Enterprise Risk Management:
Modeling, Evidence, and Emerging Market Implications

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Agenda

- Overview of Enterprise Risk Management (ERM)
- Challenges in ERM implementation/academic literature advancement
- Emerging markets implications

Risk Management is Dull!

- What comes to mind?
  - Insurance? Actuaries? Accountants?
- Traditional view of risk management and traditional role of risk manager
- Financial risk management
  - Came later, as a completely separate function
  - Thought we did it well
- So it is dull
  - That is, until ERM came to surface and the financial crisis happened

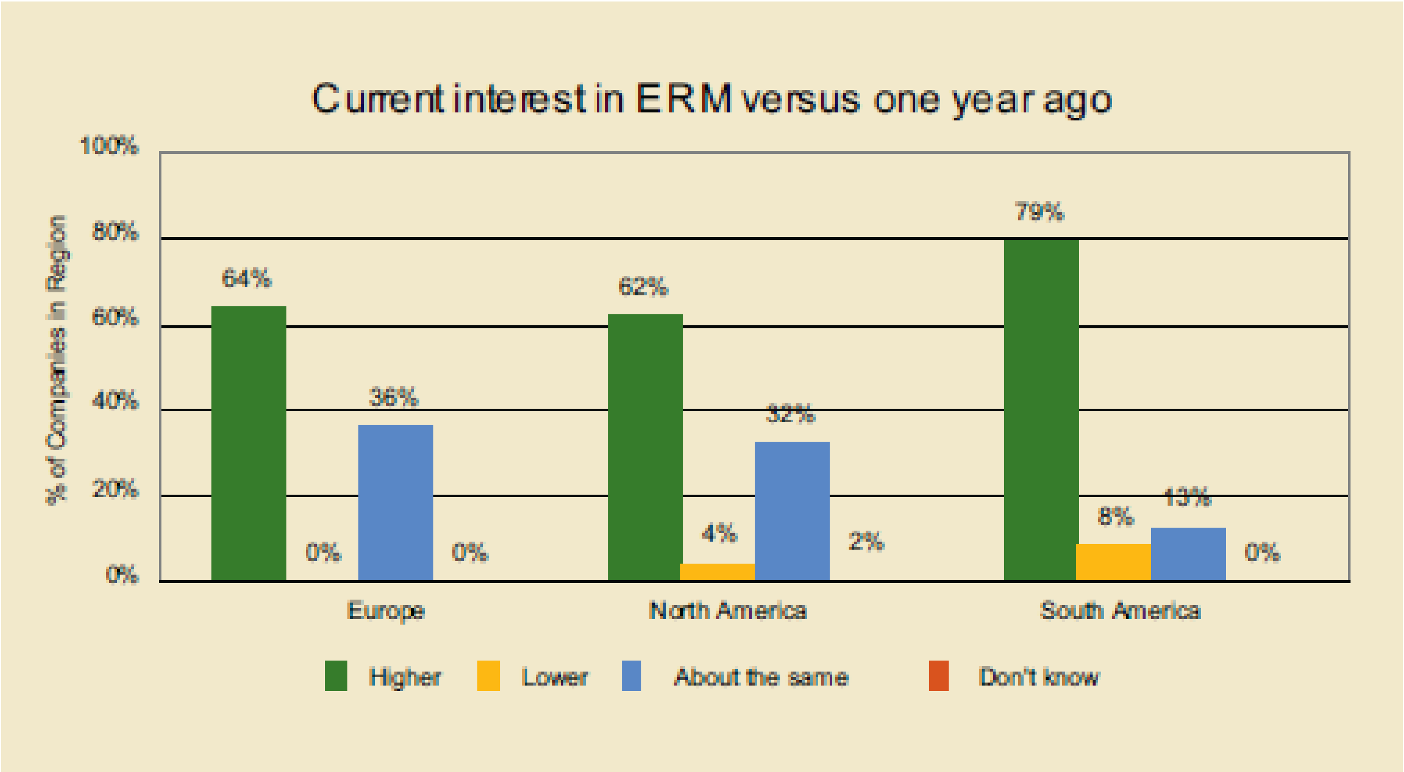
ERM-The Buzz Word

- One of the twenty breakthrough ideas for 2004 by Harvard Business Review
  - COSO ERM framework (2004)
- In 2011, while 17% of firms had their ERM programs fully integrated across the organization, 80% of organizations either had already or were in the process of developing an ERM program*
- A few frequently mentioned words
  - Chief Risk Officer (CRO)
  - risk appetite
  - risk prioritization
  - natural hedges

*Source: RIMS. 2011.*RIMS Benchmark Survey on Enterprise Risk Management*, www.rims.org.

