MANAGING EXTREMES Willis Re

CHOICES & CHOOSING PLURAL RATIONALITIES & ERM

Dave Ingram / Alice Underwood / Michael Thompson / Paul Tayler

June 2011

"Our greatest foes, and whom we must chiefly combat, are within." Miguel de Cervantes

Choices & Choosing Conclusions

Willis Re MANAGING EXTREMES

- Plural Rationalities
  - Risk is an Opinion
  - Four Risk Attitudes
  - Four Risk Strategies
  - Four Risk Environments
- Choices
  - Stay the Course
  - Reactionary Changes
  - Rational Adaptability
  - Harmony
- Choosing
  - Different Choices for Different Risks
  - Different Choices for Different Environments
  - Different Choices for Different Companies

TODAY'S AGENDA

Willis Re MANAGING EXTREMES

- Introduction Risk Opinions
- The theory of plural rationalities
- Risk attitudes and risk strategies
- Risk attitude survey
- Seasons of risk & the insurance cycle
- Surprise Game Agent Based Model
- Choices - Risk attitudes & ERM
- Choosing ERM Strategies – Case Studies

Observations

Six sets of 20 observations from the same underlying loss distribuiton

1	0	0	0
2	1	0	0
3	0	0	0
4	0	0	0
5	0	0	1
6	0	1	0
7	0	0	0
8	0	0	0
9	0	0	0
10	1	0	0
11	1	1	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
total	3	2	1
Average	0.15	0.10	0.05
Std Dev	0.37	0.31	0.22

1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	1
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
total	0	0	1
Average	-	-	0.05
Std Dev	-	-	0.22

Stock market total returns: loss > 20%

	1990 - 2009	1970 - 1989	1950 - 1969	1930 - 1949	1910 - 1929
	0	0	0	1	0
	0	0	0	1	0
	0	0	0	0	0
	0	0	0	0	0
	0	1	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	1	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	1	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	1	0	0	0	0
	1	0	0	0	0
Total	3	1	0	3	0

What stock market model would you **believe**?

Willis Re MANAGING EXTREMES

- In the next 20 years,
  - Risk is **high**
    - Chance of loss > 20% is 10% or more
  - Risk is **moderate**
    - Chance of loss > 20% is about 5%
  - Risk is **low**
    - Chance of loss > 20% is much less than 5%
  - **Do not believe we know** the risk level

You May also have a **belief** about how to best measure risk…

- Risk is best measured by…
  - Using a market consistent model
  - Using a model that is consistent with historical experience
  - Using stress tests of worst cast scenarios
  - It is a waste of time to measure risk

And if nothing else…

The historical track record tells us…

That you are **ALL CORRECT** in your beliefs

Sometimes.

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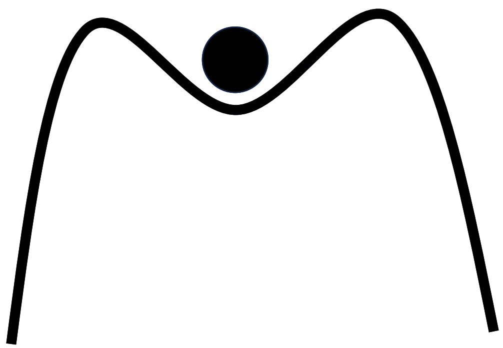
Choosing ERM Strategies – Case Studies

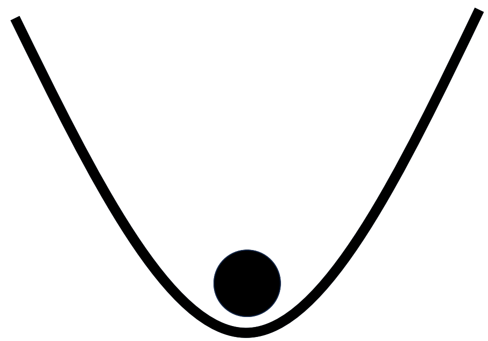
Plural Rationalities

- From Social Anthropology (aka Cultural Theory)
  - Douglas, M. & Wildavsky, A. (1982). *Risk and Culture*. University of California Press.
  - Thompson, M., Ellis, R. & Wildavsky, A. (1990). *Cultural Theory*. Westview Press.
  - Thompson, M. Organising and Disorganising:A Dynamic and Non-Linear Theory of Institutional Emergence and its Implications (2008) Triarchy Press.

