



The Actuarial Profession

making financial sense of the future

Classification of different risks

*Patrick Kelliher FIA, Institute and Faculty of Actuaries
Risk Classification Working Party*

Introduction

- Coherent risk classification is key to Enterprise Risk Management. Without it, there is scope for overlap and confusion as to which category a risk falls under and who ultimately is responsible.
- There are nearly as many classification systems as there are institutions engaged in ERM. This can complicate comparisons between institutions i.e. where the same risk is given two different titles; or the same title is given to two very different risks.
- The Risk Classification Working Party has developed a classification system for the Actuarial profession which we hope would act as a common reference point for discussion between Actuaries and hopefully remove the scope for confusion.
- As part of this work, the Working Party has sought as far as possible to break risks down into their components to identify demarcation issues.
- We would note that there is no perfect system of classification but hope a common reference point can facilitate comparison of risk frameworks, and help underpin further research into risk.

Agenda

- The multiplicity of risk classification systems in use.
- Potential problems posed by confusion over terminology.
- Broad principles underpinning the common risk classification system which we hope will address this confusion.
- The high level categories of risk in this system:
 - How each high level category is subdivided; and
 - The demarcation issues the Working Party came across in developing the system and how we sought to address these.
- Concluding remarks

A multitude of risk classification systems

PRA categories

- The UK Prudential Regulatory Authority (PRA) sets out risk management standards in its Systems and Controls handbook (SYSC). This has sections covering the following risk types:
 - Market
 - Credit
 - Insurance – including Persistency and Expense Risks
 - Liquidity
 - Operational
 - Group Risk – relating to exposures to other parts of the financial services group to which a firm belongs
- Note there is no explicit section in SYSC dealing with strategy or reputation risks (though no doubt these would be covered as part of the supervisory process).

BaFin Minimum Risk Classification

- The German regulator expects to see firms' risk frameworks covering at a minimum (see 5.2 of MaRisk VA, March 2009):
 - Market
 - Credit including Country Risk
 - Underwriting – broadly akin to the PRA's Insurance
 - Liquidity
 - Operational
 - Concentration risk – relating to concentrations of exposure to individual counterparties
 - Strategy
 - Reputation
- It is worth noting the differences in how BaFin categorise risks relative to the PRA e.g. Concentration Risk is considered separately from Credit Risk.



Lloyds Banking Group Risk Categories

- From its 31st December 2009 Report and Accounts (p63), Lloyd's Banking Group's considered the following primary risk drivers:
 - Market
 - Credit
 - Insurance – including Persistency and Expense Risks insofar as they affect Insurance business
 - Operational
 - Financial Soundness – including Liquidity Risk as well as tax, accounting and regulatory capital issues
 - Business – broadly covering strategy-related risks



Prudential (UK) Risk Categories

- From its 31st December 2009 Report and Accounts (p41), Prudential's Enterprise Risk Management framework considered the following broad categories:
 - Market
 - Credit
 - Insurance – including Persistency and Expense Risks
 - Liquidity Risk
 - Operational
 - Business Environment Risk – relating to exposure to forces in the external environment that could significantly change the fundamentals that drive the business's overall objectives and strategy
 - Strategy – ineffective, inefficient or inadequate senior management processes for development and implementation of business strategy

Aegon's Risk Categories

- While Market and Credit Risk high level categories are used by most companies, in a presentation to investors (November 2007), Aegon disclosed they used the following risk classification:
 - Investment and Counterparty Risk – including Equity and Counterparty Risks
 - Mismatch Risk – covering Interest Rate and Currency Risks
 - Operational Risk
 - Underwriting Risk
- Market Risk is split between the first two categories, with the Investment and Counterparty Risk category also covering Credit Risk. The driver for this categorisation may be risk appetite, with interest rate risk arising from mismatching typically regarded as “unrewarded” risk.

Confused ?

- Even at a high level, there is scope for confusion between different classification systems.
- However as one drills down to sub-categories, further confusion is possible. For instance one organisation may class failure of a project as Operational Risk, another may class it as Strategy Risk.
- Some other areas of doubt:
 - Should non-disclosure be considered as part of Insurance / Underwriting Risk or as an Operational (Fraud) Risk ?
 - Is spread widening of Corporate Bonds a Credit or a Market Risk ?
 - Is a shortage of buyers in a market a Liquidity or a Market Risk ?...as we shall see, this list is not exhaustive!

Confused ?



Does it matter ?

Does it matter ?

