



# RISK IDENTIFICATION, EMERGING RISK PERSPECTIVES AND COMPLEXITY SCIENCE APPLICATION

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October 16, 2012 2-3:15 pm  
Session 99PD

# WHAT ARE EMERGING RISKS

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- Evolving risks (creeping, mean reverting)
  - Public pension guarantees
  - Home mortgage market
- Tail risk (recently unseen)
  - Earthquake/asteroid/black plague
- Correlations of risks
- Rumsfeld's Knowns and Unknowns

# EMERGING RISKS

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- May be internally or externally generated
  - Higher order impact (e.g., oil spill/tourism)
  - May be positive event (e.g., nanotechnology)
- Next big risk is likely to be something new

# AVOIDING THE “PERFECT STORM”

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- Environmental scanning
- Mean reversion (Perfect Sunrise)
- Gaussian copout
  - Once per century events don't happen 4 days in a row
  - Is New Madrid fault frequency really independent from severity?

# SURVEY

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- Emerging risks originally developed by World Economic Forum (23)
- Top 5 emerging risks (including #1)
- Leading indicators
- Combinations of risks
- Current topics

# EMERGING RISKS

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- Economic
  - Oil price shock
  - Fall in value of US \$
  - Chinese economic hard landing
  - Financial volatility
  - Blow up in asset prices
- Environmental
  - Climate change
  - Freshwater loss
  - Tropical storms
  - Earthquakes
  - Inland flooding

# EMERGING RISKS

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- Geopolitical
  - International terrorism
  - Weapons of mass destruction
  - Interstate/civil wars
  - Failed and failing states
  - Transnational crime
  - Globalization fallback
  - Regional instability
- Societal
  - Pandemics / Infectious diseases
  - Chronic diseases
  - Demographic shift
  - Liability regimes
- Technological
  - Cyber security / Interconnectedness of critical infrastructure
  - Technology / Space weather