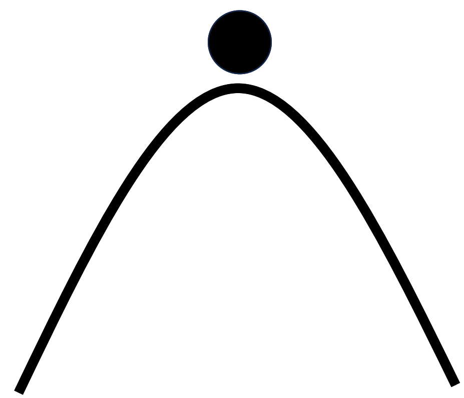
Four beliefs of risk



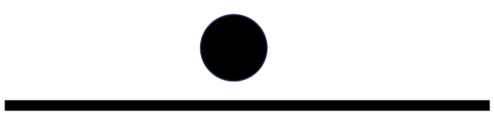
Managers



Maximizers



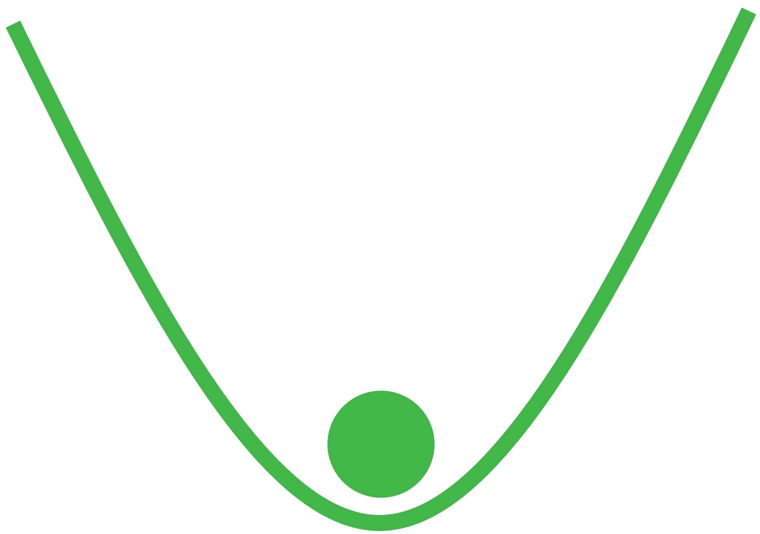
Conservators



Pragmatists

Maximizers' belief

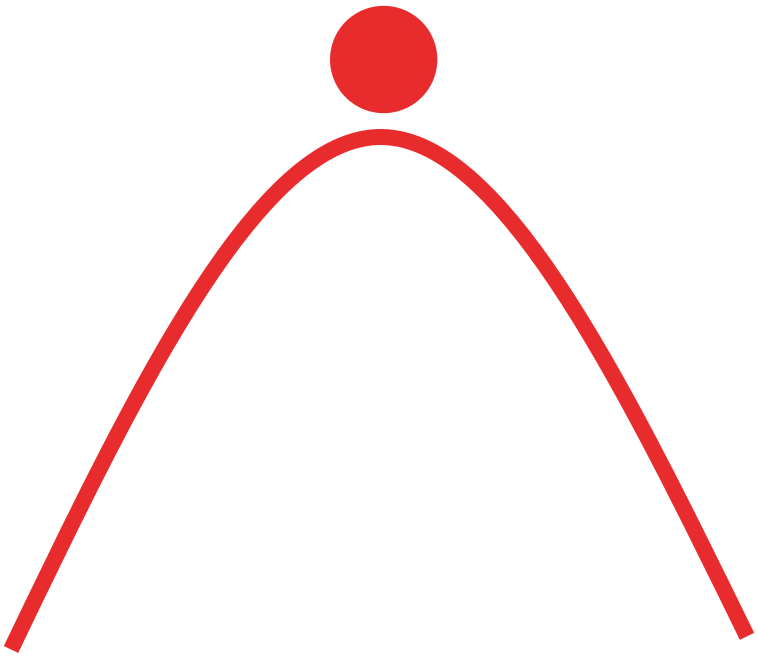
- Risk is not very important – **profits** are important
- It's fine to accept large risks, as long as the price is right
- Risk is mean reverting:
  - Gains will always follow losses
  - The best companies will have larger gains and smaller losses over time



World has High Drift, Low Vol

Conservators' belief

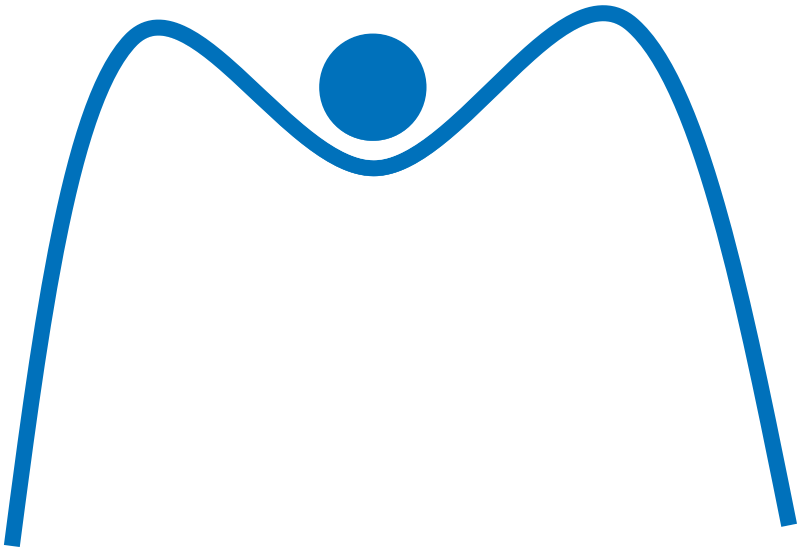
- Increasing profit is not as important as avoiding loss
- Need to **tightly limit** risks
- The world is in a delicate balance
  - Any major change could send things into ruin