- I would contend that differences in terminology could inhibit discussion of and research into risk.
- Two particular areas of concern:
 - As actuaries become more involved with wider enterprise risk management, they should hopefully become more involved in non-traditional areas such as operational and strategy risks. However there are large differences in how companies classify these risks and thus greater scope for confusion.
 - Solvency II – to meet internal model and Pillar II ORSA requirements, actuaries will need to demonstrate an understanding of risks at a granular level, but as noted, the further we drill down into risk categories, the greater the scope for divergences of terminology.
- Different terminology could be a barrier to actuaries sharing knowledge in these areas.

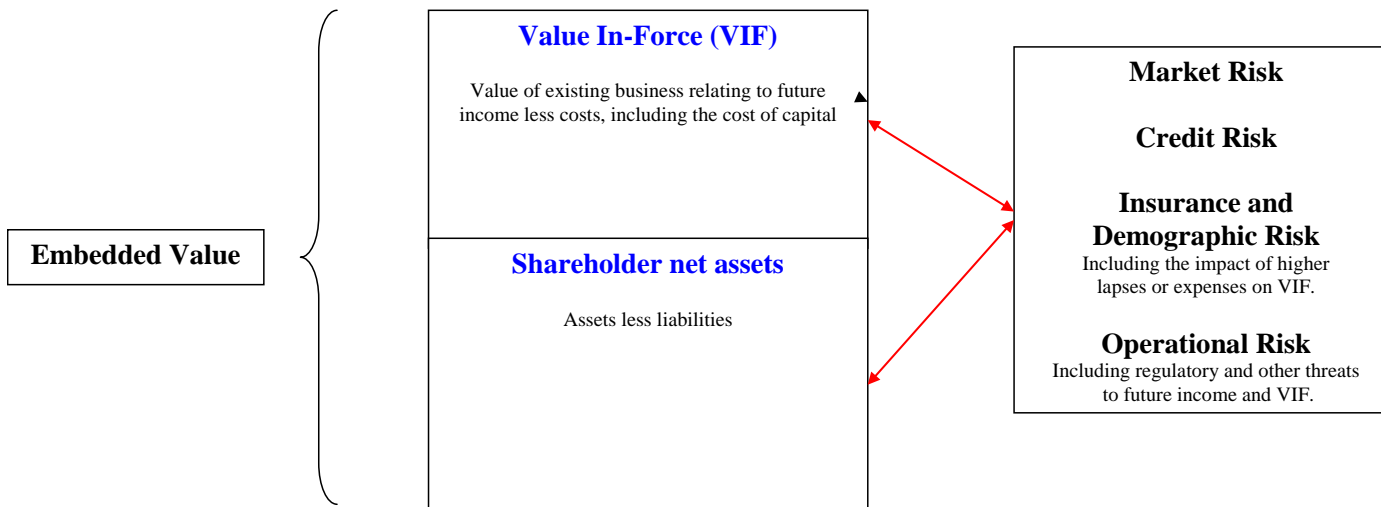
Does it matter ? – Solvency II

- To take Mortality Risk as an example, while most life insurers will have this as a category, internal models will need to consider components of this risk such as parameter estimation error and shocks to experience like changes in non-disclosure law. There are likely to be significant divergences in terminology between offices for these components, and in how they are demarcated from other risks such as Operational Risk.
- Similarly, for a Pillar II risk assessment like ORSA, we need to be able to break down risks such as Equity Risk into constituent parts and identify which parts are mitigated through controls (e.g. stock and sector risks being mitigated through diversification) and which parts require capital (general market – β – risk). Again offices will differ in how they decompose risks , the terminology employed, and the demarcation lines with other categories.