High Interest in ERM

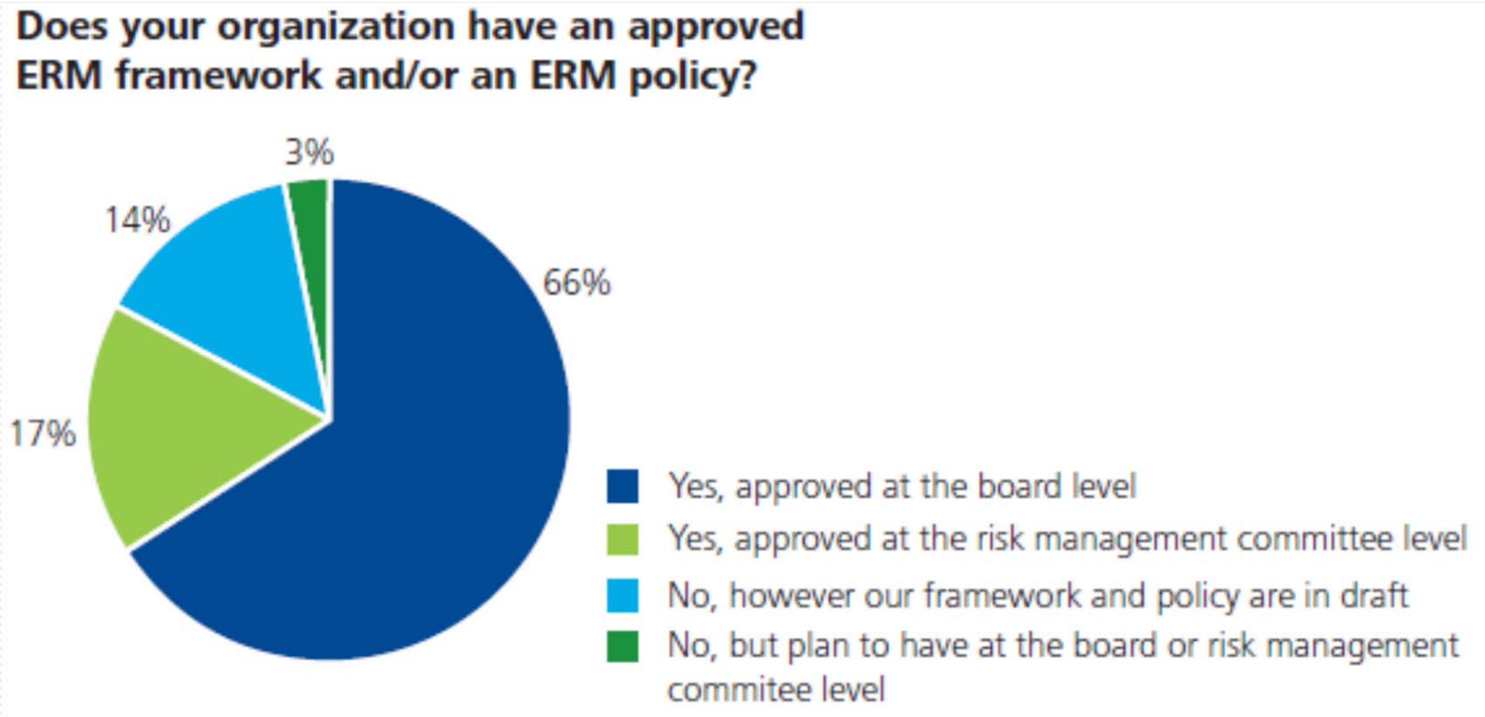
- General industries (other than financial)



Sources: Exhibit 2 from *Perspectives on ERM and the Risk Intelligent Enterprise*, Deloitte, 2008, pp7

