Emerging Risks Survey

April 2012

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JOINT RISK MANAGEMENT SECTION

Canadian Institute of Actuaries
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Fifth Risk Manager Survey of Emerging Risks

Risk management is an evolving discipline. The financial crisis pointed out both the shortcomings of implementation at many firms as well as the potential for the risk management process when backed by a strong risk culture. As time passes from the initial crisis, trends are becoming apparent and new metrics are being developed to measure the mood of the risk community. Most risk managers are providing input and having a say when new opportunities are considered, and ERM activity is expanding.

The perception of emerging risks continues to ebb and flow. Some seem less important as time elapses from a specific series of events, and others are surging as news reports intensify. As with other financial analytical tools, the perceived time horizon rarely goes out more than a couple of years.

Risks generating historical data that remain stable over time can usually be represented by a statistical distribution. Other risks are evolving in uncertain ways, have been forgotten in their dormancy, or are new. These latter risk types are emerging risks and typically do not have a well-defined distribution. They require more thought when modeling their impact.

Risk managers are asked to provide potential scenarios to their management teams, but must be careful to provide both positive and negative outcomes and not stress only extreme scenarios. One risk receiving more exposure today is the potential loss of freshwater services. Many are concerned about this risk and its implications, especially in combination with other risks. If a risk manager, as a result, were to recommend changes in market penetration this might not be well received. This is a challenge for those who are first to recognize a future problem through their environmental scanning for emerging risks.

Providing an appropriate time horizon is challenging to risk managers. If an entity has liabilities that take decades to run off, like life insurance, then it makes sense to think about discontinuities to mortality risk for that length of time. Unfortunately, there are times when a risk manager identifies a material risk and competitors are blind to it. A firm pricing for the risk might be forced to leave that market as they no longer have a competitive product. Think of a firm that recognized the dangers of asbestos and refused to insure that risk. Since others were not pricing for it, a customer could pay the same as the firm's product and also be covered for asbestos. If potential customers recognize the mispricing, then there are no sales. A risk manager must be creative and able to communicate to a skeptical audience. While feature films will run in 2012 discussing ancient Mayan calendars, seeking to convince senior management that fresh water shortages might lead to regional conflicts in Asia is hard.

This survey attempts to track the thoughts of risk managers about emerging risks across time. It is the fifth survey of Emerging Risks conducted by the Casualty Actuarial Society, Canadian Institute of Actuaries, and Society of Actuaries' Joint Risk Management Section. It demonstrates that trends are as important as absolute responses,

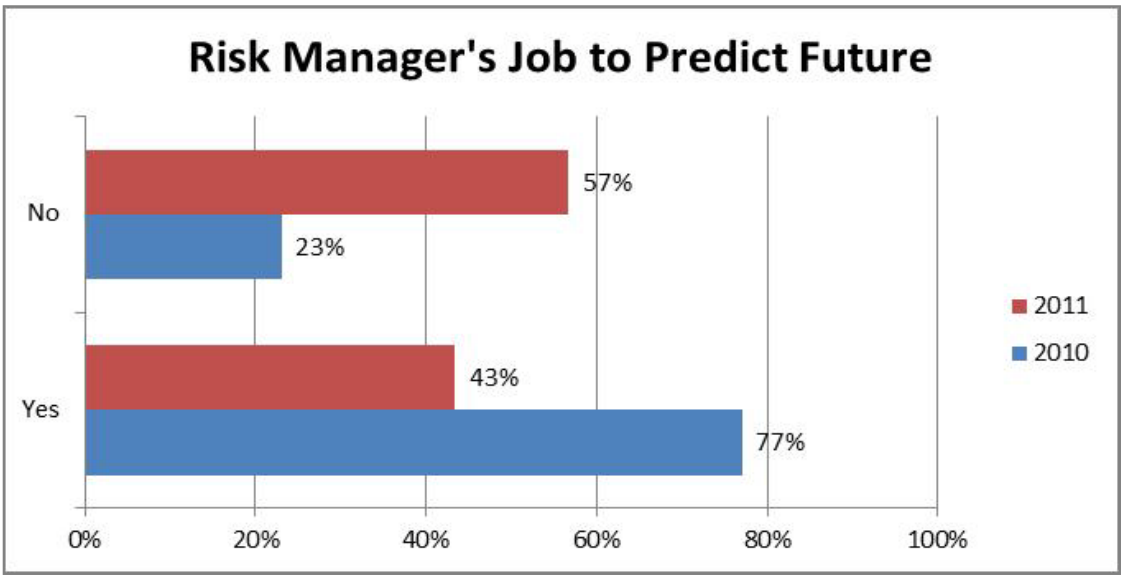
helping risk managers contemplate individual risks, combinations of risks, and unintended consequences of actions. The survey responses and summarized results also provide a tool for risk managers to network with peers and share new ways to think about risk. To further clarify the responses, numerous opportunities were provided within the survey to comment beyond the specific questions posed.

The job of a risk manager can be difficult. Few want to listen to warnings, but once a risk has surfaced woe be the CRO with no plan in place. As Nassim Taleb has said, once a Black Swan has revealed itself many will say they predicted it in advance. Of course, in reality, most, if not all, did not, and certainly did not make any effort to mitigate the risk.

Note that all survey results can be found in Appendix II and that Appendix III includes the 2010 survey details for comparison.

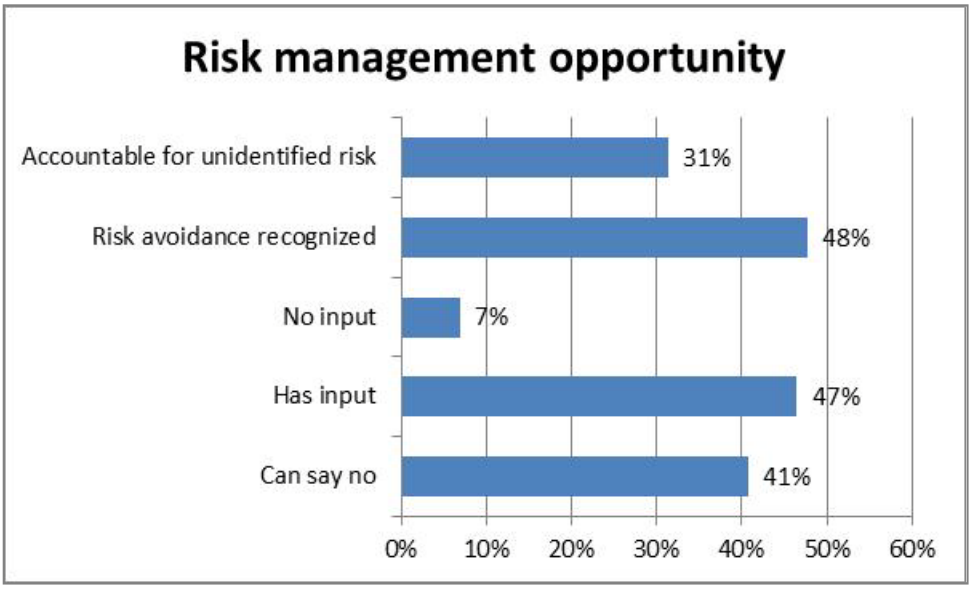
Executive Summary

The recent financial crisis highlighted the importance of having a risk management process. Many firms, especially those dealing with financial risks, had a Chief Risk Officer (CRO) established before the crisis. Traditionally the CRO provided reports to the board and senior management. Now firms are asking the CRO for their opinions, asking for potential scenarios, and understand that these are not predictions. Management teams seem to better understand that it is not the risk manager's job to predict the future. While 77% of respondents felt in 2010 that their firms expected them to be predictive, now over half (57%) specifically say that is not part of their job.

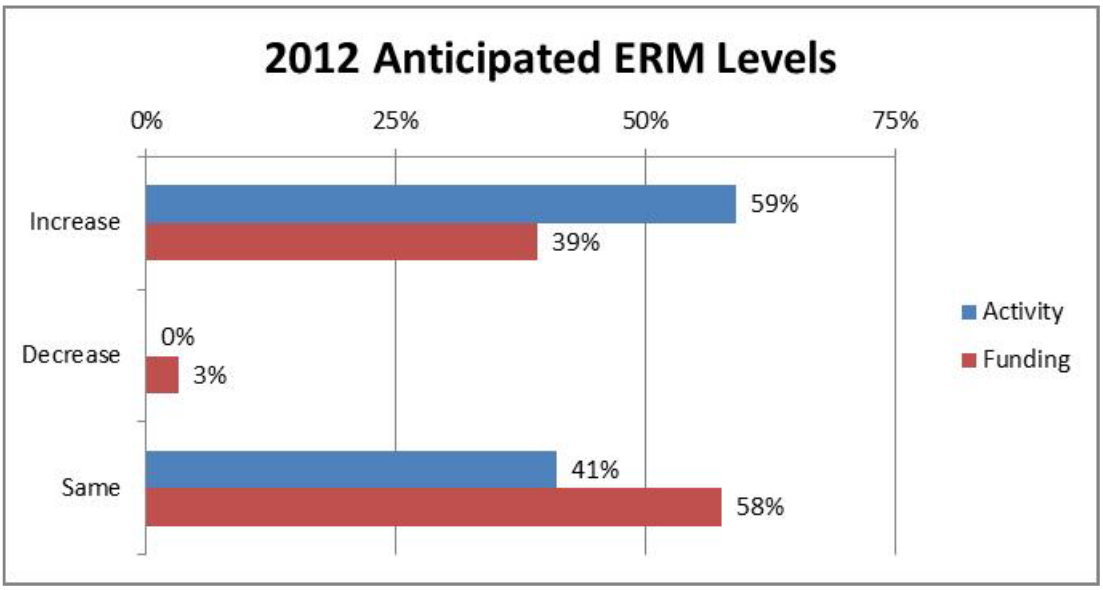


Part of a risk manager's job is to identify which risks should be avoided or mitigated. This year's survey asked questions about the risk manager's role in strategic planning. Risk managers were recognized for avoiding a risk in 48% of the responses, while only

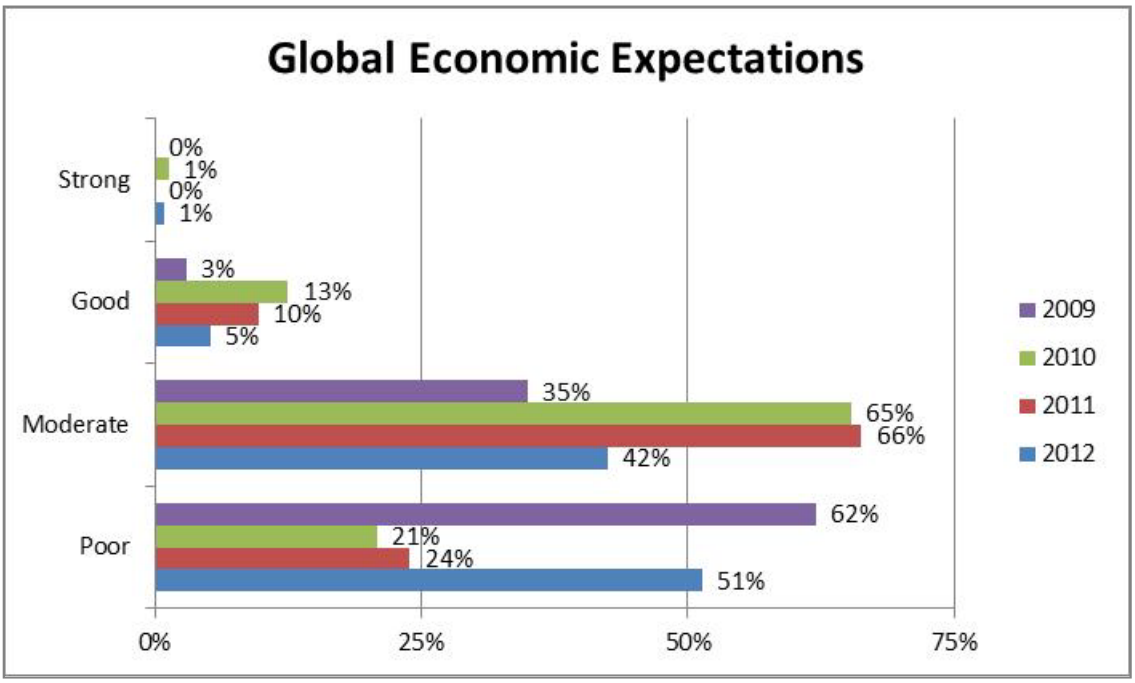
31% were held accountable when a risk that had not been identified arose. Even more interesting, when a strategic opportunity is being considered, 84% have input to the discussion or can say no to it. Only 7% reported having no input. This could itself be a leading indicator, showing how risk management is getting a seat at the table for strategic discussions.



2011 continued staff expansion, with 50% reporting larger internal staff sizes (similar to 2010). Activity continued to grow but at a slower rate than the prior year (63% versus 75%). In 2012 most expect an increase in activity (59%), but only 39% anticipate an increase in funding. As time passes from the financial crisis the reducing levels of growth could mean that the risk management staff is stable, but it could also point to a less influential role going forward. Perhaps a periodic crisis is necessary to keep risk managers and their knowledge of risk in the forefront of decision making.



Global economic expectations for 2012 are nearly as dismal as they were prior to 2009. Only 6% of the risk managers expect a strong or good economy, continuing a three year trend.



Cognitive Bias

The recent book by Nobel laureate Daniel Kahneman, "Thinking Fast and Slow," has given more publicity to the concept of anchoring bias. According to Kahneman, while you cannot self-identify your biases, it is possible to identify the tendency for bias in others. The evolving field of behavioral finance describes anchoring as the tendency to let recent events dominate our thinking about potential events. Previous survey reports discussed the impact on results when the Mumbai terrorist attacks occurred while the survey instrument was open (Fall 2008). Prior to that event few had chosen *International terrorism* as one of the top 5 emerging risks, but after the event each of the remaining surveys listed it and several noted it as the top overall emerging risk.

Since the previous iteration of this survey in 2010, a number of events have influenced the thinking of risk managers. While the Japanese earthquake/tsunami and Arab Spring were the events with largest worldwide implications, other events included the European sovereign debt crisis and the largest economic impact of physical disasters in history. These included flooding, monsoons, fires, earthquakes, volcanic eruptions and tornados.

With these events as a backdrop to anchor opinions, there were definite shifts in the 2011 results. The Economic category of risks is still the clear top choice ahead of the Geopolitical, Societal, Technological and Environmental categories. Yet it also shows that as time passes from the financial crisis, its level of importance is stabilizing. Finishing a strong number two, Geopolitical risks rebalanced from *International terrorism* to *Regional instability* and *Failed and failing states*.

As in past reports, the survey results show that current values of the S&P 500, a barrel of oil, and the U.S. dollar relative to the Euro seem to anchor perceptions of risk. The survey results have evolved over time, generally led by current environmental factors. Only economic factors are shown here in Table 1, and the researcher would be interested in suggestions of other metrics that might be drivers of emerging risks.

	S&P 500	Oil (per barrel)	USD/Euro
Spring 2008	1,385.59	$ 113.70	$ 1.56
Fall 2008	968.75	68.10	1.27
Fall 2009	1,106.41	77.04	1.48
Fall 2010	1,176.19	84.49	1.40
Fall 2011	1,131.42	78.93	1.34

Table 1

The initial survey was released to the INARM group (International Network of Actuarial Risk Managers) in April 2008, soon after Bear Stearns ceased its independence. When that survey was completed, the S&P 500 stood at 1,385.59 (according to Yahoo Finance), the price of a barrel of oil was $113.70 (Energy Information Administration at http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=D) and one Euro cost $1.56 (http://www.federalreserve.gov/releases/h10/Hist/dat00_eu.htm). Oil was priced relatively high, the stock markets were at record levels, and the dollar had trended down. At that time the top four emerging risks chosen were

Survey 1 (April 2008)

1. *Oil shock* (57% of respondents)
2T. *Climate change* (40%)
2T. *Blow up in asset prices* (40%)
4. *Fall in value of US $* (38%)

With oil at historic highs it was the predominant emerging risk chosen. The second survey was completed in early November 2008. Rates are compared at the end of October. At that time, using the same sources, the S&P 500 had dropped 30%, the price of a barrel of oil had decreased 40%, and the U.S. dollar had strengthened 23%. The top four emerging risks from this second iteration of the survey were

Survey 2 (November 2008)

1. *Blow up in asset prices* (64%)
2. *Fall in value of US $* (48%)
3. *Oil price shock* (39%)
4. *Regional instability* (34%)

Systemic risk was perceived to be very high at this time with stock values in free fall. Oil prices had fallen quite a bit, U.S. currency was considered a safe harbor and Barack Obama had just been elected President. The next survey to this one was in early December 2009, and metrics were collected at November month end. The S&P 500 had increased 14%, the price of a barrel of oil had increased 13%, and the U.S. dollar had weakened 17%. The economy had begun its recovery. The top four emerging risks from this third iteration of the survey are

Survey 3 (December 2009)

1. *Fall in value of US $* (66%)
2. *Blow up in asset prices* (49%)
3. *Oil price shock* (45%)
4. *Chinese economic hard landing* (33%)

In 2010, data was compiled in October and the indicators had not changed materially. The stock market was up 6%, oil was up 10% and the dollar had further strengthened by 6%. Most of the top 5 results continue to come from the Economic category.

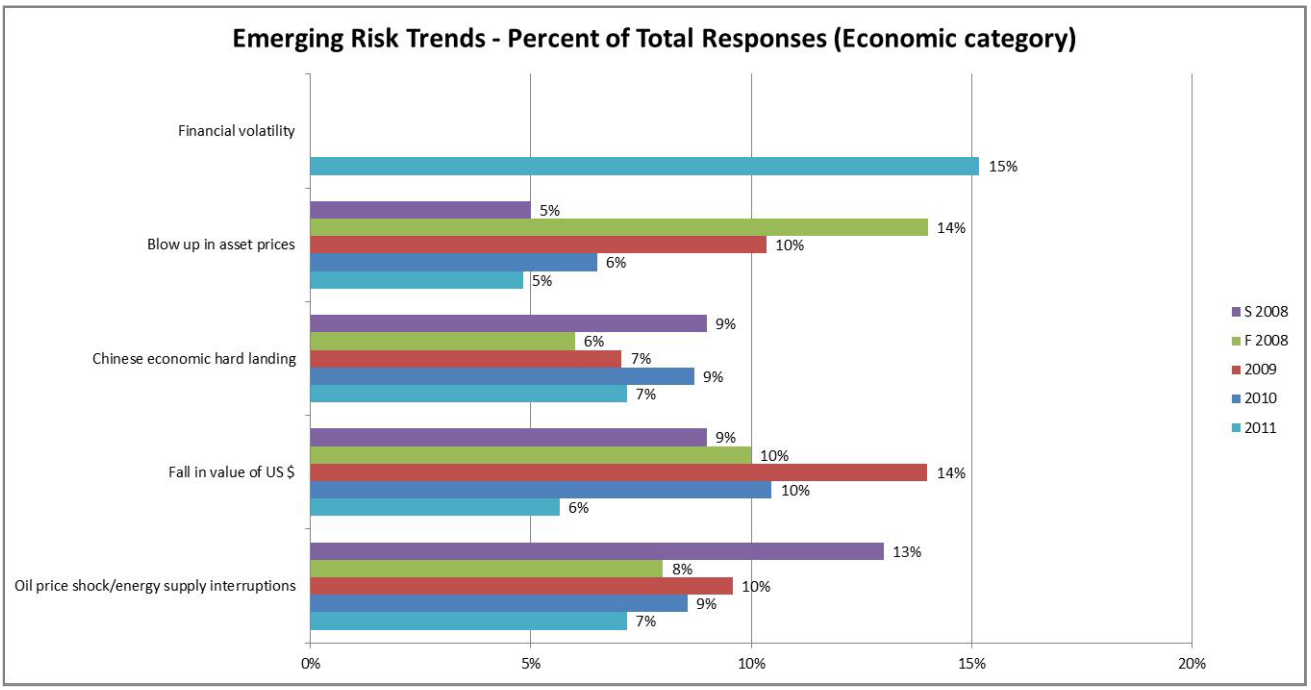
Survey 4 (October 2010)

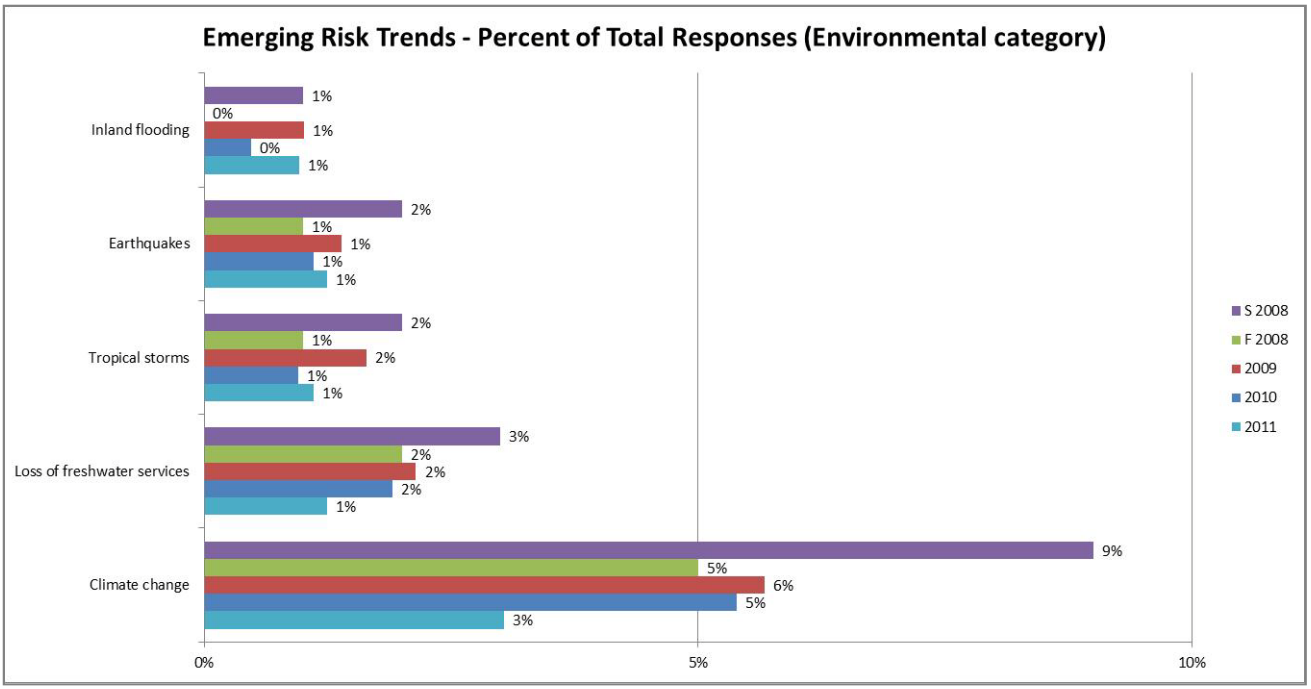
1. *Fall in value of US $ (49%)*
2. *International terrorism (43%)*
3. *Chinese economic hard landing (41%)*
4. *Oil price shock (40%)*
5. *Failed and failing states (38%)*

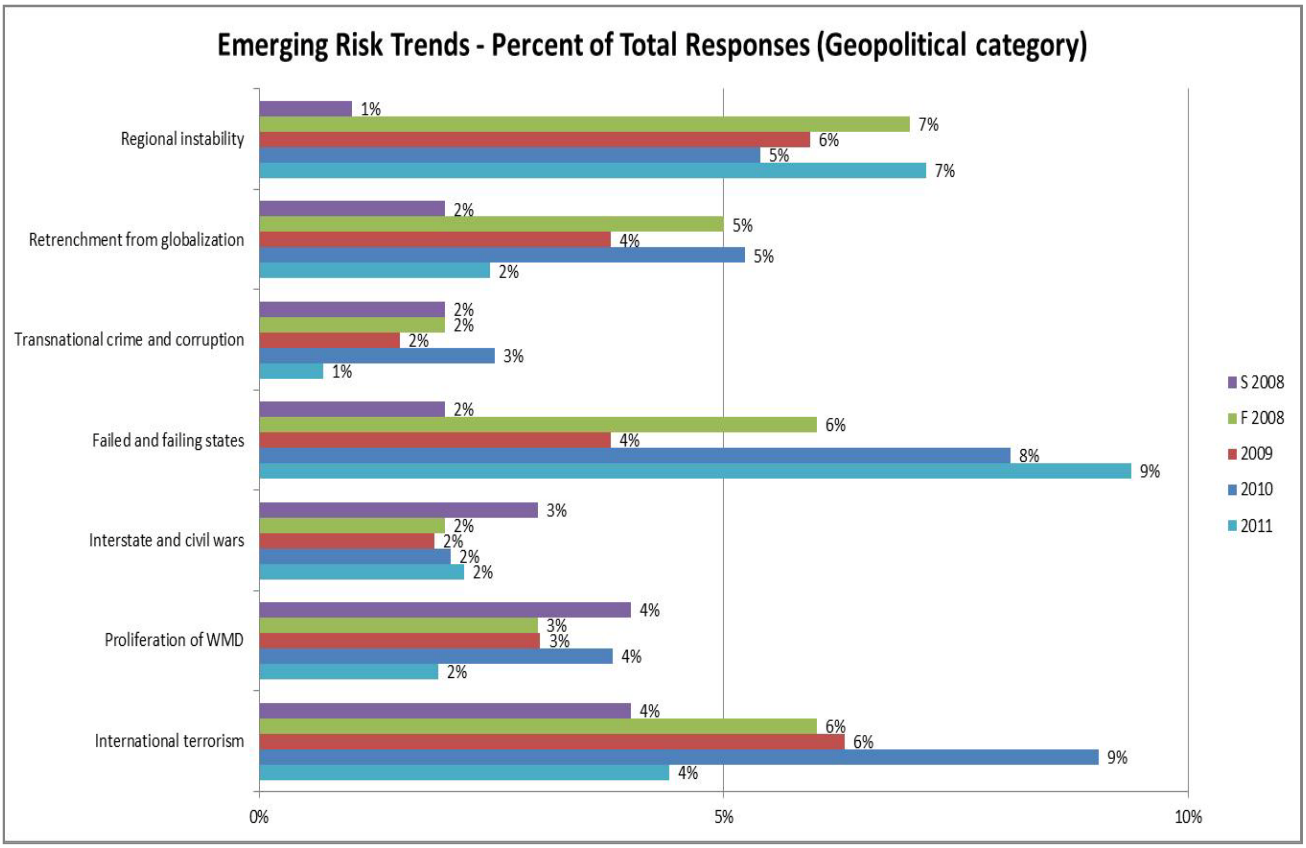
In the 2011 survey, data was compiled at the end of September and the metrics had not changed materially. The stock market was down 4% overall and very volatile for the year, oil was down 7% and the dollar had further strengthened against the Euro by 4%. The risks were revisited prior to this survey. One risk was moved to a different category, two combined and one added. Comparisons have been adjusted. Most of the top 5 results continue to come from the Economic category. The new risk, *Financial volatility*, resonated with risk managers as they selected it on 68% of the surveys.