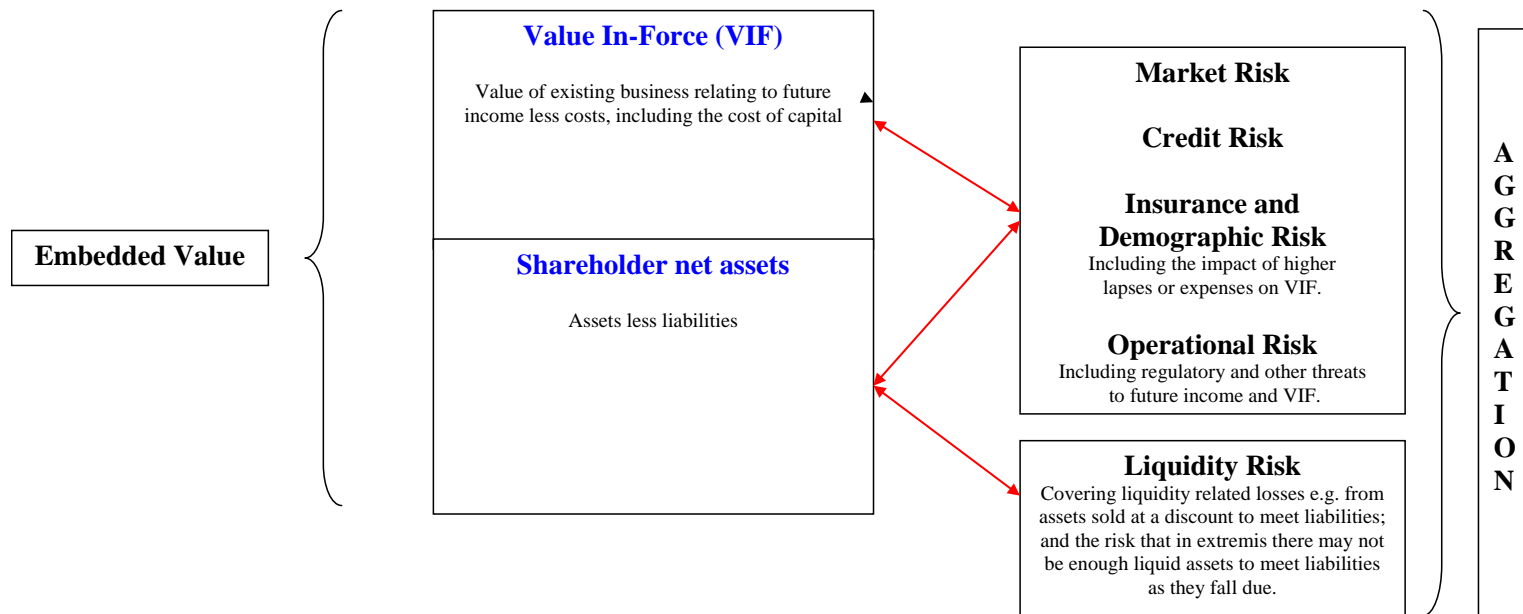
Common Risk Classification System

Broad Principles

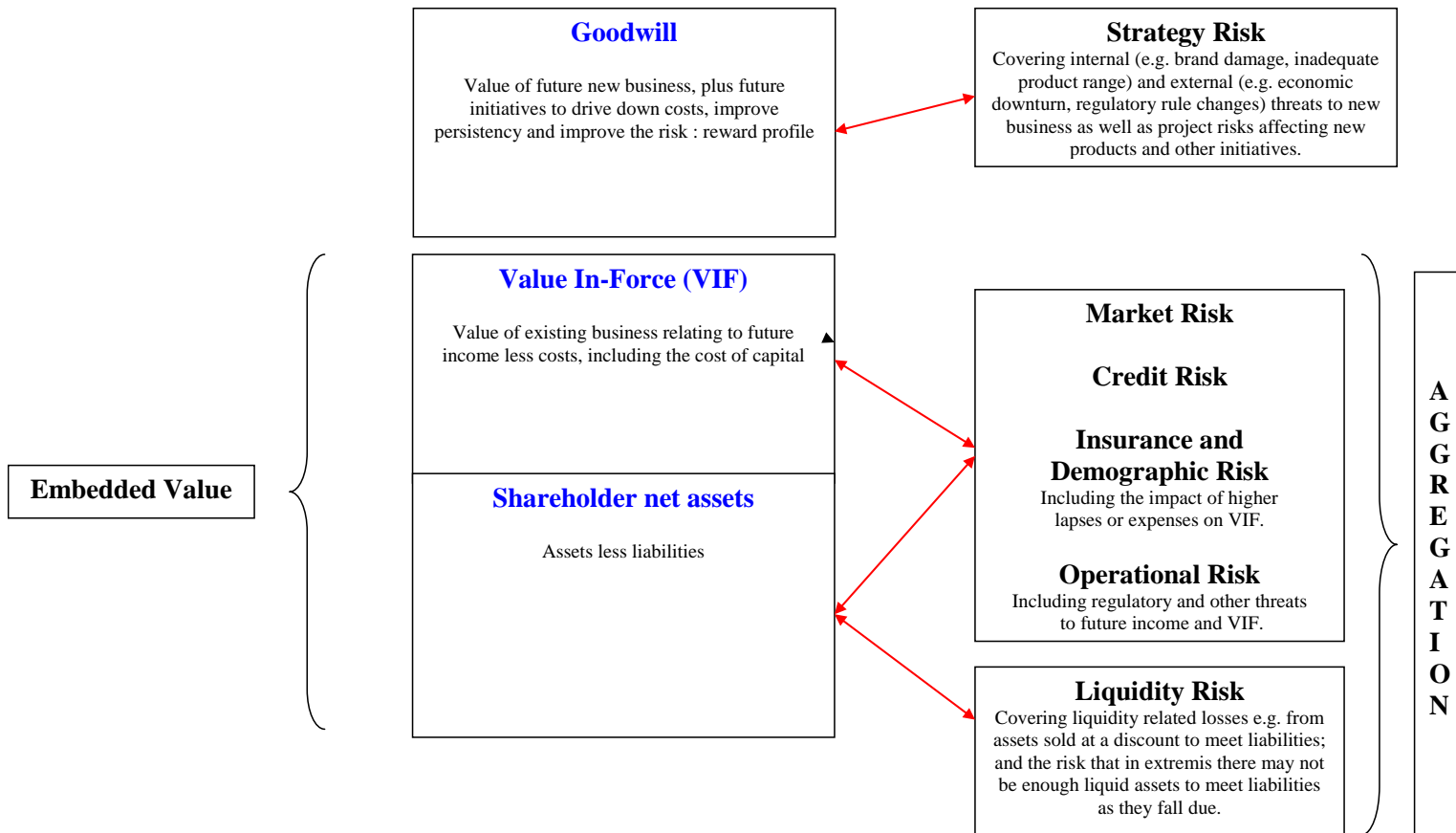
A view of the risks to a Financial Institution