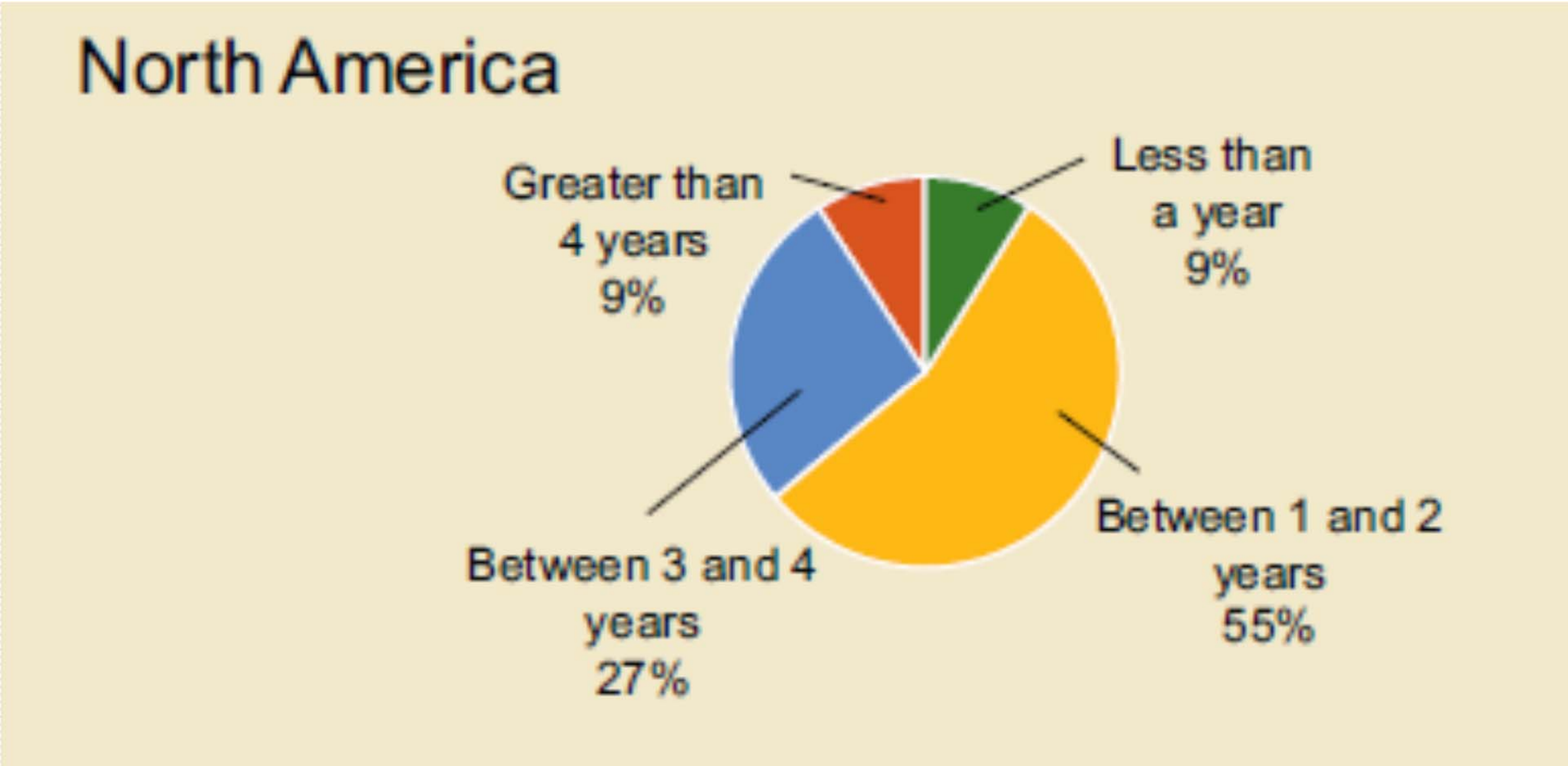
High Interest in ERM

- Financial industries



Sources: Exhibit 7 from *Global Risk Management Survey: 6th Edition*, Deloitte, 2009, pp9

Stages of ERM Implementation



Sources: adapted from Exhibit 15 from *Perspectives on ERM and the Risk Intelligent Enterprise*, Deloitte, 2008, pp16

ERM Implementation in China

- In 2006, SASAC in China (the State-owned Assets Supervision and Administration Commission) issued "ERM Guidelines for Central Government Owned SOEs (SOECG)"
  - Stipulates that starting from the year 2006 all SOECGs should "gradually adopt an ERM program at their own pace"
  - The strong motivation for the SOEs to satisfy regulatory requirements
  - Provides standard languages leading to a clear choice of keyword search
- Also seen, to a lesser degree, in private listed firms

ERM Implementation in China

Panel A: firm-year distribution for SOECGs			
	NONEAST	EAST	TOTAL
ERM=0	401(68%)	471(56%)	872(61%)
ERM=1	191(32%)	377(44%)	568(39%)
TOTAL	592(41%)	848(59%)	1440(100%)
Panel B: firm distribution for SOECGs			
ERM=0	44(41%)	50(32%)	94(35%)
ERM=1	63(59%)	108(68%)	171(65%)
TOTAL	107(40%)	158(60%)	265(100%)
Panel C: firm-year distribution for ALL LISTED			
ERM=0	2454(89%)	4164(87%)	6618(88%)
ERM=1	313(11%)	597(13%)	910(12%)
TOTAL	2767(37%)	4761(63%)	7528(100%)
Panel D: firm distribution for ALL LISTED			
ERM=0	422(77%)	855(81%)	1277(80%)
ERM=1	124(23%)	201(19%)	325(20%)
TOTAL	546(34%)	1056(66%)	1602(100%)

*Ai et al. (2013), sample period: 2006-2011

What is ERM?

- The objective is to maximize value for stakeholders
- Manage risks of an organization holistically in a portfolio
  - In a well-designed enterprise risk management (ERM) program, the firm integrates risk management into the strategic planning process across the organization, addressing strategic, financial, operational, and hazard risks under a single overarching process

Basic Risk Types in Corporations

- Hazard risk
  - E.g., fire, theft, windstorm, liability, etc.
  - Traditionally handled by insurance
- Financial risk
  - Due to changes in financial markets
  - E.g., interest rate risk, foreign exchange rate risk, credit risk, etc.
  - Traditionally handled by financial instruments
- Operational risk
  - A broad, somewhat ambiguous definition
  - E.g., IT system failure, management fraud
- Strategic risk
  - E.g., technology innovation, regulatory or political impediments, reputation damage