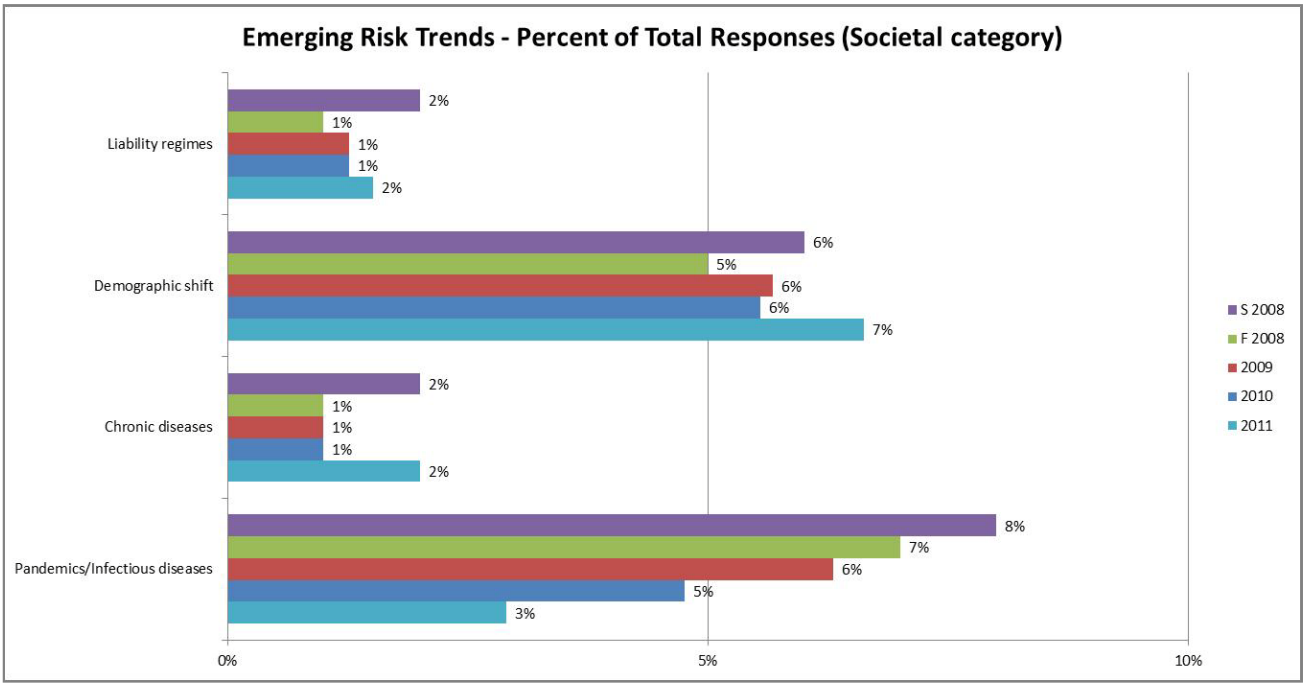
Survey 5 (October 2011)

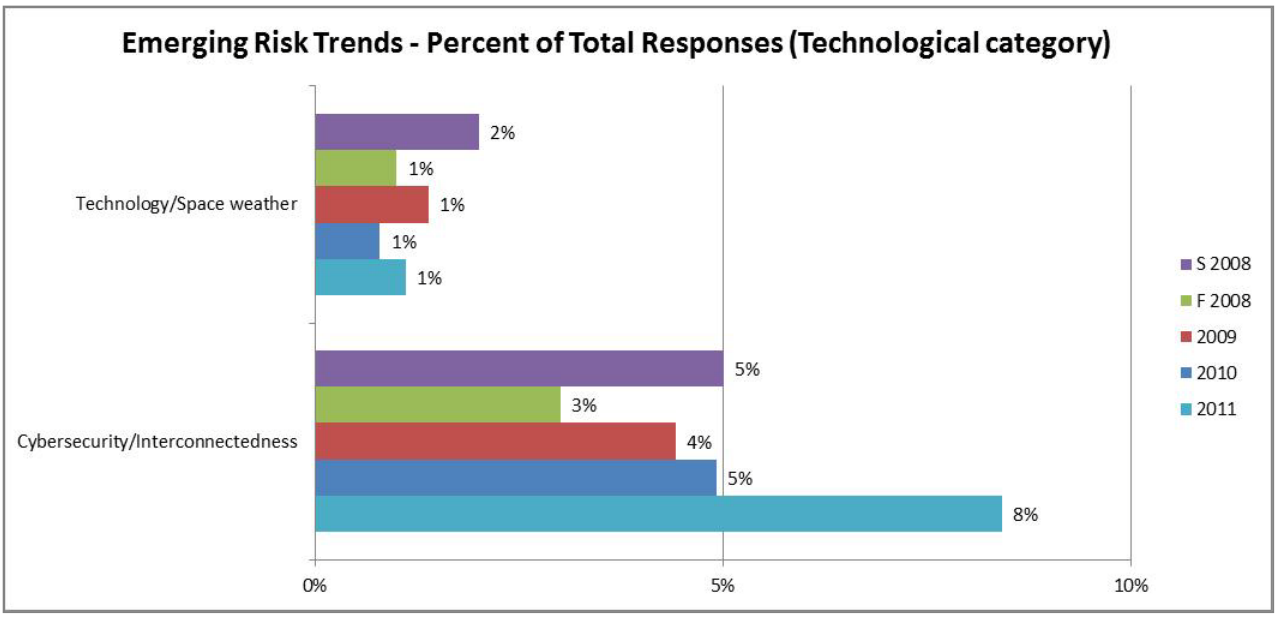
1. *Financial volatility (68%)*
2. *Failed and failing states (42%)*
3. *Cyber security/interconnectedness of infrastructure (38%)*
4. *Chinese economic hard landing (32%)*
4. *Oil price shock (32%)*
4. *Regional instability (32%)*


Emerging Risk Trends - Percent of Total Responses (Economic category)
Financial volatility
Blow up in asset prices
Chinese economic hard landing
Fall in value of US $
Oil price shock/energy supply interruptions
15%
5%
14%
10%
6%
5%
9%
6%
7%
9%
7%
9%
10%
14%
10%
6%
13%
8%
10%
9%
7%
0%
5%
10%
15%
20%
S 2008
F 2008
2009
2010
2011


Emerging Risk Trends - Percent of Total Responses (Environmental category)
Inland flooding
Earthquakes
Tropical storms
Loss of freshwater services
Climate change
1%
0%
1%
0%
1%
2%
1%
1%
1%
1%
2%
1%
2%
1%
1%
3%
2%
2%
2%
1%
9%
5%
6%
5%
3%
0%
5%
10%
S 2008
F 2008
2009
2010
2011


Emerging Risk Trends - Percent of Total Responses (Geopolitical category)
Regional instability
1%
7%
6%
5%
7%
Retrenchment from globalization
2%
5%
4%
5%
2%
Transnational crime and corruption
2%
2%
2%
3%
1%
Failed and failing states
2%
6%
4%
8%
9%
Interstate and civil wars
3%
2%
2%
2%
2%
Proliferation of WMD
4%
3%
3%
4%
2%
International terrorism
4%
6%
6%
9%
4%
0%
5%
10%
S 2008
F 2008
2009
2010
2011


Emerging Risk Trends - Percent of Total Responses (Societal category)
Liability regimes
2%
1%
1%
1%
2%
Demographic shift
6%
5%
6%
6%
7%
Chronic diseases
2%
1%
1%
1%
2%
Pandemics/Infectious diseases
8%
7%
6%
5%
3%
0%
5%
10%
S 2008
F 2008
2009
2010
2011

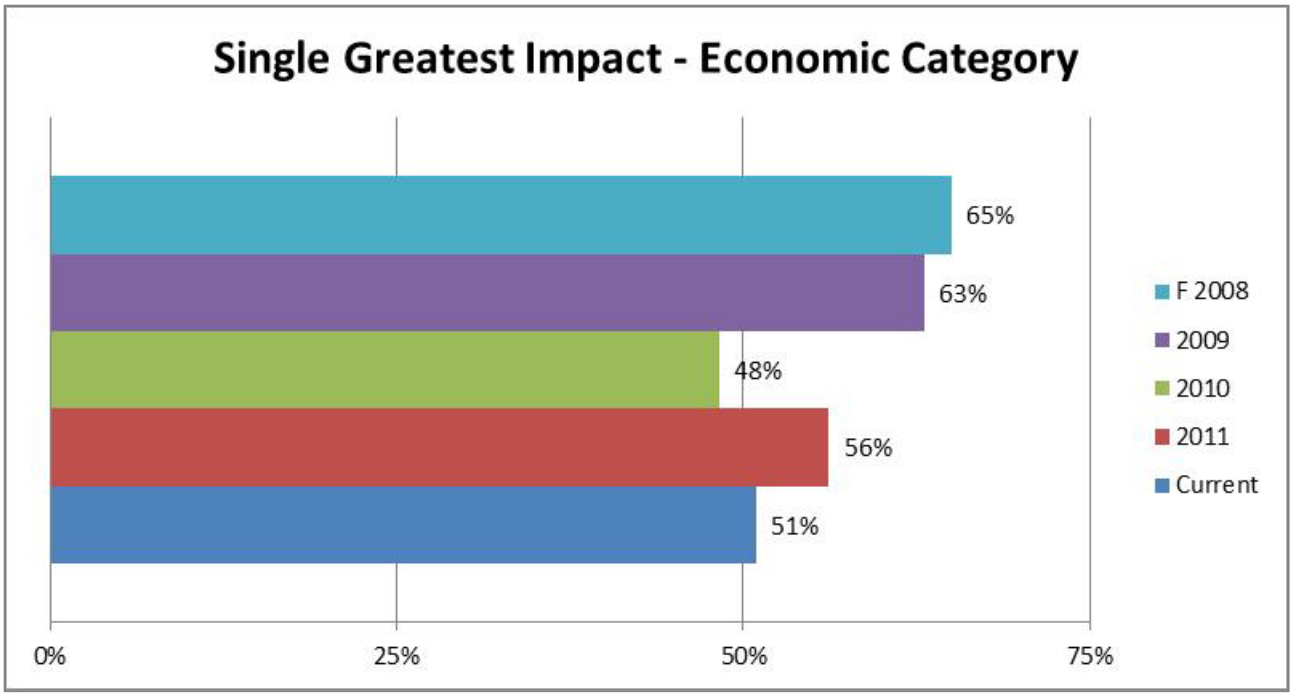


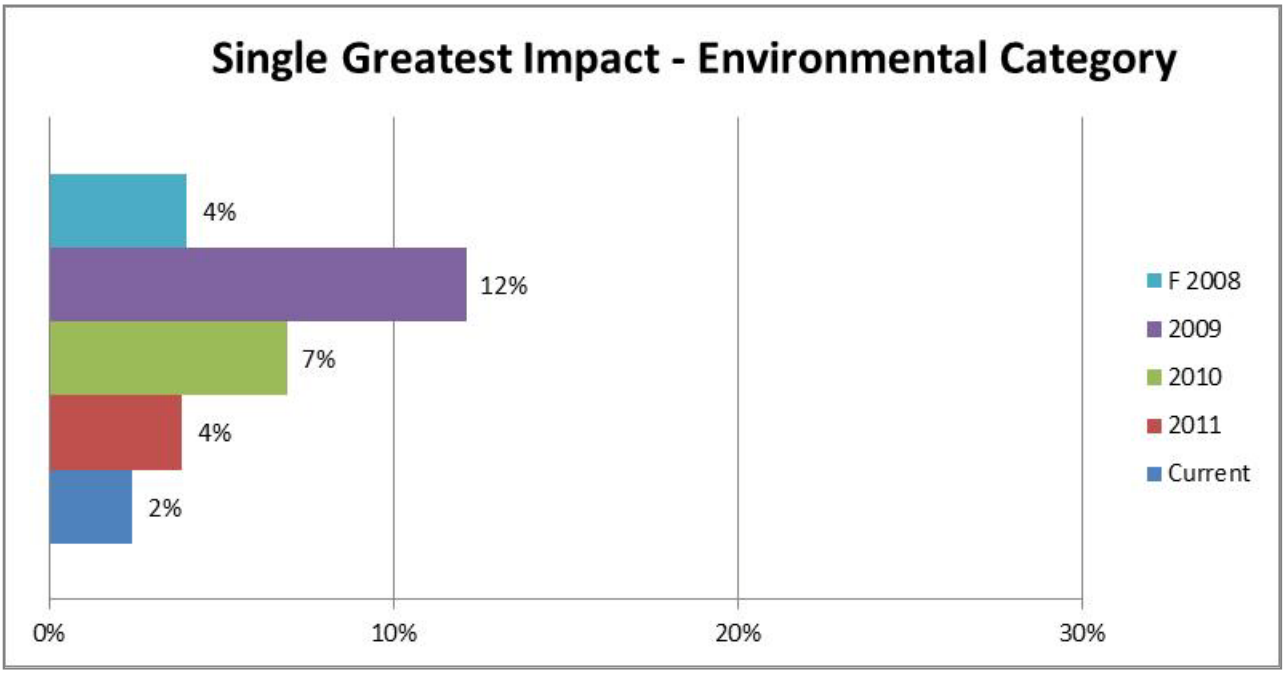
From the initial survey to the current one, *Climate change* has dropped from 40% to 14% of the responses. This could be due to either (1) risk managers no longer feeling it is an emerging risk, (2) to reduced media coverage or (3) they might simply prioritize it lower.

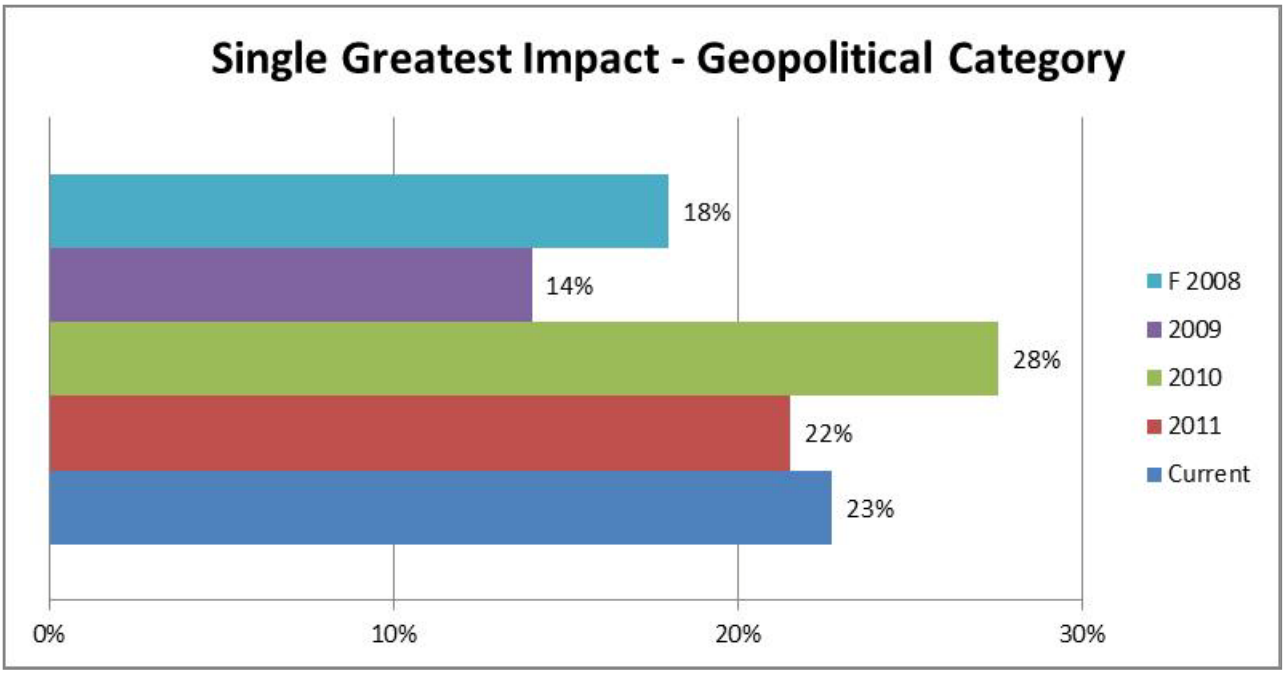
The Arab Spring clearly impacted the choices for the top overall emerging risk. Economic category risks took three of the top 5, with *Failed and failing states* and *Cyber security/Interconnectedness of infrastructure* finishing second and third, respectively. Concerns about China remain strong.

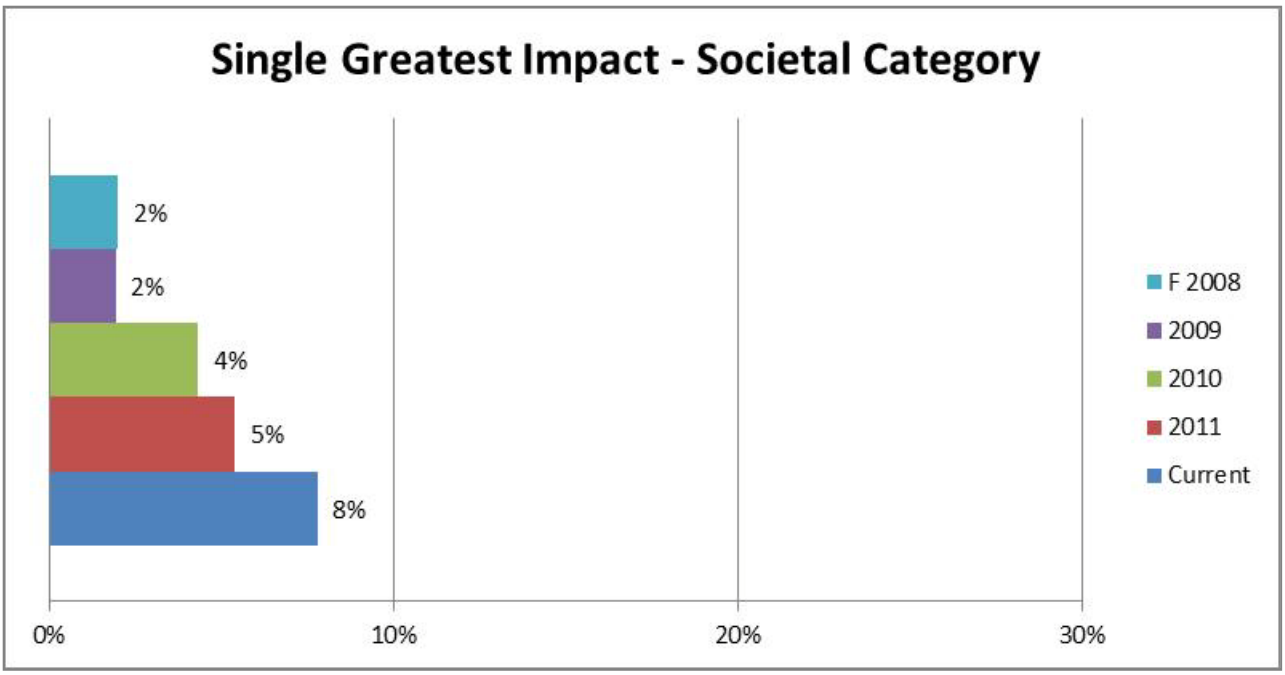
Top emerging risk October 2011

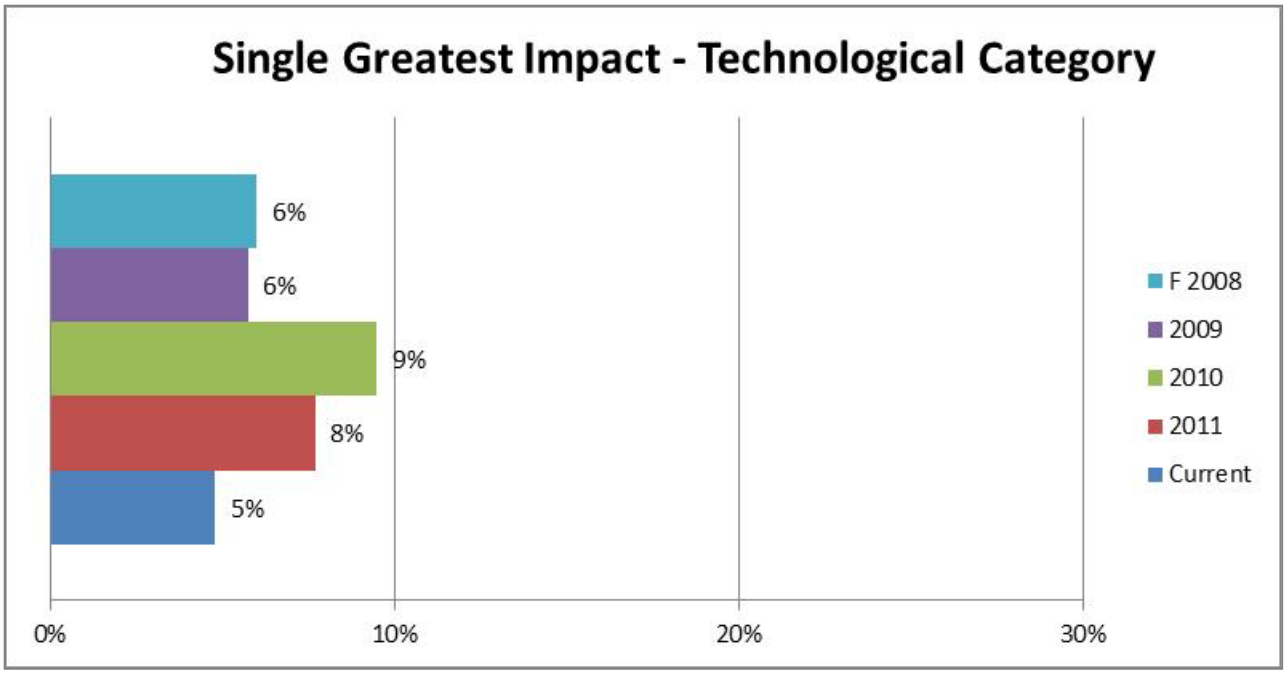
1. *Financial volatility (40%)*
2. *Failed and failing states (12%)*
3. *Cyber security/interconnectedness of infrastructure (7%)*
4. *Blow up in asset prices (6%)*
5. *Chinese economic hard landing (5%)*


Single Greatest Impact - Economic Category
65%
63%
48%
56%
51%
0%
25%
50%
75%
F 2008
2009
2010
2011
Current


Single Greatest Impact - Environmental Category
4%
12%
7%
4%
2%
0%
10%
20%
30%
F 2008
2009
2010
2011
Current

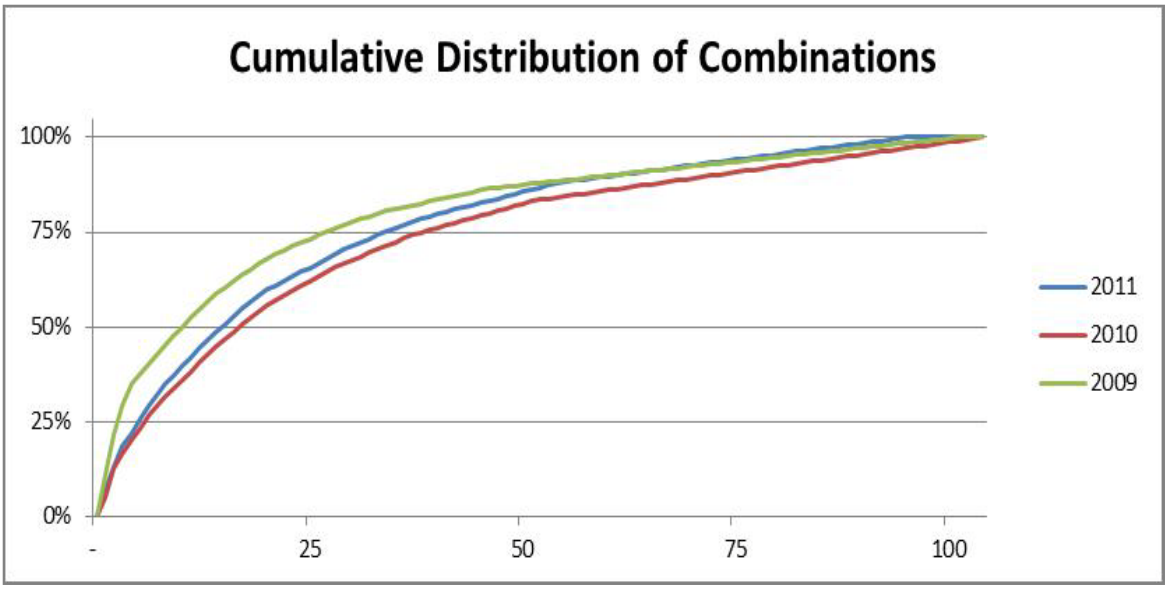

Single Greatest Impact - Geopolitical Category
18%
14%
28%
22%
23%
0%
10%
20%
30%
F 2008
2009
2010
2011
Current


Single Greatest Impact - Societal Category
2%
2%
4%
5%
8%
0%
10%
20%
30%
F 2008
2009
2010
2011
Current



The five surveys have been conducted in periods with unique characteristics that drove results. The perceived risks of geopolitical instability are rising, while risk managers seem to be not sure what to make of the current economic struggles. The real scenario, of course, remains to play out.

The survey asked about concerns due to risk combinations for the third time and measured the concentration of responses. The three leading combinations were dominated by the *Financial volatility* risk combined with *Failing and failing states, Oil price shock, and Chinese economic hard landing*. The top combinations not including *Financial volatility* (6 of the top 8) consisted of *International terrorism and Cyber security, Fall in value of US $ and Chinese economic hard landing, and Oil price shock and Fall in value of US $*. Increasing from 3% to 6% was the *Cyber security* risk. This risk continues to trend higher, despite not being rated high relatively as a current risk.

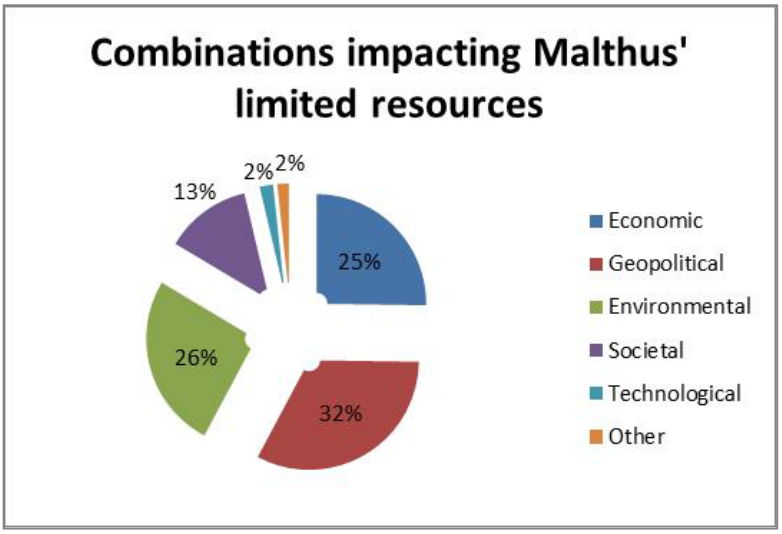


There are 253 possible risk combinations. The distribution was more concentrated in 2011 relative to 2010, but not as severe as 2009, as can be seen in the accompanying chart. The period immediately following the financial crisis might be the most extreme we will see. The concentrated result appears to result from the major events occurring in 2011; sovereign debt crisis, Japanese earthquake and tsunami, and the Arab Spring. By quartile, with data listed cumulatively and first quartile representing the most frequent responses, results were

Risk Concentration Ratio					
				Avg prior to	
	2009	2010	2011	Current Yr	Avg/Curr Yr
First quartile	3	6	5	4.5	0.90
Second quartile	10	17	15	13.5	0.90
Third quartile	27	38	34	32.5	0.96
Total	101	104	95	102.5	1.08
Remaining	152	149	158		
					96

This is presented as an indicator of the current risk environment, with each quartile being considered against the mean of the previous surveys (mean of previous results divided by the current result). It is likely that 2009 is an extreme example, so this year's Risk Concentration Ratio of 96 would be more useful if there was more data to work with. As a relative measure it represents the current feeling among the risk management community and is expected to become a regular feature of this survey. Another way to look at this metric would be to consider two consecutive years. This calculation results in a 2010 ratio of 69 due to the heavy concentration in 2009, and a 2011 ratio of 114 as risk managers are more worried about fewer risks this year (concentrating their focus).

