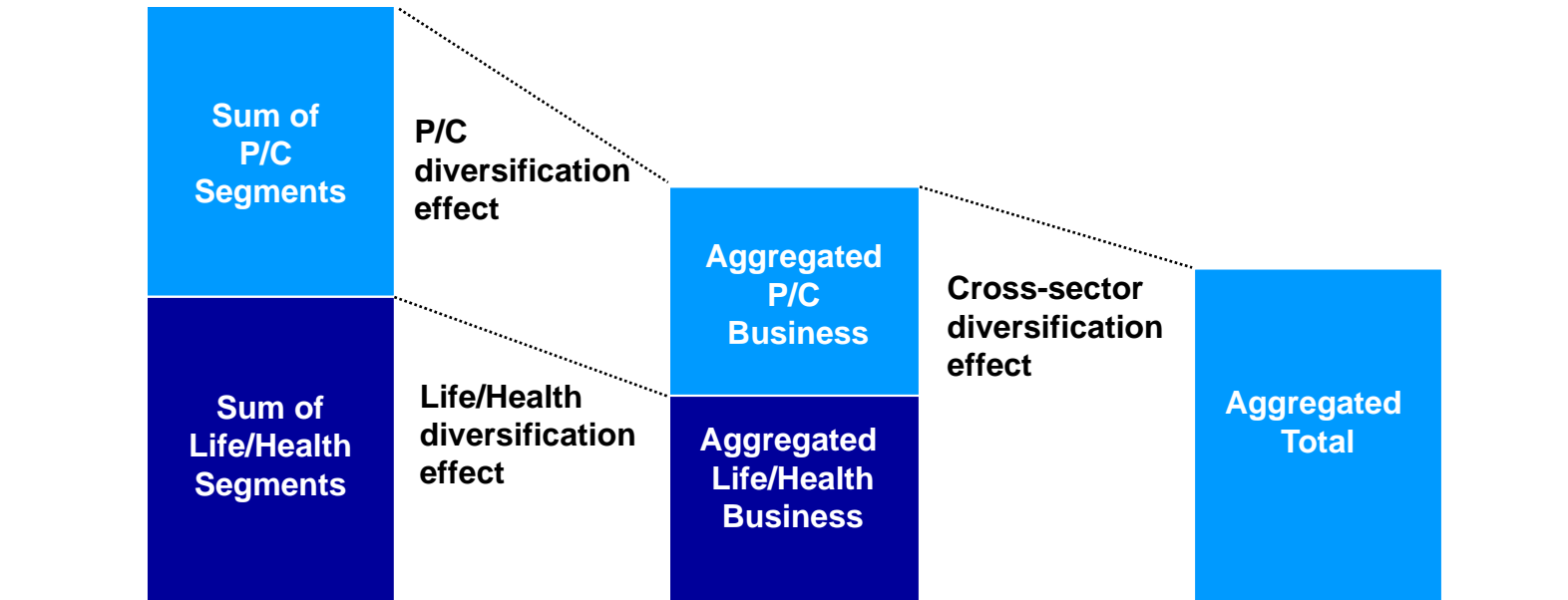
	Market	Credit	Insurance	Operational
Market risk	100%	50%	10%	25%
Credit risk		100%	10%	25%
Insurance risk			100%	10%
Operational risk				100%

- Choice of correlation factors should be weighted towards the higher correlations that typically arise in more extreme scenarios
 - Use of copulas becoming increasingly common
 - Multinationals are often basing correlation on the 2005 CRO Forum Paper on Diversification

By combining models, insurance companies are able to measure diversification benefits

Enterprise Diversification Benefit

Economic Capital



Sample EC Results: Market and credit risk typically dominate

EC — Concentrated



EC — Diversified



Source: Tillinghast Client Studies.