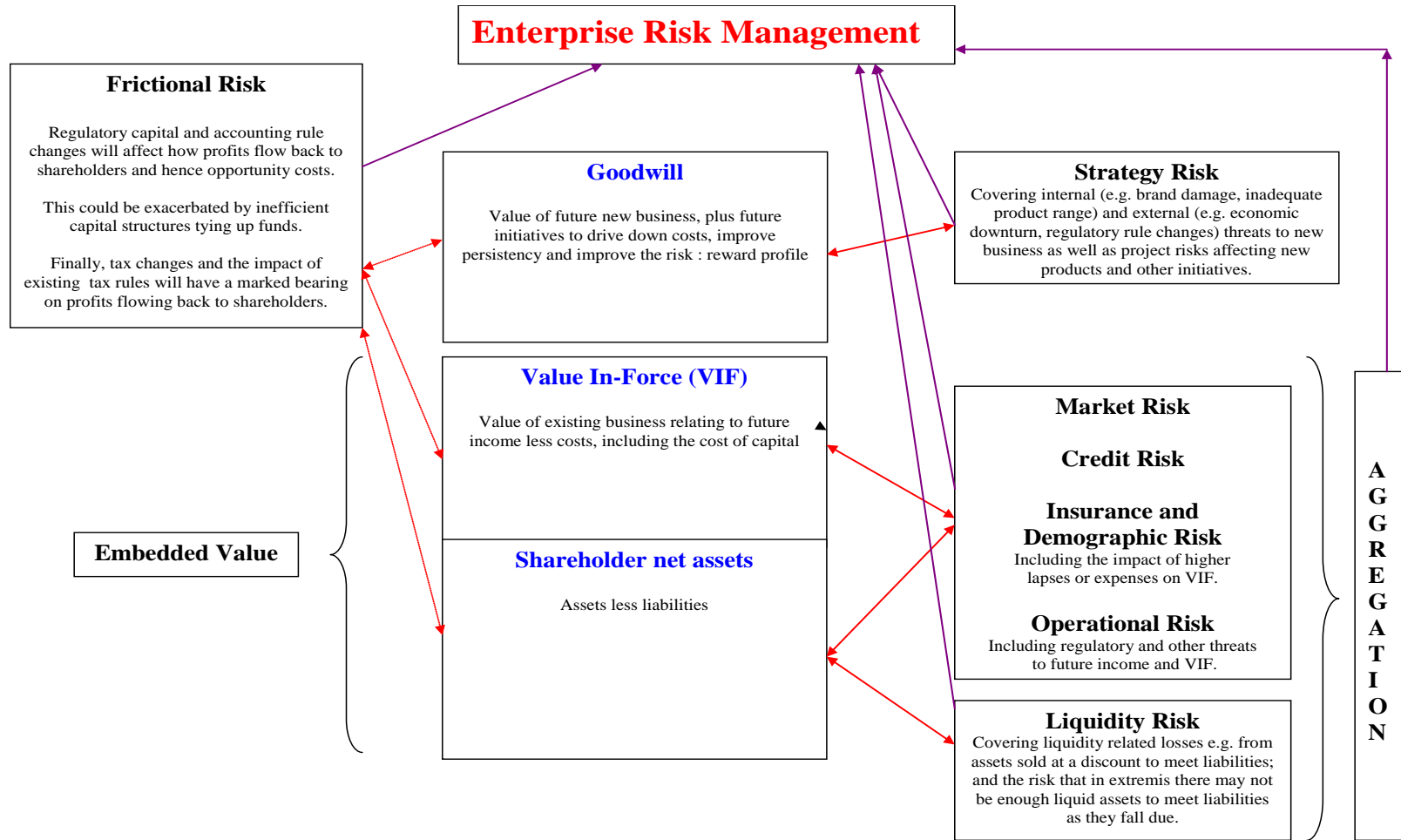
A view of the risks to a Financial Institution