Driving Forces of ERM

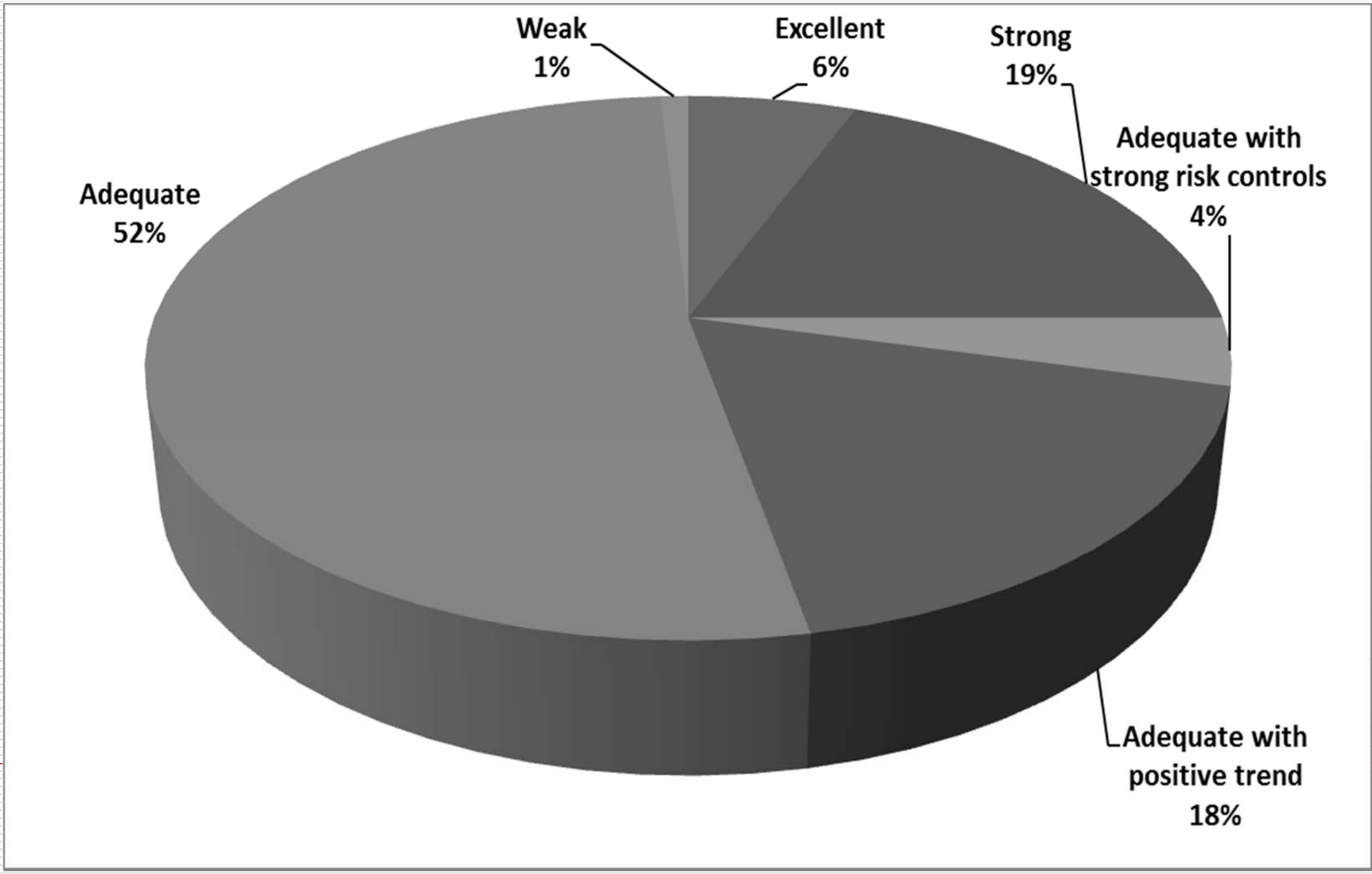
- Regulatory Compliance
  - Sarbanes-Oxley Act (2002)
  - COSO ERM Framework (2004)
  - Basel II Capital Accord (2006)
  - NAIC's new regulatory standard "Own Risk and Solvency Assessment (ORSA)" expected to provide a major push toward advancing the commitment to ERM as a value-enhancing strategy for U.S. insurers at all levels

