

Health and Care Conference 2010

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The Impact of the Economy on Life and Health

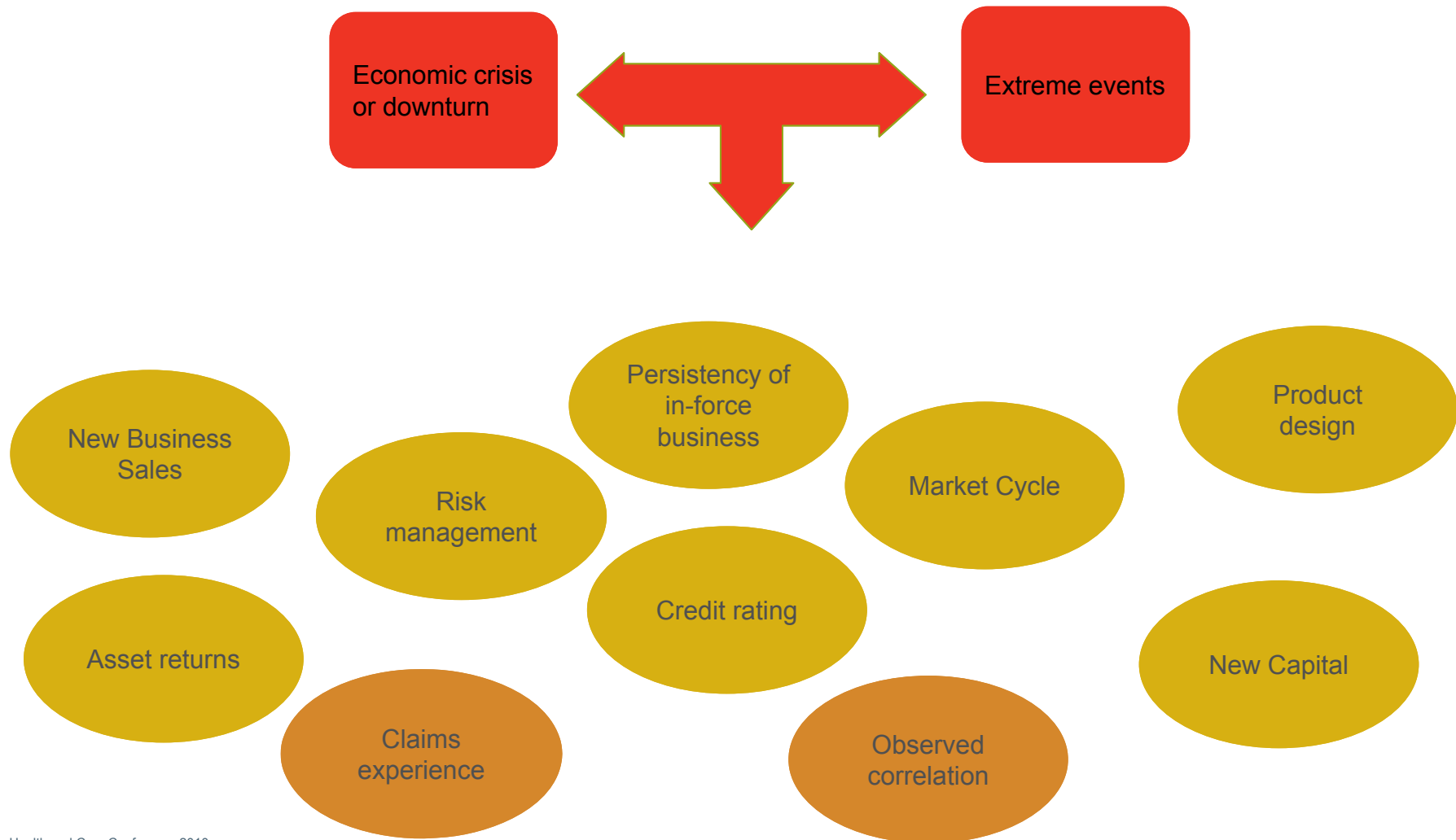
When the stock markets sneeze,
the world gets a cold – or vice versa

13 May, 2010

Agenda

- Introduction
- Regulatory capital requirements for tail dependencies
- Real Life examples
- Known and Unknown Unknowns
- Mitigation
- Conclusion

