Risk Management in Insurance

A competitive advantage

Fernando Somoza
Mediterranean Life CRO

Club de Gestión de Riesgos de España

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Contents

Non economic approaches by both the insurers and regulators have been a key weakness of the industry

- Historically failures of insurance companies have often been caused by concentration of risks not controlled or not identified:
  - Real estate and high yield bonds for US Life insurance in early 90s
  - Longevity risk for some UK life insurers
  - Catastrophe risk for Bermudean reinsurers
- On the regulatory side, inappropriate constraints have led to inefficient capital allocation and to non-optimal pricing

- An environment detrimental to insurers, consumers and shareholders

Risk Perception

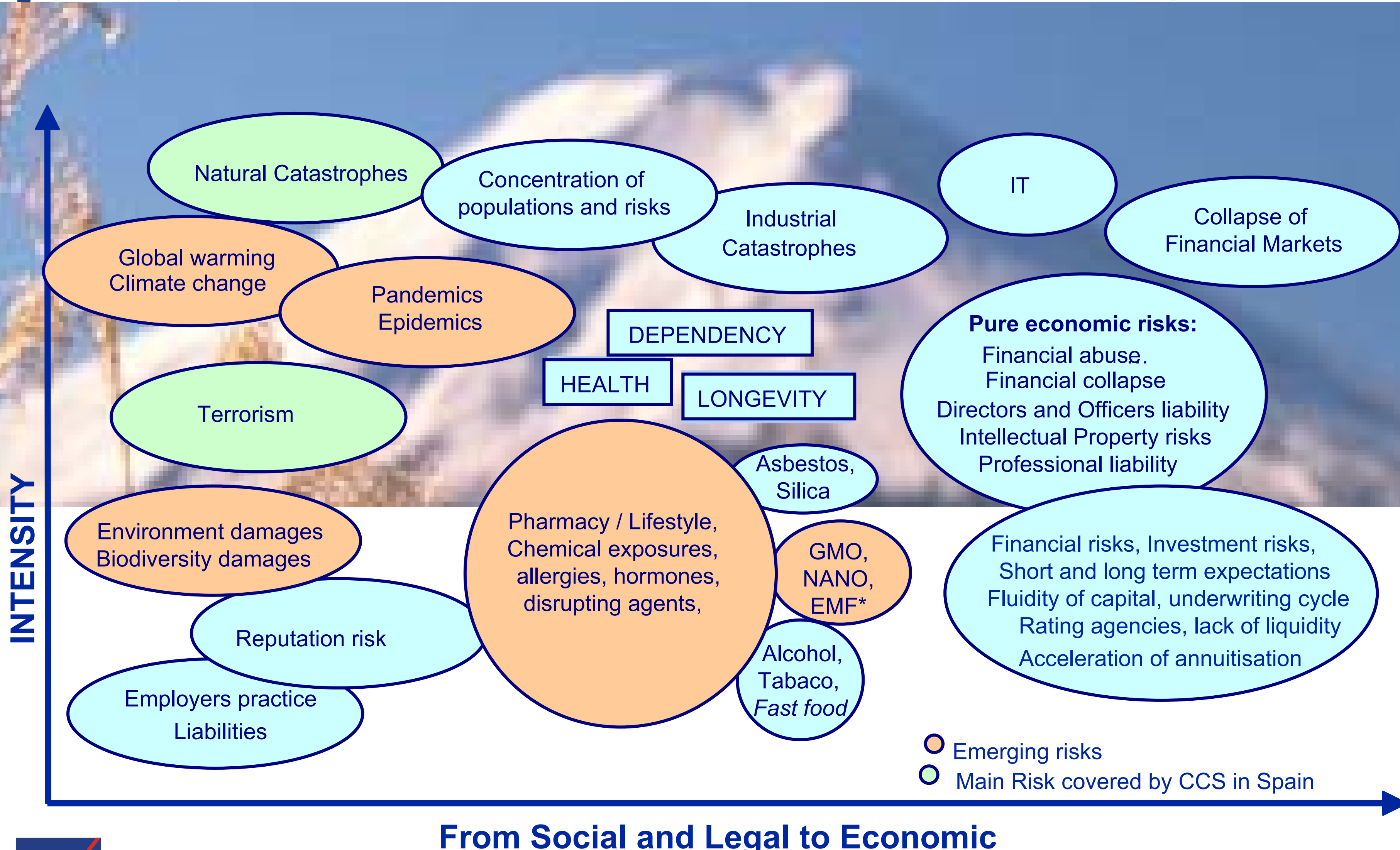
- Risks are perceived differently:
  - Some real risks are not considered to be relevant, either because they are not known or rejected as hypothetical. (Repetition of 1918 flu, Tsunami before Dec.26,2004)
  - Other risks are perceived as threats, even if no cause-effect relationship has been detected so far. (Antenna for mobile communication)