World has Negative Drift, Low Vol

Managers' belief

- Risk is measurable and controllable
- Risk and reward should be **carefully balanced**
- Experts are best suited to
  - Help find risks offering the best rewards
  - Manage these risks to keep firm safe



World has Moderate Drift, Moderate Vol

Pragmatists' unbelief

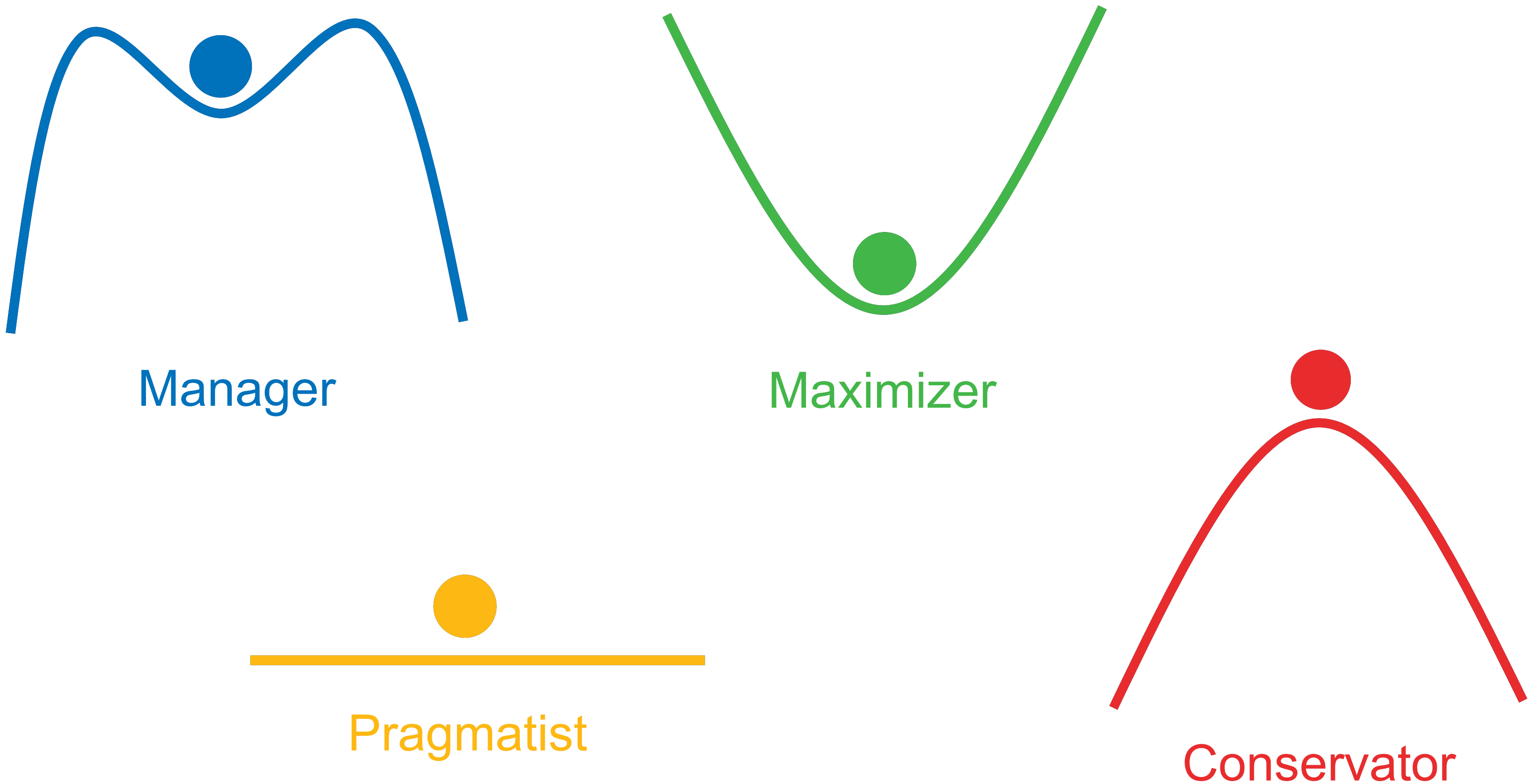
Willis Re MANAGING EXTREMES

- The future is totally unpredictable
- You can't control risk so there is no point in trying
- It is usually best to
  - Avoid major commitments
  - Keep options open
  - Seek **freedom to react** to changing conditions