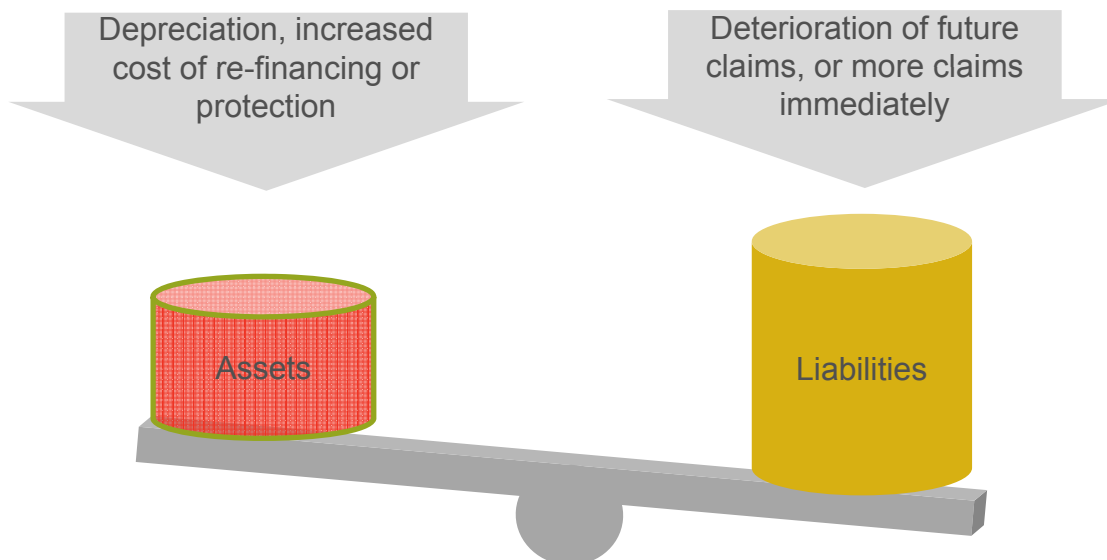
Introduction



Why is dependency a problem?



As a result of one and the same event:



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From a Stress Test to a Scenario

Swiss Solvency Test (SST) distinguishes between *

- Stress Test: only a single or small number of connected, risk factors are stressed in isolation from other risk factors
- Scenario: comprehensive multi-risk consideration

Example: Financial Sector Assessment Program (FSAP) **

- Introduced in 1999 by IMF and World Bank
- Switzerland: SST scenarios used for conglomerates *

* <http://www.finma.ch/archiv/bpv/e/themen/00506/00552/00728/index.html?lang=en>

** <http://www.imf.org/external/NP/fsap/fsap.asp>

FSAP, Switzerland: SST Group Scenario 1 (extract)

Financial distress

- **Shares**, real estate and hedge funds drop by 30%
- Interest rates curves increase by 300 bp
- Life insurers: **lapse** rate increases to 25% (one year)
- Volume of **new business** 25% of an average year
- Insurance and reinsurance companies:
all downgraded by 3 notches

<http://www.finma.ch/archiv/bpv/e/themen/00506/00552/00728/index.html?lang=en>

FSAP, Switzerland: SST Group Scenario 2 (extract)

Default of reinsurers or retrocessionaires

- **Catastrophe** causing reinsurer downgrade
 - Large natural catastrophe
 - Followed by a **downturn of the global financial market**
- **Downgrade** by three notches (e.g. from A+ to BBB+)
- Loss given default (LGD) = 50%
- Cost of new reinsurance doubles

FSAP, Switzerland: SST Group Scenario 3 (extract)

Pandemic

- **Mortality**: extra mortality by region in % of population
 - Proposed parameters correspond to an increase in mortality of 100% in Europe, 60% in North America, 1000% in Asia
- **Age shape**: adults more affected than elderly
 - $q_x^{\text{pandemic}} = \alpha * q_x + \beta$
 - 1/3 of extra deaths younger than 65
- **Financial market** effects
(FX rates, interest rates, spread changes, equity prices)

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Real Life Examples

- Stock markets and heart attacks
- Minimum Wage and BMI
- Economy and Disability (IP)
- Unemployment and Suicides
- Political change and mortality

Known and unknown unknowns

- Dynamic policyholder behaviour
- Natural catastrophes, pandemics
- War, riot, anarchy and terror
- Climate change