Link to Market-Consistent Financial Reporting



Adding value from EC

- Increased focus on allocation of capital for performance management purposes
 - EC as required capital for EEV/MCEV calculations
 - Use of EC as a metric for short-term/long-term incentive plans
- Use of EC for business planning/investment allocations
 - Principles-based capital is using a real-world run-off model
 - Once EC is calculated, free surplus is often used as the limit for alternative investments
- Use of EC in pricing
 - Principles-based regulation requires projection of EC at annual intervals
 - In practice, factor-based shortcuts are still predominant
- EC is seen as a key component of ERM framework
 - Increasing scrutiny by regulators/rating agencies
- Leveraging the results from SOA Industry Study on EC
 - Link with international developments on Fair Value/Solvency II

Leading-edge companies are leveraging EC to connect risk and value

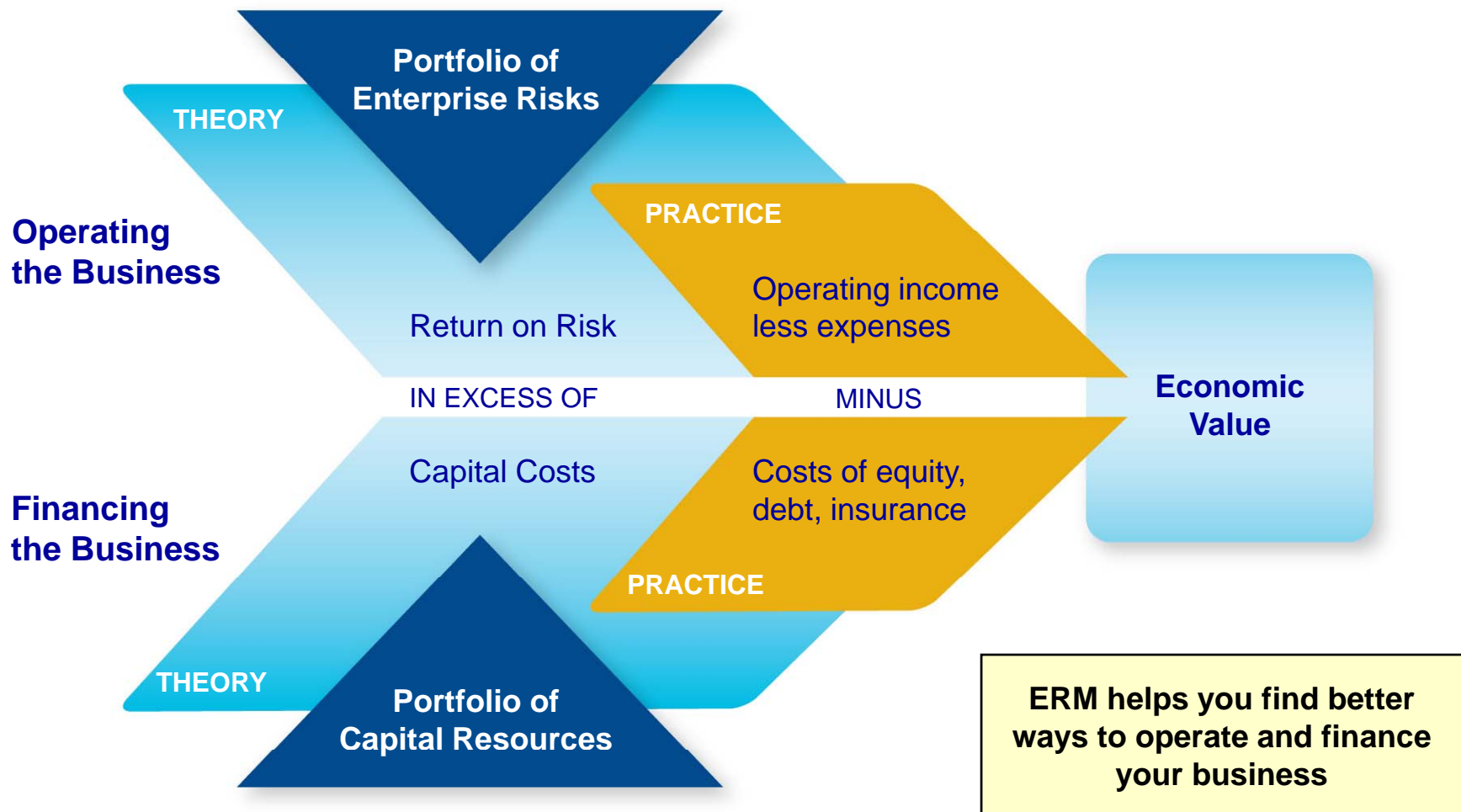
Example: AIG's Applications of EC