# CURRENT ENVIRONMENT MATTERS

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## April 2008

- Oil price \$114
- S&P 500 1,386
- Currency 1.56 \$/Euro

## November 2008

- Oil price \$68
- S&P 500 969
- Currency 1.27 \$/Euro

## October 2011

- Oil price \$79
- S&P 500 1,131
- Currency 1.34 \$/Euro

## Fall 2012

- Oil price \$95-100
- S&P 500 1,400-1,500
- Currency 1.31 \$/Euro

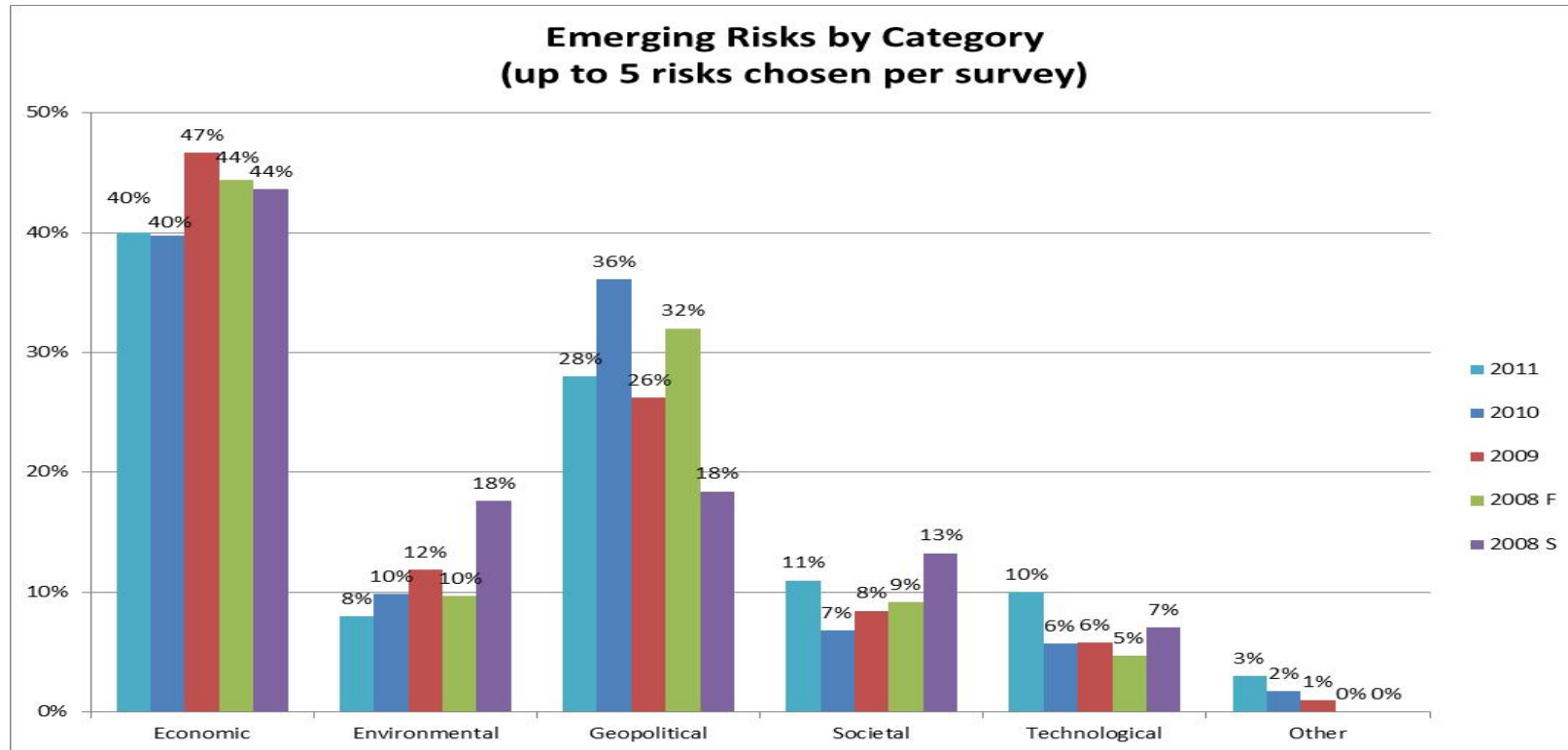