Economy and heart attacks

Duke University (NC) Study

- During the financial crisis January 2008 to July 2009: Nasdaq down, heart attack rates up – Nasdaq up, attacks down
- But at the same time: main stock market decline was in late autumn/winter, where MI (myocardial infarction) typically seem to increase anyway
- Problem: too small sample (both region and number of cases), and time period not sufficient to net out seasonal effects
- Authors therefore plan to extend the study

Earlier studies have already found higher rates of heart problems in the context of

- Christmas and New Year's Eve
- During World Cup soccer matches (e.g. England-Argentina 1998 penalty shoot out, admissions +25%)
- devastating disasters like Hurricane Katrina (see later)

Minimum Wage and BMI

General BMI increase over several decades

- Potential reason is less expensive food and fast food

Investigation* shows

- While real minimum wage in the US declined 50% from 1968 to 2007, there is a statistically significant relationship to increase in BMI from ~24 to ~27 from 1984 to 2006 (period with available data)

Consequence for insurance covers e.g. CI

- BMI at policy inception versus future trend
- Obesity-related claims are correlated to economic situation

Plausible, but no evidence for causal relationship

*Meltzer and Chen, The impact of minimum wage rates on body weight in the United States, Working paper 15485, National Bureau of Economic Research, November 2009

Economic downturn: Disability Income Insurance

Investigation Australia*

- In downturn: benefit payments for disability increase
 - Incidence rates
 - Duration of disability
 - Share of disabled in working population
- Indicators for economic situation
 - Unemployment
 - Number of insolvencies
 - Productivity (GDP)
 - Retailing

Investigation South Africa**

- Individual lump sum business
- Anticyclical link between economy and disability rates
- Indicators for economic situation
 - Unemployment
 - Consumer confidence
 - Business confidence
 - Productivity (GDP)

* David Service and Kerry Ferris: DISABILITY EXPERIENCE AND ECONOMIC CORRELATIONS, [Accepted for publication at the Institute of Actuaries of Australia Convention May, 2001]

** <http://www.persfin.co.za/index.php?fSectionId=581&fArticleId=5388984>

Economic downturn: Disability Income Insurance

Experience in Germany

- Employees
 - Incidence rates decrease before starting to increase
 - Phase of job uncertainty: percentage of sick leaves decreases
- Self-employed
 - Incidence rates increase
 - Latent disability cases start to claim

Example: Manager of a joinery

- In prosperous times: full time work in spite of back disorders
- In economic downturn: claim

Experience in the UK

- Increasing percentage of claims due to mental diseases
- Offices see connection to economic downturn*
- NHS take measures to respond to the challenge of the economic downturn for mental health**
- Observations similar to Germany
 - employees vs. self-employed
 - Oppositional forces in group insurance: employees avoid going off sick to protect their jobs, employers are interested to pass on wage bill to insurers

* see e.g. <http://www.citywire.co.uk/adviser/-/news/protection/content.aspx?ID=336436>

** <http://www.rcpsych.ac.uk/files/pdfversion/OP70.pdf>

further reading: Germany - Versicherungswirtschaft 15. September 2009

Economy and Health

General observation

- Life expectancy increases with economy (developing/emerging/industrial countries)
- On the other hand: adverse development caused by unhealthy lifestyle (example obesity)

Naive approach

- Economic upturn
 - more time and money for “body and soul”
 - better medical condition, lower mortality
- Economic downturn
 - less expenses for health, lower standard of living
 - poorer public health

Economy and Health

Inconclusive results of scientific research*

- Contradictory observations
 - Mortality increases with upturn
(also for each cause of death, except suicide)
 - Mortality decreases with upturn
 - Mortality decreases with upturn after a certain delay
- Employed are more healthy than unemployed, but
 - During downturn: health improvements because of less work
 - During upturn: less time for sports and healthy nutrition (home cooking), increased work load, less sleep, more traffic, more pollution

Vice versa: Demographic change impacts economy

- Ageing strains the statutory pension insurance
- Ageing strains economy: „Asset Melt Down“

* Christopher J Ruhm: Commentary: Mortality increases during economic upturns, International Journal of Epidemiology, July 2005

Unemployment and Suicides

Under normal conditions, the suicide risk seems controllable

- medical and financial underwriting
- policy conditions

In difficult times, this gets out of control

- Great depression 1929
- Japan since 1998
- Experience of some companies in 2009