One question each year deals with a combination of risks surrounding a topical issue. Previous questions have addressed regional food shortages, political instability and the risks surrounding China's economy, and each has since proven to be timely. In this survey Malthusian concerns about resource depletion (food, energy, water, and commodities) were explored. Respondents were asked to include up to three risks. Results were spread across Geopolitical, Environmental and Economic risks.



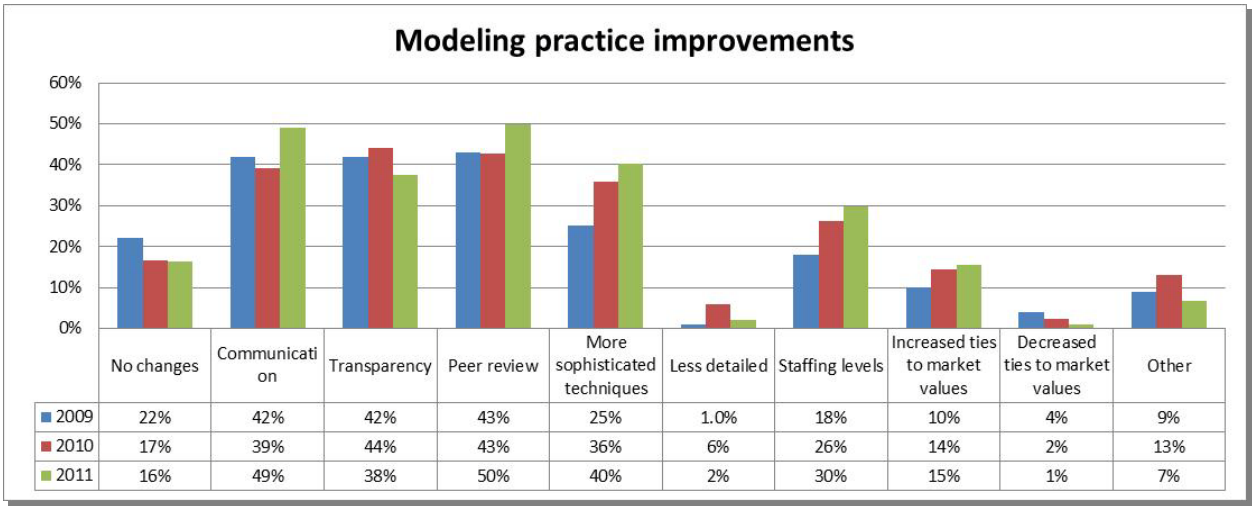
The top 2 specific risks chosen were *Loss of freshwater services (50%)* and *Oil price shock (45%*). Rounding out the top 6 were *Climate change, Regional instability, Failed and failing states, and Demographic shifts.*

Leading Indicators

An approach used to manage risks and make better (and earlier) decisions factors in leading indicators. As companies implement an ERM process, many are creating metrics around key performance indicators. These are designed to help make better decisions and provide warnings about growing risks. A lagging indicator uses information collected after a decision is made, such as quarterly revenue. A leading indicator provides information earlier in the process. Examples would include instances of long lines on the first day of the Christmas shopping season or a spike in the credit default spread for a supplier. Over half the respondents reported having at least some leading indicators around emerging risks. The percentage reporting that they do not identify emerging risks continues to decline (22%). Examples reported include various stock indices, monitoring press articles and regulatory changes. Some reported a "threat rating" scheme that triggers mitigation steps.

ERM requires a balance between quantification and qualitative efforts. These efforts have included leveraging existing modeling efforts to find opportunities and external assessment of acquisitions and improved communication.

Risk managers in this survey reported that their models continue to get more sophisticated, with peer review and communication improved. Transparency remains an important area of improvement.



	No changes	Communication	Transparency	Peer review	More sophisticated techniques	Less detailed	Staffing levels	Increased ties to market values	Decreased ties to market values	Other
2009	22%	42%	42%	43%	25%	1.0%	18%	10%	4%	9%
2010	17%	39%	44%	43%	36%	6%	26%	14%	2%	13%
2011	16%	49%	38%	50%	40%	2%	30%	15%	1%	7%

While many firms limit the amount of external consulting used (41% don't use external experts), many justify outside staff for topical expertise (43%) and an outside perspective (39%), while others have consultants jump start development of their ERM process to build models.

Conclusions

As this report is being written in spring 2012 the Middle East is stressed, with Syria near civil war and Iran causing international controversy over its nuclear program. Cyber hacking is becoming routine and storms in the United States are impacting areas earlier and further north than ever before. The European debt crisis continues to evolve, yet the U.S. stock market has rallied behind a strengthening dollar, higher oil prices and lower volatility. This is the new normal, and risk managers are developing tools to deal with these and other emerging risks. Many have developed scenarios to predict potential outcomes and are working hard to continuously improve their models. They are beginning to understand that human frailties bias our ability to make decisions. The world's perception of Geopolitical risk is evolving from terrorism to failing states, while risks like climate change and pandemics continue to reduce in concern. Meanwhile, cyber security and regional instability move higher.

Risk management is a process. Standardized measurement tools are developed for specific risks, allowing a range of viewpoints to participate in the risk discussion. Constantly questioning methods and scanning for emerging risks will create an environment where an organization maintains a competitive advantage. As this survey adds data points, new information will be obtained from trending the rich viewpoints of risk managers.

Background

This research project was funded by the Joint Risk Management Section of the Society of Actuaries, Canadian Institute of Actuaries, and Casualty Actuarial Society. A survey was developed and made available through an email link to members of the Joint Risk Management Section. Others were invited to participate utilizing the INARM list serve and Linked-in groups related to risk management. A total of 172 responses were received. This represents greater than 5% of completed surveys relative to the number distributed (over 2,500 to JRMS) and is comparable to previous research. This is the fifth survey completed. Many questions are starting to generate sustained trends that suggest conclusions. The previous surveys were distributed in April 2008, November 2008, December 2009 and November 2010. This year's survey was conducted in October 2011. For background purposes, articles and previous research reports can be found at

April 2008

- Article: pages 18-21 of the International News August 2008 issue http://soa.org/library/newsletters/international-section-news/2008/august/isn-2008-iss45.pdf
- Article (reprint): pages 17-20 of the Joint Risk Management Section March 2009 newsletter http://soa.org/library/newsletters/risk-management-newsletter/2009/march/jrm-2009-iss15.pdf

November 2008

- Research report http://www.soa.org/files/pdf/research-2009-emerging-risks-survey.pdf

December 2009

- Research report http://www.soa.org/research/research-projects/risk-management/research-2009-emerg-risks-survey.aspx
- Article pages 12-14 Aug/Sep 2010 The Actuary http://www.soa.org/library/newsletters/the-actuary-magazine/2010/august/act-2010-vol7-iss4.pdf

November 2010

- Research report http://www.soa.org/research/research-projects/risk-management/research-2010-emerging-risks-survey.aspx
- Article http://www.soa.org/library/newsletters/risk-management-newsletter/2011/august/jrm-2011-iss22-rudolph.pdf

Rather than developing a unique set of emerging risks to consider, one originally developed by the World Economic Forum (WEF) was chosen for the initial survey. The World Economic Forum reports, starting in 2007, can be found at www.weforum.org . The 23 risks developed by the World Economic Forum are described in detail in Appendix I. They differ slightly from previous years as Infectious disease has been combined with Pandemics, and Financial volatility has been added. Demographics has moved from the Economics category to Societal to better reflect its impact. Each risk has

been categorized as either Economic (5 risks), Environmental (5), Geopolitical (7), Societal (4) or Technological (2). The previous risks have continued, but several descriptions have been shortened. The changes were not felt to be material except for adding *Financial volatility*, which was felt to better represent the true concerns of risk managers, and so trends across surveys will continue. The current survey continues its evolution, adding and subtracting a few questions while leaving the core of the survey intact.

Research reports do not create themselves in isolation, and the researcher thanks Beverly Barney, Dave Ingram, Barbara Scott and Steve Siegel for their help designing and implementing the questionnaire, along with gleaning information from the results. Of course all errors and omissions remain the responsibility of the researcher.

Researcher

The lead researcher for this project is Max J. Rudolph, FSA CFA CERA MAAA. Additional related articles and presentations can be found at his web site. His contact information is

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Results

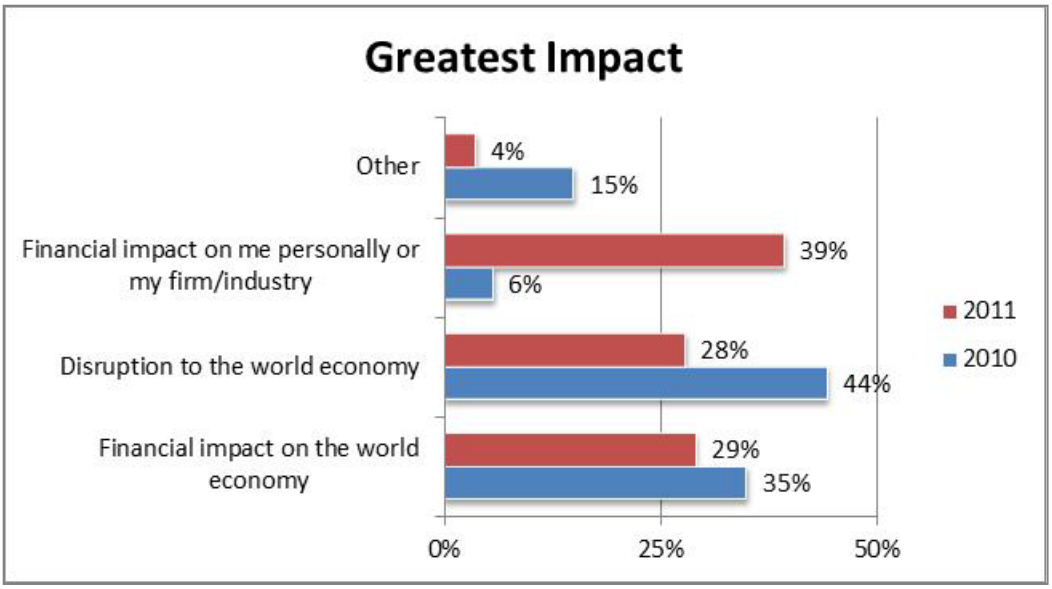
The survey contained sections covering Current Risks, Emerging Risks, Leading Indicators, Methodology, Predictions, Current Topics, and Demographics. Highlights of each section are presented here while complete results can be found in Appendix II. A total of 172 surveys were completed (electronically). Some respondents did not answer all the questions. Partially completed surveys are included and percentages adjusted for the number completing each question. Answers of Not Sure and Not Applicable were generally excluded from percentages. In addition, many questions allowed or sought out comments and examples that proved enlightening.

Introductory Questions

Previous emerging risk surveys found an anchoring effect tied to recent risk events. During the financial crisis in 2008 there was a high concentration within the Economic risk category that seemed to scale back as time passed from the crisis. The Mumbai terrorist attack in November 2008 provided a striking example. It occurred while the survey was open, and had a big impact on the remaining surveys. Oil prices have been another indicator, and in 2011 the Arab Spring events seem to have impacted the results. Risk managers who keep this bias in mind while managing their emerging risks are better able to overcome these changes in perspective. The survey also looks at averages when data is available over several years. The survey continues to reach out to risk managers with open ended questions about how emerging risks are being managed. The researcher thanks those who filled out the survey, and especially those who contributed to the open ended questions. As with any research project, the researcher learns from the respondents.

Respondents have varying definitions of emerging risk. A bit surprisingly, the answer most commonly reported in the survey relates to the financial impact on the individual/firm/industry (39%), with financial impact (29%) and disruption (28%) to the world economy receiving comparable and material support. This may be an area for future research, as emerging risks often have unintended consequences and those who narrowly track only those risks that impact them directly could miss material threats and opportunities.

- Disruption to the world economy — 46 responses — 28% (44% in 2010)
- Financial impact on the world economy — 48 responses — 29% (35%)
- Financial impact on me personally or my firm/industry — 65 responses — 39% (6% - not asked directly in 2010)
- Other — 6 responses — 4% (15%)



In the survey a benchmarking question is asked each year about the top current risk. When the respondent answers this question they are reminded of the anchoring affect identified in prior surveys. In the field of behavioral finance it is thought that recognizing our shortcomings will help us to overcome them. Anchoring continues to be seen in this iteration of the survey.

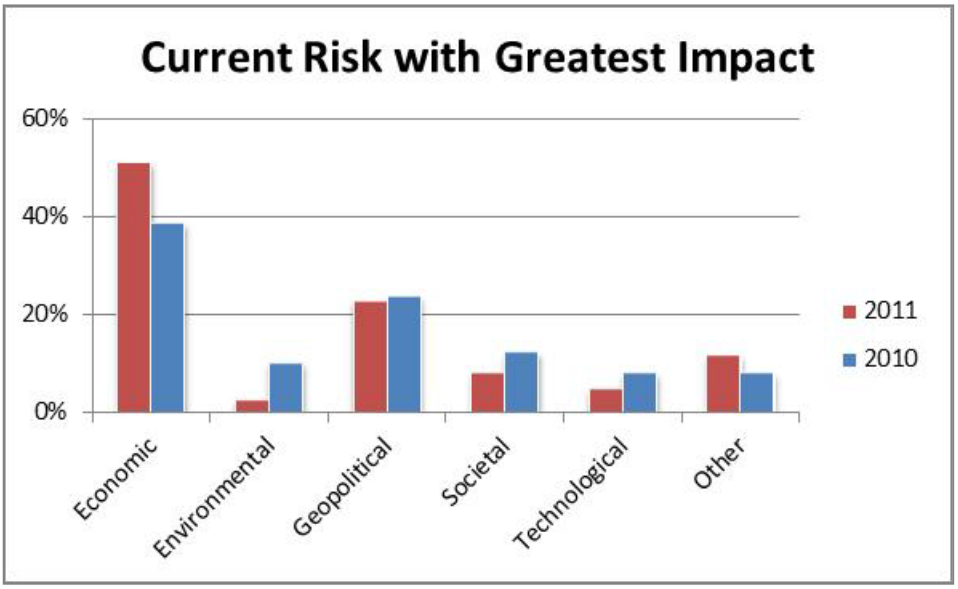
The 23 emerging risks used in this iteration of the survey were reviewed and updated from the prior survey. Originally the risks were taken from the 2007 World Economic Forum (WEF) report on Emerging Risks. Since then the WEF has evolved its list in ways that seem consistent with a shorter time horizon than used here. For this survey several updates were made, but it is felt that trend analysis is still valid. The *Demographic shift* risk was moved from the Economic category to Societal, with past survey data updated. *Financial volatility* was added in the Economic category. The *Pandemic* and *Infectious disease* risks were combined. The Technological category risks were renamed to *Cyber security/Interconnectedness of infrastructure* and *Technology/Space weather*.

For the five broad categories, responses were impacted by several events occurring in 2011. Tensions were high in the Middle East as the Arab Spring unfolded, the European debt crisis continued to develop, and there was an above normal occurrence of natural disasters. This included Australian flooding, monsoons and fires, storms in the United States and Asia, and of course the earthquake and tsunami in Japan. It was reported in the Economist magazine (January 14, 2012) that 2011 had the worst economic impact of disasters in history.

The categories of risks chosen as those having the current greatest impact were

- Economic 85 responses 51% (39% in 2010)
- Environmental 4 responses 2% (10%)
- Geopolitical 38 responses 23% (24%)
- Societal 13 responses 8% (12%)
- Technological 8 responses 5% (8%)
- Other 19 responses 11% (8%)

The Economic category continued as the top choice, receiving over half the support as the new *Financial volatility* risk overwhelmed the other options. Environmental surprisingly dropped to only 2% of responses, and the Societal and Technological categories dropped as well.



More than half of the "other" responses were also tied to economic risks, especially public debt, with additional responses expressing concern with a low interest rate scenario and convective storms. All but two of the risks were chosen by at least one survey respondent. The top choices were

- *32% Financial volatility*
- *11% Failed and failing states*
- *7% Chinese economic hard landing*
- *7% Blow up in asset prices*
- *4% Regional instability*

Of the Economic risks, only *Oil price shock/energy supply interruptions and Fall in value of US $* fell outside the top 5. An oil shock was considered by many to be the top risk early in 2008 when the first emerging risks survey was completed. In 2011 it has fallen to a tie for 8th overall as oil prices have stabilized. Since oil prices continually change, and are once again increasing as this report is written, this could change in future surveys.

Respondents were clearly more worried about the potential for unrest throughout the world during this survey. Categories that increased materially (over 5% or doubled) included

- *Failed and failing states (from 4% to 11%)*
- *Regional instability (from 1% to 4%)*

The categories that decreased materially (over 5% or reduced by half)

- *Fall in value of US $ (from 11% to 2%)*
- *Blow up in asset prices (from 14% to 7% but still ranked #4)*
- *Climate change (from 6% to 1%)*
- *Loss of freshwater services (from 3% to 1%)*
- *International terrorism (from 4% to 2%)*
- *Proliferation of weapons of mass destruction (WMD) (from 4% to 1%)*
- *Interstate and civil wars (from 5% to 2%)*
- *Retrenchment from globalization (from 4% to 2%)*
- *Demographic shift (from 7% to 3%)*
- *Cyber security/interconnectedness of infrastructure (from 8% to 4%)*

The Geopolitical category is very interesting. Some risks have materially increased and are found in the top 5, while others fell back. This category especially seems to be anchored in the current news, and in late 2011 the Arab Spring was well under way and Osama bin Laden had been killed (May 2011). The dollar was strengthening as the European debt crisis continued to unfold.

Section 1: Emerging Risks

Top 5: Geopolitical increases but Economic Category leads

After asking which risk has the current greatest impact, 161 survey respondents chose up to five emerging risks that "you feel will have the greatest impact over the next few years." The World Economic Forum had a time horizon of 10 years in mind when it developed their 23 risks, but that is not required here. The data is also compared across surveys. At the time of the first survey in May 2008 the market was showing signs of weakness, but the real concern was the price of oil. In late 2008 the stock markets had fallen precipitously but the price of oil had dropped from record highs. This was the height of the global financial crisis. In December 2009 the global financial crisis and systemic risk were beyond the worst point and unemployment was high. The Copenhagen

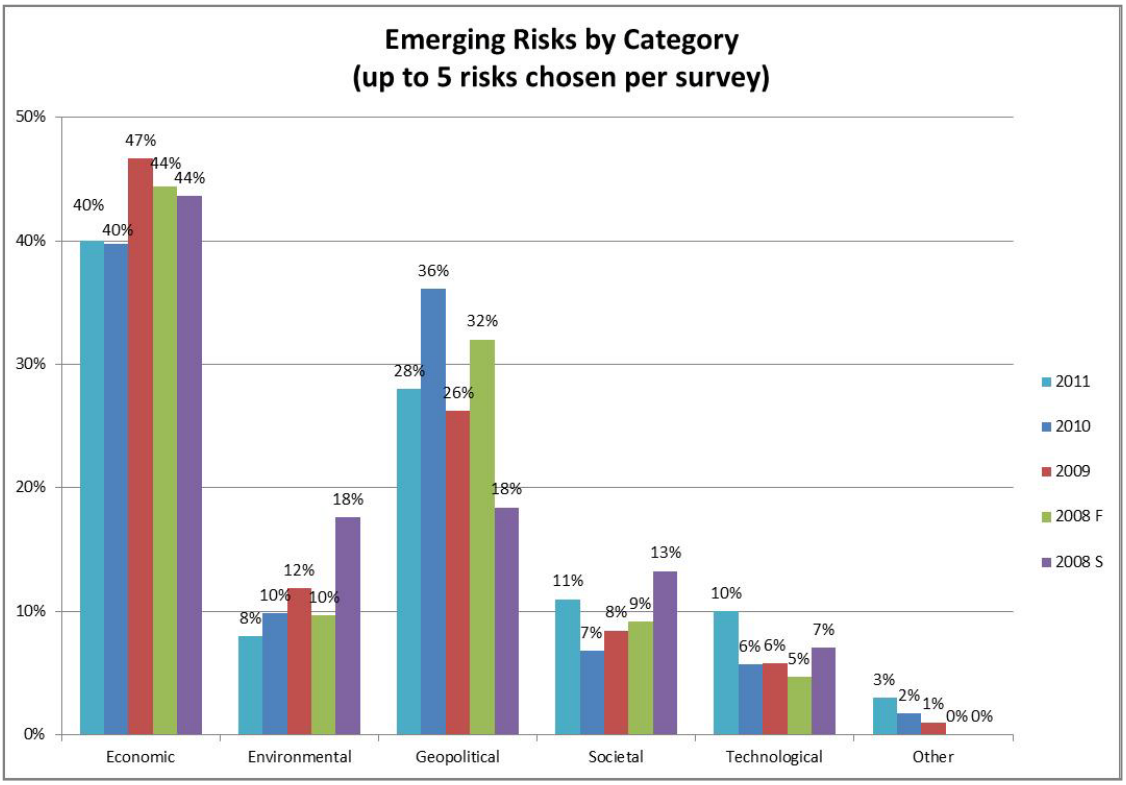
climate conference had just been held and the H1N1 mild pandemic had spread that spring. The large deficits incurred by fiscal stimulus packages were front and center in risk manager's minds. In late 2010 political tensions on the Korean peninsula and the European debt crisis were hot topics. Concurrent with the most recent survey, fresh in risk managers' minds was the Japanese tsunami and nuclear disaster, the Arab Spring, and the evolving European debt crisis. You can see there is never a dull moment, and that a crisis is not that unusual.

Not all respondents chose to list five risks. While 81% of those who filled out at least one risk did share five, the average was 4.26, down from 4.71 a year earlier. Percentages in this survey are based on the number of respondents who answered the specific survey question. This allows consistent comparison with previous and subsequent survey iterations. For example, 161 respondents answered Question 1 and 35 included *Blow up in asset prices* as one of their (up to 5) responses. Thus 22% (35/161 = 0.22) chose this emerging risk. These percentages will be higher than those that are based on all of the responses rather than the number of respondents.

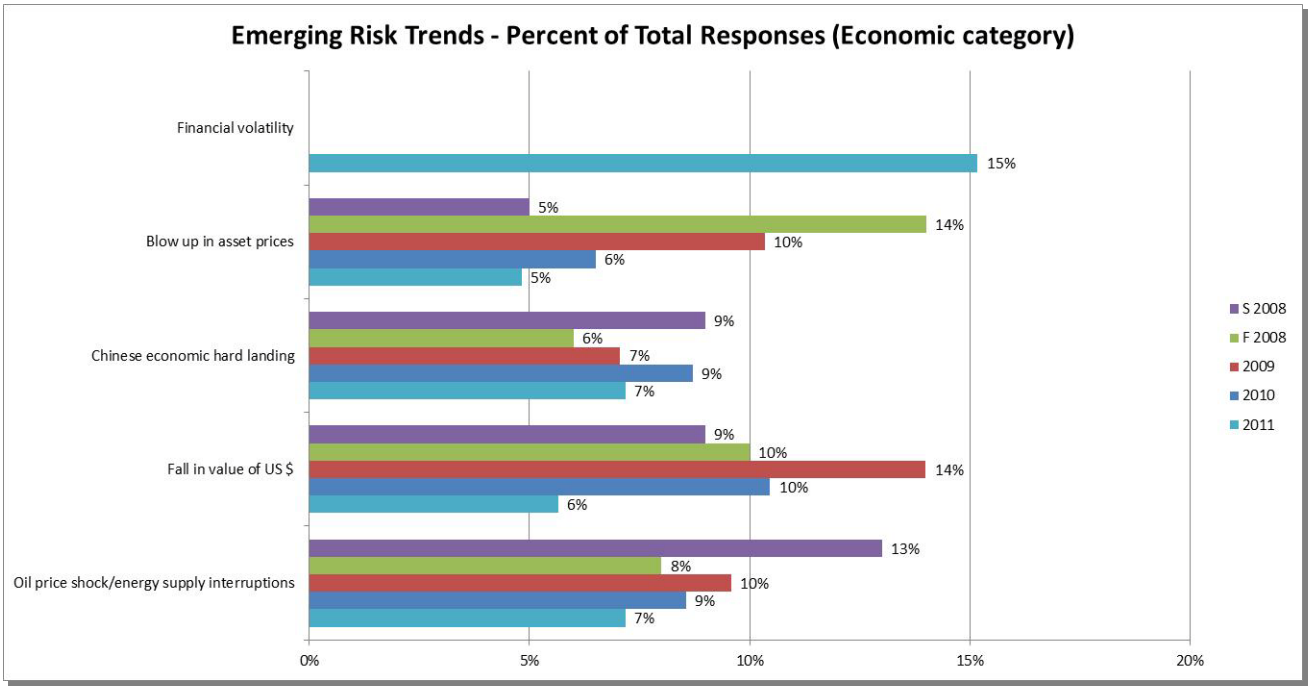
Given the current economic stresses worldwide and the group being surveyed (risk managers), it is not surprising that the Economic category again received the most responses, followed again this year by Geopolitical. Other categories trailed far behind.

A total of 725 responses were received, including 23 (3%) in the Other category. The results distributed by category (using percentages of total responses) are:

1.	290 responses	40% (40%/47%/44%/44% in past surveys)	Economic
2.	205 responses	28% (36%/26%/32%/18%)	Geopolitical
3.	83 responses	11% (7%/8%/9%/13%)	Societal
4.	69 responses	10% (6%/6%/5%/7%)	Technological
5.	55 responses	8% (10%/12%/10%/18%)	Environmental



The Geopolitical category saw surges in *Regional instability* and *Failed and failing states*. This category continues to be volatile from year to year. The chart shows that, while Economic and Geopolitical risks remain the highest, the trends are found elsewhere. Environmental risks continue to decline. The new *Financial volatility* risk came in as the top choice overall, and *Oil price shock* and *Chinese economic hard landing* tied for fourth. Societal and Technological risks saw an upsurge in the 2011 survey. Increasing trends (at least 2 consecutive years) include *Failed and failing states* and *Cyber security/interconnectedness of infrastructure.* Decreasing trends included *Oil price shock, Fall in value of US $, Blow up in asset prices, Climate change, Loss of freshwater services and Pandemics/Infectious diseases.* Some categories rebounded materially after falling in the previous survey. These included *Natural catastrophe: Inland flooding, Regional instability and Demographic shift.* Dropping after a strong increase in the last survey were *Chinese economic hard landing, International terrorism, Proliferation of weapons of mass destruction (WMD), Transnational crime and corruption and Retrenchment from globalization.* The Arab Spring and flooding in North America and Australia seem to have impacted the results.