Driving Forces of ERM

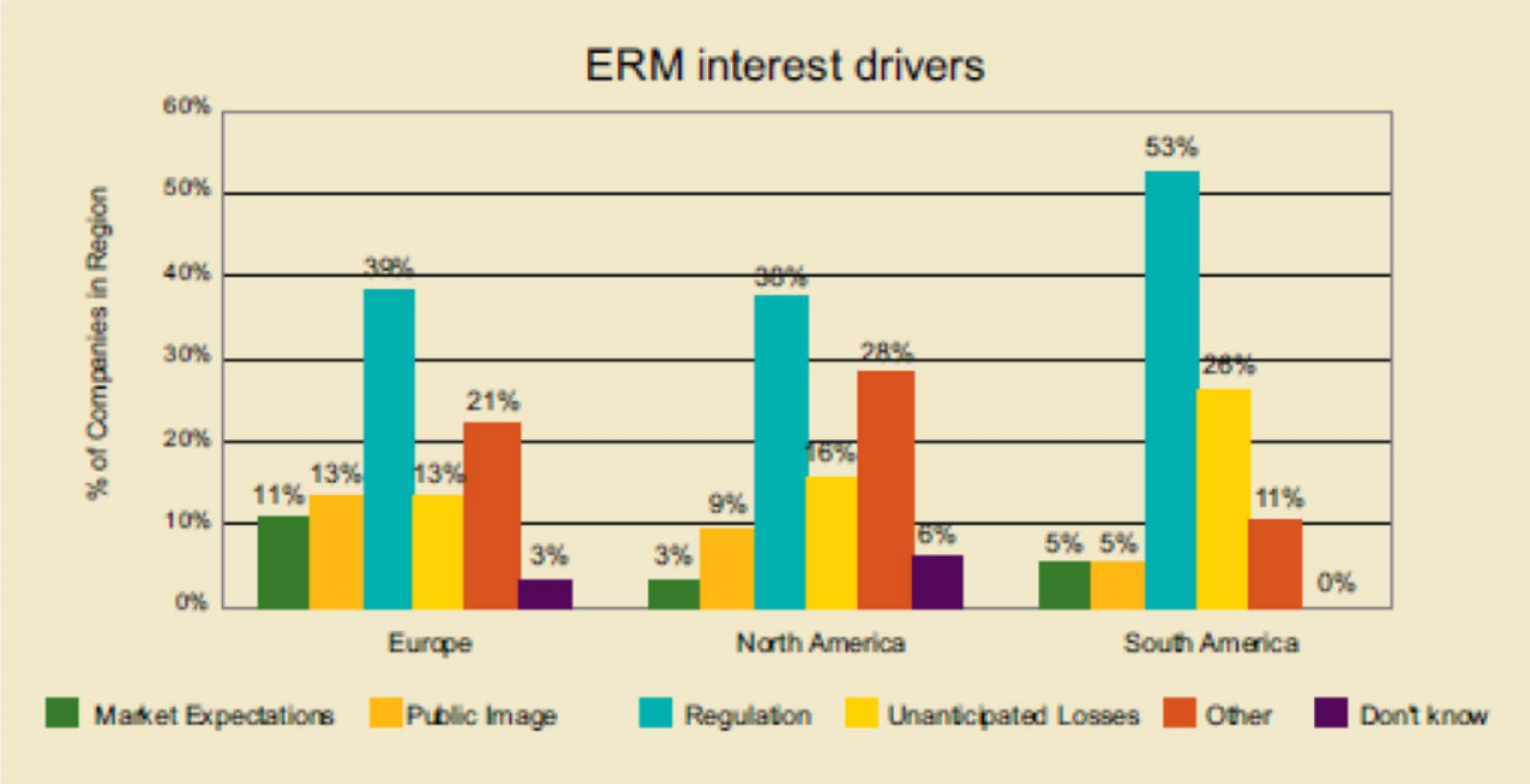
- Best practice standard
  - Standard & Poor's (2005, 2006, 2008)
  - A. M. Best (2007)
- Other stakeholders
  - Shareholders
  - Business partners
  - Employees
  - Management
  - Others

Driving Forces of ERM

- S&P ERM Rating Scores for P&C Insurance Companies, December 2011



Driving Forces of ERM



Sources: Exhibit 3 from *Perspectives on ERM and the Risk Intelligent Enterprise*, Deloitte, 2008, pp7

What is OLD about ERM?

- Risk management process
  - Identify risk exposures
    - Pure and financial risk exposures
    - Other risk exposures
  - Quantify risk exposures/risk measurement
    - Loss frequency and severity
    - All the fancy models
  - Design a risk management program
    - Retention, Insurance, Hedging
    - ERM
  - Implement, monitor, and evaluate the program

What is NEW about ERM?

- Manage all risk exposures in an integrated or holistic manner
  - Risks are also opportunities
  - Risk taking is guided by a carefully determined "risk appetite"
  - Risks may be correlated and the correlations can be exploited ("natural hedges")
  - Some risk exposures are more important (or have a higher priority) to the firm ("risk prioritization")
  - A dollar loss caused by a fire is the "same" as a dollar loss caused by price drop ("risk integration")
  - Risk culture, communication, and ownership

Perspectives on Risk Prioritization

- What are the two most significant risks (in 2010)?

	Total	Financial services	Media & entertainment	Construction & property	Healthcare services	Retailing
Financial	53.6 %	46.3 %	53.1 %	52.5 %	54.7 %	70.6 %
Business growth	26.9 %	14.8 %	29.7 %	28.8 %	5.7 %	35.3 %
Operational	24.1 %	18.5 %	26.6 %	27.1 %	24.5 %	31.4 %
Regulatory	21.0 %	53.7 %	14.1 %	10.2 %	26.4 %	9.8 %
Macroeconomic	19.1 %	29.6 %	12.5 %	22.0 %	3.8 %	17.6 %
Political	14.3 %	7.4 %	4.7 %	22.0 %	39.6 %	0.0 %
Reputational	8.7 %	20.4 %	12.5 %	6.8 %	7.5 %	11.8 %

Sources: A New Risk Equation, Grant Thornton, 2010, pp9

Challenges in ERM

- General industries (other than financial)

	Moderate or Significant Challenge	Not a Challenge
Difficulty in measuring and assessing risks	47%	5%
Time and costs required to implement	47%	5%
Lack of understanding of the benefits of the integrated management of risk across the enterprise	46%	6%
Lack of in-house skills	39%	12%
Lack of support among management	35%	17%
Difficulty in proving the business case	35%	15%
Higher/redundant cost for managing risk at both corporate and business unit level	31%	17%
Competing initiatives (e.g., SOX)	29%	19%
Regulatory or legal issues	20%	30%