World has Unknown Drift, Unknown Vol

Poll question

- Would you say that your own risk attitude is:



Poll results

- Would you say that your own risk attitude is:

Attitude	Risk Managers	Single Insurer Employees	Actuaries
Maximizer			
Manager			
Conservator			
Pragmatist			

Poll results

- Would you say that your firm's predominant risk attitude is:

Attitude	Risk Managers	Single Insurer Employees	Actuaries
Maximizer			
Manager			
Conservator			
Pragmatist			

TODAY'S AGENDA

Introduction

The theory of plural rationalities

Risk attitudes and risk strategies

Risk attitude survey

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Choosing ERM Strategies – Case Studies

Risk strategies

- Diversification
- Loss controlling
- Risk trading
- Risk steering

Diversification

- Oldest type of risk
  - Spread exposures across different classes of risks
  - Avoid large risk concentrations
- Formal diversification programs set targets for the spread of risk
  - Maximums and minimums for various classes of risk
- Uneven growth

Loss controlling

- Most traditional form of risk
  - Identify and mitigate the most significant risks
- Commonly practiced by non-financial firms
  - Also applies to financial risk
    - Careful underwriting of loans / insurance policies
    - Claims management & credit workout
- Low growth

Risk trading

- Newer risk strategy
  - Arose from trading desks and the insurance industry
- Focus on getting the price of risk correct
  - Requires complicated models of risk, reward, and economic capital
- Can be applied on a transaction-by-transaction or other “siloed” basis
  - If these firms use Economic Capital, they allocate it to the case level
- Seek high growth

Risk steering

- Applies the ideas of risk trading at a macro level to the major strategic decisions of the firm
  - Seeks the optimal risk / reward balance
  - Tries to steer the firm in that ideal direction
- Fundamentally an enterprise-wide approach
- Almost always tied to Economic Capital Model
- Some seem to think that only risk steering is “real” ERM
- Moderate growth – grow with market

Favorite risk strategies

Conservators	**favor Loss Controlling**
Maximizers	**favor Risk Trading**
Managers	**favor Risk Steering**
Pragmatists	**favor Diversification**

Poll Results

- The predominant risk strategy of my firm is:

Firm Strategy	Risk Managers	Single Insurer Employees	Actuaries
Diversification			
Loss Controlling			
Risk Trading			
Risk Steering			

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Risk attitude survey

- Adapted survey from Dake
  - Dake, K. (1991). Orienting Dispositions in the Perception of Risk: An Analysis of Contemporary Worldviews and Cultural Biases. *Journal of Cross-Cultural Psychology*, 22, 61-82.
- *And* Oltedal, Moen, Klempe, Rundmo
  - Explaining risk perception. An evaluation of cultural theory. Rotunde no. 85, 2004. Norwegian University of Science and Technology, Department of Psychology

Risk Attitude Survey

Risk Attitudes	Agree	Disagree
CONSERVATORS	23.8%	10.0%
MANAGERS	57.7%	0.0%
MAXIMIZERS	40.8%	1.5%
PRAGMATISTS	25.4%	29.2%