Suicides in Japan

Cultural peculiarity

- Shame and responsibility

1998 Asian financial crisis

- Currency crash
- Harsh increase in unemployment and suicide rates

– Persist at these levels since

Karoushi

(death from excessive labour)

- Not considered suicide

Source: Inoue et al., Industrial Health 2007, 45 177-180
Suicide rates per 100,000, Unemployment rates per 100

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Table 1a. Annual suicide rates in Mie prefecture, Japan

	Total	Male	Female
1996	17.21	22.36	12.31
1997	16.81	22.39	11.50
1998	26.52	35.56	17.90
1999	24.21	33.30	15.54
2000	22.03	30.82	13.67
2001	23.84	36.23	12.04
2002	23.96	33.35	15.00

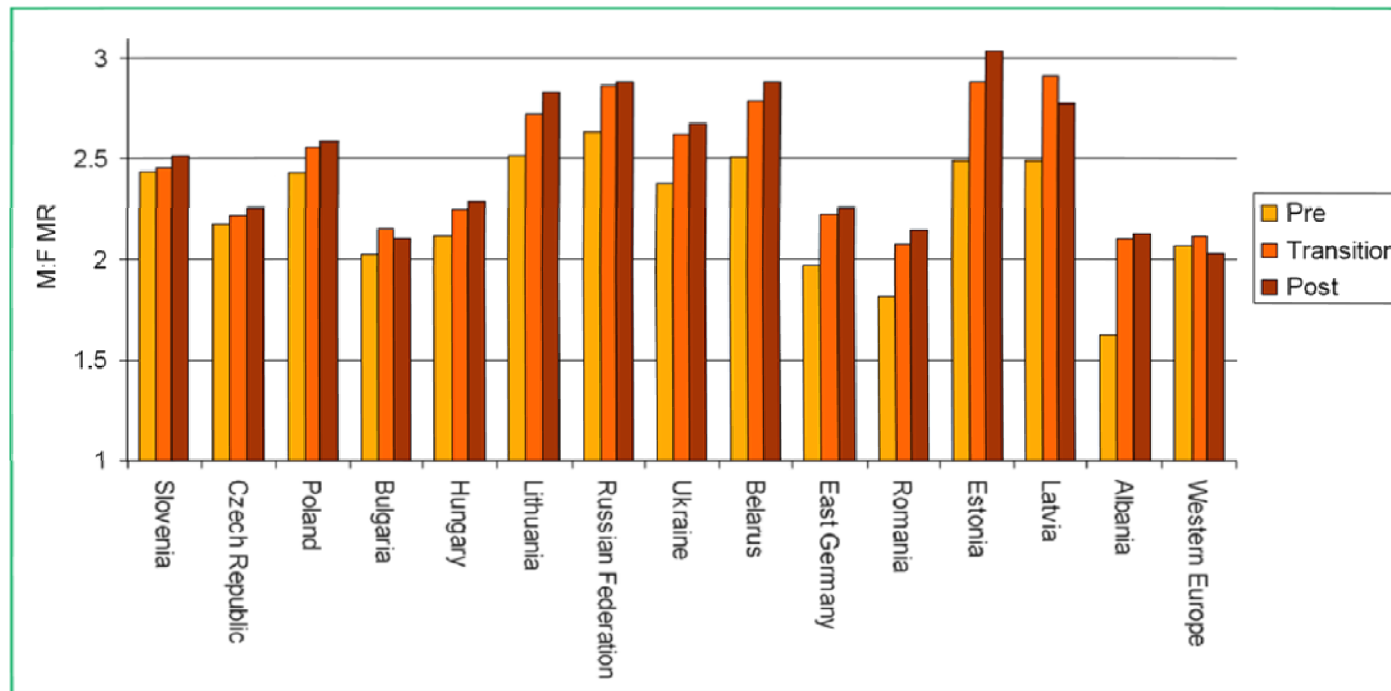
Table 1b. Annual unemployment rate in Japan

	Total	Male	Female
1995	3.2(3.4)	3.2(3.8)	3.3(2.7)
1996	3.3	3.3	3.4
1997	3.5	3.5	3.5
1998	4.3	4.4	4.2
1999	4.7	4.9	4.5
2000	4.7(3.9)	4.9(4.3)	4.5(3.3)
2001	5.2	5.3	4.9
2002	5.4	5.6	5.1

Parenthesis internal shows the rate of unemployment in Mie prefecture, Japan.