Sources: Exhibit 8 from *Perspectives on ERM and the Risk Intelligent Enterprise*, Deloitte, 2008, pp11

Challenges in ERM

- Financial industries

Sources: Exhibit 10 from Global Risk Management Survey: 6th Edition, Deloitte, 2009, pp12

Challenges in ERM

- Models/technologies
  - Specific techniques (e.g., risk measures, dependency modeling, EC model)
  - Incorporate risk management into the decision making process
  - Information systems, technologies
- Management support
  - In 2010 >3/4 of executives recognize value of ERM as compared to <1/2 in 2008*
- Risk cultures and other "soft" issues
  - Unique Asia-Pacific cultures
    - E.g., Risk aversion? Collectivism?

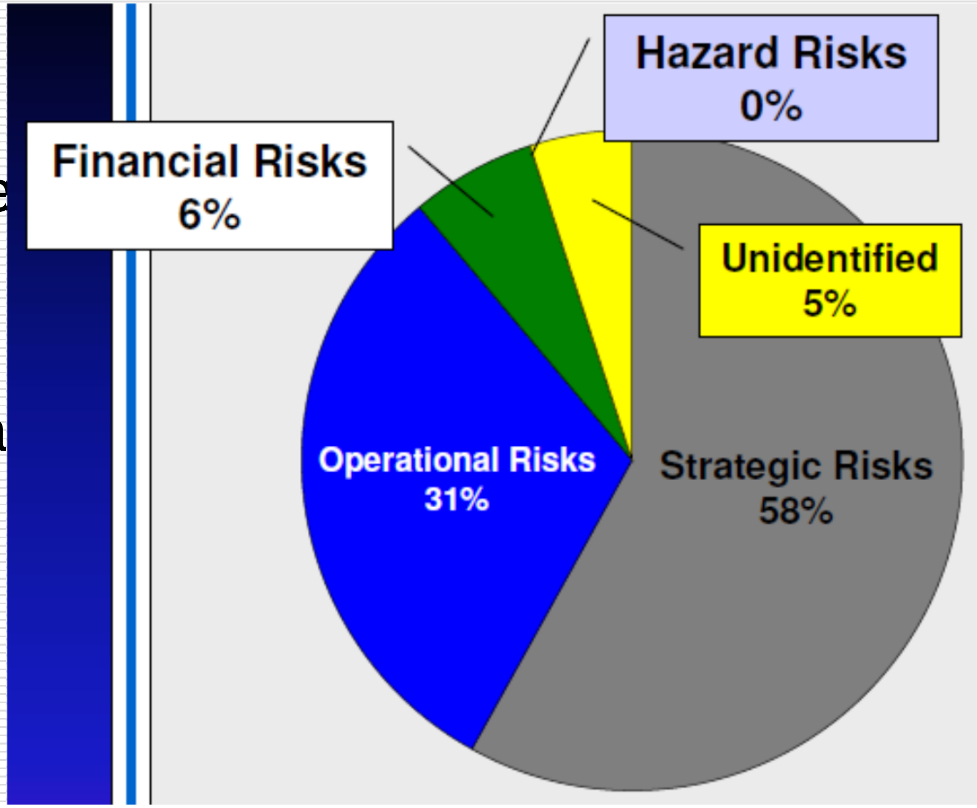
*Sources: Exhibit 7 from *Global Risk Management Survey: 7th Edition*, Deloitte, 2011, pp14

Issues to Consider in ERM Implementation

- Operationalization of ERM
  - Back to the basics (identification and measurement)
    - E.g., Cargill's exposure to political risk: rice plant seized by Venezuelan government in April, 2009
    - E.g., AIG's huge financial risk exposure associated with credit default swaps
  - Integrate risk management into business strategic decision making, dependency modeling (e.g., Ai et al. 2012, Ai et al. 2013)

Issues to Consider in ERM Implementation

- Emerging and difficult risk categories
  - Operational risk
    - Dahen and Dionne (2010)
  - Weather related risk
    - E.g., Brockett et al. 2005, 2009, Ai et al. 2013
  - Strategic risk
  - Reputation risk