- Optimization of Capital Structure – Hybrid Issuances & Share Repurchases
- Assessment of alternative risk retention and reinsurance strategies for exposures to U.S. natural catastrophes
- Assessment of the economic costs/benefits of purchasing index-based excess of loss credit protection for portfolio of reinsurance recoverables
- Evaluation of alternative asset allocation strategies taking account of regulatory constraints and economic considerations for our life insurance businesses operating in low-yield environments
- Facilitation of active capital management processes for the life insurance segments by incorporating economic capital analysis for potential transactions
- Assessment of capital mobility throughout the organization, developing principles and strategies to improve capital efficiency

Source: AIG Investor Relations Website; November 2007

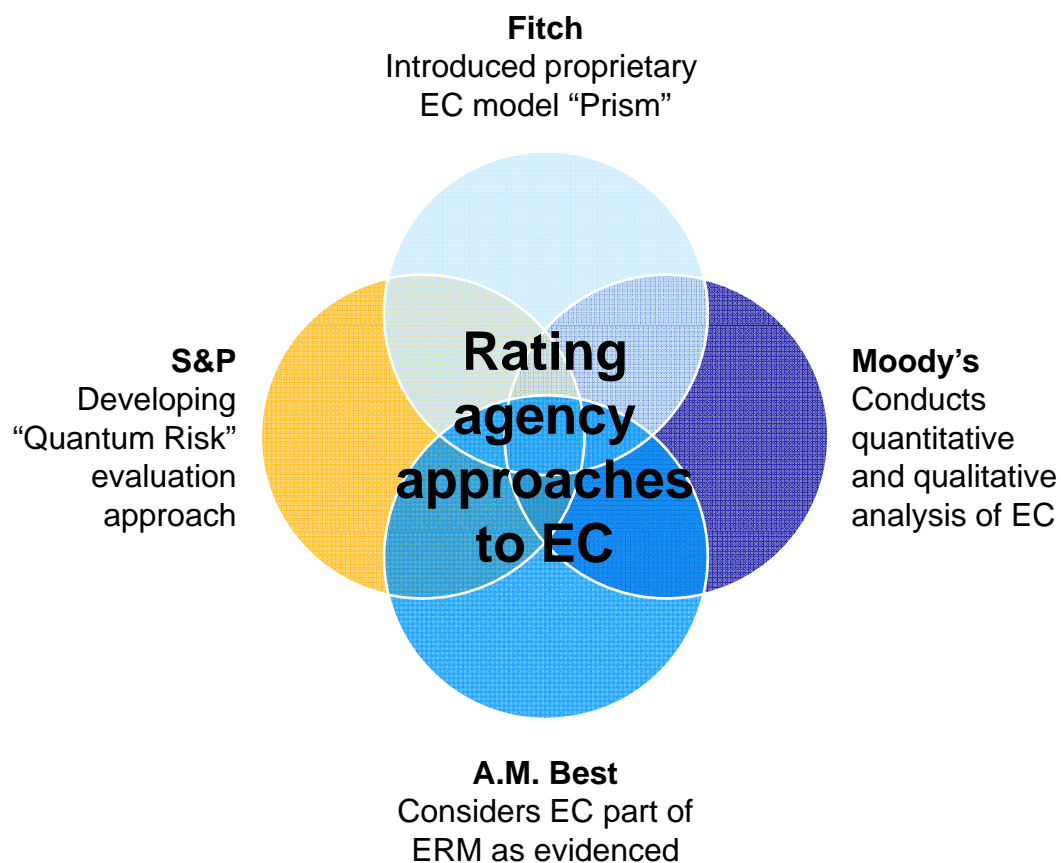
Successful companies are able to maximize value by relating a firm's decisions on the risks they take to decisions on the capital they use