Political change and mortality

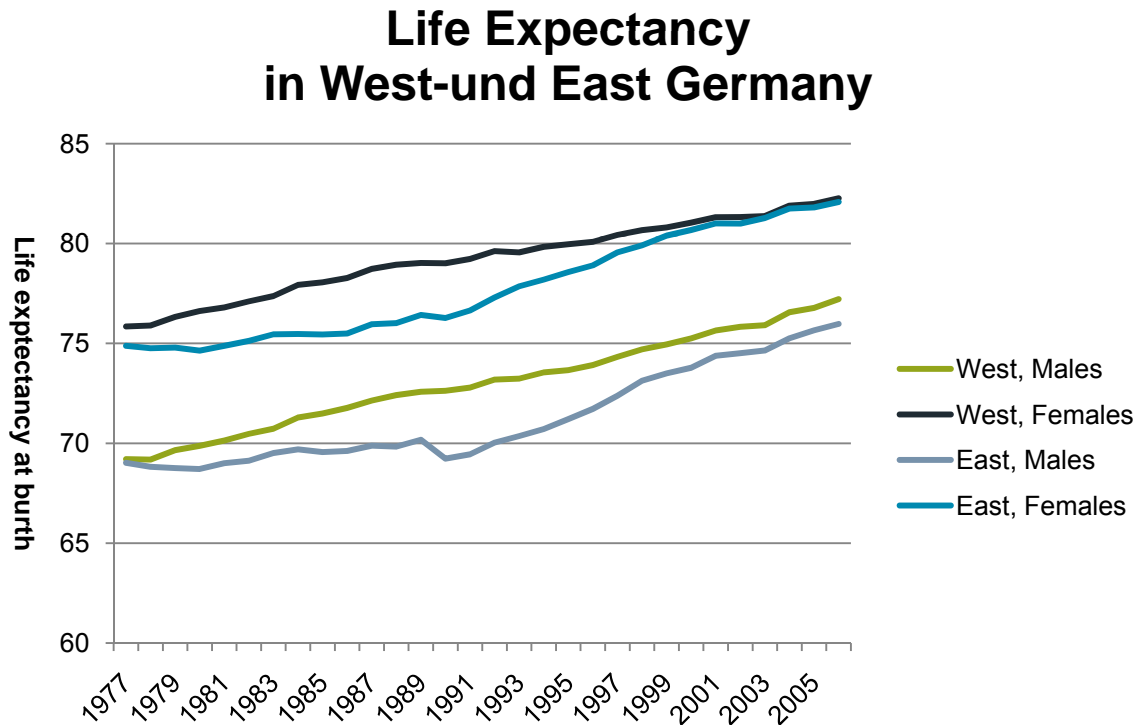
Figure 1. Overall M:F MR Across the Economic Transition in 14 Nations and for Western Europe (12 Nations)



Daniel J. Kruger, Randolph M. Nesse: Economic Transition, Male Competition, and Sex Differences in Mortality Rates, *Evolutionary Psychology* 2007. 5(2): 411-427

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Political Change and Mortality: Germany