A view of the risks to a Financial Institution



A view of the risks to a Financial Institution



High Level Categories

- Based on the view above, we have arrived at the following high level categories:
 - Market
 - Credit
 - Insurance & Demographic
 - Operational
- Risks directly impacting Embedded Value incl.VIF
- Liquidity – relating not so much as to the amount of assets v liabilities but whether they are liquid enough to meet liabilities as they fall due
- Strategy – covering threats to goodwill
- Frictional Risks such as tax, changes in regulatory capital requirements and accounting rules, and capital structure and the fungibility of capital
- Finally there is an Aggregation & Diversification category to cover the interaction of the different risk types with each other

Key concepts

- Event-based classification as opposed to cause-based – e.g. it would class what happened to Northern Rock as a Liquidity Risk rather than delving into the strategy that lead to the run on the bank.
- This is not to say causal based analysis isn't important – it certainly is! – but often such analysis can identify multiple causes.
- Focus is on gross risk and generally excludes control failures.
- In particular it treats ALM as a control and focuses more on the underlying exposures liabilities and assets each have.
- Reputation risk is classed under Strategy Risk – reputation damage may also lead to mass withdrawals but this is assumed to come under Persistency Risk and Liquidity Risk categories.
- Risks include regulatory capital and accounting impacts as well as the economic impact (noting that the impact of rule changes is covered under Frictional Risk).

Common Risk Classification System

High Level Categories

Market Risk – Concepts

- Market Risk covers equities, property, commodities etc., but note a distinction is made between actual and implied inflation.
- Market Risks may be further broke down into:
 - Specific risk relating to an individual share, bond or property
 - Sector impacts e.g. telecom shares, regional office property markets
 - General market impacts – domestic and overseas
 - Income risk relating to dividend and rent variability
 - Implied volatility of options for that particular asset class
 - Model Risk relating to changes in the value of derivatives for a particular asset class due to changing models of that asset class
 - Basis Risk relating to residual differences between movements in particular exposure and assets intended to hedge this out
- Note movements in say equity futures prices would come under Equity Risk and so on (even though the movement may also be driven by interest rate risk).



Market Risk – Demarcation and other issues

- Should Private Equity be included under Equity Risk or as a stand alone category ? This system assumes the former on the basis that exit values will ultimately be related to the wider equity market.
- Interest Rate Risk relates to movements in the risk-free rate – but what is this ? AAA-rated government bond yields ? Swaps ?
- There is a need to distinguish between liquidity effects – the balance of buyers v sellers – in terms of their impact on markets and Liquidity Risk. The following demarcation has been adopted:
 - Changes in mid-market prices of assets come under Market Risk
 - Liquidity Risk covers lower bid-prices relative to mid-market price and falls in the deal size at which one can trade without affecting the price
- Note while rogue trading and similar trading losses are market related, these are still classed as Operational Risk.
- Similarly the impact of falling markets and economic downturns on new business comes under Strategy Risk.