Source: Kingson presentation, PRMIA, November 24, 2003

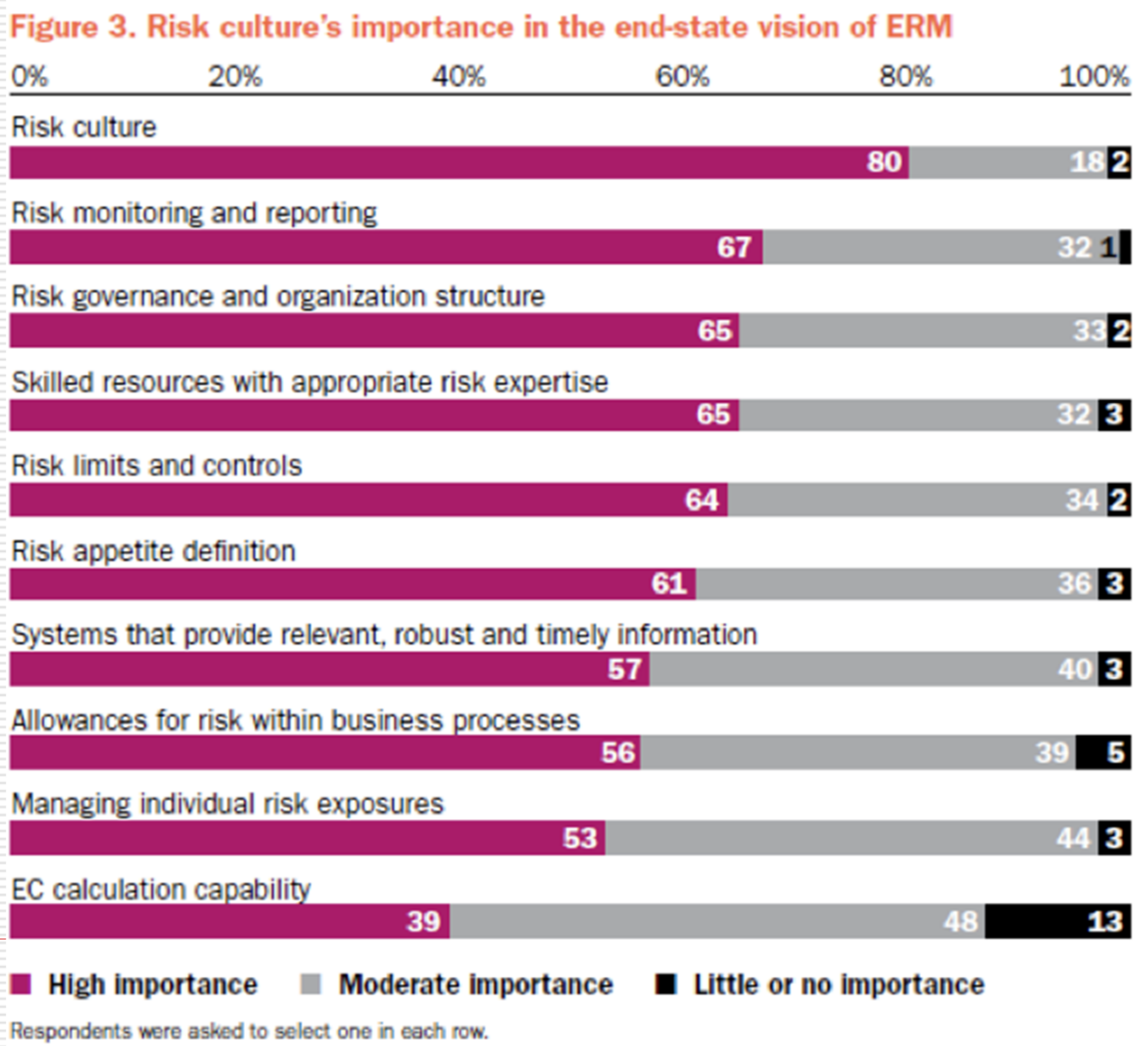
Issues to Consider in ERM Implementation

- What firms implement ERM?
  - Larger, highly leveraged, public firms
  - Liebenberg and Hoyt (2003), Kleffner et al. (2003), Beasley et al. (2005)
- Value of ERM (value of corporate RM)
  - Hard to make a case for the value from what never got to happen in the first place
  - Empirical evidences
    - Improve accounting performance, market performance, revenue and cost efficiencies
    - Grace et al. (2010), Hoyt and Liebenberg (2011), Ai et al. (2013a and 2013b)/ McShane et al. (2011), Pagach and Warr (2011), Lin et al. (2012)

Issues to Consider in ERM Implementation

- Building a strong risk culture
  - “the system of value and behaviors present throughout an organization that shape risk decisions” (*Business Week*, May 12, 2009)
  - Understand the business
  - Determine the risk appetite (in the context of the industry, the peers, and other stakeholders)
  - Facilitate effective risk communications horizontally and vertically
  - Establish risk ownership from the top to the bottom
  - “It is not just the model that matters, it is the mindset” (Knowledge at Wharton, April 2009)

Issues to Consider in ERM Implementation



Source: Towers Watson, 2012. Global ERM Survey: Keep Your Eye on the Prize

Issues to Consider in ERM Implementation

- Business planning for crisis
  - E.g., BP Oil Spill Disaster, April 2010
  - Beyond the models for regular periods of times
  - Scenario analysis/Stress testing (Stulz, 1996, 2008)
- Network economy
  - Think outside the box of an "entity" (Power, 2009)
  - Systemic nature of crises →
    Integrative nature of risk management

My Favorite Quote

- "The revolution idea that defines the boundary between modern times and the past is the mastery of risks: the notion that the future is more than a whim of the gods and that men and women are not passive before nature. Until human beings discovered a way across that boundary, the future was a mirror of the past or the murky domain of oracles and soothsayers who held a monopoly over knowledge of anticipated events."

(*Against the Gods*, Peter L. Bernstein, pp1)

Thank you!