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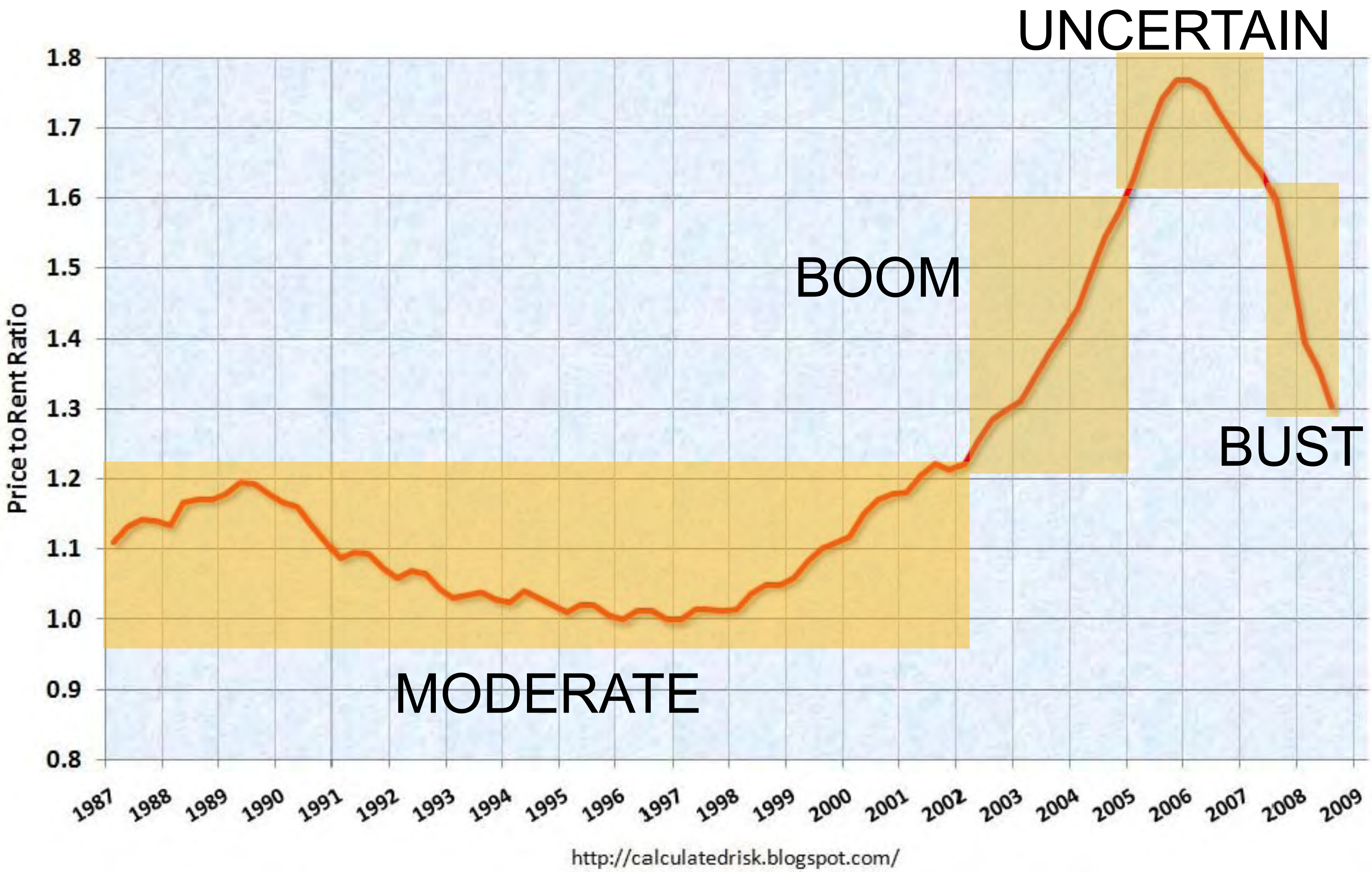
Why do these four risk Attitudes exist?

- Four contradictory views of the world
  - But the world doesn't hold still

- No one view is right all of the time…
- But each of the views is right some of the time