Credit Risk – Concepts

- 28 categories of Credit Risk have been identified, broadly by source of Credit Risk
 - The following Credit Risk variables may be considered:
 - Probability of Default (PD)
 - Exposure at Default (EAD – e.g. for credit cards)
 - Loss Given Default (LGD – allowing for collateral & other recoveries)
 - Migration Risk i.e. downgrades (/ poorer internal credit rating)
 - The risks may be broken down further by variable or in aggregate as follows:
 - Model Risk e.g. increase in bad debt provisions due to model change
 - Process Risk due to random fluctuations including concentration risk
 - Parameter Estimation Risk
 - Regional / Sub-portfolio impacts
 - Domestic Shocks
 - Overseas Shocks e.g. currency restrictions preventing repayment
-

Credit Risk – Demarcation and other issues

- For bonds, how might one distinguish between defaults and downgrades (Credit Risk) and general spread movements (Market Risk) ? The market may already have factored these into the price.
- Market movements will affect collateral values and hence LGD but propose this impact is still considered under Credit Risk as it is contingent on default.
- Outsourcing is generally considered an Operational Risk but where should failure of the outsourcing counterparty come into ? For this system we propose only accruals should come under Credit Risk with losses in respect of services not yet paid for (and which will need to be sourced elsewhere) coming under Operational Risk.
- Failure of an asset manager and/or mutual fund manager will generally be treated as outsourcing failure (Operational Risk).

Insurance and Demographic Risk – Concepts

- 28 categories of Insurance and Demographic Risk have been identified, loosely based on Solvency II categories.
- For General Insurance, the following variables may be considered:
 - Claim Frequency – Prospective
 - Claim Frequency – IBNR
 - Claim Severity – Prospective
 - Claims Severity – Claims reported but not settled
 - Claim Severity – IBNR

Insurance and Demographic Risk – Concepts

- The risks may be broken down further as follows:
 - Model Risk – increases in reserves e.g. due to new severity model
 - Process Risk – due to random fluctuations including concentration risk
 - Parameter Risk – arising from statistical estimation
 - Heterogeneity – variations in underlying portfolio distorting experience
 - Trend Risk – rate of change different from expected
 - Endogenous Shocks – e.g. changes in underwriting standards
 - Exogenous Shocks – e.g. more refined rating by competitors
 - Catastrophe

Insurance and Demographic Risk – Demarcation and other issues

- Non-disclosure – this may be viewed as a form of fraud (Operational Risk) but could also be due to say poor wording of underwriting questions. Have included non-disclosure under this category as unless detected, it will be implicit in claim experience.
- Option take-up rates and costs will often vary with market conditions, but we propose that variations in rates from expected should come under this category even if the variation is due to market conditions (expectations should probably be dynamic).
- Expense and Property re-build costs will be linked to inflation, but propose that inflation of these comes under this category as opposed to Market Risk as they will be affected by other factors such as the rate of change of the portfolio and specific construction industry factors.

Liquidity Risk – Concepts & Issues

- Banks are particularly vulnerable to Liquidity Risk as their business model essentially involves “borrowing short and lending long”.
- General Insurers also need liquidity to meet claims arising.
- Historically Liquidity Risk has not been an issue for UK life insurers who take in money on a long-term basis and invest most of this in marketable securities. However this is changing as portfolios mature and increased hedging increases margin calls. It has been an issue for US and other life insurers (e.g. General American Life).
- Aside from not being able to meet liabilities as they fall due, Liquidity Risk can give rise to losses in respect of:
 - Assets realised for less than balance sheet value in order to meet liabilities, possibly at “fire sale” prices; and
 - Interest on borrowing to tide over liquidity shortfalls.
- Would argue that only the excess interest over base rates on borrowings should count towards liquidity losses.

Liquidity Risk – Concepts & Issues

- In terms of demarcation, while the definition of Credit Risk as failure of a counterparty to honour obligations may include failure of a lender to honour a line-of-credit, this system treats this as a Liquidity Risk.
- Default of a deposit counterparty would be counted as Credit Risk but any additional cost in seeking to replace these liquid funds (e.g. through borrowing) should come under Liquidity Risk.