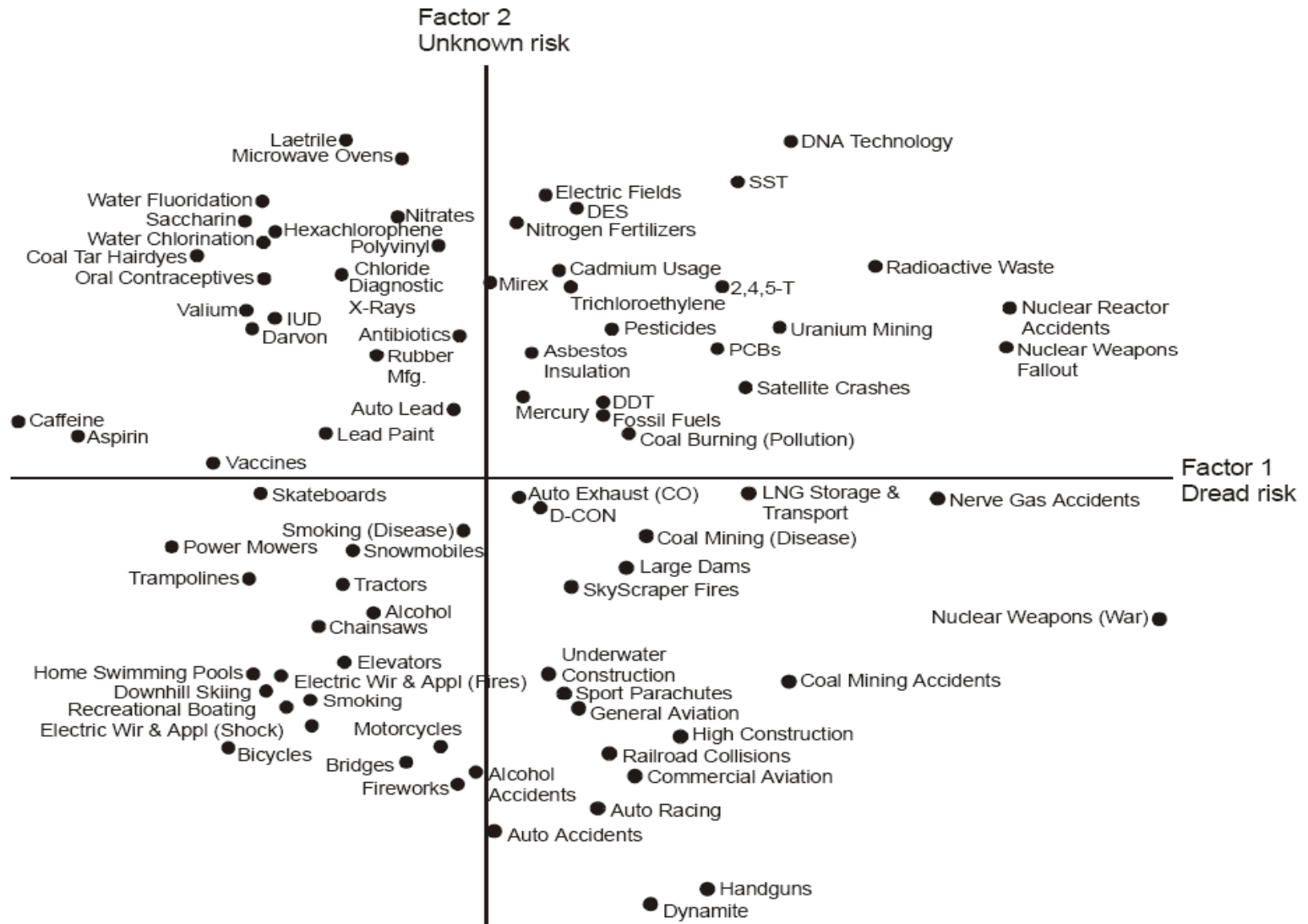
- No major genetic differences
- No major climate differences
- Eye-catching effect in transition period
- Convergence after reunification

Quelle: Human Mortality Database
<http://www.mortatli.org>

Known and unknown unknowns

- Dynamic policyholder behaviour
- Natural catastrophes, pandemics
- War, riot, anarchy and terror
- Climate change

Perception of Risk



Source: Paul Slovic, Perception of Risk Posed by Extreme Events, 2002

(Dynamic) Policyholder Behaviour

Surrenders, lapses, use of options

- Will vary with economic changes and extreme events
- Economically rational behaviour vs. individual perception
- e.g. Downturn
 - People likely to lapse mortality policies due to lack of money or insurable interest
 - If downturn is due to a heavy mortality trend, possible inversion (perception of risk)
 - Catastrophe-caused shock could cause mass surrender to get funds home

No reliable statistical data available

- Typically, the experience is blended with other effects

But one of the major tail risks

Pandemics

- Pandemics are an example of an expected combined impact on assets, liabilities and the insurance enterprise itself
- 31 known pandemics since 1580
- The 2009 pandemic changed overall perception

Year	Name	Number of deaths	Mortality of infected
1918-1919	Spanish Flu	~ 50 millions	2.50%
1957-1958	Asian Flu	~ 2 millions	~ 0.37% (USA)
1968-1969	Hong Kong Flu	~ 1 million	~ 0.19% (USA)
1977	Russian Flu	10,000 (USA)	?
2003	SARS	299 in HK	Up to 71% in HK
2009	Swine Flu	16,000 (March 2010)	

<http://www.who.int/inf-pr-1999/en/pr99-11.html>

Taubenberger JK, Morens DM. 1918 influenza: the mother of all pandemics.