For the insurance industry, risk perception is very important

A picture


STRONG FOCUS BY THE INDUSTRY ON SOLVENCY II, WHICH IS ONLY PART OF THE PICTURE

A mountain of risks present in our industry but not always present in business decision taking



*GMO = Genetic Modified Organisms, NANO = Nanotechnologies,

EMF = Electromagnetic fields

Attitudes towards risk in the insurance industry

Attitude towards risk is often **ambivalent** :

Attitudes towards risk

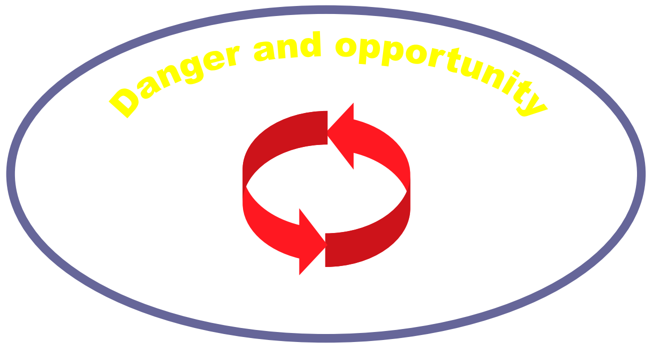
Threat Perception

Safety oriented Attitude

Survival-Driven

Focus on loss potential

Risk in opportunity



Ambiguous risk acceptance

min — max

Opportunity Realisation

Innovation-oriented Atttude

Incentive driven

Focus on potential profit

Opportunity in risk

Differences in risk perception and attitude towards risk will lead to obvious differences between “chosen” and “imposed” risks in our balance sheet

Banking and Insurance Risk Cultures Today (in transition!)

Banking

- Minimise risk on balance sheet. Shift to capital market
- Price everything
- Capital allocation to products
- Strong regulation
- Stop Loss procedures
- Strong correlation with performance incentives

Insurance

- Assume risks and hold them
- Many risks given for free
- How much capital do we need?
- We lag behind (positive?)
- Limits
- Usually very weak link to performance incentives

Risk Management in AXA

- What is Risk Management used for in AXA ?
- Internal Models
- ALM evolution
- Risk Adjusted pricing
- Innovative Risk transfer techniques
- Aligning Management incentives with Risk adjusted performance

What is Risk Management used for in AXA? 1/3

RISK IS OUR RAW MATERIAL

- The insurance industry is in the business of managing risk

- We are in the business of :
  1. Taking risks **<u>off</u>** our clients' balance sheet
  2. Taking these risks **<u>on</u>** our balance sheet
  3. Transforming it and /or transferring it
  4. …and generating profit from this activity

- Risk Management is **THE** business model of AXA.