Emerging Risk Trends - Percent of Total Responses (Economic category)
Financial volatility
Blow up in asset prices
Chinese economic hard landing
Fall in value of US $
Oil price shock/energy supply interruptions
15%
5%
14%
10%
6%
5%
9%
6%
7%
9%
7%
9%
10%
14%
10%
6%
13%
8%
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7%
0%
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15%
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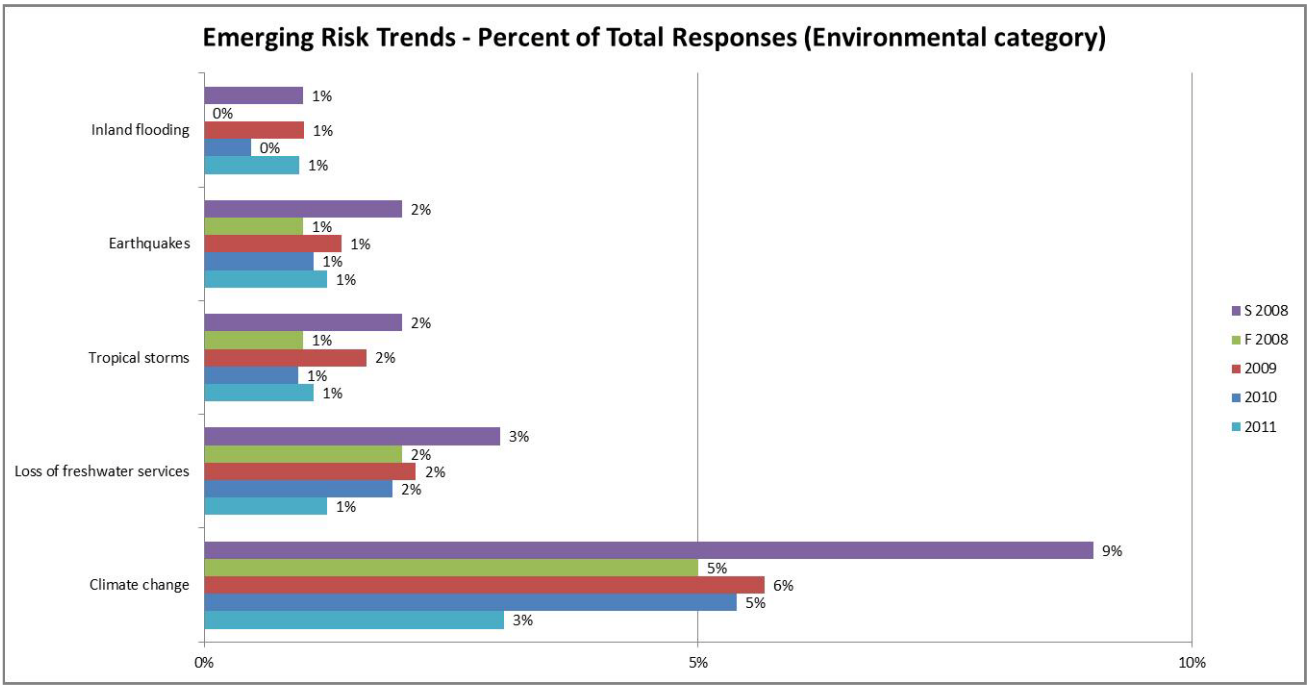
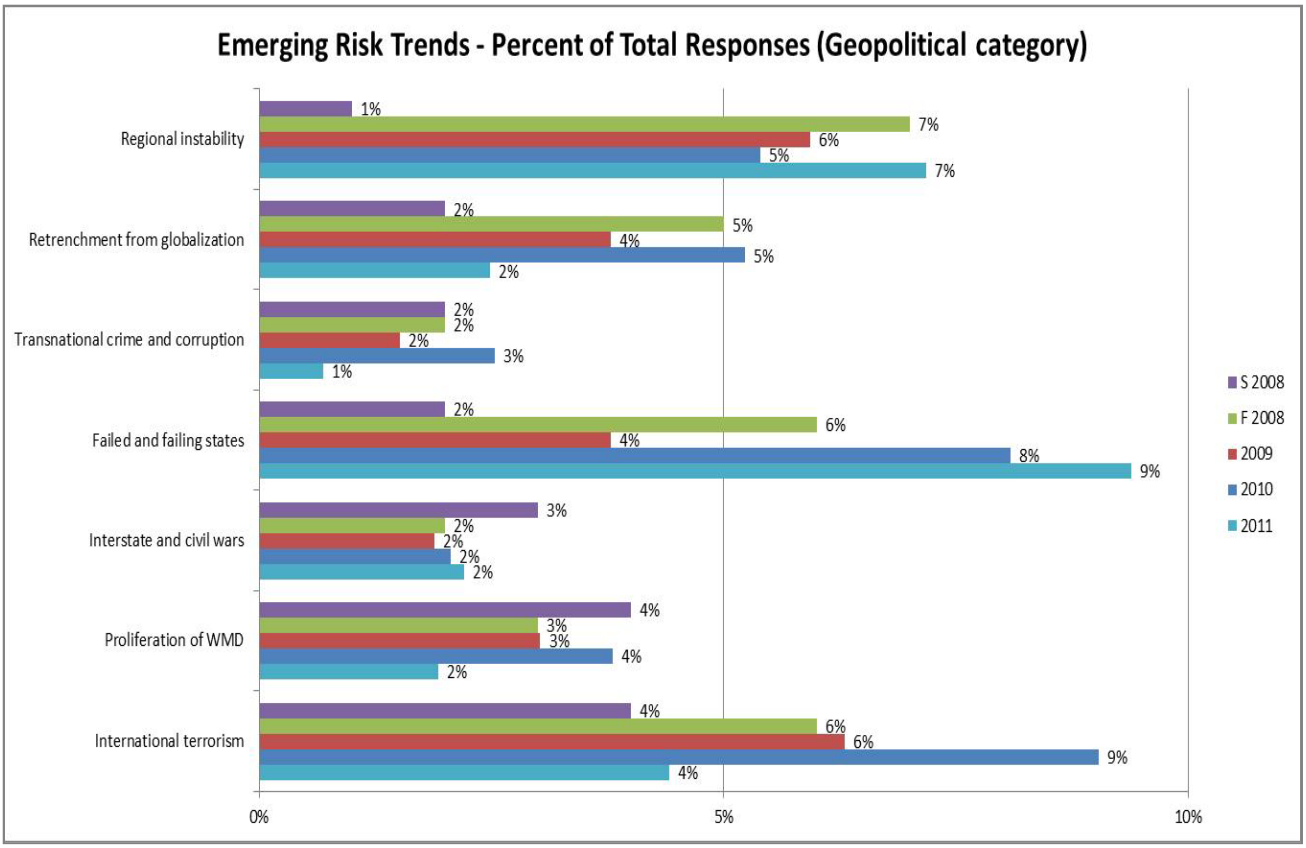
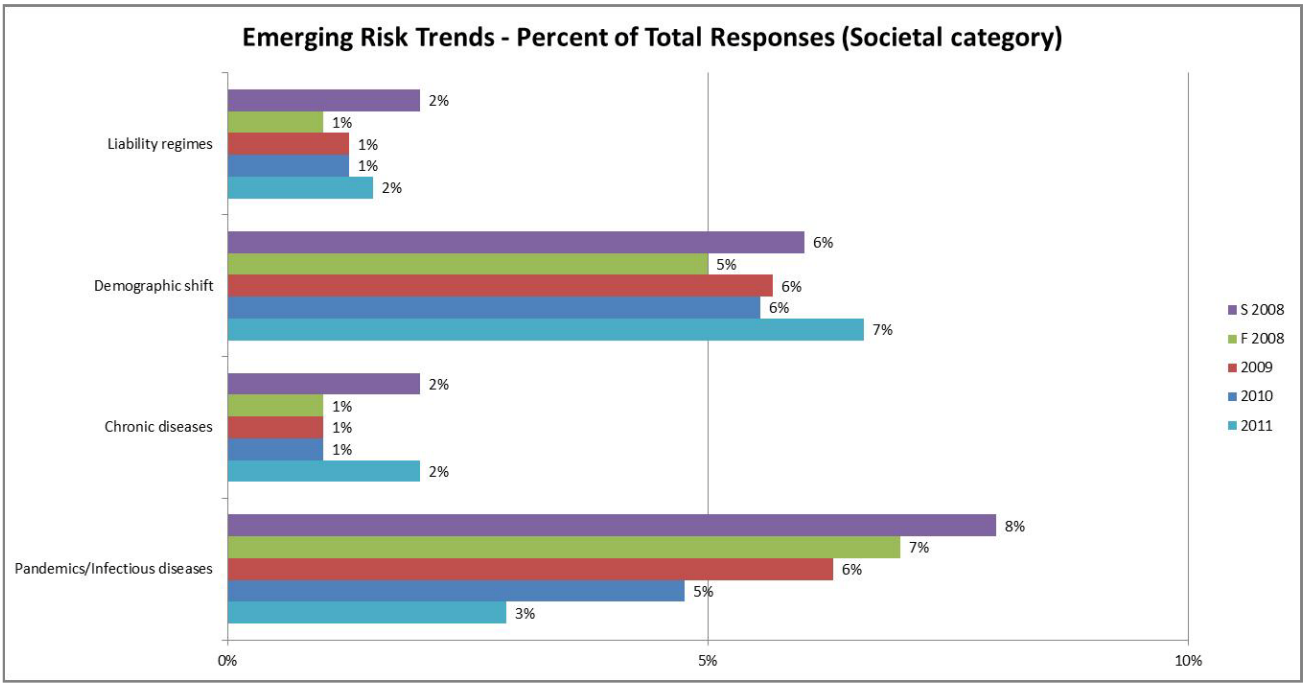
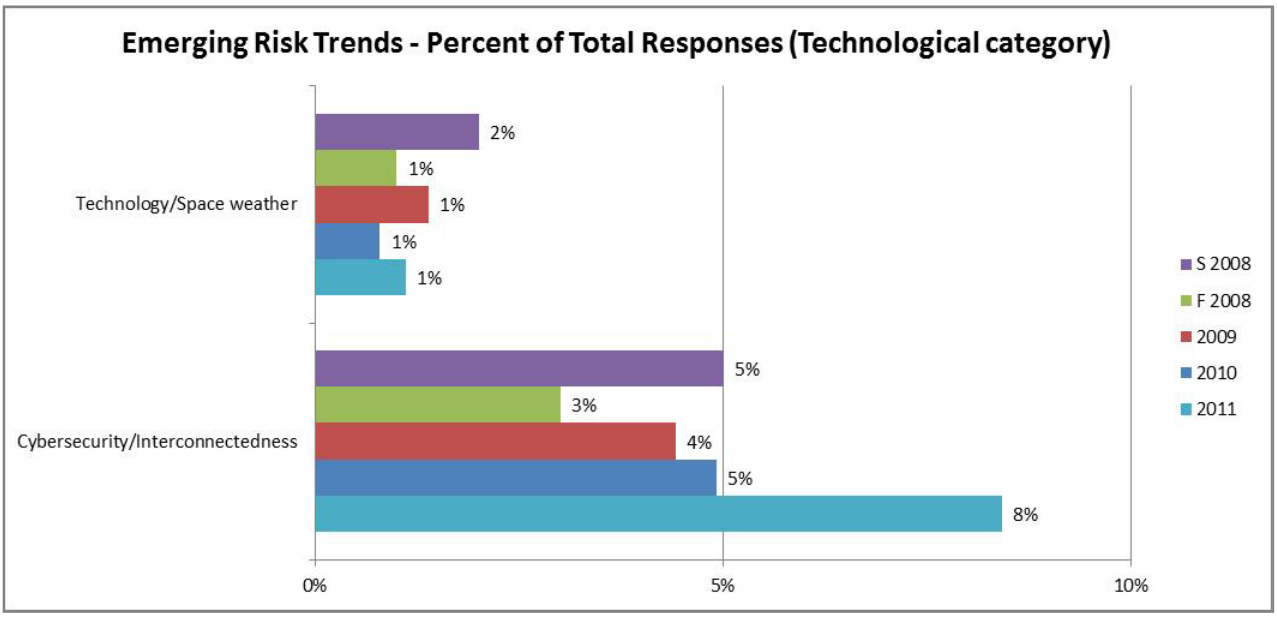
S 2008
F 2008
2009
2010
2011


Emerging Risk Trends - Percent of Total Responses (Environmental category)
Inland flooding
Earthquakes
Tropical storms
Loss of freshwater services
Climate change
1%
0%
1%
0%
1%
2%
1%
1%
1%
1%
2%
1%
2%
1%
1%
3%
2%
2%
2%
1%
9%
5%
6%
5%
3%
0%
5%
10%
S 2008
F 2008
2009
2010
2011


Emerging Risk Trends - Percent of Total Responses (Geopolitical category)
Regional instability
1%
7%
6%
5%
7%
Retrenchment from globalization
2%
5%
4%
5%
2%
Transnational crime and corruption
2%
2%
2%
3%
1%
Failed and failing states
2%
6%
4%
8%
9%
Interstate and civil wars
3%
2%
2%
2%
2%
Proliferation of WMD
4%
3%
3%
4%
2%
International terrorism
4%
6%
6%
9%
4%
0%
5%
10%
S 2008
F 2008
2009
2010
2011


Emerging Risk Trends - Percent of Total Responses (Societal category)
Liability regimes
2%
1%
1%
1%
2%
Demographic shift
6%
5%
6%
6%
7%
Chronic diseases
2%
1%
1%
1%
2%
Pandemics/Infectious diseases
8%
7%
6%
5%
3%
0%
5%
10%
S 2008
F 2008
2009
2010
2011



In past surveys, respondents seemed to use Fall in value of US $ as a proxy for financial volatility. With the addition of this risk there may be a discontinuity in the currency risk results before it again stabilizes.

The top six specific responses to Question 1, *What are the emerging risks that you feel will have the greatest impact over the next few years?*, were spread across the Economic, Geopolitical and Technological categories.

1.	68% (new risk in survey)	*Financial volatility*
2.	42% (38%/18% in 2010/2009)	*Failed and failing states*
3.	38% (23%/21%)	*Cyber security/interconnectedness of infrastructure*
4.	32% (41%/33%)	*Chinese economic hard landing*
4.	32% (40%/45%)	*Oil price shock*
4.	32% (25%/28%)	*Regional instability*

One of the most interesting results of this year's survey relative to previous years is the drop in *Climate change* responses. This year's 14% response rate is just over half what was recorded in the last two surveys (25% in 2010). Many of the Economic category risks have fallen as we move further away from the financial crisis, and this continued despite the addition of the *Financial volatility* response. Another unexpected change was within the Geopolitical category, where the Arab Spring led to moderate increases in *Failed and failing states* (38% to 42%) and *Regional instability* (25% to 32%) but other risks, like *International terrorism* (43% to 20%), *Proliferation of weapons of mass destruction* (18% to 9%), *Transnational crime and corruption* (12% to 3%) and *Retrenchment from globalization* (25% to 11%), all fell materially. The *Cyber*

security/interconnectedness of infrastructure (23% to 38%) response continues its march upwards, and is now in third place.

While the Climate change responses plummeted and Loss of freshwater services dropped, other Environmental category risks increased by small amounts. Each of *Natural catastrophe: Tropical storms* (4% to 5%), *Earthquakes* (5% to 6%) and *Inland flooding* (2% to 4%) saw small increases. Within the Societal category, both *Demographic shift* (26% to 32%) and *Liability regimes* (6% to 7%) increased. *Technology/space weather* (4% to 5%) in the Technological category also increased.

Responses that fell for the second straight year included *Oil price shock* (40% to 32%), *Fall in value of US $* (49% to 25%), *Blow up in asset prices* (31% to 22%), *Climate change* (25% to 14%), *Loss of freshwater services* (9% to 6%) and *Pandemics/Infectious diseases* (22% to 13%). Despite the reductions these remain significant responses in the survey. One driver seems to be the length of time since the last crisis relating to that risk, and as we distance ourselves from the 2008 financial crisis and pandemic managers either feel it is not an emerging risk and they are managing it or that, having lived through a similar period of time and surviving, that it is less worrisome.

Most of the Other responses to question 1 referenced in some way the public debt crisis, either specifically mentioning European sovereign debt or generically including all government debt. In addition, complexity and interconnectedness, carbon's impact on economic growth, increased regulatory intervention, civil unrest, prolonged low interest rates, prolonged global recession, crisis of values, inaccuracy of CAT models, investors reaching for yield and the rise of socialism in the U.S. were suggested.

It was a bit surprising that *Technology/space weather* and *Transnational crime and corruption* did not increase due to the increased media coverage of geomagnetic storms and the interconnectedness of transnational crime with several other risks on the list.

Complete results for all survey questions can be found in Appendix II. Appendix III details the survey results from Fall 2010 and are provided for comparison.

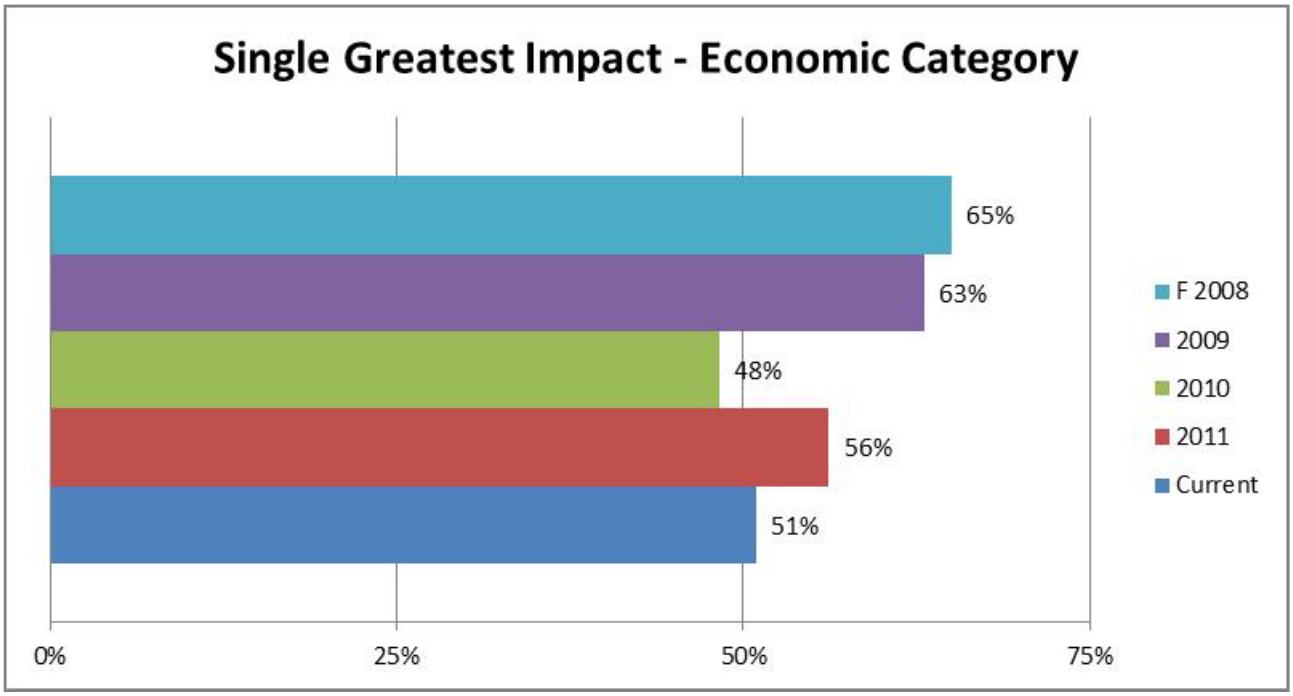
One method to analyze this data over time is to highlight those risks reported in the current survey above their long-term averages. For this purpose the data were analyzed with responses as a percentage of all responses, rather than as a percentage of surveys collected. Only five of the 23 risks meet these criteria in this survey. The greatest differential was 3% for both *Failed and failing states* (on this list for the second consecutive year) and *Cyber security/interconnectedness of infrastructure.* Eleven are trending below the average, led by a 4% below average result for *Fall in value of US $.* This may have been impacted by the addition of the *Financial volatility* risk. All four returning risks are below their long term average for the Economic category, while the Societal category has 3 out of 4 (slightly) above their longer term average (only *Climate change* fell below).

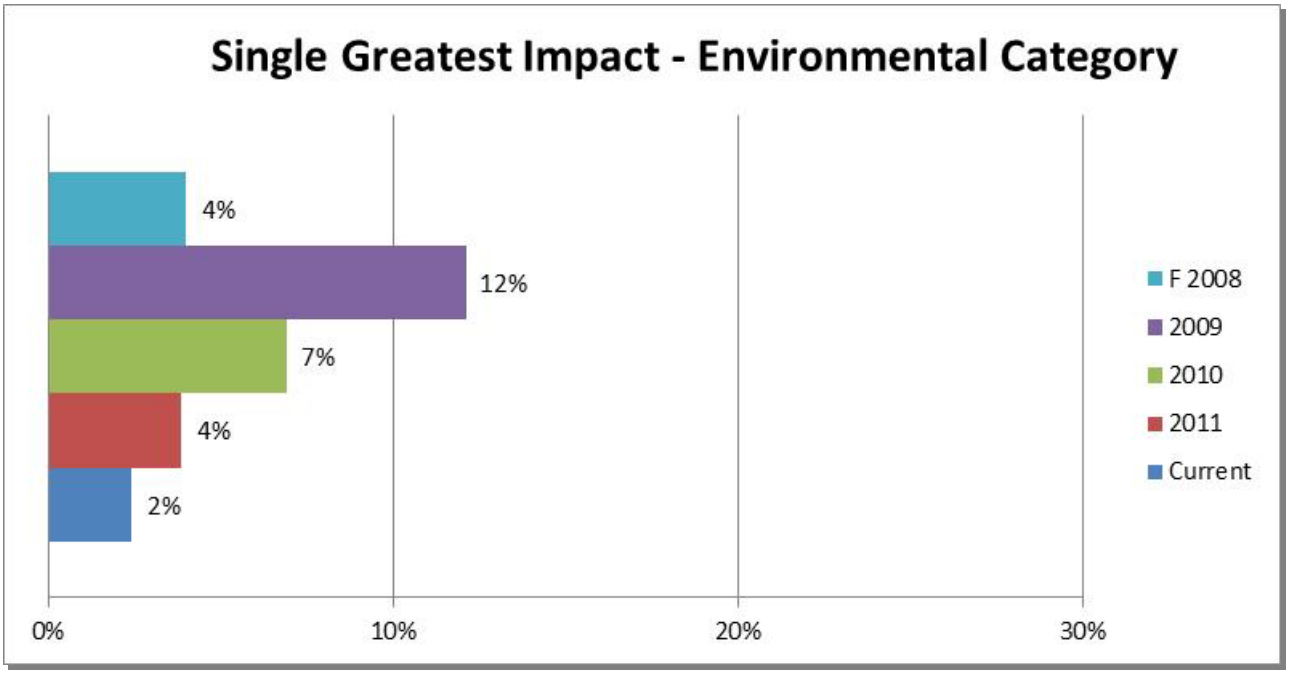
Top Emerging Risk: *Financial volatility*

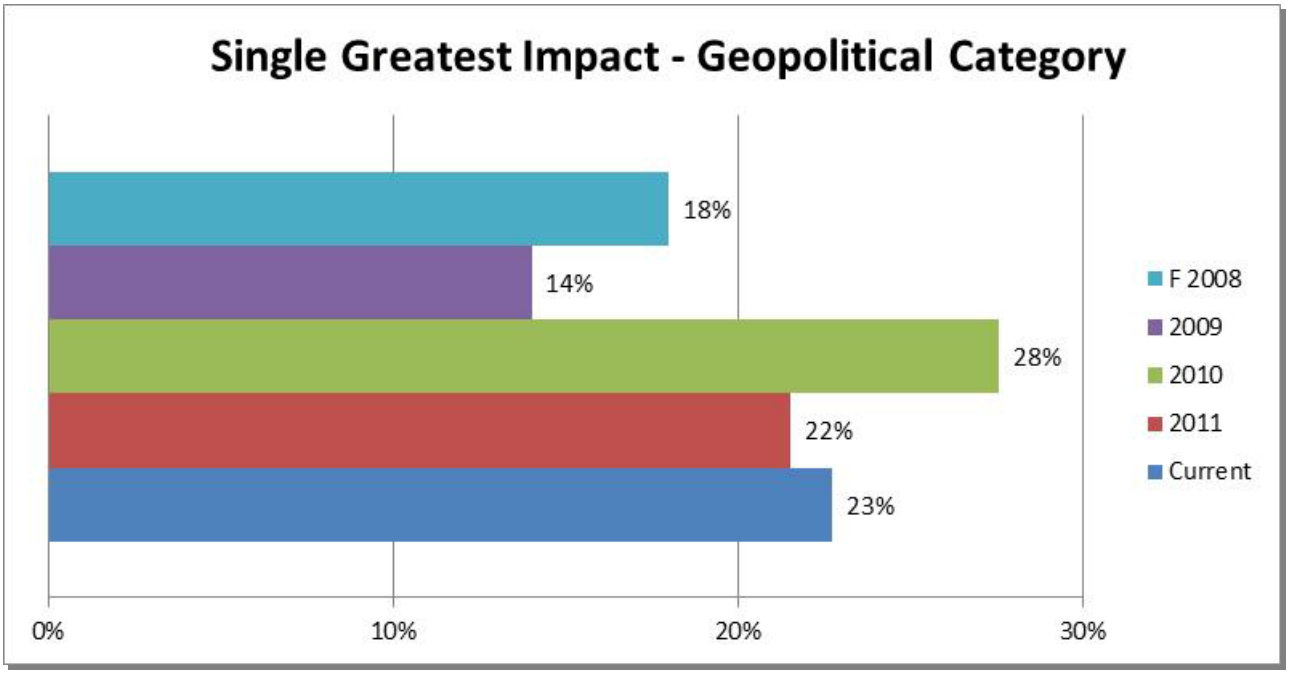
In Question 2, respondents were asked to state which single emerging risk they expected to have the greatest impact. Not surprisingly, the Economic category continues to dominate this question with over half the responses, and Geopolitical risks again ranked second. Technological risks again held the third spot, with Societal moving up and dropping the Environmental category all the way to the bottom position.

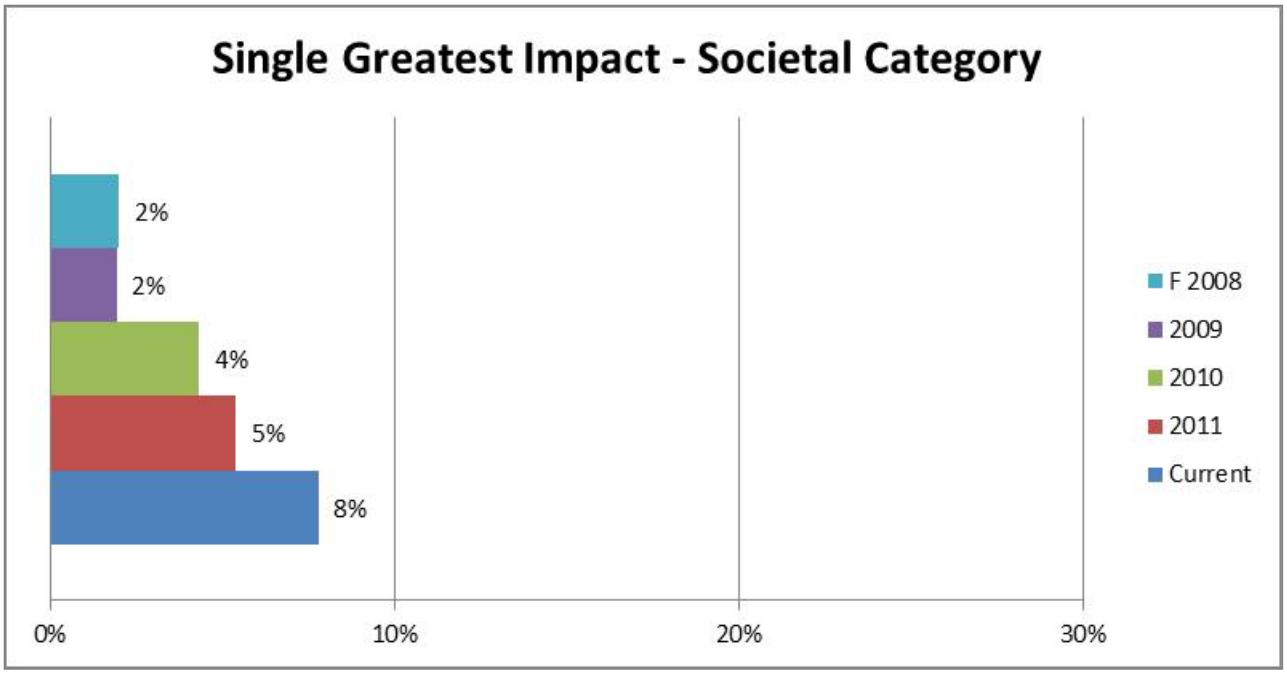
1. 56% (48%/63%/65%) Economic
2. 22% (28%/14%/18%) Geopolitical
3. 8% (9%/6%/6%) Technological
4. 5% (4%/2%/2%) Societal
5. 4% (7%/12%/4%) Environmental

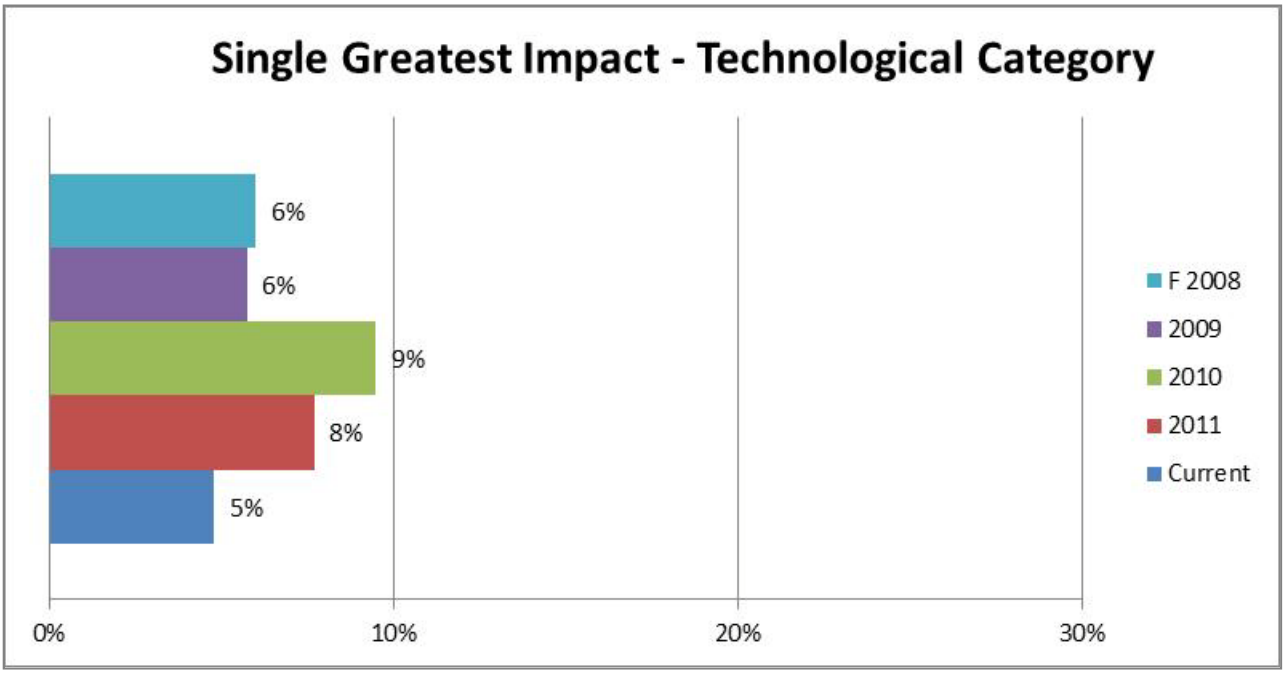
In the accompanying chart, the current risk with greatest impact has been included with the emerging risk choices for current greatest impact. The results for current risk do seem to be pulling up/down the emerging risk results for the Environmental, Geopolitical and Societal categories as might be expected by the anchoring theory of behavioral finance.