Viboud C, Boelle CY. Influenza epidemics in the United States, France, and Australia, 1972-1997

Wing K. Fung and Philip L.H. Yu. SARS case-fatality rates, and WHO

Pandemics – Impact on Assets and Enterprise

Assets

- Asset allocation and portfolio diversification
 - Increased correlation of asset classes
- Length and type of stress
 - short, waves, long
- Liquidity
 - required for claims payments, but assets will have to be sold into soft markets
- Possibilities for refinancing or capital increase
- Own and reinsurer's financial strength

Enterprise

- Operational risk
 - Business continuity
 - Own people impacted, but increased activity required
 - Claims management
 - Death certificates and delays
 - Underwriting
- Strategy
 - Stop sales during pandemic, or e.g. in first wave?
 - Review underwriting procedures? Change conditions?
 - Ability to write new business (additional capital strain)
 - Potential sales or premium increase (higher perception of risk)
 - M&A
 - Post-pandemic positioning?

Future Pandemics – Impact on Liabilities

Pandemic excess mortality

- Infectivity, lethality
- Various observed shapes
- Age dependency
- Population vs. portfolio exposure
- Sum at risk and social class

Policyholder behaviour

- Options, lapse

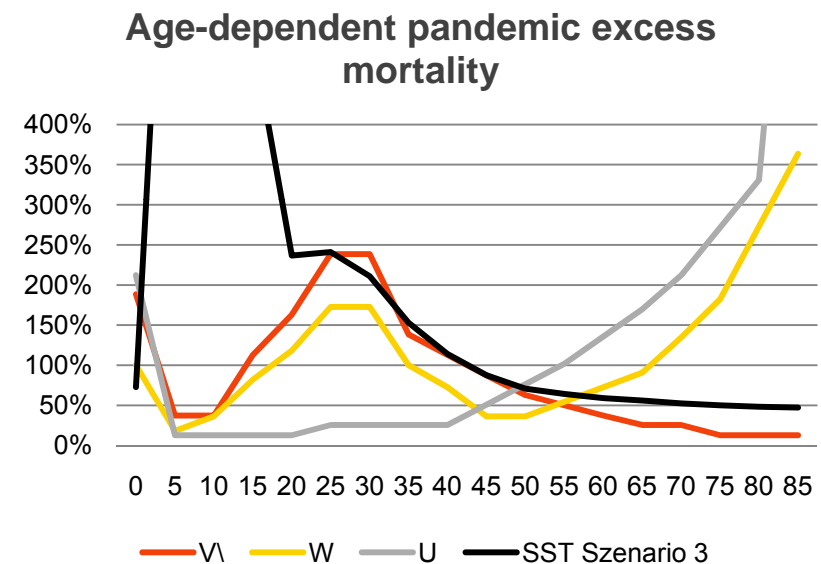
Product type and design

- Particular attention: products with capital protection (market prices!)
- Pensions as a potential source of profits
- Health insurance, unemployment, disability

Accumulation with e.g. group insurance, non-life covers

Non-pandemic claims increase

- Vaccine intolerance
- Through shortage of resources (e.g. doctors, drugs, hospital beds)



Devastating Cat Events – Example: Hurricane Katrina

Katrina itself (Aug 29, 2005)

- Category 3 hurricane, 1,800 deaths, cost >USD150Bn
- Immediate impact on health and economy

The aftermath (study Feb 2006- 2008*)

- MI rates persistently times 3
- Shift in socio-economic status of the population
 - To commonly more uninsured, unemployed, medically noncompliant
 - “from conscious health care attitude to survival mode”
 - Requires additional study on migration behaviour

Such disasters (hurricane or earthquake) have immediate but also delayed or long-term medical effects

*Lanier et al., *Hurricane Katrina: the infarcts beyond the storm*, J Disaster Med. And Public Health preparedness, 2009

War, riot, anarchy and terror

Can occur as a consequence of a crash of the financial markets, or pandemic, or independently

Can impact assets and liabilities to significant extent

– “dirty bomb”

Particularly sensitive in a globalized economy – but difficult to draw a line from historic experience