Towers Perrin's ERM Risk-Value Framework



Rating agencies are increasingly considering proprietary EC models when assessing capital adequacy

- Building EC models into their rating process during ERM reviews
- Having an EC framework is a key requirement for ERM
- Expecting companies to demonstrate balance between qualitative and quantitative ERM
- Linking capital adequacy requirements directly to ratings



S&P Endorses MCEV Reporting

“We value the more meaningful information provided by [MC]EV-based measures because they more faithfully represent the underlying economics of the insurance portfolio, and enable us to dissect financial performance by new business contribution, experience deviations for all principal assumptions, and assumption changes.”

Source: S&P RatingsDirect, October 15, 2007

Summary of S&P position:

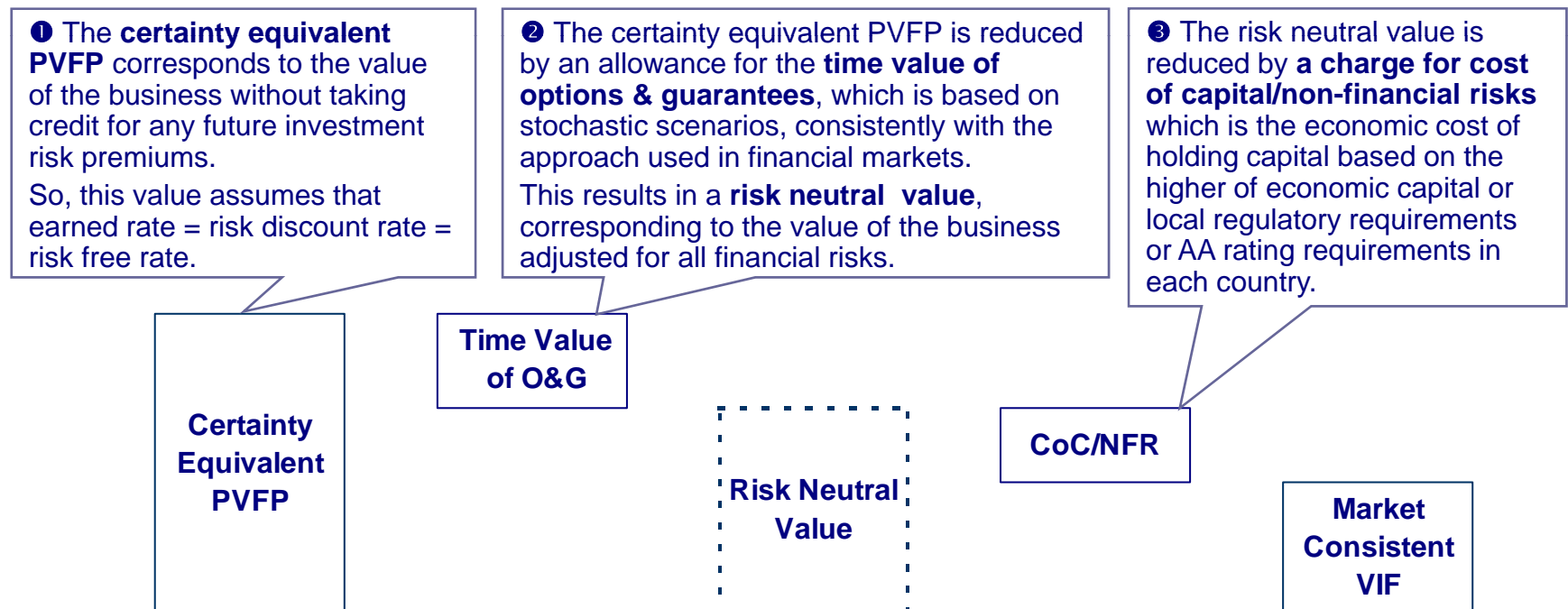
- Encourages MCEV as a global financial reporting standard
- Starting in 2008, will allow for capital relief based on internal MCEV models
- In favor of valuation via market consistent discounting plus margins
- Does not object to “day one” profits (and losses)
- Prefers going concern market consistent value rather than exit value