Single Greatest Impact - Environmental Category
4%
12%
7%
4%
2%
0%
10%
20%
30%
F 2008
2009
2010
2011
Current


Single Greatest Impact - Geopolitical Category
18%
14%
28%
22%
23%
0%
10%
20%
30%
F 2008
2009
2010
2011
Current





The same bifurcation occurs here in the Geopolitical category that was seen in Question 1, with *Failed and failing states* moving up to the second overall rank and *Regional instability* showing a strong increase while others in the category decreased. *Financial volatility* is the risk that respondents are most worried about, and dominated with 40% of the responses.

The Economic category had three of the top five specific responses, with *Failed and failing states* in second and *Cyber security/interconnectedness of infrastructure* moving

up to third. Results were more concentrated in this survey than recent others, with 52% explained by the top two responses and 70% in the top 5 (this is similar to results in 2009). These results are telling as an economic crisis is brewing in Europe and there is uncertainty throughout the Middle East/North Africa, Asia, and countries driven by natural resource exports. One of the major findings of this survey is the increased awareness of *Cyber security* threats in the minds of the risk managers. For the first time, *Oil price shock* was not one of the five top choices for greatest impact (note that oil prices rebounded by spring 2012).

1.	40%	*Financial volatility*
2.	12% (8%/2%/2%)	*Failed and failing states*
3.	7% (9%/4%/6%)	*Cyber security/interconnectedness of infrastructure*
4.	6% (10%/22%/25%)	*Blow up in asset prices*
5.	5% (14%/4%/3%)	*Chinese economic hard landing*

Risk Combinations

As we saw in the period leading up to the financial crisis and ongoing tensions in the Middle East, it is clear that no one can fully understand all of the interactions between risks and how it will all play out. An example of such interaction might be the economic weakness in Europe combined with an event impacting the world's oil supply, driving the world's economy into another recession or conflict. This would influence economic growth as well as the worldwide balance of power. The expert risk manager will not have the absolute "right" answer to this, but will oversee a process that considers flexibility in responding to new issues rather than inflexibly following a set of rules to measure and manage risk.

Combinations of emerging risks interact in ways that are often not fully understood, generating unintended consequences as scenarios develop. Risk combinations can happen simultaneously or sequentially. For example, the Geopolitical risk *Loss of freshwater services* could lead to *Interstate and civil wars*. Concurrent emerging risks could exacerbate a scenario. In 2011 the Japanese earthquake and immediate financial volatility led to supply chain scenarios that had not previously been considered.

In Question 3, risk combinations are considered. These results can be looked at from several perspectives. Each respondent could choose up to three combinations of two risks. In total 341 combinations were suggested. Respondents were asked to list their top combination first. Appendix II includes a grid showing all combinations. Even though the question is about combinations of risks, it is helpful to look first at the risks in isolation. Consistent with earlier questions, Economic (48%) and Geopolitical (32%) are the most frequent responses when identified in isolation. There was again movement toward the Technological category, and Societal saw a small increase. The Environmental category reduced for the second consecutive year but maintained its position overall relative to the other categories.

1. 48% (45%/53%/49%) Economic
2. 32% (35%/25%/32%) Geopolitical
3. 7% (11%/13%/9%) Environmental
4. 7% (4%/3%/2%) Technological
5. 6% (5%/5%/8%) Societal

Individual risks were led by the same major categories. *Financial volatility* was included 19% of the time, with *Failed and failing states* and *Oil price shock* (9%) tied for second.

1. 19% *Financial volatility*
2. 9% (8%/3%/5%) *Failed and failing states*
2. 9% (10%/13%/12%) *Oil price shock*
4. 8% (10%/8%/6%) *Chinese economic hard landing*
5. 7% (5%/6%/8%) *Regional instability*

While *Financial volatility* dominates the combination category as it did when considering individual risks, several other risks had material increases. *Cyber security/interconnectedness of infrastructure* was the only risk that increased by at least 3%, doubling from 3% to 6%. It has risen for 3 consecutive years. *Regional instability* was the only other risk to rise more than 1%, with an increase from 5% to 7%. *Pandemics/infectious diseases* dropped from 4% to 1% after being as high as 7% in earlier surveys more recent to the mild 2008 pandemic. It is interesting to see that *Oil price shock*, which received less relative attention when considering a single emerging risk, maintained its third place ranking here. *Chinese economic hard landing* leveled off but continued among the top five risks in combination. *Natural catastrophe: Earthquakes* has shown consistent, yet small, increases and now receives 2% of the responses. *Financial volatility* is one of the risks chosen for each of the first three combinations, and six out of eight. In order, its six companion risks are *Failed and failing states, Oil price shock, Chinese economic hard landing, Fall in value of US $, Blow up in asset prices, and Regional instability.* The top two combinations not to include *Financial volatility* were *International terrorism/Cyber security and interconnectedness of infrastructure* (4^{th}), *and Fall in value of US $ and Chinese economic hard landing* (7^{th}). The major category combinations were

- 29% (29%/42%/34%) Economic – Economic
- 24% (21%/16%/22%) Economic – Geopolitical
- 14% (20%/14%/16%) Geopolitical – Geopolitical
- 7% (3%/2%/1%) Geopolitical – Technological
- 6% (2%/3%/2%) Economic – Societal
- 4% (3%/1%/1%) Economic – Technological
- 4% (7%/9%/7%) Environmental – Environmental
- 3% (5%/3%/2%) Economic – Environmental
- 2% (3%/2%/2%) Environmental – Geopolitical
- 2% (2%/3%/5%) Environmental – Societal
- 1% (2%/2%/4%) Geopolitical – Societal
- 1% (2%/1%/2%) Societal – Societal

- 1% (<1%/1%/<1%) Technological – Technological
- <1% (0%/<1%/0%) Environmental – Technological
- 0% (1%/<1%/1%) Societal – Technological

While the combinations of the Economic and Geopolitical categories retained the top three positions, both Geopolitical/Technological (3% to 7%) and Economic/Societal (2% to 6%) saw material gains. While the combinations were more spread out for the Economic/Societal combination, for Geopolitical/Technological the *Cyber security* combined with *International terrorism* and *Transnational crime and corruption* for most of the results. The two major reductions were combinations entirely consisting of the Environmental (7% to 4%) or Geopolitical (20% to 14%) category.

Leading combinations were (top 10 are listed, including ties)

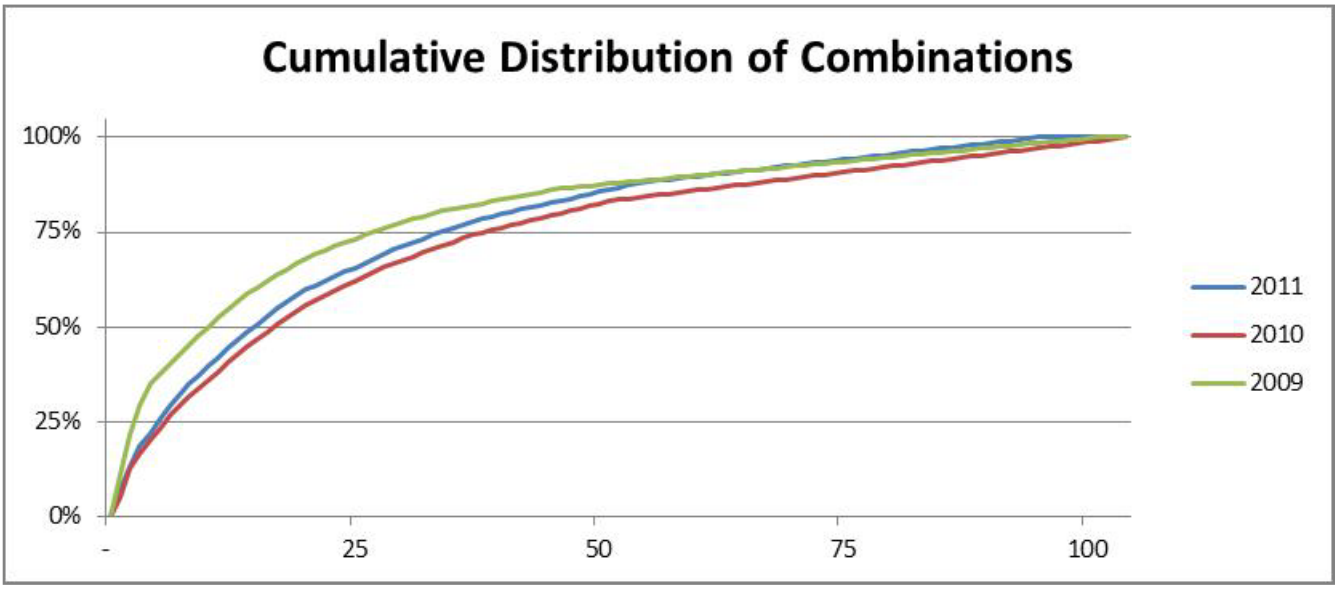
1. 24 responses
    - *Financial volatility*
    - *Failed and failing states*
2. 21 responses
    - *Oil price shock/energy supply interruptions*
    - *Financial volatility*
3. 18 responses
    - *Chinese economic hard landing*
    - *Financial volatility*
4. 12 responses
    - *International terrorism*
    - *Cyber security/interconnectedness of infrastructure*
5. 12 responses
    - *Fall in value of US $*
    - *Financial volatility*
6. 12 responses
    - *Blow up in asset prices*
    - *Financial volatility*
7. 11 responses
    - *Fall in value of US $*
    - *Chinese economic hard landing*
8. 9 responses
    - *Financial volatility*
    - *Regional instability*
9. 8 responses
    - *Oil price shock/energy supply interruptions*
    - *Fall in value of US $*
10. 8 responses
    - *Chinese economic hard landing*
    - *Retrenchment from globalization*
11. 8 responses

- *Fall in value of US $*
- *Retrenchment from globalization*

12. 8 responses
    - *Financial volatility*
    - *Cyber security/Interconnectedness of infrastructure*
13. 8 responses
    - *Failed and failing states*
    - *Regional instability*
14. 8 responses
    - *Transnational crime and corruptions*
    - *Cyber security/Interconnectedness of infrastructure*

Many of these combinations are likely to have unintended consequences, and these responses provide useful input to specific combination questions for future surveys. For example, this survey includes a question specific to resource shortages. As a consequence of these results, it could lead to future questions focusing on the Societal category and why risk managers are becoming less worried about these risks.

Responses were more concentrated than in the previous survey, but not nearly as much as the 2008 Fall survey, with fewer risk combinations chosen (95 versus 104/101/75 in previous surveys).



There are 253 possible risk combinations. The distribution was more concentrated in 2011 relative to 2010, but not as severe as 2009, as can be seen in the accompanying chart. This seems to be a result of the major events occurring in 2011; sovereign debt crisis, Japanese earthquake and tsunami, and the Arab Spring. By quartile, with data listed cumulatively and first quartile representing the most frequent responses, results were

Risk Concentration Ratio					
				Avg prior to	
	2009	2010	2011	Current Yr	Avg/Curr Yr
First quartile	3	6	5	4.5	0.90
Second quartile	10	17	15	13.5	0.90
Third quartile	27	38	34	32.5	0.96
Total	101	104	95	102.5	1.08
Remaining	152	149	158		
					96

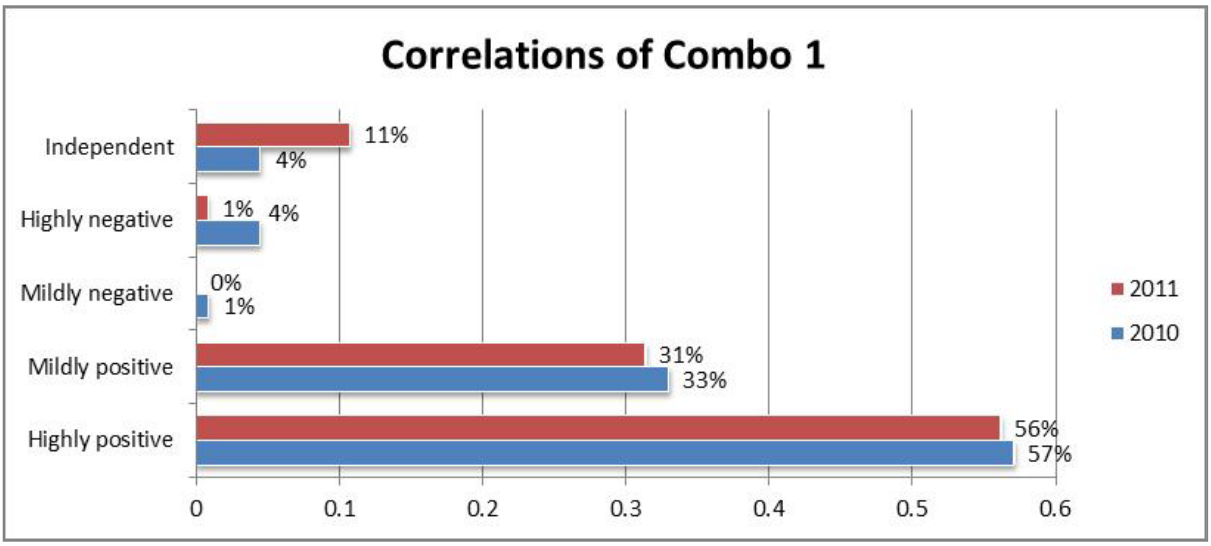
This may be an indicator of the current risk environment, with each quartile being considered against the mean of the previous surveys (mean of previous results divided by the current result). It is likely that 2009 is an extreme example, so stating that this year's Risk Concentration Ratio of 96 would be more useful if there was more data to work with. As a relative measure it will provide a measure of the current feelings among the risk management community and will become a regular feature of this survey. Another way to look at this metric would be to consider two consecutive years. This calculation results in a 2010 ratio of 69 due to the heavy concentration in 2009, and a 2011 ratio of 114 as risk managers are more worried about fewer risks this year (concentrating their focus).

The next chart shows the responses in the order they were chosen. A follow up question referred to Combination 1 so it would be reasonable to assume that it is the risk manager's first choice. All of the risks in the Economic category except *Oil price shock* see drop-offs of at least 3% between Combo 1 and Combos 2/3, while risks such as *Loss of freshwater services, Transnational crime and corruption, and Cyber security/interconnectedness of infrastructure* are more likely by at least 3% after the first combination. It may be that a risk manager is anchored in current events for the first choice and that Combos 2 and 3 provide more forecasting credibility.

	1	2	3	4	5	6	7	8	9	10	11	12
Combo 1	21	19	27	23	64	2	1	3	3	1	10	2
Combo 2	20	13	18	7	37	8	6	2	3	4	19	10
Combo 3	18	8	12	11	28	5	6	-	5	-	9	2
Total	59	40	57	41	129	15	13	5	11	5	38	14
	9%	6%	8%	6%	19%	2%	2%	1%	2%	1%	6%	2%
Combo 1	8%	**8%**	**11%**	**9%**	**26%**	1%	0%	1%	1%	0%	4%	1%
Combo 2-3	9%	5%	7%	4%	15%	3%	**3%**	0%	2%	1%	6%	3%

	13	14	15	16	17	18	19	20	21	22	23	
Combo 1	3	24	1	5	17	5	1	7	1	8	2	250
Combo 2	9	24	5	8	18	2	1	5	3	14	2	238
Combo 3	6	16	6	9	15	3	3	9	2	19	2	194
Total	18	64	12	22	50	10	5	21	6	41	6	682
	3%	9%	2%	3%	7%	1%	1%	3%	1%	6%	1%	
Combo 1	1%	10%	0%	2%	7%	2%	0%	3%	0%	3%	1%	
Combo 2-3	3%	9%	**3%**	4%	8%	1%	1%	3%	1%	**8%**	1%	

Respondents were asked the level of correlation for the two risks in Combo 1. While 87% of responses felt they were either highly or mildly positively correlated, the independent response increased from 4% to 11%. Only 1% felt the risks were highly negatively correlated, down from 4%.

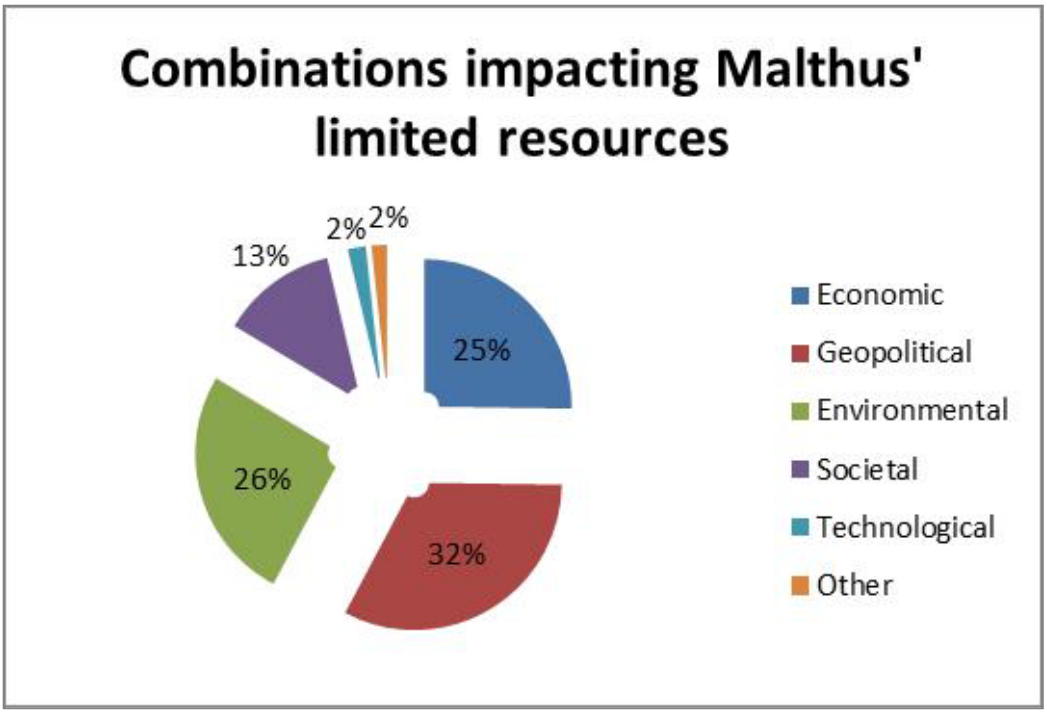


Of course a highly positive correlation does not infer causality, but the risk manager might consider if correlated risks are sequential that one might be a leading indicator for the other.

Question 5 changes with each survey, looking at risk combinations surrounding a topical issue. Previous questions have addressed China's financial relationship with the world, regional food shortages and political instability. In this survey Thomas Malthus' theory that population would overwhelm resources was explored. Respondents were asked to consider food, commodities, water and energy. Respondents included up to three risks, and 127 respondents chose 353 responses (2.8 per). Results focused on Environmental, Geopolitical and Economic risks, with the leading response 33% from Environmental.

1. 33% Environmental
2. 26% Geopolitical
3. 25% Economic
4. 13% Societal
5. 2% Technological

The top two specific risks chosen, quite a bit ahead of the rest, were *Loss of freshwater services* (50%) and *Oil price shock* (45%). Rounding out the top 6 were *Climate change, Regional instability, Failed and failing states* and *Demographic shifts.*



There were six write-in responses, and half expressed skepticism about the question. The three specific comments were "Do not accept the premise", "Theory is flawed", and "Malthusian model is preindustrial and may no longer apply". This serves as a revealing mini case study about the study of emerging risks. Risk managers are asked to provide their opinion. They might be proved correct, and they might be proved wrong. The accuracy of their analysis may take years to determine and could be material. Asbestos is a classic example. There were likely risk managers concerned with the risks being taken, but they were not proved right until after their working careers ended. On the other hand, the risk manager must be careful to understand the risk culture of their firm when raising issues. Each firm will have their own limit of how many emerging risks it can follow and how much they want to spend to research potential emerging risks that might not obviously impact them directly (a good example of that is the Gulf Coast tourism industry and the impact on it from the BP oil spill). A balance needs to be created, incorporating cost estimates and time horizons. Scarce resources are one of these controversial issues. There are a wide range of potential outcomes, and the issue does not go away. Malthus first brought it up over 200 years ago and it remains widely debated today.

Other comments referred to repressive regimes, unsustainable growth caused by shareholder maximization, and the failure to expand women's rights.

Risk as Opportunity

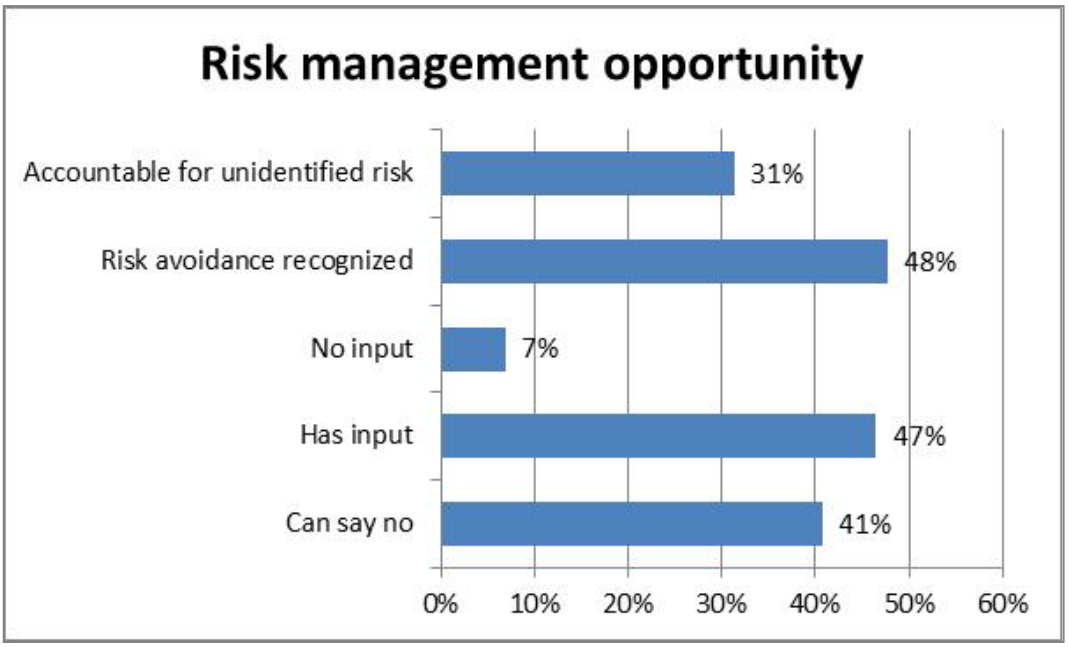
Many risk managers view risk as two sided, with opportunities drawn out of the same tools and datasets used for risk mitigation. The survey asked which emerging "opportunities" are being monitored. Some of the responses included

- Financial volatility and asset mispricing
- Political agendas frequently distort economic fundamentals. This leads to artificial low interest rates and affects commodity prices as well.
- Flood risk; climate change; new technology
- Alternative energy – Personal belief that sources of energy will change in my lifetime. I believe the changes could have positive financial and environmental impacts.
- Clean water as an investment theme
- Mergers and acquisitions, because they can help diversify risks
- Federal health care reform
- International CAT
- Financial volatility related products such as structure notes.
- Demographic changes – may lead to product opportunities that hedge existing products
- Energy and food opportunities, since I can connect what I see on the ground to an economic hypothesis and practical investment opportunities.
- Inflation
- Negative black swans: war and financial events
- It is likely that European debt problems will not be contained.
- Housing
- We monitor all types of assets and have invested, amongst things, in large commercial real estate properties which can be purchased at a steep discount while realizing significant gains over time.
- Changing customer preferences, unmet customer needs
- Continuing instability and lack of confidence
- Failed and failing states
- Tort reform
- Major catastrophes
- Market dislocations for business growth and investment opportunities
- Riskier, but higher yielding assets
- Cheaper capital provision e.g., cat bonds in lieu of traditional cat reinsurance
- Personal income
- Natural catastrophes
- Regulatory activity

This is a developing area in risk management. If the risk manager is to aid the strategic planning process, it seems to be a place where competitive advantage can be added from understanding risks better. Highlighting a few of the comments made, it seems that

product pricing, finding under/overvalued assets, and seeking out opportunities for diversification could be early indicators of success that risk managers are especially qualified to identify.

A new question in the 2011 survey asked how the ERM team was utilized when a strategic opportunity is presented to their firm. A wide majority (84%) can say "no" to a strategic opportunity and/or have input but no vote. Nearly half (48%) expect to be recognized for avoiding a risk while almost a third (31%) feel they would be held accountable if they failed to identify a risk.