# ANCHORING – BEHAVIORAL FINANCE

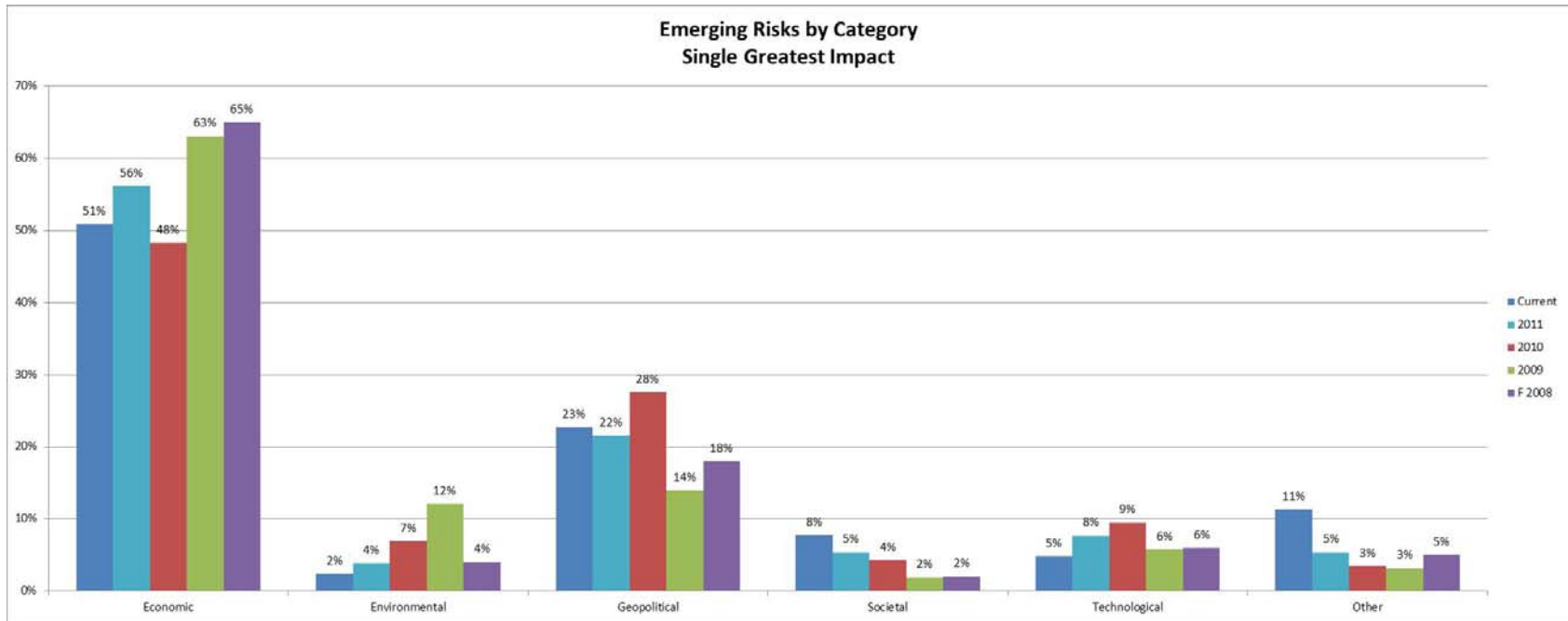
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- April 2008
  - 57% Oil price shock
  - 40% Climate change
  - 40% Blow up in asset prices
- October 2011
  - 68% Financial volatility
  - 42% Failed and failing states
  - 38% Cyber security/ Interconnectedness of infrastructure
  - 32% Chinese economic hard landing
  - 32% Oil price shock
  - 32% Regional instability