Disadvantages noted by S&P:

- Recognizes that fair value reporting will add to volatility, but says that volatility is a reality of the business
- Fair value will require “huge” actuarial resources, adoption of new systems, and increasing administrative costs
- Insurers are worried that accelerated recognition of profits will accelerate taxation

European Embedded Value (EEV): communicating risk adjusted values to the market

- The EEV of the life insurance business is the sum of:
 - Adjusted Net Asset Value (ANAV). This represents the tangible net assets. It is derived by aggregating the local regulatory (statutory) balance sheets of the life companies.
 - Value of inforce (VIF). This is the present value of local regulatory (statutory) profits projected over the entire future duration of existing liabilities. It includes the following 3 components:



Time value of options and guarantees

- EEV covers all material options and guarantees (O&G) embedded in life business, such as:
 - Interest rate guarantees on traditional products, such as guaranteed cash values and guaranteed annuity options (GAOs)
 - Profit sharing, such as bonus rates, credited interest rates and policyholder dividends
 - Guaranteed benefits (GMDB, GMIB) on unit-linked annuity products and no lapse guarantees on life insurance products
 - Dynamic policyholder behavior, such as full or partial surrender, annuitization and premium discontinuance
- Time Value of O&G = Risk Neutral Value – Certainty Equivalent PVFP

The risk neutral value is evaluated using stochastic models, which are run over 1,000 (or more) economic risk neutral scenarios.