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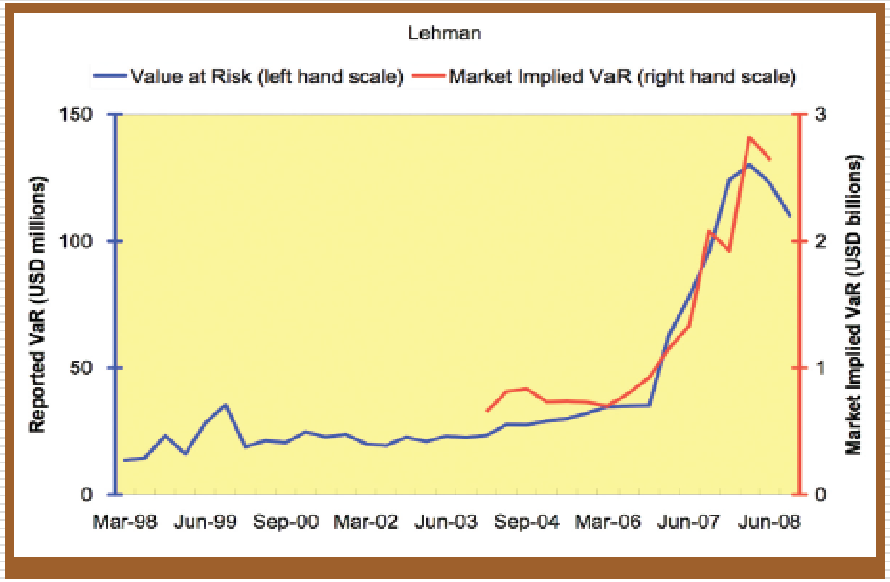
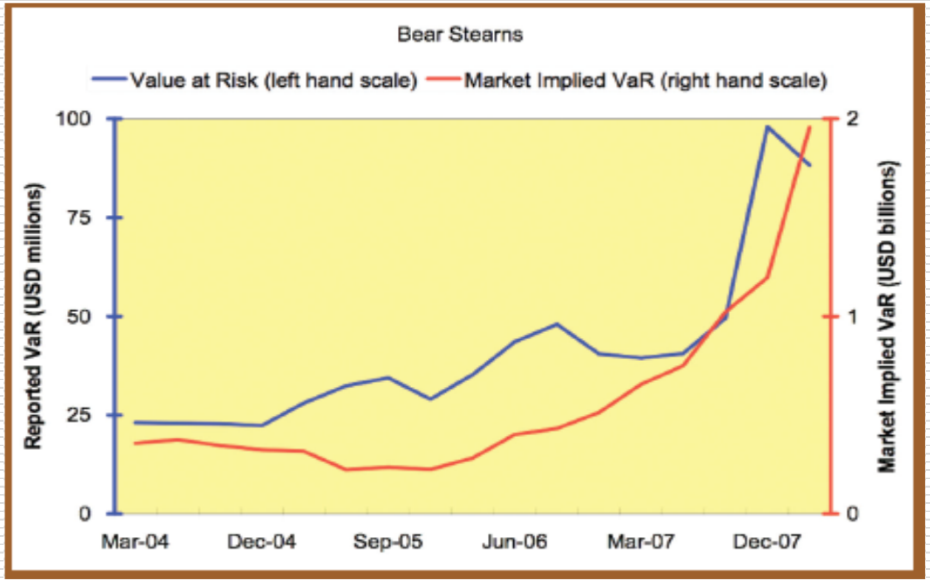
The 2008 Financial Crisis

- What happened?
  - Government pledged more money than on the Marshall Plan, the Korean War, the Race to the Moon, Operation Iraqi Freedom, and NASA's lifetime budget combined! (RIMS, 2009)
- A round of heated debates on corporate risk management and ERM
  - "It is obvious that there has been a massive failure of risk management across most of Wall Street." (*Financial Times*, Nov. 26, 2007)
  - "ERM,… at worst it is illusory—the risk management of nothing" (Power 2009)
  - Lack of risk management or bad risk management? Too little ERM or too much ERM?
- Is something wrong?

Is Risk Management to Blame?

- Models do provide (some) insights
  - The *Global Risks Report* identified "a global collapse in asset prices" as a major risk in 2007 and warned of "a liquidity crunch will spark a U.S. recession in the next 12 months" in early 2008





Source: Adapted from Figure 2 in "Opening the Vault to Risk Disclosures Data," by Aaron Brown, in GARP, February 2009

Is Risk Management to Blame?

- A model is just a model
  - "All models are wrong, but some are useful" (Box, 1979)
  - E.g., the use of Gaussian Copula model for default correlations
    - "Very few people understand the essence of the model." (David Li)
    - "The most dangerous part is when people believe everything coming out of it." (David Li)

Is Risk Management to Blame?

- Human beings are biased
  - "…we all had the solid quantitative information about the risks, and most of us decided they were worth taking." "…the problem was not failure to see the risk, it was failure of the plans to reduce it." (Aaron Brown, GARP, Feb 2009)
  - Behavioral biases
    - "One difficult problem…not of ignorance of badly underpriced risk, but of the concern that unless firms participate in a current euphoria, they will inevitably lose market share." (Alan Greenspan, Financial Times, March 16, 2008)
    - Behavioral economics and behavioral finance