# TOP EMERGING RISKS



# TOP CATEGORY

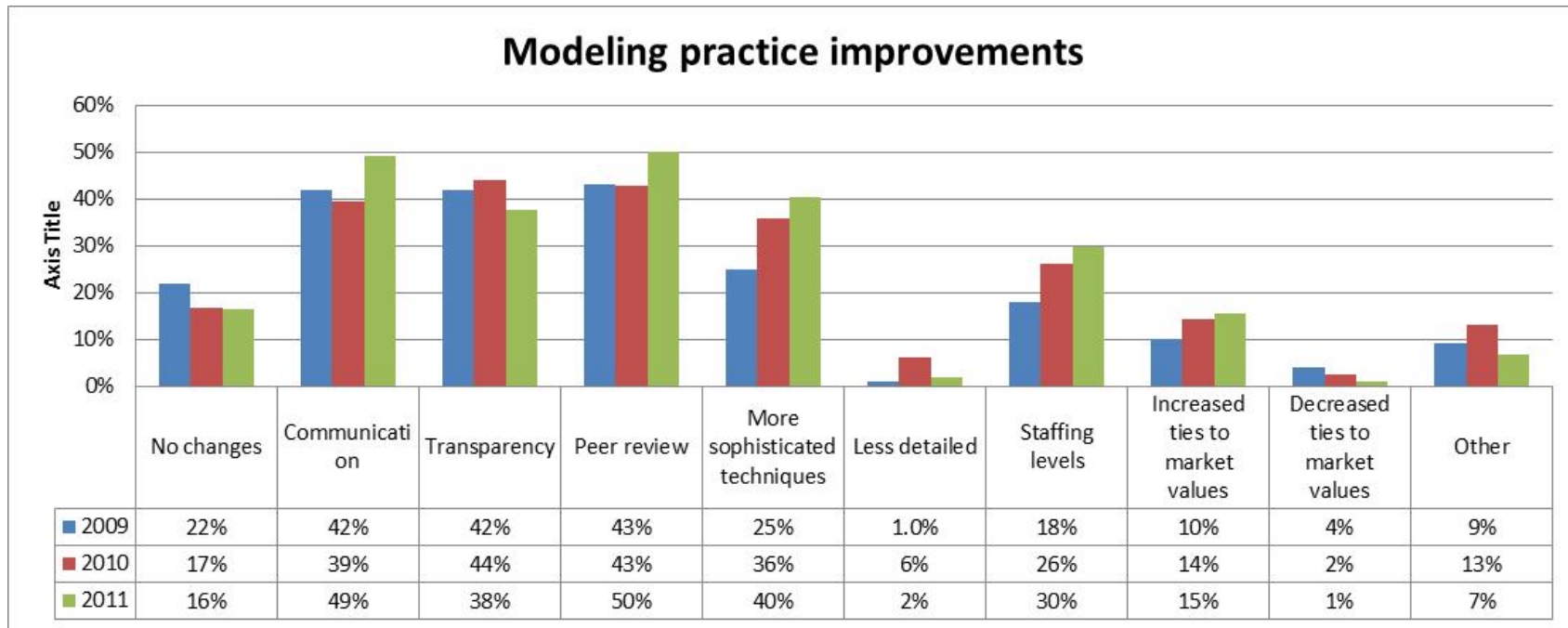


# LEADING INDICATORS

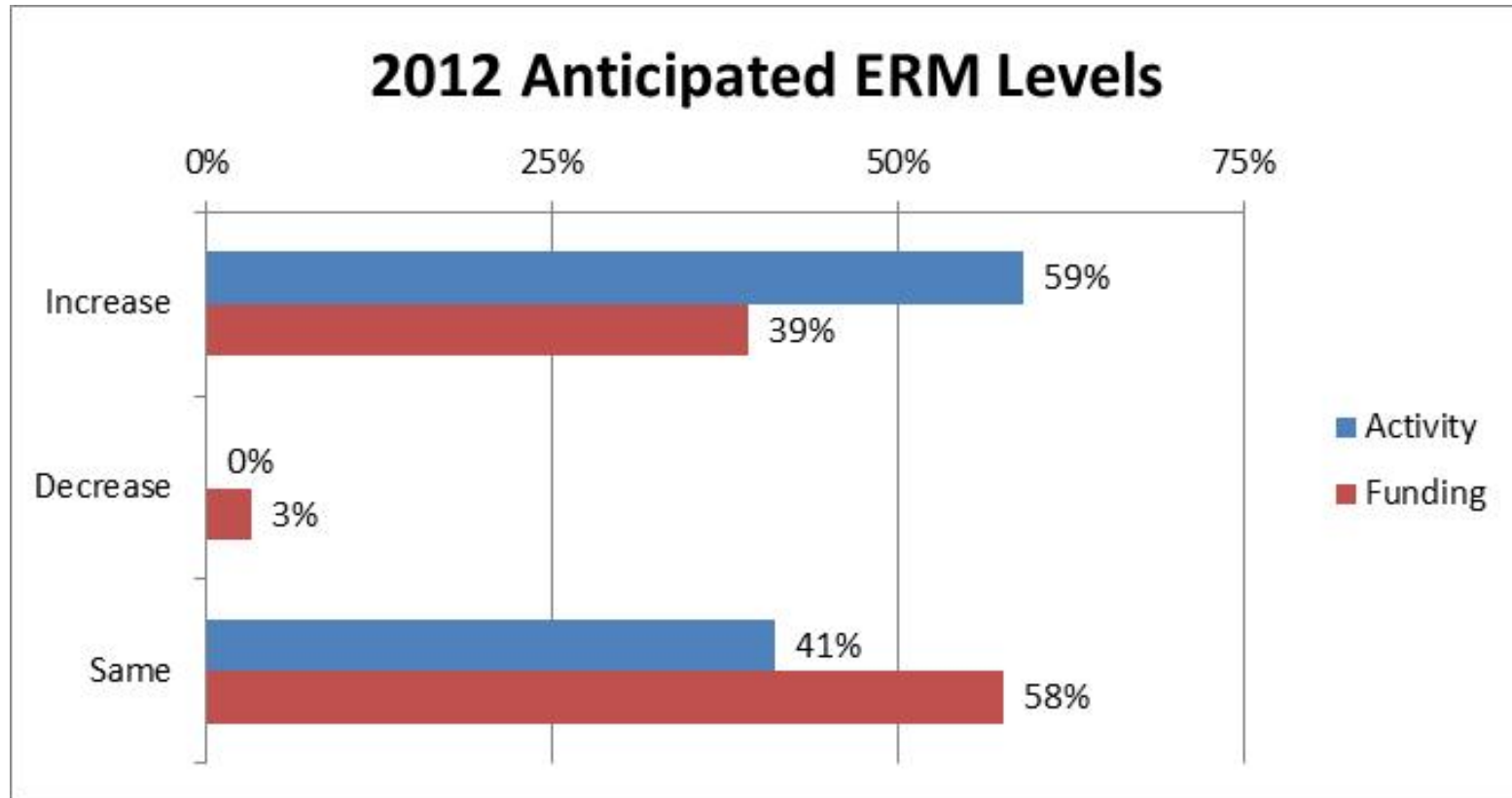
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- Over 50% identify leading indicators
  - sea surface temperatures
  - WHO pandemic alert level
  - CO<sub>2</sub>
  - CPI, GDP, value of the dollar, gold price, oil price, US deficit, US debt, CDS rates, unemployment, interest rates
  - solar activity
  - water supplies
- **“mostly by the seat of our pants”**