Four seasons of risk



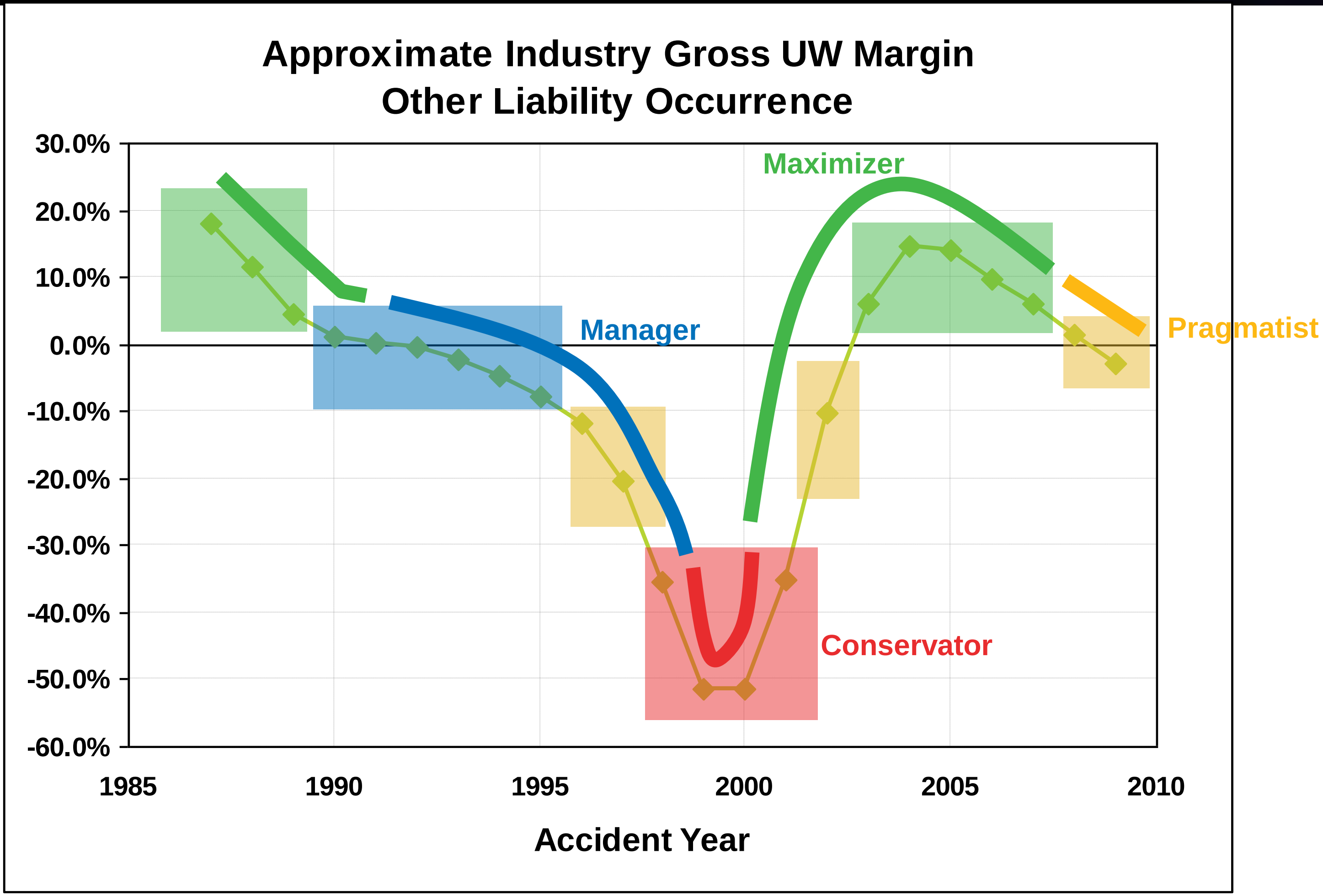
Winner
Best Practical Paper Award

The Human Dynamics of the Insurance Cycle and Implications for Insurers: An Introduction to the Theory of Plural Rationalities

David Ingram, FSA, CERA, FRM, PRM
Alice Underwood, PhD, FCAS

Presented at
2010 Enterprise Risk Management Symposium
Society of Actuaries
April 12-15, 2010

Insurance cycle and risk attitudes



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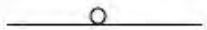
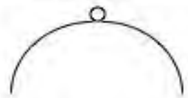
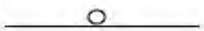
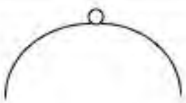
Agent Based Model

- Based Upon Thompson/Tayler
  - The Surprise Game (1984) Warwick Working Papers No. 4. Institute for Management Research and Development, University of Warwick
- Closed World of 30 firms
- Start with firms following all four strategies
- Start in a random environment

Dynamics

- Stresses from firms cause changes in environment
- Success and failure of firms cause them to change strategies (Surprises)

A Typology of Surprises

Expected World \ Actual World	 UNSETTLED	 RECESSION	 BOOM	 NORMAL
 PRAGMATIST (Fatalism)	**ALIGNED No Surprises**	Expected windfalls don't happen	Unexpected runs of good luck	Unexpected runs of good and bad luck
 CONSERVATOR (Egalitarianism)	Caution does not work	**ALIGNED No Surprises**	Others prosper (especially individualistic strategists)	Others prosper (especially hierarchical strategists)
 PROFIT MAXIMIZER (Individualism)	Skill is not rewarded	Total collapse (when none was expected)	**ALIGNED No Surprises**	Partial collapse
 RISK REWARD MANAGER (Hierarchy)	Unpredictability	Total collapse (when only partial was expected)	Competition	**ALIGNED No Surprises**