Operational Risk – Concepts

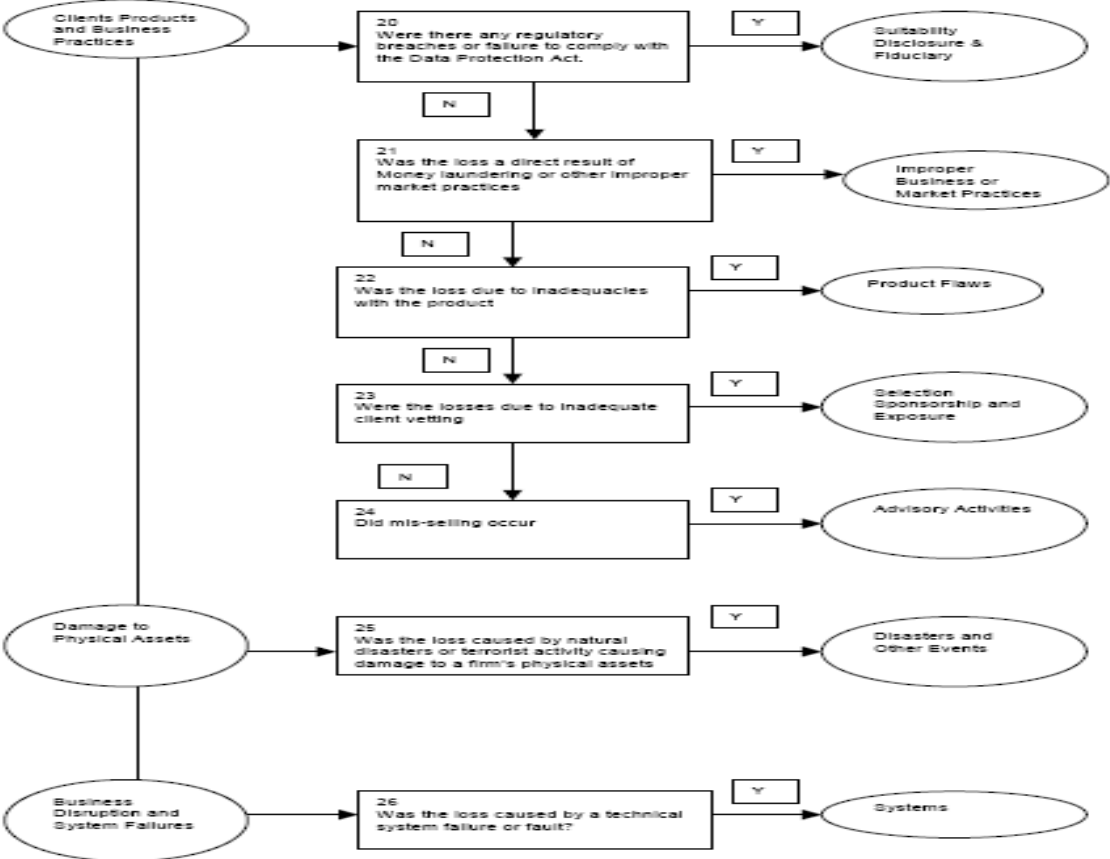
- 22 Operational Risk categories have been identified based Basel II definitions.
- There can be confusion over what constitutes an operational loss and where particular losses should be categories. The common risk classification system adopts the following conventions:
 - Operational losses include overtime and temporary staff recruited to solve a problem but not the cost of existing of staff who may be switched to problem solving i.e. marginal costs only.
 - IT errors relating to e.g. transaction processing should come under the category for transaction processing rather than under IT as these errors may be as much about specification and testing than coding.

Operational Risk – Demarcation and other issues

- There is a Basel II decision tree which can be used to allocate events to categories, but this is not perfect e.g. if there is a regulatory breach, it would allocate misselling events to the Suitability, Disclosure and Fiduciary category rather than Advisory Activities & Misselling.

Operational Risk – Demarcation issues

ORIC Decision Tree: Choosing Level 2 ctd.



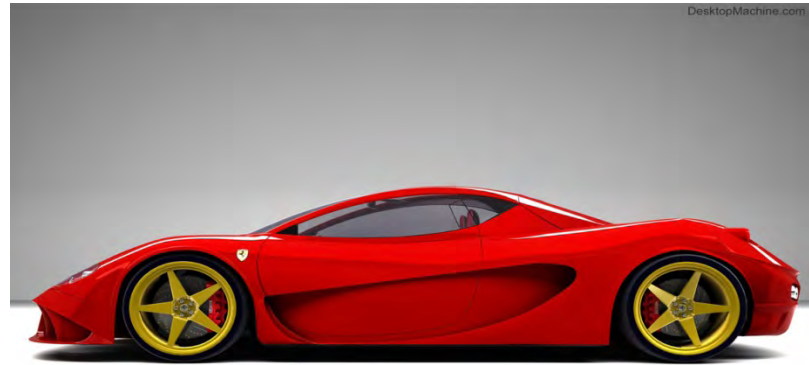
Operational Risk – Demarcation and other issues

- There is a Basel II decision tree which can be used to allocate events to categories, but this is not perfect e.g. if there is a regulatory breach, it would allocate misselling events to the Suitability, Disclosure and Fiduciary category rather than Advisory Activities & Misselling.
 - The common system seeks to avoid this problem by delving into operational risk in extensive detail (340+ sub-categories) rather than relying on a decision tree.
 - There is a demarcation issue where external parties collude with staff to defraud a firm – propose this is Internal not External Fraud.
 - Operational loss events can give rise to reputation damage, but propose this is covered under Strategy Risk as the former does not necessarily have to give rise to the latter, and PR management can limit any reputational impact.
-