# PREPARING FOR ORSA

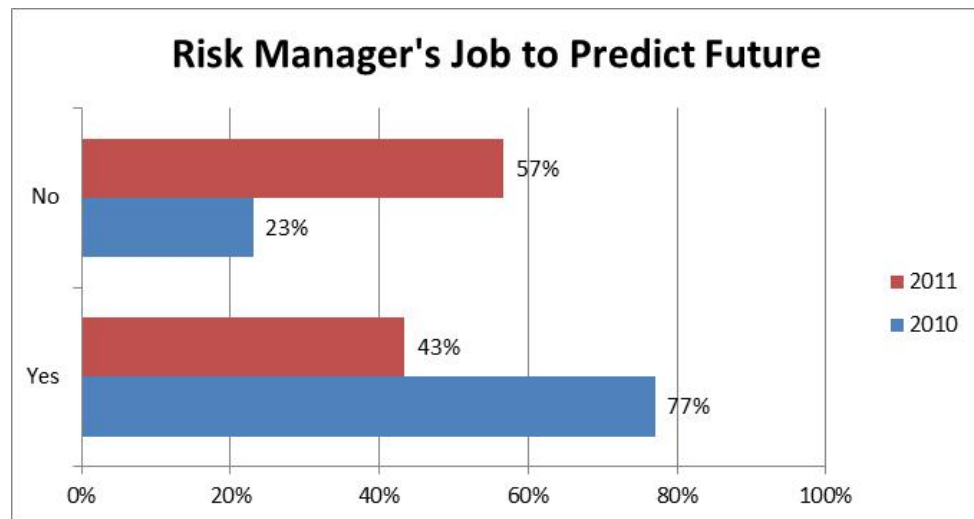


# DOING MORE WITH LESS?



# PREDICTING THE FUTURE

- Predicting potential outcomes
- Not predicting actual future events
- **“to be prepared to react is the goal”**
  - Flexibility
  - Common sense



# INTERESTING REVELATIONS

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- Geopolitical risk evolving from terrorism to failing states and regional instability
- Financial volatility dominance (40% pick #1)
- Worried about China
- Cyber security becoming a concern but not space weather
- Climate change trending down



# TO ACCESS PRIOR SURVEYS

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- <http://www.soa.org/research/research-projects/risk-management/research-2011-emerging-risks-survey.aspx>
- Article in August 2010 issue of The Actuary: Challenging the Herd
- <http://www.soa.org/library/newsletters/the-actuary-magazine/2010/august/act-2010-vol7-iss4.pdf>
- 2010 survey article  
<http://www.soa.org/library/newsletters/risk-management-newsletter/2011/august/jrm-2011-iss22-rudolph.pdf>

# THANK YOU!

## MAX J. RUDOLPH FSA, CFA, CERA, MAAA

- Rudolph Financial Consulting, LLC
  - Design/peer review ERM and ALM strategies
  - Leverage ORSA and Risk Focused Exams
  - Continuing education and research: modules, seminars, newsletter, predictions
  - Facilitate board level ERM sessions
- Professionalism
  - SOA Board of Governors
  - Investment Section Chair
  - Actuarial Standards Board, ERM Task Force
  - SOA President's Award



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