What is Risk Management used for in AXA? 2/3

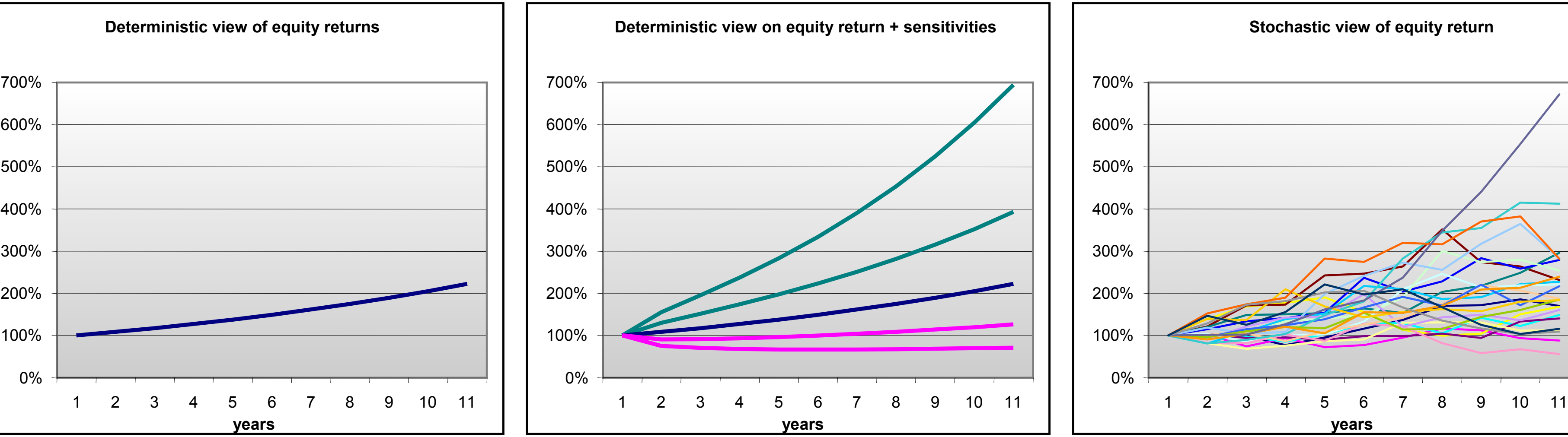
- The objective of Risk Management in AXA is **not to prevent** people from taking risks but **to allow** people to understand and manage in the optimal way the risks that they take (from a risk return standpoint)
- Risk has a price, and our pricing must take this into account
- Understanding of risks and increasing level of comfort with risk are the most efficient ways to ensure that the **right risks are taken**
- Risk Management in AXA is therefore a **"business enabler"** rather than a "control function"

What is Risk Management used for in AXA? 3/3

- The Risk Management organization (300 professionals across the AXA Group), embeds economic approaches in key processes:
  - Measure and approach risk consistently throughout the AXA Group, through the use and development of internal models
  - Asset Liability Management
  - Technical management of insurance portfolios and business development
  - Optimization of risk taking activities, (in particular by leveraging diversification effect) and risk transfer activities (reinsurance strategy, securitization)
  - Management incentives

Internal models: Stochastic modelling is a superior tool in AXA's Risk Management (1/2)

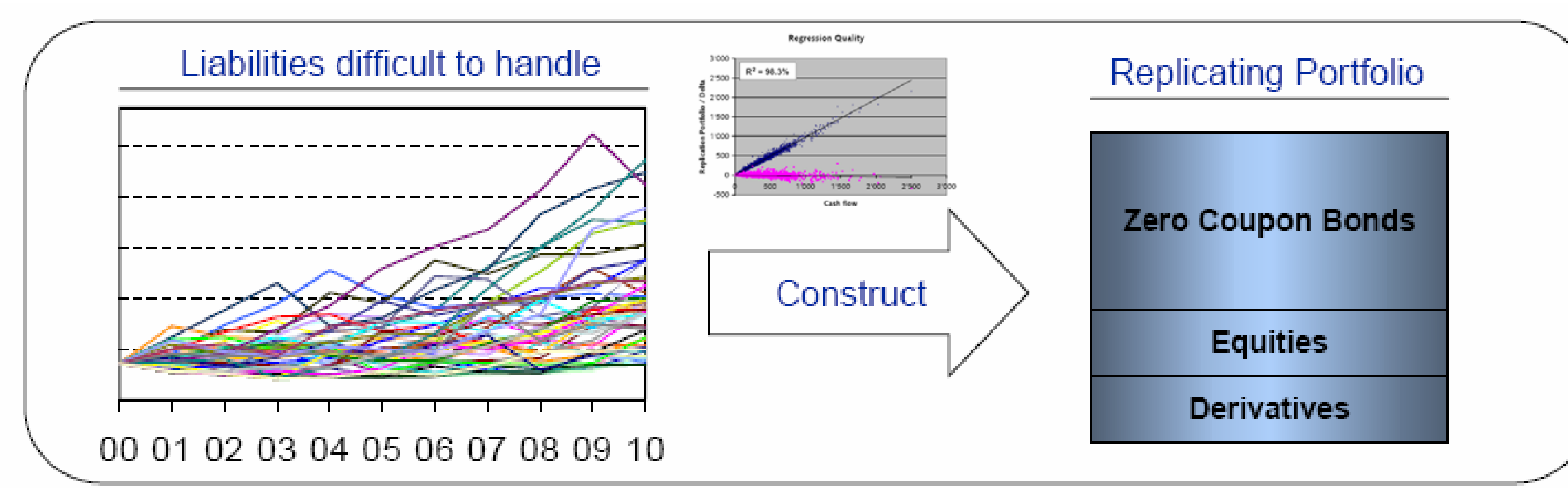
- Modelling techniques borrowed from the banking industry, and specifically from capital markets, combined with the improvement of IT capabilities have helped develop Risk Management in the insurance industry.