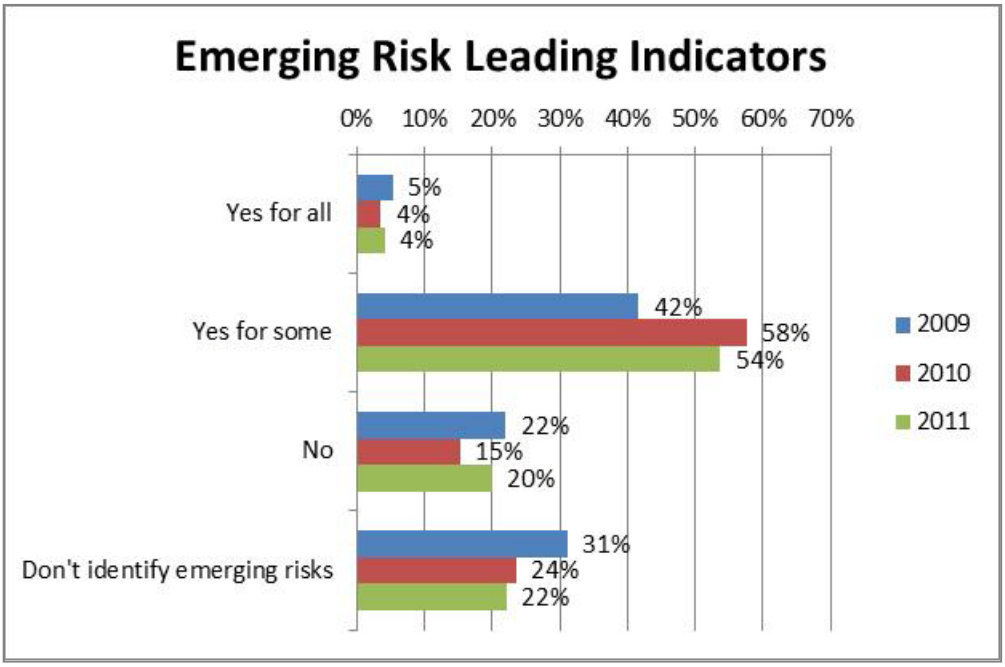


Section 2: Leading Indicators

Leading indicators of emerging risks are metrics, or events, that provide an indication that an emerging risk may be materializing. This also provides information used to make better decisions. Key risk indicators (KRIs) provide information about a specific risk. They do not replace metrics that measure value but attempt to derive drivers behind future performance. Trending GDP or CPI can provide macroeconomic KRIs, as can revenue and liabilities for a firm. These are examples of lagging indicators that measure historic results. Leading indicators, in contrast, provide information earlier in the process. For example, a leading indicator such as a lower unemployment rate would drive expectations of higher collected taxes. A leading indicator could also be an event that when it occurs becomes the indicator. An example might be the signing of a star athlete that would drive higher attendance at games. The survey asked about the use of leading indicators that would provide a firm with actionable information about a risk.

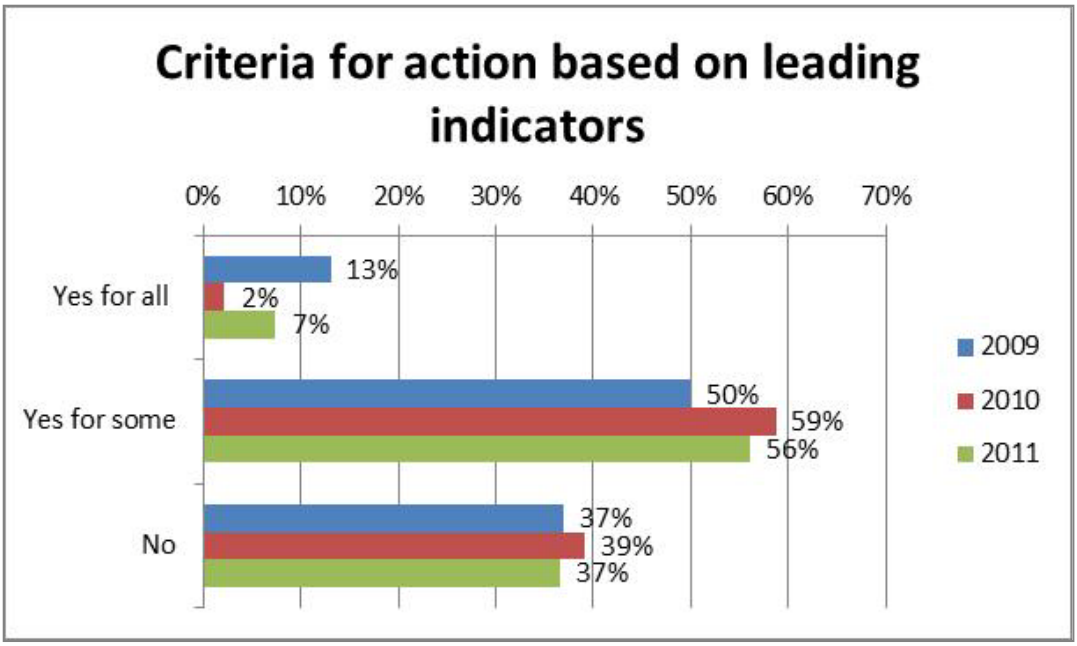
The first question asks "Once an emerging risk is identified, do you select leading indicators to measure changing likelihoods?" Four percent of the respondents noted that

they had leading indicators for all identified emerging risks and 54% had them for some. Twenty-two percent did not formally identify emerging risks, but this number is slowly reducing.



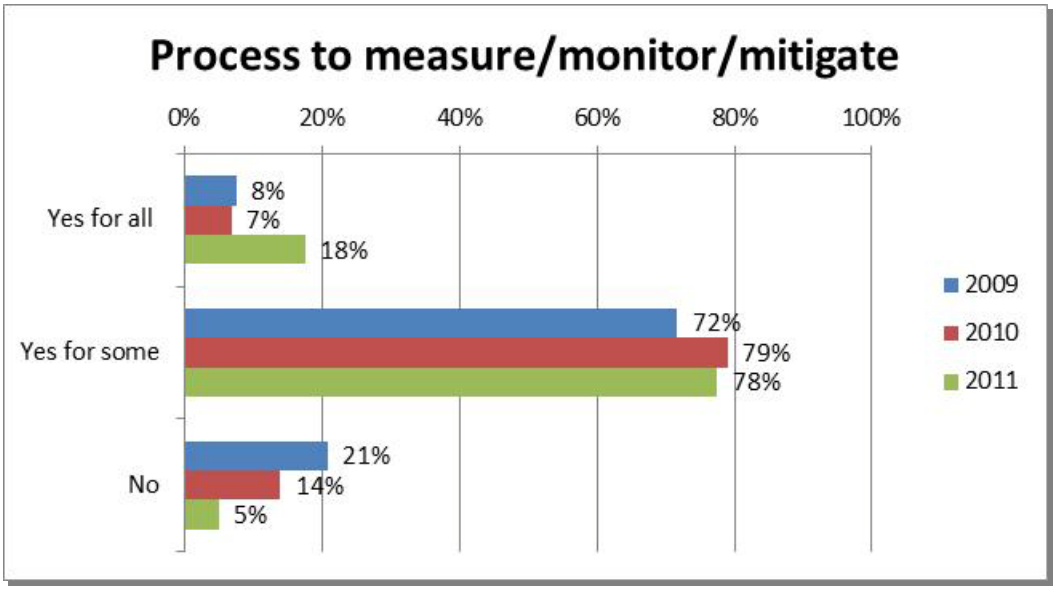
What is more interesting are the examples risk managers shared about the leading indicators they collect and monitor (found in their entirety in Appendix II). Many are standard byproducts of the financial reporting process or economic metrics. These include stock indices, the WHO indicator (pandemic), credit spreads, spending patterns, concentration of nuclear reactors, oil price and weather markers. Some are qualitative and include reading articles and monitoring competitors. Some have the ability to monitor web traffic on specific issues. The most common response was that risk managers are monitoring regulatory developments, which makes sense given the large amount of activity surrounding Dodd-Frank, Solvency II, Basel, health care reform and other regulatory regime changes in the works.

The survey asked whether these leading indicators included criteria that would lead to an action to mitigate or accept the risk. There were 51 responses of the 55 who stated that they use leading indicators for emerging risks. Of those, over half (63%) stated that criteria exist for at least some of their emerging risks which is comparable to prior surveys.



When asked for examples, several respondents talked about triggers and how they work to quantify metrics surrounding emerging risks. Based on the examples provided, and comparing them to last year's survey results, it appears that many risk managers have moved beyond general statements about risk appetite and into specific examples. Some comments shared include a threat rating scheme to trigger actions, monitoring exposures to specific risks, and credit default swap rates on companies to reduce stock exposure to them. Risk managers seemed more comfortable in this survey developing actionable events.

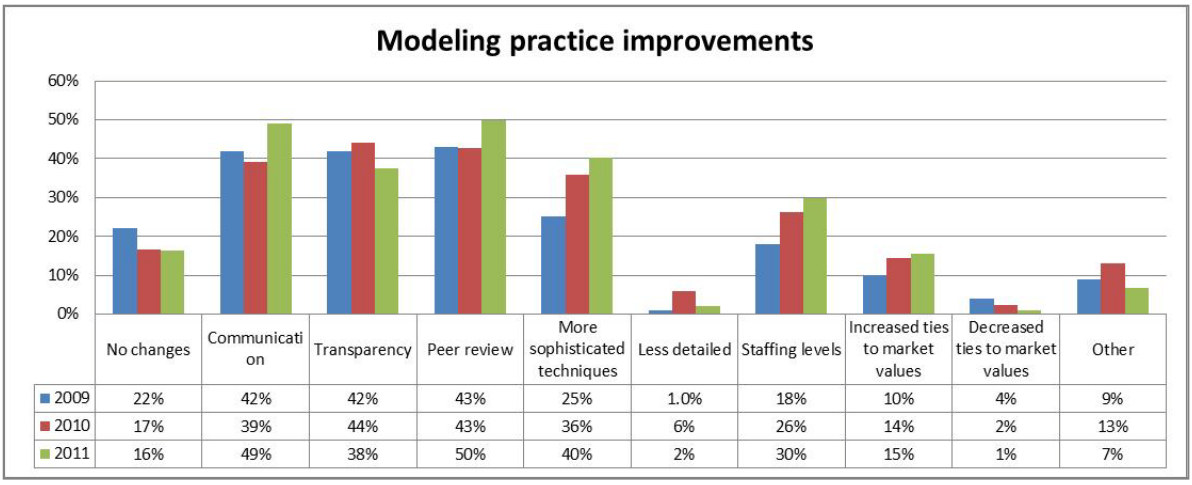
Forty seven respondents answered Question 5 about measuring, monitoring, and mitigating an emerging risk once it has been identified, with 95% responding that they did for some or all of their identified emerging risks (up from 79% in 2009). The trend continues its upward swing and only 5% reported no process in place, down from 21% in 2009 and 14% in 2010.



Examples provided show an evolution to more quantitative analysis but mostly continue to be non-specific, talking in generalities. Topics include use of dashboards and threat ratings, and seem to focus on groups utilizing their amassed experience to make decisions about concentrated exposures. One respondent shared that they have ownership in several sectors that they feel provide an early warning to general business conditions. Several mentioned that scenarios are being developed to determine the specific impact of an event. Another discussed the working relationship between the risk manager embedded in business units and the corporate ERM staff unit.

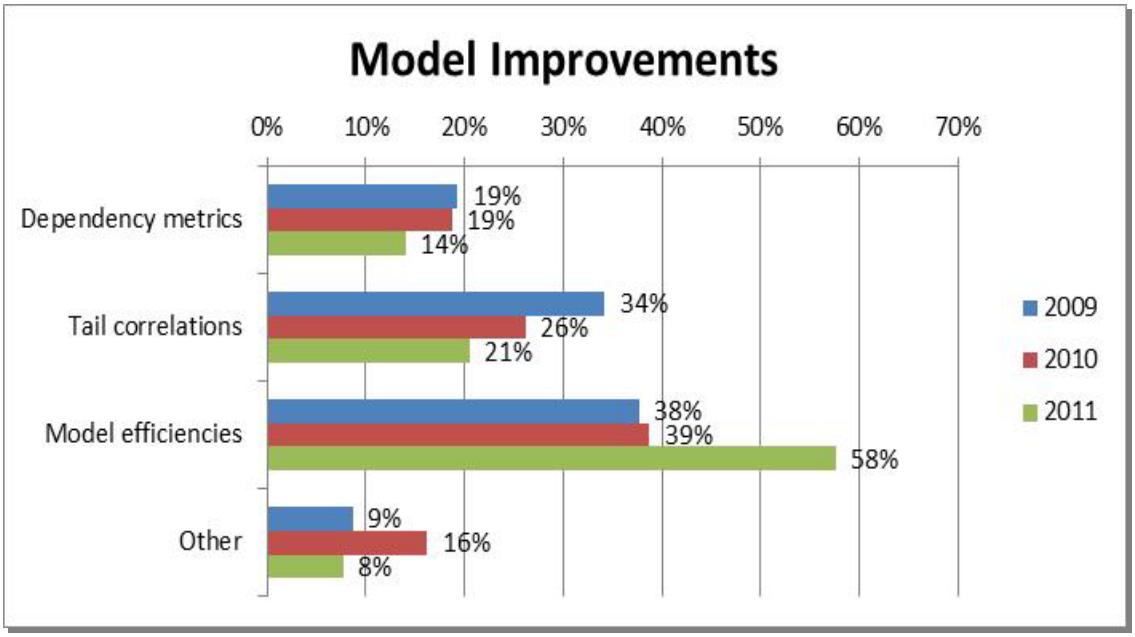
Section 3: Methodology

Models continue to be heavily scrutinized as Basel III and Solvency II, among other regulatory developments, move forward. How are risk managers adapting? Staffing is revisited again later in the survey, but communication, peer review, increasingly sophisticated techniques and transparency were the leading responses. Most received more consideration than last year. Some have said that the regulations developed as a result of the financial crisis are a full employment act for modelers, and nothing here contradicts that.



	No changes	Communication	Transparency	Peer review	More sophisticated techniques	Less detailed	Staffing levels	Increased ties to market values	Decreased ties to market values	Other
2009	22%	42%	42%	43%	25%	1.0%	18%	10%	4%	9%
2010	17%	39%	44%	43%	36%	6%	26%	14%	2%	13%
2011	16%	49%	38%	50%	40%	2%	30%	15%	1%	7%

Modeling improvements are important to any evolutionary process. Financial modeling is no exception. Going forward, model efficiencies (58%, up materially from 39%) and tail correlations (21%, down from 26%) were again the leading responses. Others are using stress testing to model results across the entire business using a common set of shock assumptions.



In possibly the most interesting part of the survey to analyze, respondents were asked first to share instances where quantification efforts have enabled better decision making and then where qualitative efforts did the same.

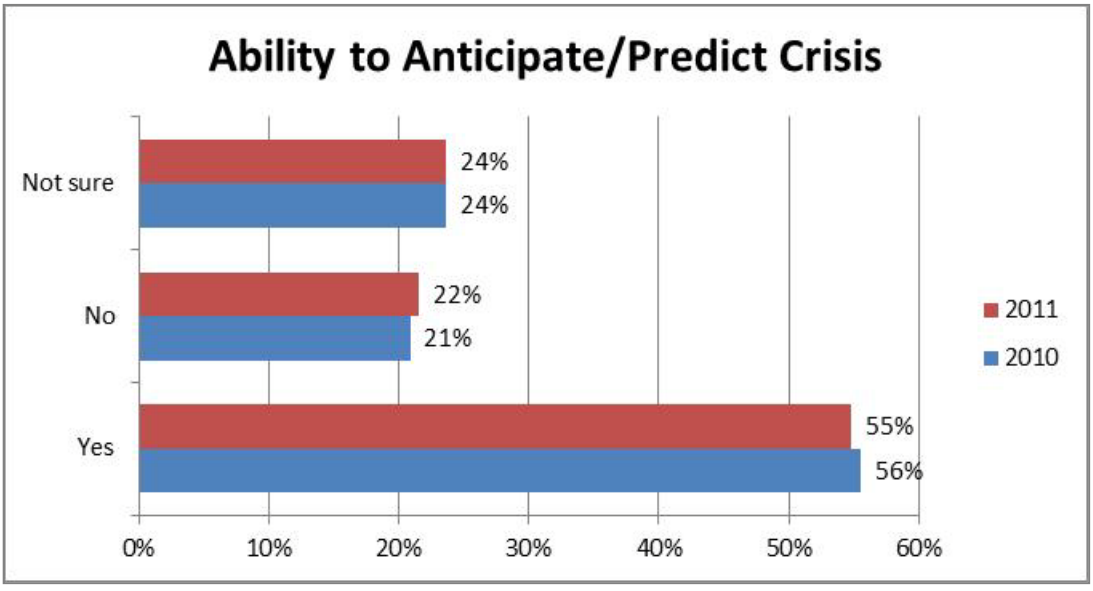
The 19 quantitative responses included discussions about ALM, medical cost trends, implications on product design, improved analysis regarding risk appetite and risk limits, cost of entitlement programs, strategic decision making, results of reverse stress testing,

diversification through aggregation techniques, reinsurance contracts, volatility and residential mortgage defaults.

There were 11 qualitative examples where decision making was aided. Some described a technique such as heat maps and scenario planning to provide a recurring process, while others said it helped with acquisitions, product design, operational risks across the entity, response to new regulation, public debt implications, and even fundamental stock analysis.

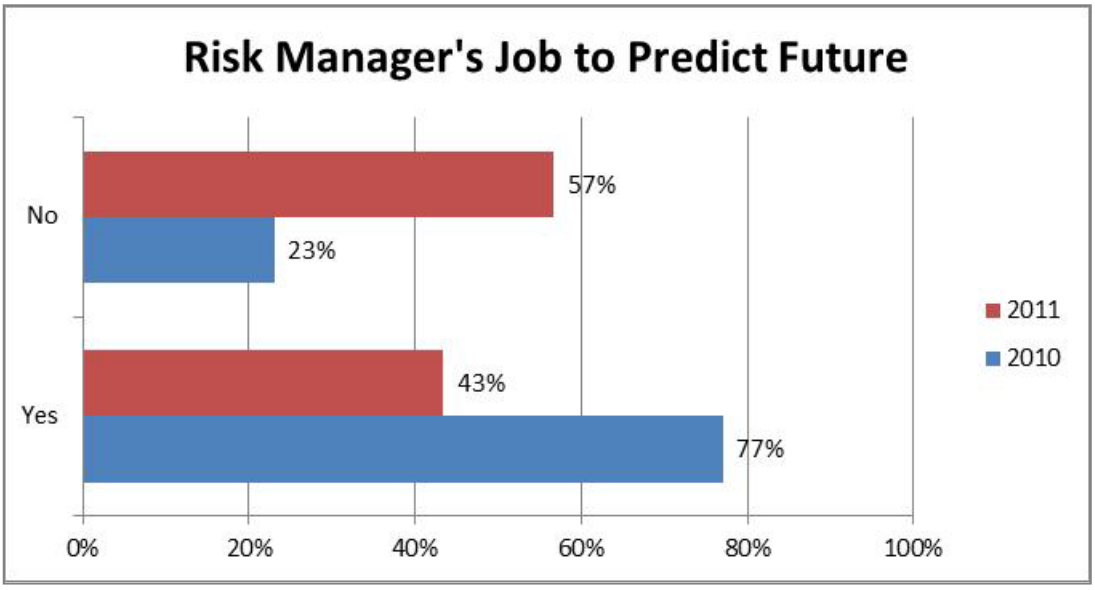
Section 4: Predictions

The role of the risk manager continues to evolve. In some instances during the financial crisis, highlighted by recent Congressional hearings about MF Global Holdings, risk managers have been held accountable for their employer's risk management lapses, appearing to be a "fall guy" for the senior managers who made the strategic decisions to be in a specific market. This section dives into this perception. When asked if it is possible to anticipate/predict a crisis, over half (55%) stated that it was possible. This was in line with the prior survey, and comments received were once again very revealing. Many thought that some crises could be predicted but that you could not predict them all. Others said that they prepare for a crisis that had the potential to occur or felt comfortable predicting an increased likelihood for a specific crisis. One response hinted at an interesting question – that if a crisis was predictable and understood that it would not become a crisis. Another thought that many had recognized the housing bubble as a "perfect storm" but were afraid to address it for fear of being responsible for popping the bubble.



Fewer than half (43%) of the risk managers felt it was their job to predict the future, down materially from the prior survey (77%). Based on the comments received, most

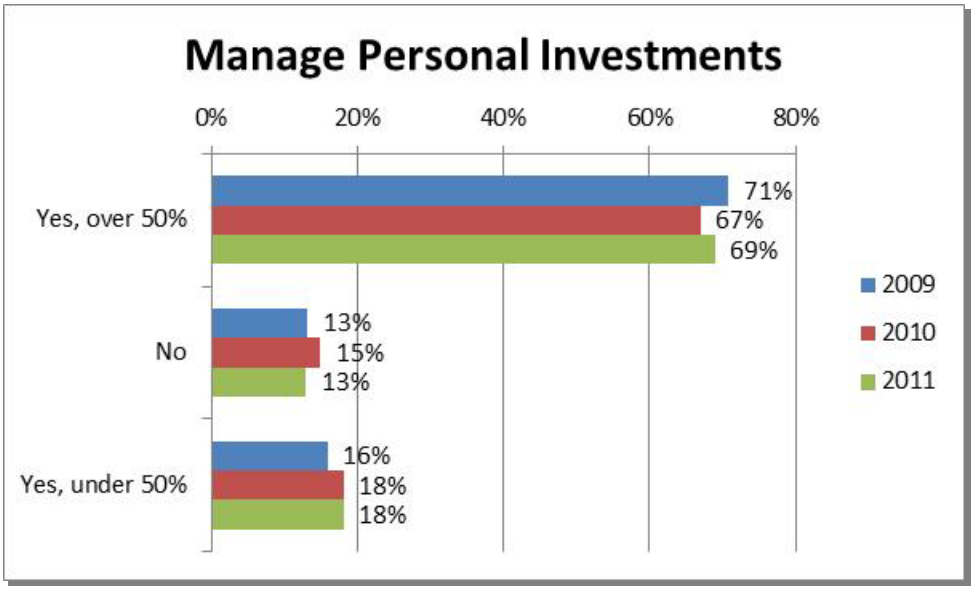
seemed to define this as predicting potential outcomes rather than actual future events. One suggested that "you risk your credibility when you try to make predictions about the unknown." Perhaps it is as important to communicate to the person receiving the information about scenarios that these are possibilities and not certainties. Others referred to limiting exposures ahead of a specific crisis. Most seemed to agree with the response that, "one can be prepared for different future scenarios".



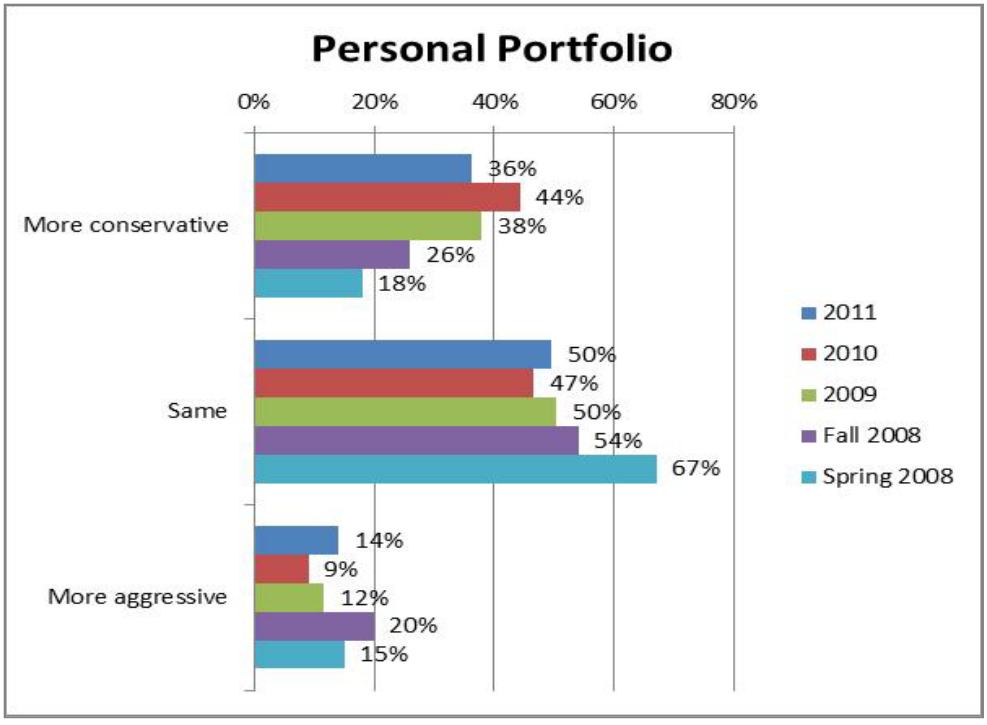
Section 5: Current topics

Since the first iteration of this survey in April 2008 much has transpired. With this in mind, some questions were posed for trending purposes and to determine if the responses can be used as leading indicators and thus predictive.

Respondents were asked if they manage their personal investments. A large majority of the risk managers, 82%, manage some portion of their portfolio with over half managing the entire amount. These percentages have been stable across surveys, so it does not appear that the past few years' results have impacted the willingness to manage personal assets.

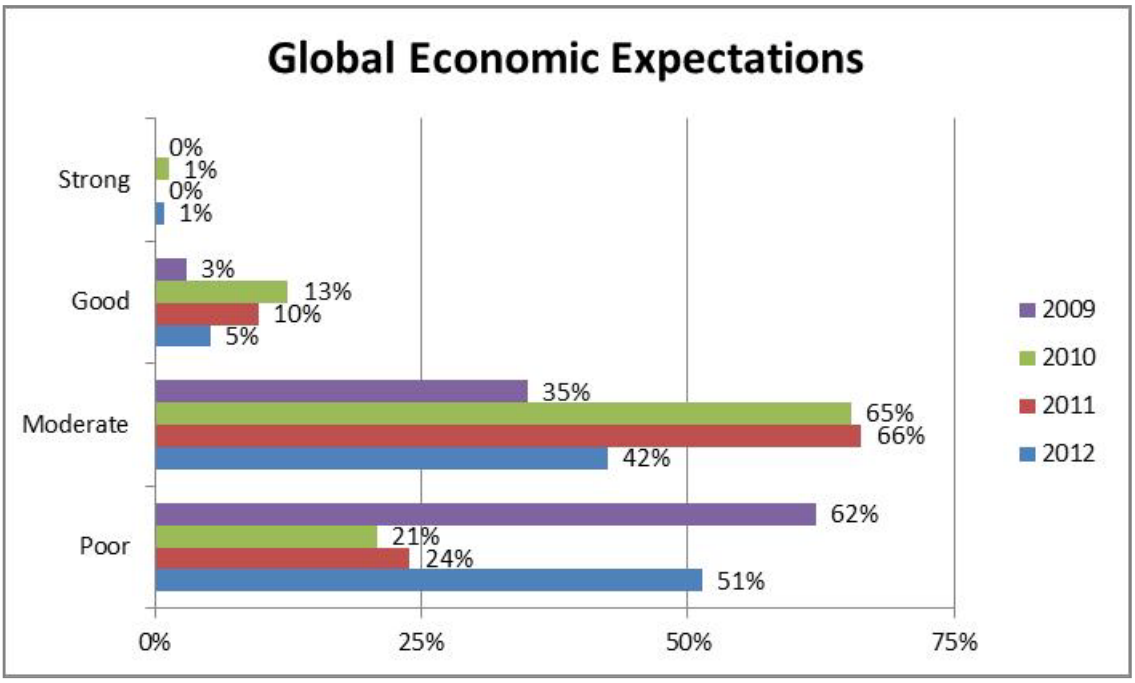


Personal investment strategies had been trending toward conservatism until the current survey. This year saw a move off of what might have been bottoms, with 14% stating their strategy would be more aggressive than usual (up from 9%).