Pro-cyclical factors

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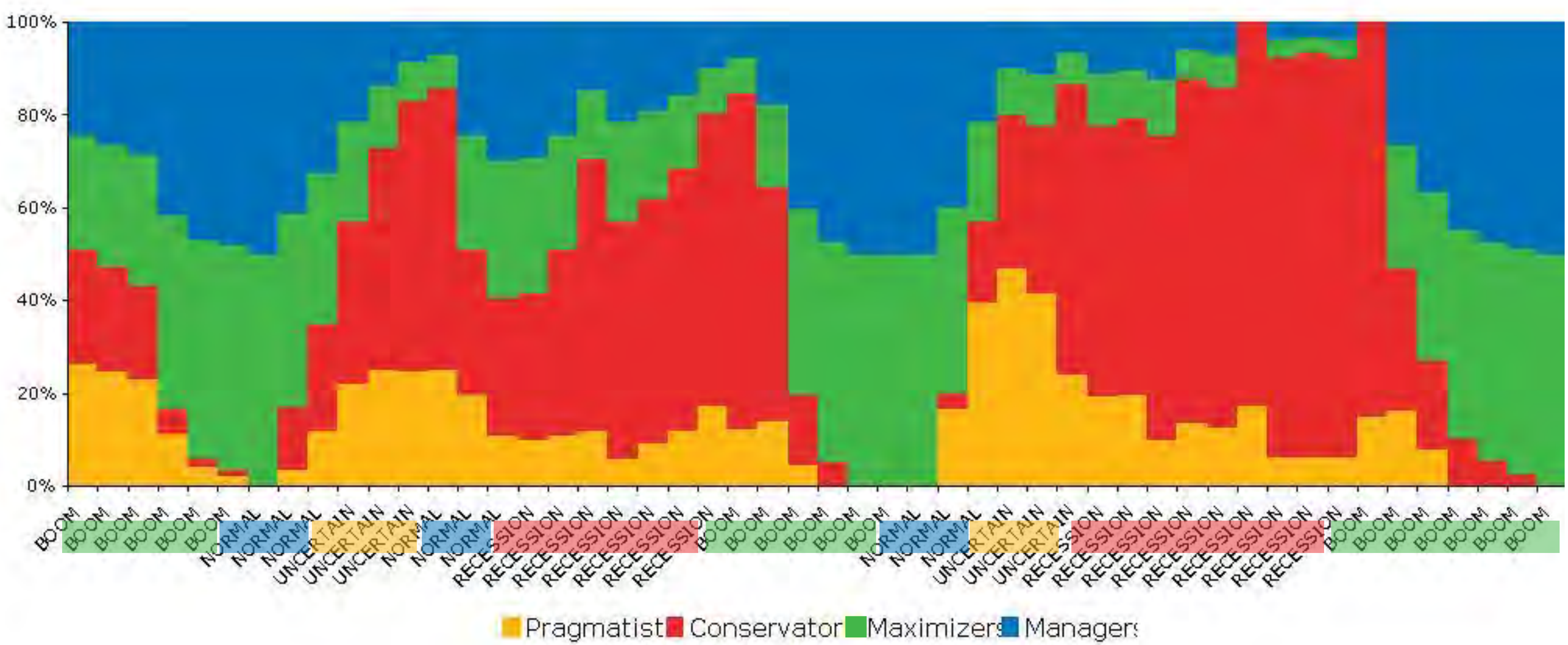
- During each environment
  - Companies following a strategy that aligns with environment achieve their objectives
  - The other groups do not have experience as they expect
  - Timing across firms not synchronized, but close enough to magnify the ups and downs of the market as a whole

Agent-based model



TODAY'S AGENDA

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Risk attitude and ERM

Willis Re MANAGING EXTREMES

- Risk Attitudes can be used to enhance ERM program design and development
  - When first creating an ERM program
    - Align ERM program to predominant risk attitude
    - Instead of using a textbook version of ERM that does not fit with risk attitude
      - Usually rejected as irrelevant or even dangerous
  - When enhancing an existing ERM program
    - To recognize and support multiple risk attitudes

Favorite risk strategies

Conservators	**favor Loss Controlling**
Maximizers	**favor Risk Trading**
Managers	**favor Risk Steering**
Pragmatists	**favor Diversification**

ERM development objectives

	LOSS CONTROLLING	RISK TRADING	RISK STEERING	DIVERSIFICATION
Risk Management Systems	Strict limits Strict authorities	Flexible Opportunities	Formal policies and standards CRO	Flexible High communication
Risk Models	Stress testing	Pricing models Rating agency	Economic capital & value	Simplified economic capital
Risk Management Reports	Limit breaches Emerging risks Extreme loss	Profit and risk weighted sales	ROE Capital budget	Risk aggregates & concentrations

Focus on strengths or weaknesses?

Rational adaptability

Risk Environment	BOOM	BUST	UNCERTAIN	MODERATE
Risk Attitude	Maximizer	Conservator	Pragmatist	Manager
Risk Management Strategy	Risk Trading	Loss Controlling	Diversification	Risk Steering

A perfect ERM program will adapt to the risk environment

Agent-based model: preliminary findings

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Stay the Course			
Attitude	Average Return	Std Dev Return	Failure Rate
Pragmatists	0	15.3	10.61%
Conservators	0	5.39	0.01%
Maximizers	4.28	32.08	26.96%
Managers	2.88	17.96	12.90%

Adaptation			
Adaptability	Average Return	Std Dev Return	Failure Rate
0%	-1.69	19.35	19.97%
25%	1.94	20.12	16.09%
50%	5.56	20.21	12.19%
75%	9.19	19.64	8.32%
100%	12.81	18.46	4.76%

Be realistic

- Rational adaptability is an ideal strategy
- Almost impossible to simultaneously
  - Know when the risk environment shifts
  - Do what it takes to
    - Shift the firm's risk attitude
    - Execute the new risk strategy competently