- In real life, our world is truly stochastic. Deterministic scenarios alone lead to irrational decision making. Stochastic modelling techniques help us make better more appropriate decisions.

Internal models: Stochastic modelling is a superior tool in AXA's Risk Management (2/2)

- A Replicating Portfolio technique allows us describing liabilities in an accessible way in terms of standard financial instruments.
- Sensitivities and dynamics of replicating portfolios must be close to the underlying liabilities
- This technique is a powerful tool to quantify non linear instruments, such as the embedded options we have in insurance liabilities, in particular in the Life business (profit sharing and surrender guarantees).



- The Replicating Portfolio technique is a very important tool for managing ALM

ALM evolution: moving towards Dynamic Hedging and using the “Greeks” to manage the financial risk

Internal models themselves represent an important evolution for ALM

ALM and new generations of products rely more and more on dynamic hedging: mainly through Delta, Rho and Vega hedging

The “**Greeks**”: a variety of price sensitivity measures for derivatives, differen types of derivatives may have sensitivities to some or all of these measures

- **Delta:** sensitivity of derivative value to change in price of underlying asset
- **Gamma:** sensitivity of delta to change in price of underlying asset. The higher gamma is, the more expensive delta hedging becomes
- **Rho:** sensitivity of derivative value to change in interest rates
- **Vega:** sensitivity of derivative value to change in volatility of underlying asset
- **Theta:** sensitivity of derivative value to passage of time