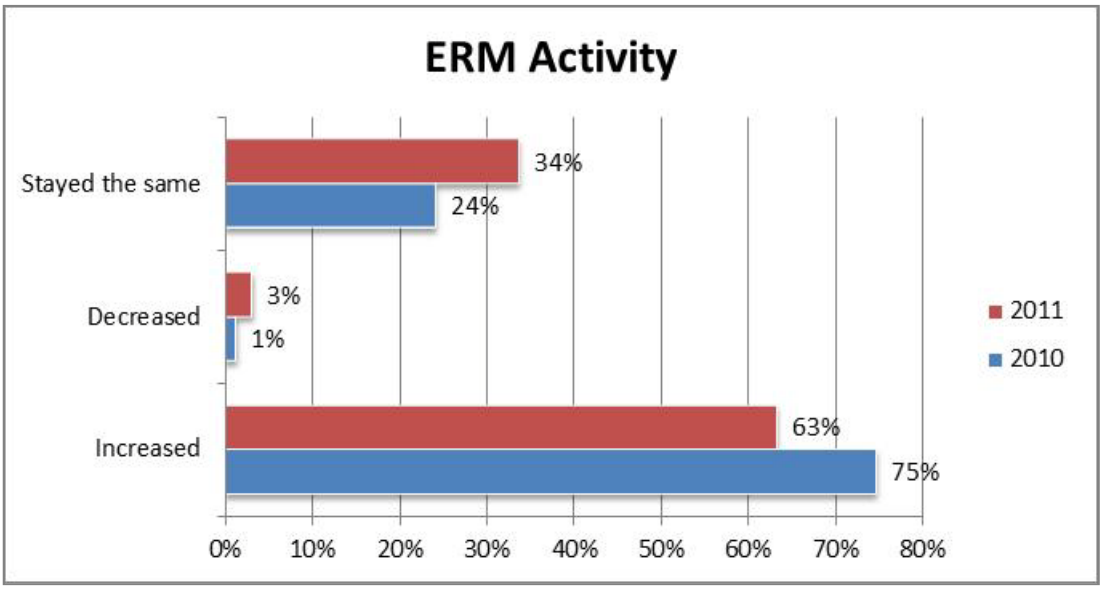


Starting with the second survey, in late 2008, Global Economic Expectations were asked about the following year. The responses for 2009 were, not surprisingly, very negative with 62% expecting a poor economy. Respondents were more optimistic for 2010 and 2011, with 65% and 66% expecting a moderate economy. The current survey shows

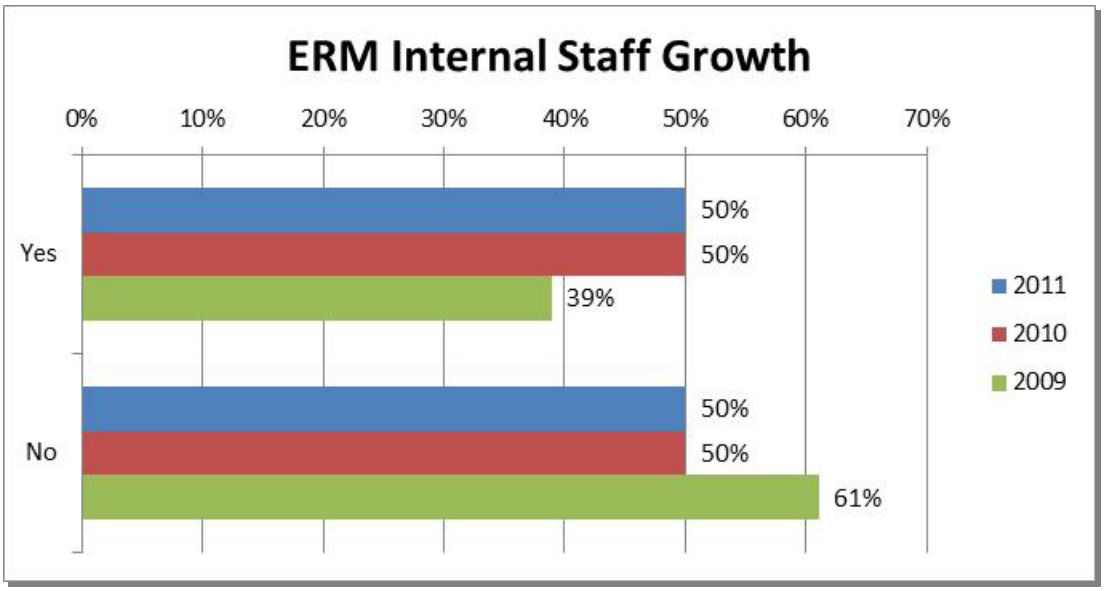
strong concerns for 2012 with 51% expecting a poor global economy, up from 24% in 2011. The survey reflects concerns in Fall 2011 almost as strongly as leading into 2009.



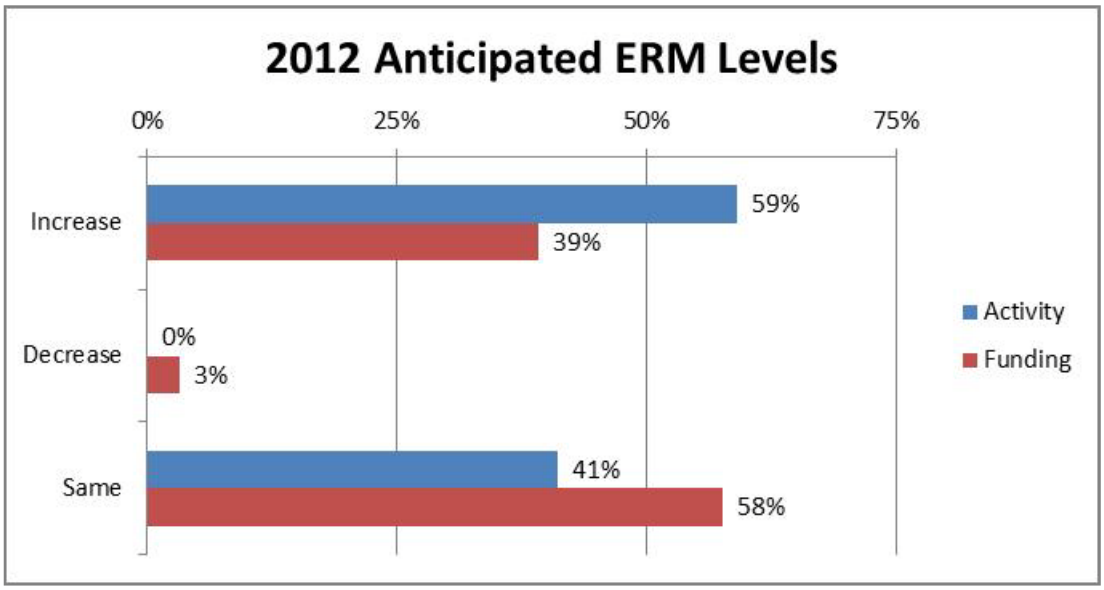
The recent crisis continues to lead to increased ERM activity, and 63% saw more in 2011, although not quite as strong as the previous survey. Some (3%) even decreased their ERM activity.



In addition to the higher ERM activity, 50% of respondent's internal staff grew in 2011, matching the 2010 result.

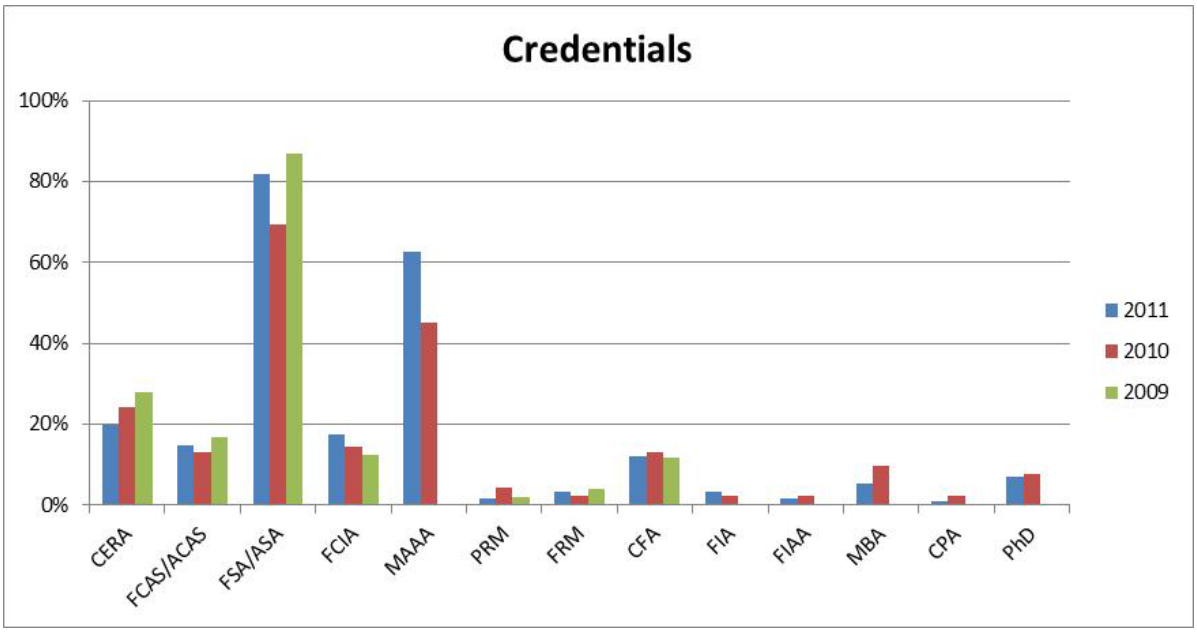


For 2012, survey respondents anticipate continued growth in their activities (59%), but less than half (39%) expect to see increased funding to accomplish these heightened expectations. As with other sectors of the economy, risk managers are being asked to do more, often with existing staffs.



There are a wide variety of opinions about the value of external versus internal ERM expertise. Some view external experts as a way to give a stamp of approval on an ERM program using knowledge of best practices. Others view the importance of knowing a company's risk culture as being key. Still others see the merits of both options. A simple question "Why do you use experts for ERM?" was asked. Multiple responses were accepted from 88 surveys. While 41% stated that they kept the process internal (up from 36%), the leading responses included topical expertise and outside perspective. Both

increased from the previous survey, consistent with other comments received in the modeling improvements section of this survey. Other comments were also encouraged, and peer review, model building, credibility, and establishing a formalized ERM process were all mentioned. It appears that best practices use a balance of internal and external expertise; using external resources to jump start a project, research best practices, and look for knowledge and alternative perspectives. Only someone internal to the organization can truly understand the risk culture employed, which drives risk management goals and objectives.

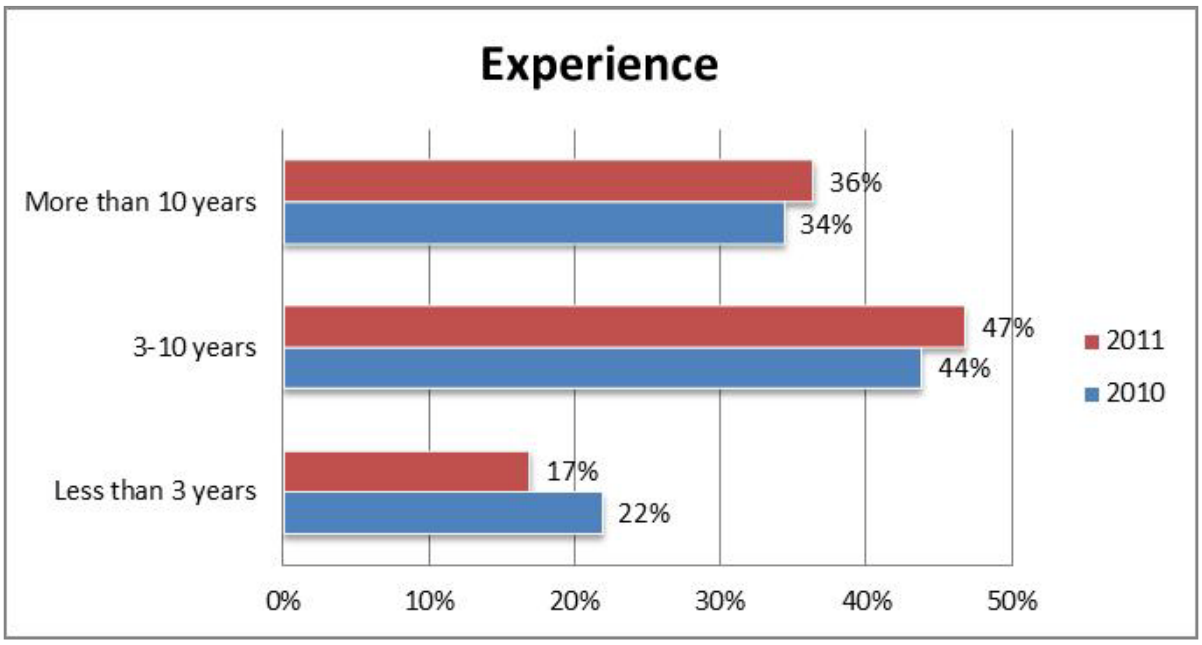


Section 6: Demographics

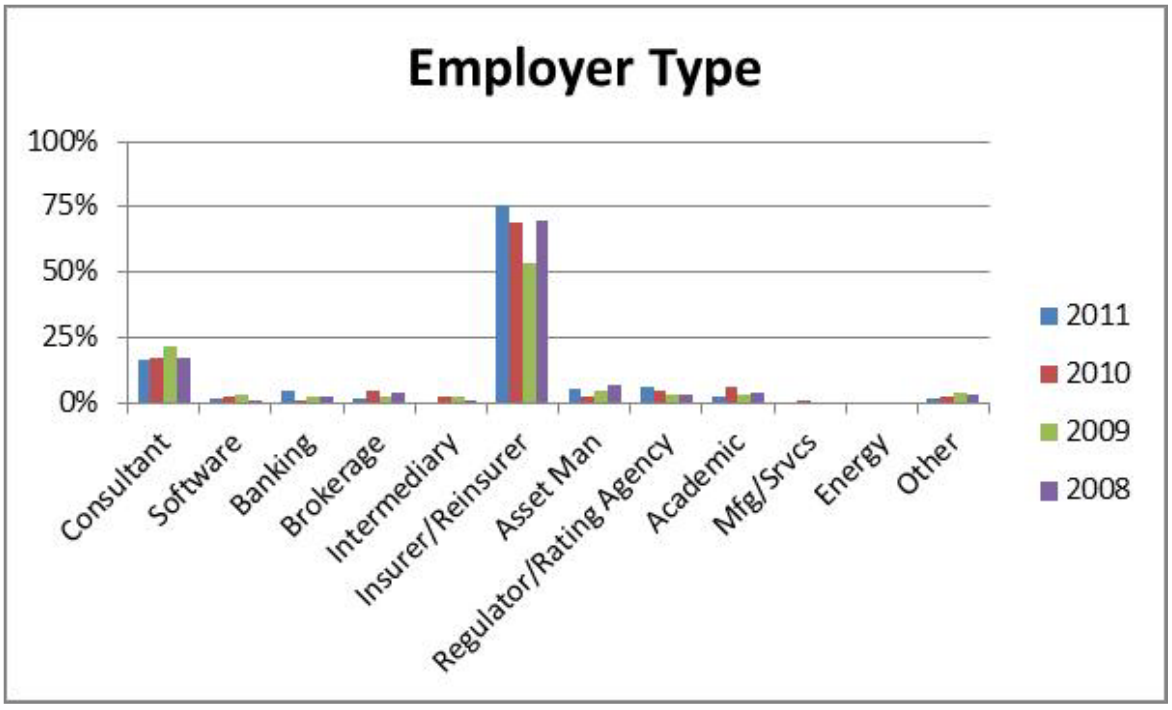
Each year the Emerging Risks survey is shared a number of ways, primarily via targeted emails and social media. In the future it is hoped that other risk management groups will participate. For this survey, only 39% reported filling out the survey in the past. In another question, 96% responded that the survey respondent held an actuarial credential. Both responses are a bit surprising. Because both the number of surveys filled out has increased and it is still primarily completed by actuaries (based on the second question), more repeat participants would be expected.

The survey may be settling in on a distribution of credentials held. Membership in the American Academy of Actuaries (MAAA) grew to 63%. Actuarial credentials from outside North America came from the United Kingdom, France, Australia, Greece and South Africa. Canadian actuaries continue to trend higher.

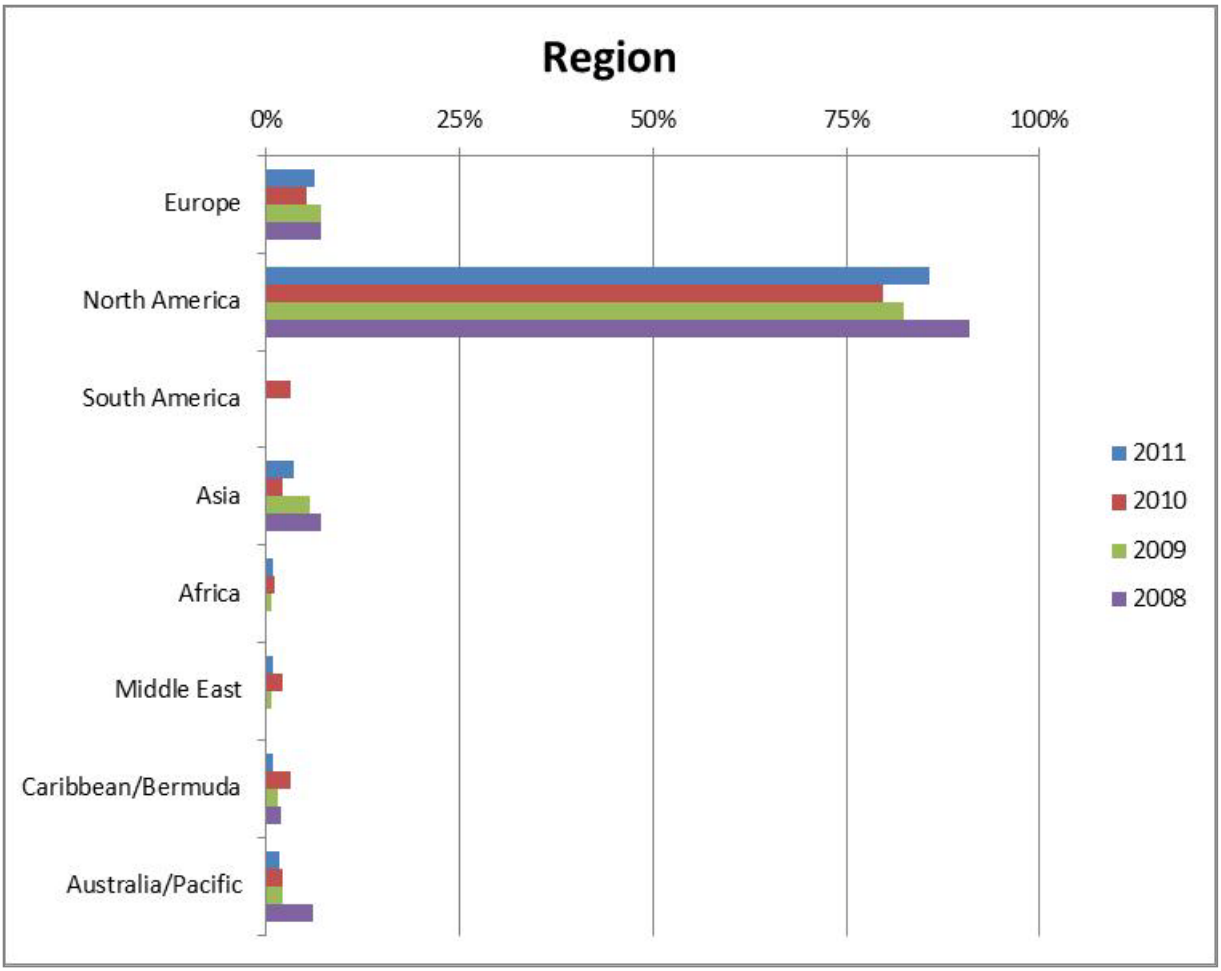
The survey asked respondents how long they have been a risk manager, and over one-third said they have over 10 years of experience in the role. This group is much more experienced than the norm and responses have revealed many best practices.



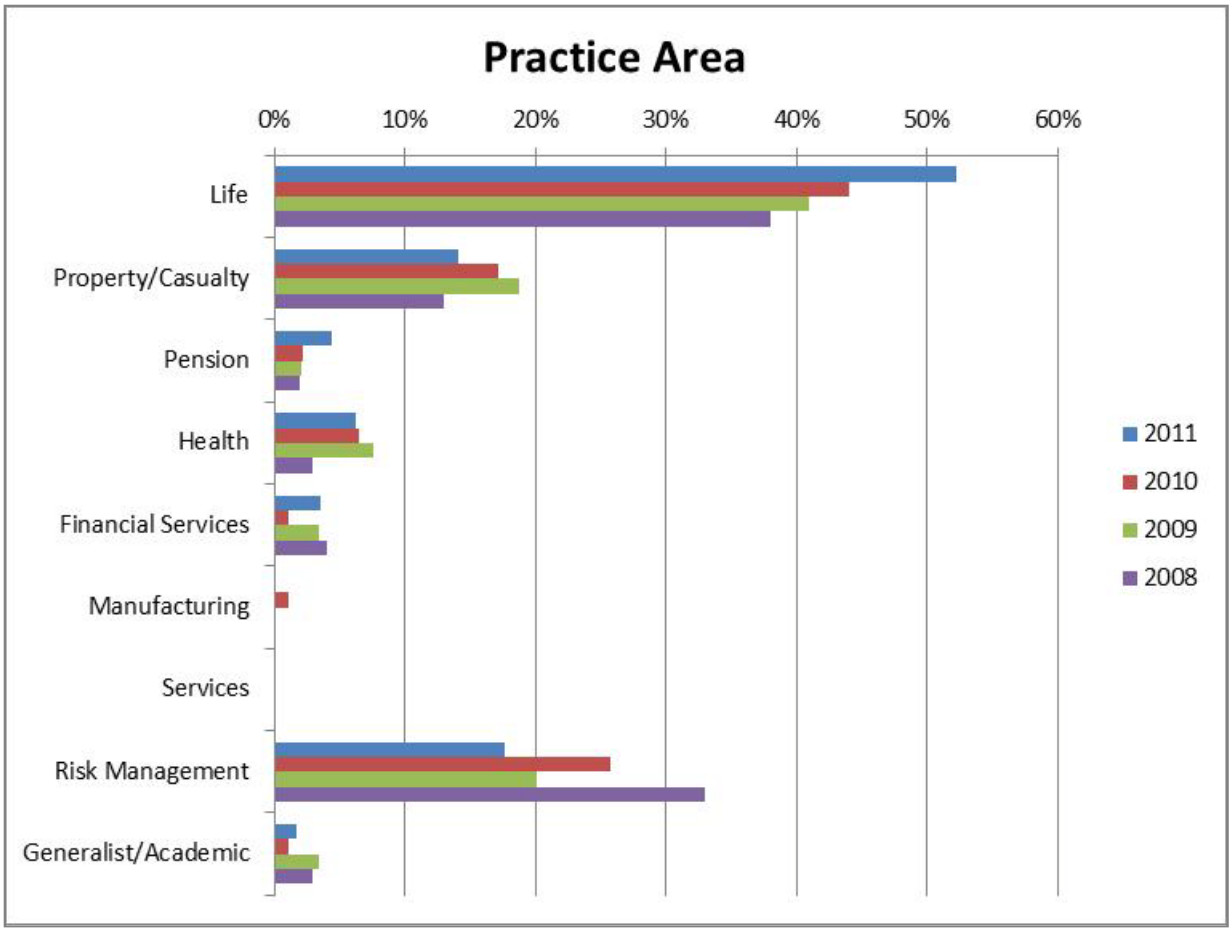
Most survey respondents are employed by either an insurance company/reinsurer (75%) or as a consultant (17%). The distribution is similar to previous surveys. Note that multiple responses are allowed.



The survey continues to be dominated by North Americans, with Europeans and Asians a significant minority. This year surveys were also completed by risk managers in the Caribbean/Bermuda, Australia/Pacific, Africa and the Middle East.



The primary area of practice continues to be dominated by life insurance (52%), risk management (18%), property/casualty insurance (14%) and health insurance (6%).



The survey found that 81% of the respondents belonged to the Joint Risk Management Section (JRMS, sponsored by the Casualty Actuarial Society, Canadian Institute of Actuaries and SOA). The survey was sent directly to all JRMS and INARM (International Network of Actuarial Risk Managers) members, along with some targeted social media groups on LinkedIn and Twitter.

Future Recommendations

Future surveys should continue to probe the anchoring issue and look for concrete examples where leading indicators changed strategic planning decisions. As managing emerging risks is an evolving discipline, the survey should continue to ask open-ended questions and use the answers to develop future questions. Utilizing the experience of the Project Oversight Group (POG) has worked very well so far in developing questions and should continue. The survey should be distributed more widely in order to gain the perspective of those outside North America and outside the insurance industry. Perhaps a partnership could be reached with UK and Australian actuarial risk managers, with the CRO Forum or CRO Council. Additional groups should be encouraged to complete the survey to reduce the reliance on actuarial risk managers.

In each survey the current 23 risks should be reviewed. The World Economic Forum list of emerging risks continues to evolve, and those in this survey should as well.

From respondents

- Clarify whether respondents have an official RM role within their firms, or are loosely affiliated with it.
- ERM seems to be concentrating more and more on the quantitative side with focus on operational/business risk causing very polarized views on their applicability to ERM. The author favors keenly understanding operational/business risk on a granular leading to aggregate level informed by capital modeling and quant considerations: What do others think is the right balance and why?

From researcher. Add questions probing

- Does an emerging risk leading indicator ever get dropped? Why?
- What blogs and other sources do you follow?
- What actions have been taken because of work done on emerging risks?
- How do you achieve balance between quantitative and qualitative analysis?
- What to do with the “Other” category when picking top Emerging Risks? Many of the comments are already covered, and if it is chosen too much can weaken the analysis. A better option might be to limit responses to the list provided and then ask respondents to share additional risks not on the list as a separate question.
- Think through the survey as others might respond. Does it make sense from their perspective? (e.g., regulator, pension consultant)
- Some questions have stabilized – perhaps, ask every other year.

Appendix I - Glossary of Risks

Initially 23 core risks were defined in Global Risks 2007: A Global Risk Network Report. They can be found at www.weforum.org/pdf/CSI/Long_Global_Risk_Report_2007.pdf. What follows is an updated version for the 2011 survey with a description of the risks.

23 risks

Economic Risks

- Oil price shock/energy supply interruptions – Oil prices rise steeply due to major supply disruption.
- Fall in value of US dollar - US current account deficit triggers a major fall in the dollar.
- Chinese economic hard landing – China's economic growth slows, potentially as a result of protectionism, internal political or economic difficulties.
- Blow up in asset prices – The value of personal assets such as housing and equities collapse, fueling a recession.
- Financial volatility – price instability of core products such as commodities, energy or currency

Environmental Risks

- Climate change – Climate change generates both extreme events and gradual changes, impacting infrastructure, agricultural yields and human lives.
- Loss of freshwater services – Water shortages impact agriculture, businesses and human lives.
- Natural Catastrophe: Tropical Storms – Hurricane or typhoon passes over heavily populated areas, leading to catastrophic economic losses and/or high human death tolls.
- Natural Catastrophe: Earthquakes – Strong earthquake(s) occur in heavily populated areas.
- Natural Catastrophe: Inland Flooding – Flooding associated with rivers causes significant economic losses, fatalities and disruption.

Geopolitical Risks

- International Terrorism – Attacks disrupt economic activity, causing major human and economic losses.
- Proliferation of Weapons of Mass Destruction –nuclear Non-Proliferation Treaty no longer effective, leading to spread of nuclear technologies.
- Interstate and civil wars – Major interstate or civil wars erupt.
- Failed and failing states – Trend of widening gap between order and disorder.
- Trans-national crime and corruption – Corruption continues to be endemic and organized crime successfully penetrates the global economy.