– Logistics, administration and international interaction

– Example: multinational insurance group

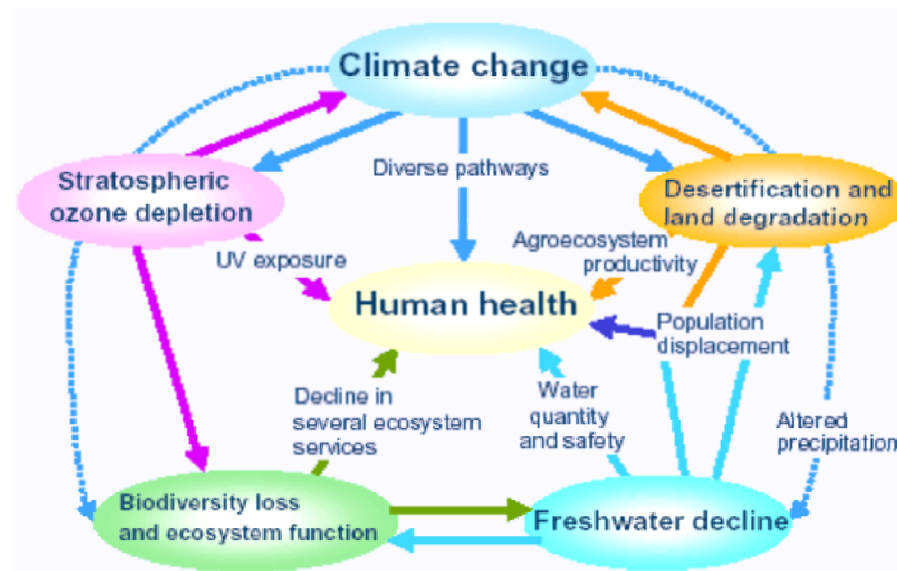
– Example: multinational group as insured client

– Freedom of services

Climate Change

Short term impact

- Heat waves/winter and deaths
- Smog and respiratory diseases
- Cyclones, hurricanes, heavy rainfalls, flood and disease outbreak, nutrition



Picture source: WHO, "Global environmental change"

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Long term impact

- More heat waves with increased number of deaths
- Irregular rainfalls affect fresh water supply
- Increased variability in temperature and rainfalls sustainably impact agriculture and then nutrition
- Devastating or frequent floods impact population in coastal areas
- Increase (duration, geographical spread, severity) in water- and insect-borne diseases and shift of diseases to other regions which are yet unprepared

Climate change is at the same time impacting political and economic stability

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Mitigation

Before

- Policy conditions/ exclusions
- Risk selection and underwriting
- Investigate and model tail dependencies
 - Statistically - difficult
 - Plausibility – e.g. use scenarios to test and explain possible dependencies
- Accumulation control
- Own risk assessment and Strategy/Preparedness
 - Including e.g. business continuity
- Seek partners with financial strength, according to own risk appetite
 - e.g. reinsurance against trends or shocks

During

- Claims handling and holistic monitoring
 - Capture trends and dependencies
- Apply preparedness plans
- Fast adaption to change in situation
 - Financial markets
 - Peers

After

- Reduction of profit participation
- C'td Claims monitoring and control
- Regulatory measures (cost allocation, reduction of guarantees)
- Rescue companies
- National or international action plans

UK, Austria, Switzerland, Germany

Significant mortality exclusions

Suicide

UK	often no exclusion (e. g. mortgage), if any: first year only
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A, D, CH	Restriction to surrender value during first three years
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War/riots/terror

UK	Often no exclusion, if any: war, invasion, hostilities (whether war is declared or not), civil war, rebellion, revolution or taking part in a riot or civil commotion.
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A, D	Death in war, (riots) or terror: restriction to surrender value
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CH	Death in war <ul style="list-style-type: none">▪ One-off cost allocation▪ Statement of claims, amount of coverage and cost allocation by supervisory authority▪ Statement of start and end of period of war by supervisory authority
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Conclusion

Single and known combinations of risk factors

- need to be addressed in policy design and pricing as far as possible

Residual risks and correlation

- need to be addressed with modern risk management techniques
 - State of the art models and method
 - Rapid adaptation to new insights
 - Awareness of the limits of perception and statistical evidence
 - Regular and critical review of models and correlations, also in the remote areas

And then...face the future!

Questions or comments?

Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