Strategy Risk – Concepts

- The common risk classification system breaks this down into exogenous and endogenous factors.
- Exogenous factors would include:
 - Impact of markets and economic conditions on sales
 - Tax and Regulatory impacts such as tax changes
 - Actions of competitors
- Endogenous factors would include:
 - Quality of products and services offered
 - Project failures e.g. failure to launch new product
- Endogenous factors includes Brand and Reputation Risk relating not only to reputation impacts (e.g. perception of poor financial strength; reputation damage of misselling and other operational events) but also whether our brand supports our strategy.

Strategy Risk – Concepts



Strategy Risk – Concepts

- Strategy Risks relate not just to new business but also to back book initiatives / projects to:
 - Drive down expenses – relative to embedded value assumptions (propose that Insurance Risk covers where assumptions rely on a project to deliver cost savings and this does not deliver)
 - Improve persistency – again relative to embedded value assumptions
 - Improve the risk : return profile through hedging initiatives – with the reduction in economic capital requirements / costs offsetting any premium that a hedge counterparty may require
- A firm may calculate its appraisal value including “goodwill” relating to future sales and project benefits, and quantify the Strategic Risk impacts of reduced sales / failed projects against this value
- Alternatively it may view “goodwill” as the excess of a firms market capitalisation over embedded value, and consider the impact of poor new business results etc. on this differential.

Strategy Risk – Demarcation and other issues

- While the common system looks at Strategy Risk as a separate risk, there is an alternative argument that strategy impacts should be looked at as part of other risk categories:
 - Impact of equity and other market movements in sales should be considered under Market Risk;
 - Reductions in projected new business profitability due to adverse claim, expense or persistency should come under Insurance Risk;
 - Reputation impacts from operational loss events should come under Operational Risk...
 - ...while Market, Credit and other risks would include the damage to (perceived) financial strength and its impact on new business;
- Similarly there is an argument that Project Risk should be a high level category in its own right.

Frictional Risk

- Often the economic impact of risks will differ from the accounting and regulatory capital impact.
- Frictional risk covers:
 - Changes in regulatory capital rules affecting the amount of capital required, and the cost of this capital, in the absence of any change in risk and economic capital requirements.
 - Changes in accounting policy affecting the perception of the business and dividends payable to shareholders.
 - It also covers inefficiencies in operating structure (e.g. capital tied up in subsidiary entities) and the problems caused by intra-group exposures.
 - Finally it also covers tax impacts – both changes in general taxation and also company specific impacts such as impairment of tax assets.

Aggregation and Diversification

- Ultimately risk classification is only a starting point in ERM – there is a need to understand how the individual strands represented by the categories above come together.
- This section attempts to identify how individual risks interact with each other across categories, and how events may lead to anticipated diversification benefits not being realised, or worse, that the aggregate may exceed the sum of the parts.
- An example of such an event might be a flu pandemic. While a low correlation may be assumed between Mortality and Market Risks, a pandemic may depress markets as well as leading to mortality losses on assurances. It may also depress economic activity leading to higher unemployment, lapses and creditor claims.

Conclusion and next steps

Conclusion

- To conclude, there is no perfect system of classifying risks – the system outlined merely aims to act as a common reference to assist comparison.
- There can be other equally valid classification systems – so long as they properly demarcate between categories, address potential areas of overlaps and are as unambiguous as possible. However this is a non-proprietary classification system freely available to all.
- We would ask actuaries not to presume that your peers in other organisations share your view of risk types and when discussing risks, either:
 - Define in detail risk terms, particularly when looking at low level risks; or
 - Use the common risk classification terminology set out here.
- Finally, while risk classification helps in viewing risks in a coherent fashion, and in allocating responsibilities, care should be taken not to look at risks in “silos”. There is considerable interaction between risks and a holistic approach should be taken to their management.

Links to paper and detailed categorisation

- Paper: “A common risk classification system for the Actuarial Profession” can be found at:

<http://www.actuaries.org.uk/research-and-resources/documents/common-risk-classification-system-actuarial-profession>

- Spreadsheet containing detailed categories can be found at:

<http://www.actuaries.org.uk/research-and-resources/documents/underlying-spreadsheet-discussion-paper-common-risk-classification->

Any Questions ?