Harmonization

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- Practical alternative to Rational Adaptability "perfection"
  - An inelegant solution
- Keep all four risk attitudes in the discussion
  - Create compromise strategies
- Must be more than superficial
  - Important to truly value all views of risk
  - Really believe that there is no totally wrong view
- Keep your eye on the rational adaptability ideal
  - Operate somewhere between "stay the course" and rational adaptability
  - Over time getting closer and closer to the ideal

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CASE STUDIES

- Eight Insurers from Canada, Peru, UK, Australia, Korea, Germany, Bermuda and USA
- How do they choose to manage specific risks
  - Insurance, Investment, Reserves, Operational
- How do they approach Enterprise Risks

Investment Risk - Approaches

- Large Investment team. Active management and trading. Exploit opportunities in the market. Within risk tolerance framework.

MAX

- Need assets to back liability risks - low risk investment portfolio could actually increase total risk – need to match liabilities

MGR

- Favor Indexing. Do not believe that there is any additional reward to be had without additional risk. Low risk investment portfolio. Do not want to lose any money from taking investment risk.

CON

- High scrutiny of largest exposures.
- Diversification Targets (secondary approach)

PRAG

Insurance Risk Approaches

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- Set boundaries within our risk appetite as well as zero tolerance qualitative risks - where we will not go. If warranted, the risk appetite could be revised, would require exec and board approval first

  MGR

- Written in risk appetite that we will not accept any risk that is not understood at senior exec level (regardless of potential return)

  CON

- Consult models for all risk related decisions, but no longer rely solely on models

  MGR

- Aspire to calculate and allocate capital by line of business for risk reward decision making

  MGR

Reserve Risk Approaches

- Very proud of track record of few or no reserve strengthenings needed.

CON

- Reserve process is highly technical

MGR

- Will tend to set initial reserves close to pricing assumptions, presuming that they got it right.

MAX

- Set reserves conservatively for cat prone book, small margin for short tailed non-cat book

PRAG

Operational Risk Approaches

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- Limits and Control Cycle
- Have formal methodology to deal with Reputation Risk.
  - Crisis management committees.
  - Polling of execs and public.
  - Proactive for negative press.
  - Not part of risk management function.
- Zero tolerance for operational losses. Take extra care even if it costs more and slows things down.
- No Operational Risk approach articulated by 4 firms

MGR

MGR

CON

PRAG

Enterprise Risk Approach

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- Have or will soon have a formal Economic Capital Model and Capital Budgeting process. **MGR**
- Use Regulatory risk factor formula to estimate aggregate risk and allocate capital **MGR**
- Current focus is on Maximum Loss and keeping a wide margin above that level **CON**
- ERM not exclusively about Economic Capital
  - None had a strong belief in the accuracy of their correlation assumptions **PRAG**
- Collaborating across risk silos to proactively mitigate effects of combinations of risk and interactions of risks **MGR**

One Firm's Choices

- Cat Risk – Diversification of Exposures – Quake, Wind, Flood – diverse locations

PRAG

- Other Insurance Risks – Trading – sell at the right price – risk is low concern

MAX

- Operational Risk - Loss Controlling – not paid for risk
  - Choose controls based upon cost benefit

CON

- Credit & Investment Risk – Steering using efficient frontier – with a long term view for strategic asset allocation.

MGR

- Credit & Investment Risk – Tactical variations on SAA will be based upon short term view of markets

PRAG

CHOICES & CHOOSING CONCLUSIONS

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"Our greatest foes, and whom we must chiefly combat, are within." Miguel de Cervantes

Recent Papers & Articles

Willis Re MANAGING EXTREMES

- Wilmott Magazine
  - The Human Dynamics of the Credit Crisis and Implications for the Afterlife. January 2010 (Ingram)
  - A Universe in Four Parts. March 2010 (Ingram, Thompson)
  - Surprise, Surprise May 2010. (Ingram, Thompson, Tayler)
  - Eyes Wide Open: Towards Rational Adaptability. July 2010 (Ingram, Thompson)
- Actuary Magazine
  - Four Seasons of Risk Management. December 2009 (Ingram)
  - Full Spectrum of Risk Attitude. August 2010 (Ingram, Underwood)
  - Fabric of ERM. December 2010 (Ingram, Underwood)
  - Changing Seasons of Risk Attitudes. April 2011 (Ingram, Thompson)
- ERM Symposium/SOA Monograph
  - The Human Dynamics of the Insurance Cycle and Implications for Insurers: An Introduction to the Theory of Plural Rationalities. January 2011 (Ingram, Underwood)
- Unpublished
  - SURPRISE, SURPRISE: From Neoclassical Economics To E-Life (Thompson, Ingram, Tayler)
  - Collective Approaches to Risk in Business: An Introduction to Plural Rationalities (Ingram, Bush)

Thank you!

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