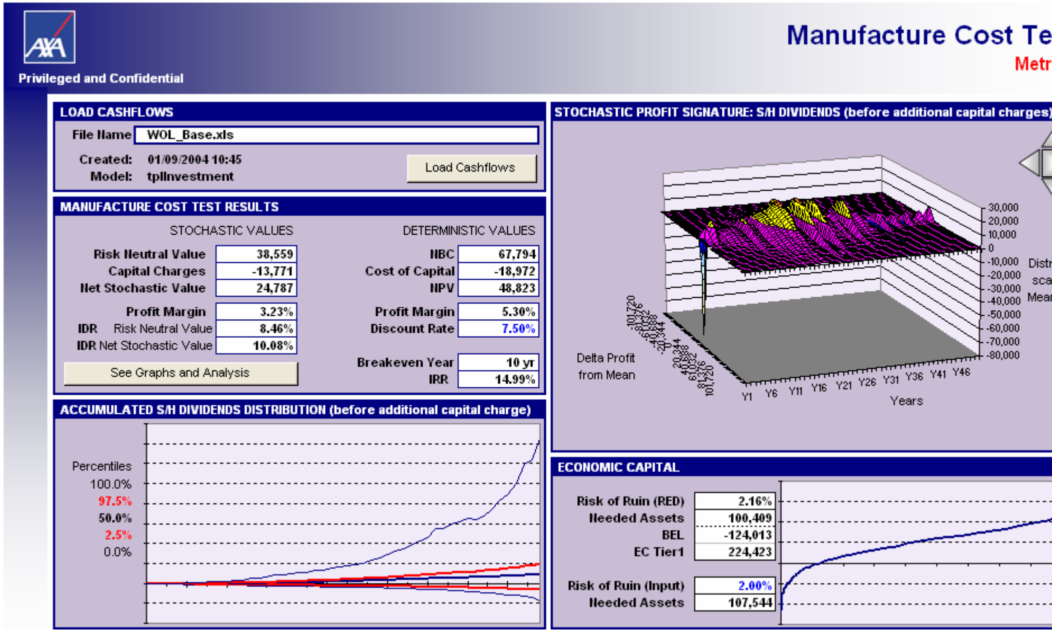
Risk adjusted pricing

AXA's Product Approval Process assesses the risk adjusted profitability of every product launched. This process is part of our Entity's governance.

Costs of risks are systematically analysed to track embedded options in the business

AXA has developed a pricing methodology with supporting tools

- Involving top management, product development, distribution, underwriting and risk management teams
- Product approval depends on risk adjusted profitability



Innovative risk transfer techniques

Increasingly, risks underwritten by insurers will be transferred to financial markets:

- High frequency, low severity risks: → capital management
- Low frequency, high severity risks: → reduction of tail risks

The AXA Group aims to be at the forefront of this fundamental evolution of the business model of the insurance industry. This should lead to a systematic use of financial instruments to dynamically manage the balance sheet.

Implemented Securitization of high frequency risks:

- Motor risk: SPARC, Nov 2005 (1,1 bn € portfolio)

Implemented Securitization of high severity risks:

- Catastrophe Risk: AURA RE, Jan 2005 (68 m€ of European windstorm risks)
- Mortality risk: OSIRIS, Nov 2006 (350 m€ of extreme mortality risks)

Aligning Management incentives with Risk adjusted performance

In 2005, AXA has adopted EEV with a Market Consistent approach, which:

- Provides the most transparent information on value to the shareholder
- Makes results independent from the choice of market assumptions
- Provides explicit allowance for the Time Value of Options & Guarantees embedded in our business, consistent with the approach used in Financial Markets
- Is in line with our Risk Adjusted Pricing and Product Approval Process

Management incentive compensation is based on targets reflecting the risk adjusted performance of AXA (i.e. Market Consistent New Business Value in the Life Business).

The Solvency II opportunity

The Solvency II opportunity

- Solvency II is rightly moving towards an economic assessment of solvency

- Expected important Capital savings for insurers which have internal models which are used for business decision taking

- Some recognition of diversification already included in QISII (between LoB and between ALM and insurance risk). International diversification still not recognised.

- Recognition of risk transfer and mitigation techniques
  - Securitization, reinsurance pooling
  - Hedging programs

Solvency II will represent a competitive advantage for diversified Groups with sophisticated dynamic Risk Management

Conclusions

AXA has gone through its cultural evolution with an enhanced modelling and risk management discipline

- Risk Management focus, stochastic calculations and IT capabilities have changed the way AXA looks at its business and at its balance sheet
- Risk Management and economic approaches are not only a control function but also a business enabler
- The result of this evolution is improving earnings quality on a risk adjusted basis, leading to a higher and less volatile ROEs,

Internal Models

- **Asset Liability Management**
- **Technical management of insurance portfolios**
- **Reinsurance and risk transfer optimisatization**
- **Management incentives**
- **Financial strength qualitative assessment by rating agencies**
- **Solvency II**

Processes already integrated i AXA's Risk Managemen

- As of today, an important missing piece is the regulatory framework (Solvency II)

Not to forget …

- …risk in the insurance industry is constantly evolving, and its management is a constant challenge
- … risk is good, since risk means opportunity…
- … Risk Perception, Risk Culture and quantitative Risk Management are always a starting point and a key condition for success
- …but, intuition, judgement, sound logic and out-of-the-box thinking are also key ingredients for superior Risk Management


A closer picture
... of the Fuji volcano

Gracias

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