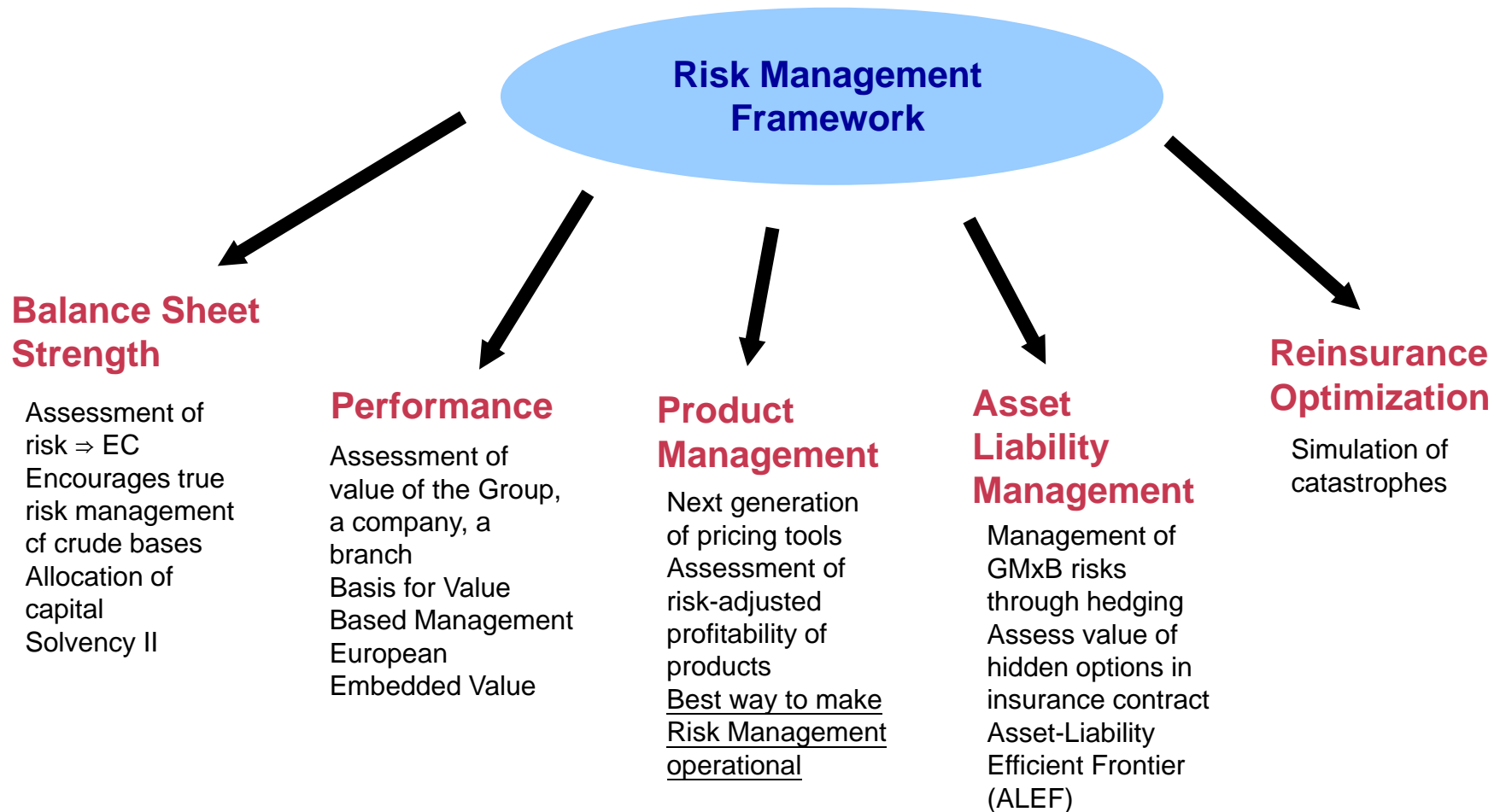
The value allows for the behavior of clients (lapses, etc.) and for some management actions (dynamic investment strategy, varying credited rate, etc.).

Evaluated by assuming that all investments earn risk free rate.

In particular, **includes the intrinsic value of O&G by reflecting the “in-the-moneyness” of the O&G at the valuation date.**

Integrated Risk and Performance framework

The objective is a consistent analytical (stochastic) framework, supporting a series of business processes



The end result is a dashboard of metrics

- Short term drivers
 - Adjusted / underlying earnings
 - Expense ratio
 - New premiums
 - Net funds flow
- Short term risk only measures
 - Economic Capital
- Short term risk and return measures
 - EEV VNB
 - Risk Adjusted Combined Ratio
 - Risk adjusted return on economic capital
- Long term risk and return measures
 - European Embedded Value (EEV)
 - MCEV

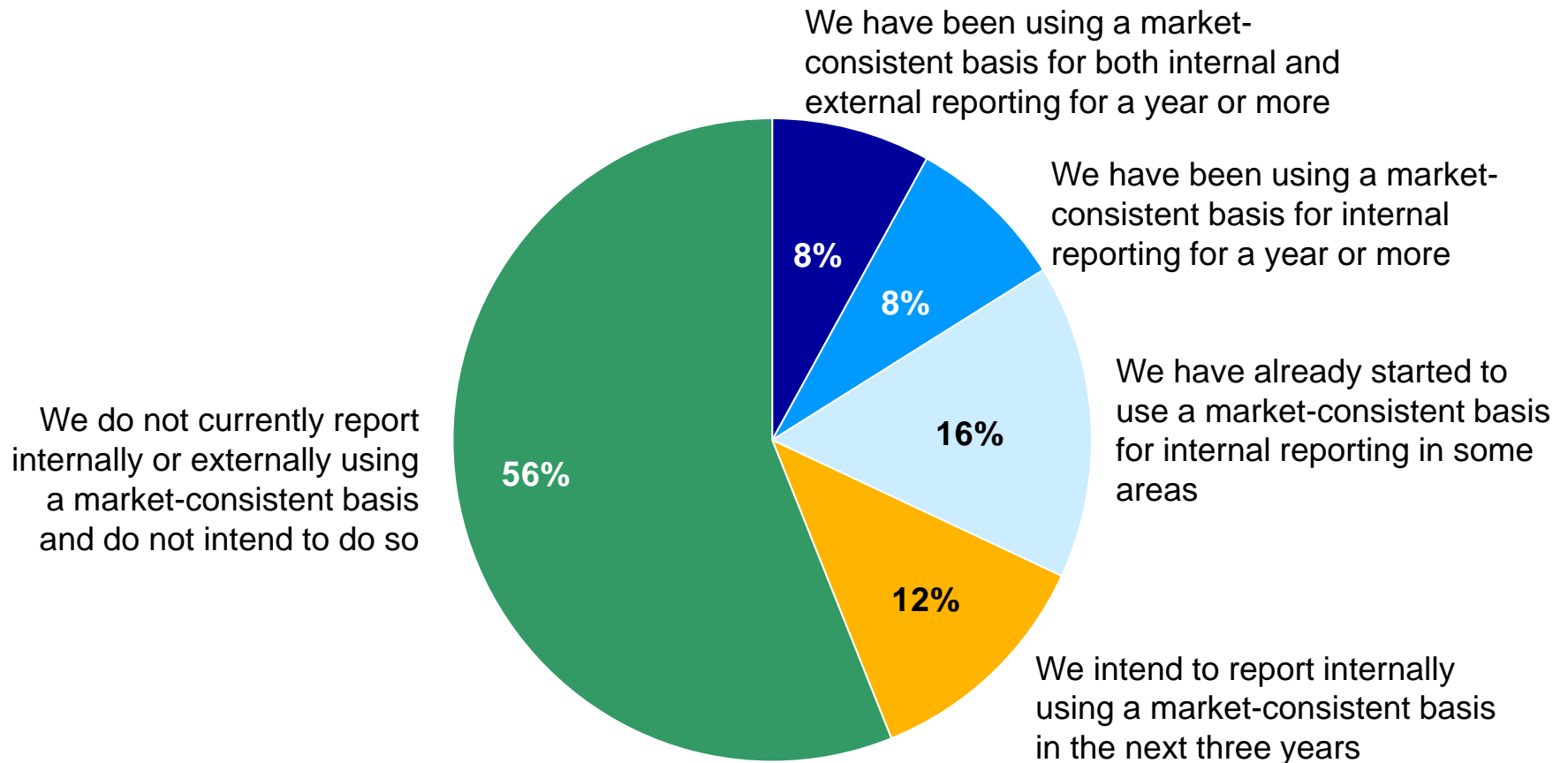
A robust platform for modeling risk is needed as the foundation:

- Almost all the major risks of the company are captured
- Both risk and return indicators can be calculated by the framework in a consistent way

The platform (ie principles, methodology and assumptions) provides a consistent basis for Value and Risk Based Management, from pricing to Management KPIs and external communication

44% of companies in our CFO Survey report internally or externally using a market-consistent basis or intend to do so in the next three years

Are you preparing financial reports on a market-consistent basis for any purpose?



Source: Tillinghast CFO Survey (NA) 2007

Contact

Hubert Mueller, FSA CERA MAAA

Principal

Towers Perrin

175 Powder Forest Drive

Weatogue, CT 06089-9658

Telephone: 1-860-843-7079

Fax: 1-860-843-7001

E-Mail: hubert.mueller@towersperrin.com

Internet: www.towersperrin.com/tillinghast