- Retrenchment from globalization – Rising concerns about cheap imports and immigration sharpen protectionism in developed countries. Emerging economies become more nationalist and state-oriented.
- Regional instability – Certain unstable areas may cause widespread political and other crises. These include, but are not limited to, the Middle East and the Korean peninsula.

Societal Risks

- Pandemics/Infectious disease – A pandemic emerges with high mortality/Incidence of diseases such as HIV/AIDS spreads geographically.
- Chronic diseases – Obesity, diabetes and cardiovascular diseases become widespread.
- Demographic shift – Aging populations in developed economies drive economic stagnation by forcing governments to raise taxes or borrow.
- Liability Regimes – Liability costs rise by multiples of GDP growth, with spread of litigiousness.

Technological Risks

- Cyber security/Interconnectedness of infrastructure – A major disruption of the availability, reliability and resilience of critical information infrastructure caused by cyber-crime, terrorist attack or technical failure. Results are felt in major infrastructure: power distribution, water supply, transportation, telecommunication, emergency services and finance.
- Technology/Space weather – health impairment due to exposure to nanoparticles, unintended consequences of technology, or disruptions caused by geomagnetic storms, meteorites and other phenomena originating from beyond the earth.

Appendix II - Survey Results 2011

The following includes both the survey as well as the responses. There were 172 respondents to the survey. Not all respondents answered every question. The percentages below reflect the number of responses received divided by the number who answered the specific question. Some totals may not add to 100% due to rounding.

Emerging risks have either not previously occurred or have not occurred for so long that they are not considered possible. The lack of credible historical data creates a formidable challenge for risk managers. These risks often seem obvious after they occur but are not considered in advance. Many risk managers are trying to be better prepared by identifying potential emerging risks and prioritizing those that might have the greatest potential impact on society. While completing the survey please consider a time horizon that extends beyond a business plan time frame (often 3-5 years). This survey is sponsored by the Joint Risk Management Section (Canadian Institute of Actuaries, Casualty Actuarial Society and Society of Actuaries). The complete results will be available on the Section webpage at www.soa.org. A summary article is also expected to be published in an upcoming JRMS newsletter.

Keep in mind that you cannot press the "back" button in your browser to review prior answers. Please use the "Previous" button at the bottom of each page to navigate back to already answered questions. If you want to save your responses for later, it is suggested to print each page before pressing the "Continue" button.

Please respond no later than October 24, 2011.

For a glossary of terms, please click here (see Appendix I) and then click on the link in the Related Links box on the right of the page.

Thanks for participating!

Note: Occasionally a comment is **highlighted** as the researcher thought it was thought provoking.

Default Question Block

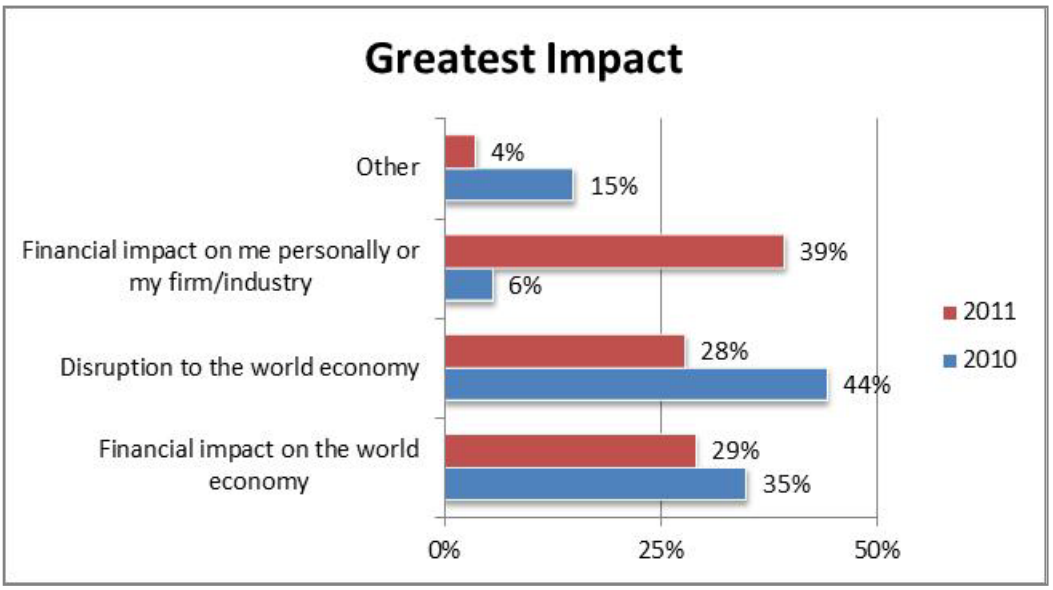
Previous surveys have found that respondents tend to be anchored in the present with their responses. It is thought that knowledge of that tendency will help you understand and compensate for it, so we will start by asking you about today's risks. The following questions will ask you to identify current and emerging risks that you expect to have the greatest impact currently and also over the next few years.

Greatest impact related to risk can have various meanings. How do you define it?

- 48 responses 29% (35% in 2010 survey) Financial impact on the world economy
- 46 responses 28% (44%) Disruption to the world economy
- 65 responses 39% (6%) Financial impact on me personally or my firm/industry

• 6 responses 4% (15%) Other

- Specifically my firm, since that is my responsibility
- Negative impact on well being
- Financial, operationally, or population
- Generally financial impact globally but it depends on the context
- Variance from plan
- All of the above



Editor's Note: this question was first asked in the 2010 survey and appeared to cause some confusion. Many of the comments reflected an opinion that the greatest impact would reflect on their firm's standing, so the question was reworded in 2011 and the result for that response was much higher (as expected).

What is the risk that currently has the greatest impact? (please select one)
The 23 risks shown have been adapted from those developed by the World Economic Forum in 2007. More detailed definitions of these risks can be found at the World Economic Forum website (also summarized in Appendix I).

167 total responses
Economic – 85 responses 51% (39%)
• 5 responses 3% (5%) Oil price shock/energy supply interruptions
• 3 responses 2% (11%) Fall in value of US $
• 12 responses 7% (8%) 3 Chinese economic hard landing
• 11 responses 7% (14%) 4 Blow up in asset prices
• 54 responses 32% 1 Financial volatility (new category in 2011)
Environmental – 4 responses 2% (10%)

• 1 response 1% (6%) Climate change
• 1 response 1% (3%) Loss of freshwater services
• 1 response 1% (1%) Natural catastrophe: Tropical storms
• 1 response 1% (0%) Natural catastrophe: Earthquakes
• 0 responses 0% (1%) Natural catastrophe: Inland flooding

Geopolitical – 38 responses 23% (24%)

• 3 responses 2% (4%) International terrorism
• 2 responses 1% (4%) Proliferation of weapons of mass destruction (WMD)
• 4 responses 2% (5%) Interstate and civil wars
• 18 responses 11% (4%) 2 Failed and failing states
• 0 responses 0% (1%) Transnational crime and corruption
• 4 responses 2% (4%) Retrenchment from globalization
• 7 responses 4% (1%) 5 Regional instability

Societal – 13 responses 8% (12%)

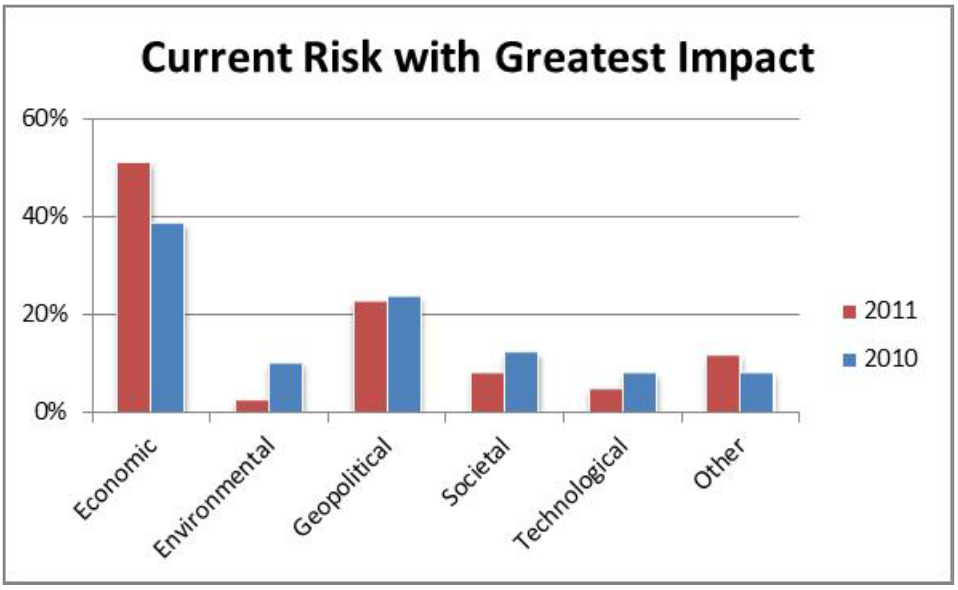
• 6 responses 4% (4%) Pandemics/Infectious diseases
• 1 response 1% (1%) Chronic diseases
• 5 responses 3% (7%) Demographic shift
• 1 response 1% (0%) Liability regimes

Technological – 8 responses 5% (8%)

• 6 responses 4% (8%) Cyber security/Interconnectedness of infrastructure
• 2 responses 1% (0%) Technology/Space weather

Other – 19 responses 11% (8%)

- Rise of socialism in US
- Government regulations
- Failed and failing country economies
- **Sovereign debt**
- Total collapse of US economy
- Weak government balance sheets
- **Natural catastrophe: severe convective storms**
- Sovereign debt/economic failure
- Spurious accuracy in risk assessment
- Default of sovereign debt of multiple developed countries simultaneously
- Public debt
- **Prolonged low interest rates**
- Debt coming due
- Government spending
- Prolonged economic uncertainty
- Recession in developed countries
- Deflation
- Global systemic financial system failures tied to Europe
- Debt

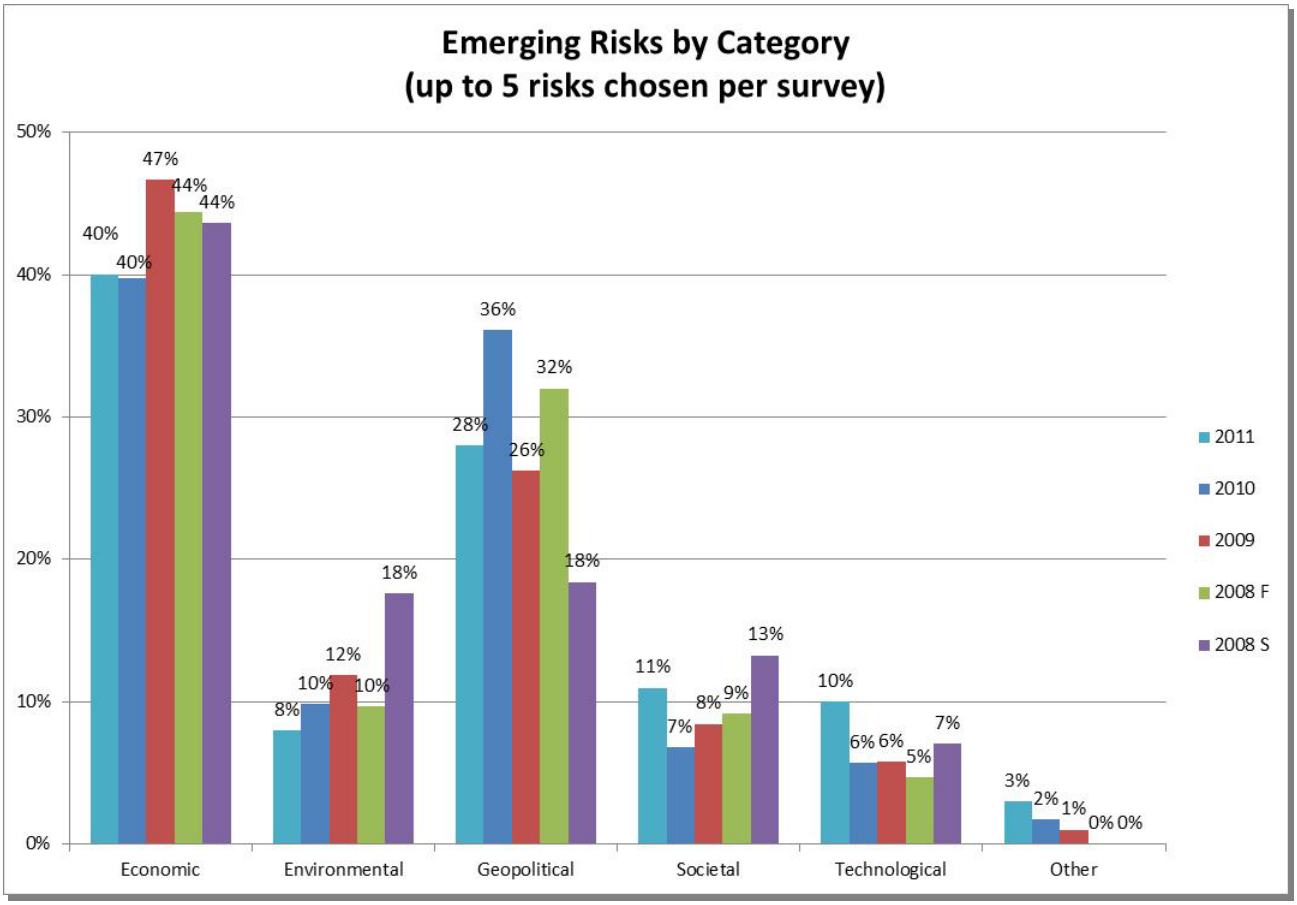


Section 1: Emerging Risks

Question 1. Please choose up to five (5) emerging risks that you feel will have the greatest impact over the next few years.

725 total responses from 161 surveys (average 4.26)
Divisor in percentages for major categories is 725 – for individual categories it is 161 (170 surveys with 9 who did not respond to this question).

- 0 9 surveys 5%
- 1 6 surveys 4%
- 2 2 surveys 1%
- 3 12 surveys 7%
- 4 26 surveys 15%
- 5 115 surveys 68%



Economic – 290 responses 40% (previous surveys F2010/F2009/F2008/S2008 40%/47%/44%/44%)

- 52 responses 32% (40%/45%) 4T Oil price shock
- 41 responses 25% (49%/66%) Fall in value of US $
- 52 responses 32% (41%/33%) 4T Chinese economic hard landing
- 35 responses 22% (31%/49%) Blow up in asset prices
- 110 responses 68% 1 Financial volatility

Environmental – 55 responses 8% (10%/12%/10%/18%)

- 22 responses 14% (25%/27%) Climate change
- 9 responses 6% (9%/10%) Loss of freshwater services
- 8 responses 5% (4%/8%) Natural catastrophe: Tropical storms
- 9 responses 6% (5%/7%) Natural catastrophe: Earthquakes
- 7 responses 4% (2%/5%) Natural catastrophe: Inland flooding

Geopolitical – 205 responses 28% (36%/26%/32%/18%)

- 32 responses 20% (43%/30%) International terrorism
- 14 responses 9% (18%/14%) Proliferation of weapons of mass destruction (WMD)
- 16 responses 10% (10%/9%) Interstate and civil wars
- 68 responses 42% (38%/18%) 2 Failed and failing states
- 5 responses 3% (12%/7%) Transnational crime and corruption
- 18 responses 11% (25%/18 %) Retrenchment from globalization

• 52 responses 32% (25%/28%) 4T Regional instability

Societal – 83 responses 11% (7%/8%/9%/13%)

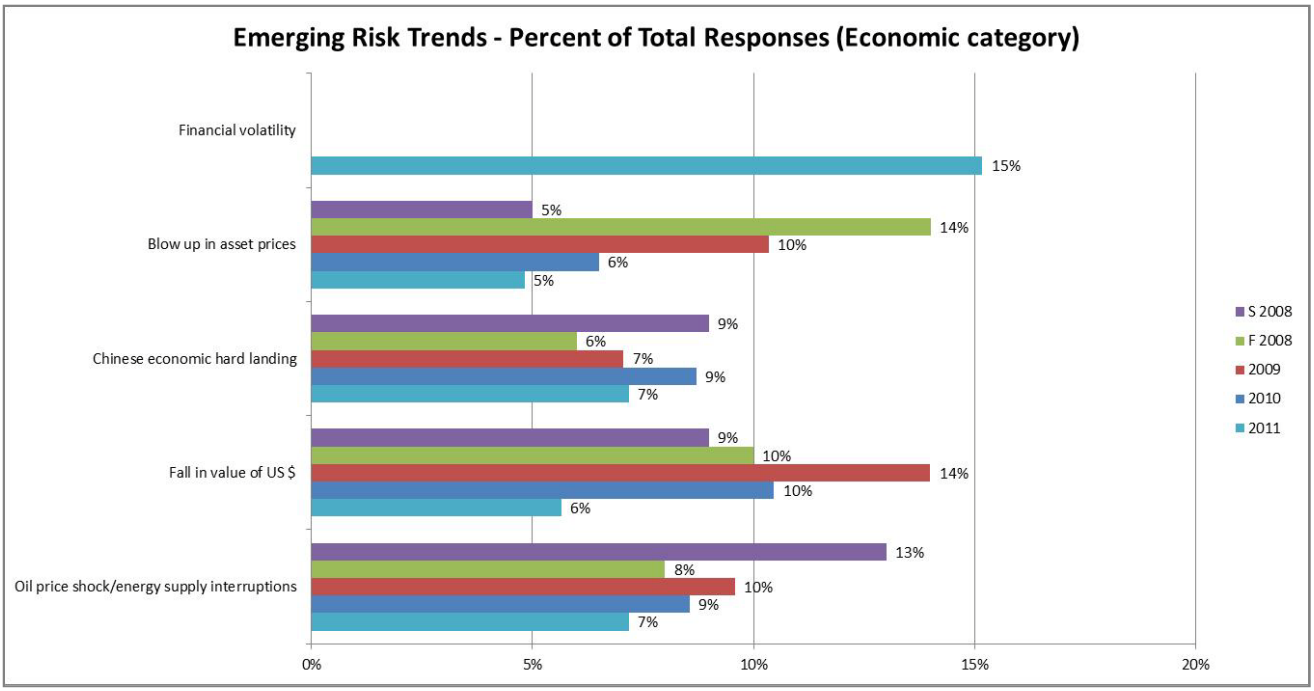
• 21 responses 13% (22%/30%) Pandemics/Infectious diseases
• 3 responses 2% (4%/4%) Chronic diseases
• 48 responses 30% (26%/27%) Demographic shift
• 11 responses 7% (6%/6%) Liability regimes

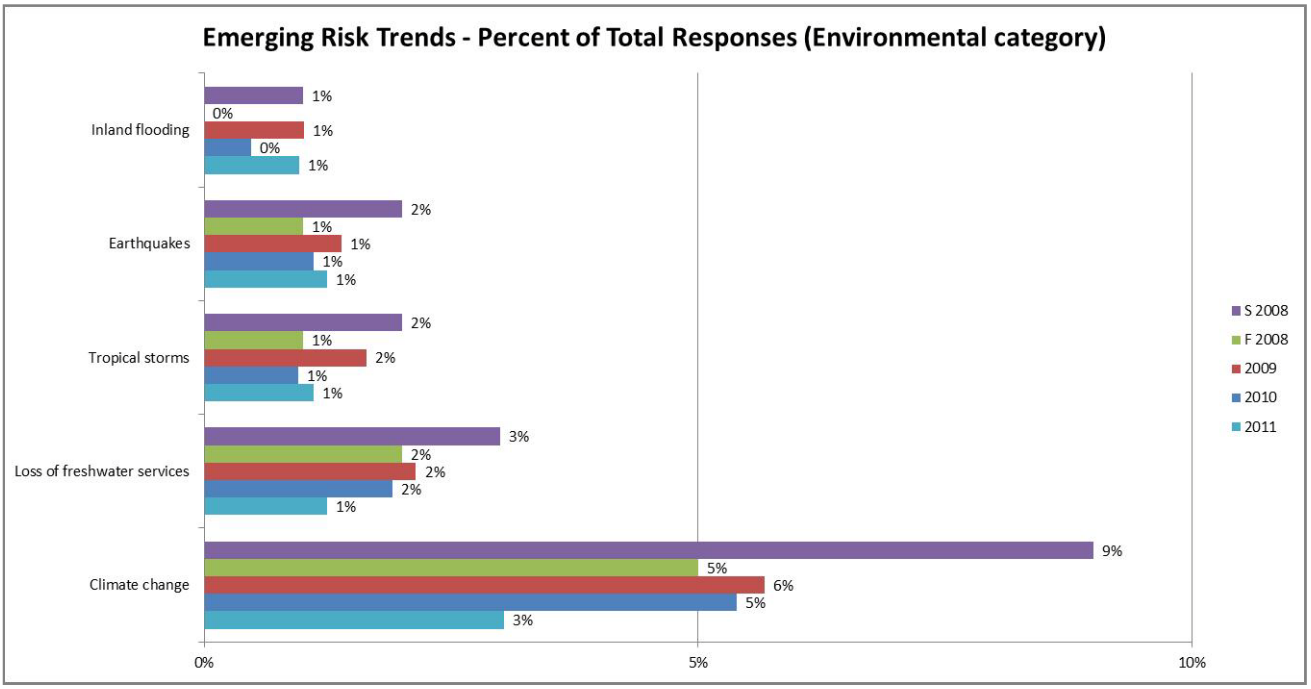
Technological – 69 responses 10% (6%/6%/5%/7%)

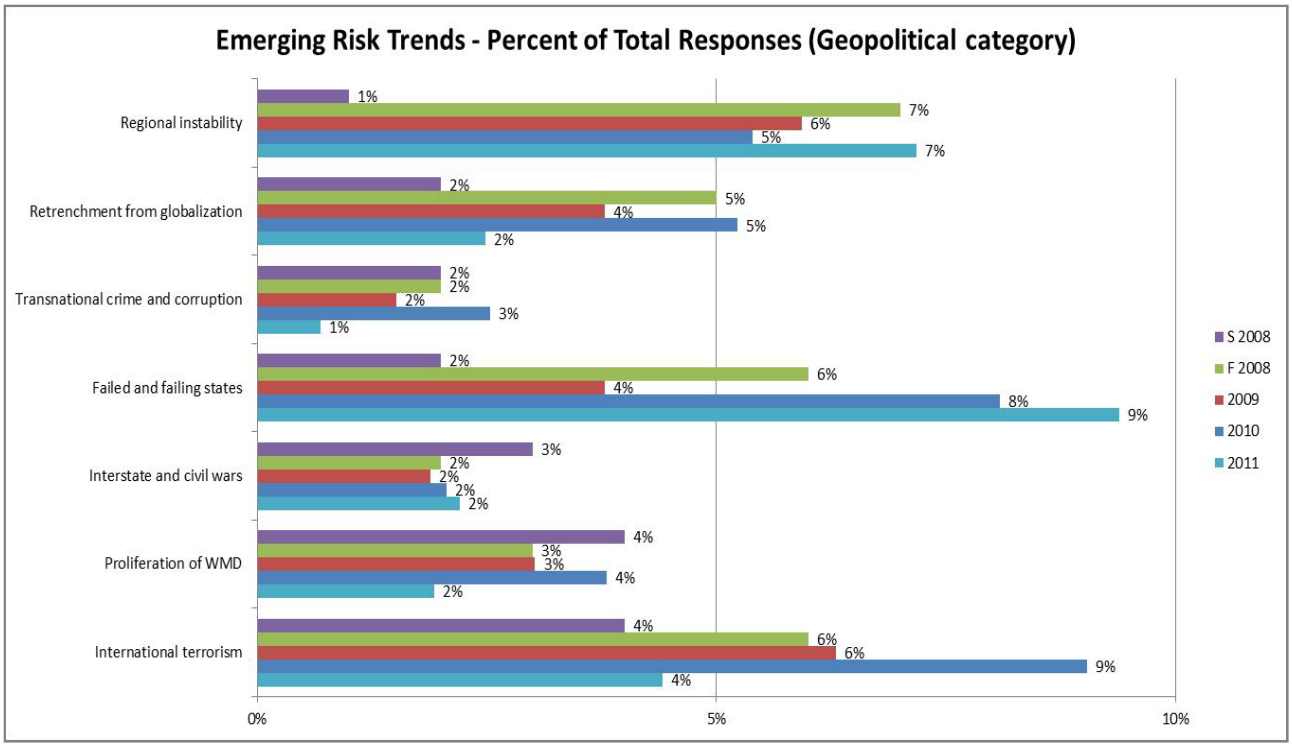
• 61 responses 38% (23%/21%) 3 Cyber security/interconnectedness of infrastructure
• 8 responses 5% (4%/7%) Technology/space weather

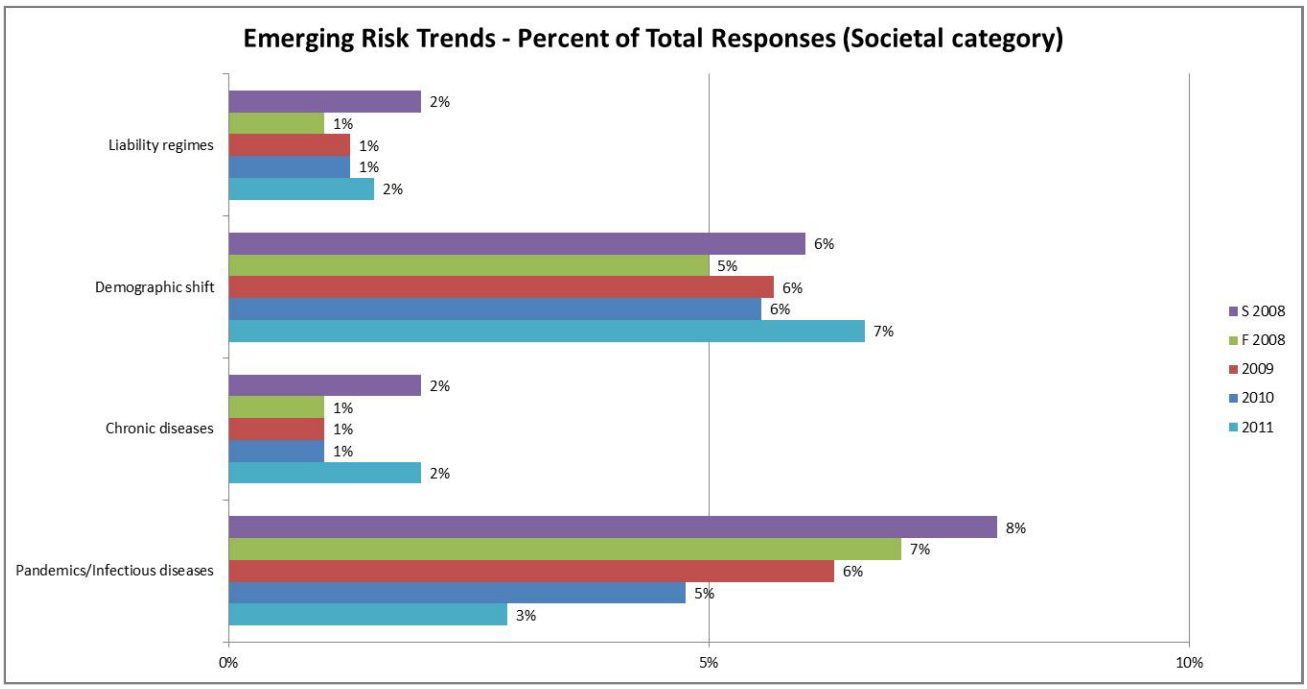
Other – 23 responses 3% (2%/1%/0%/0%)

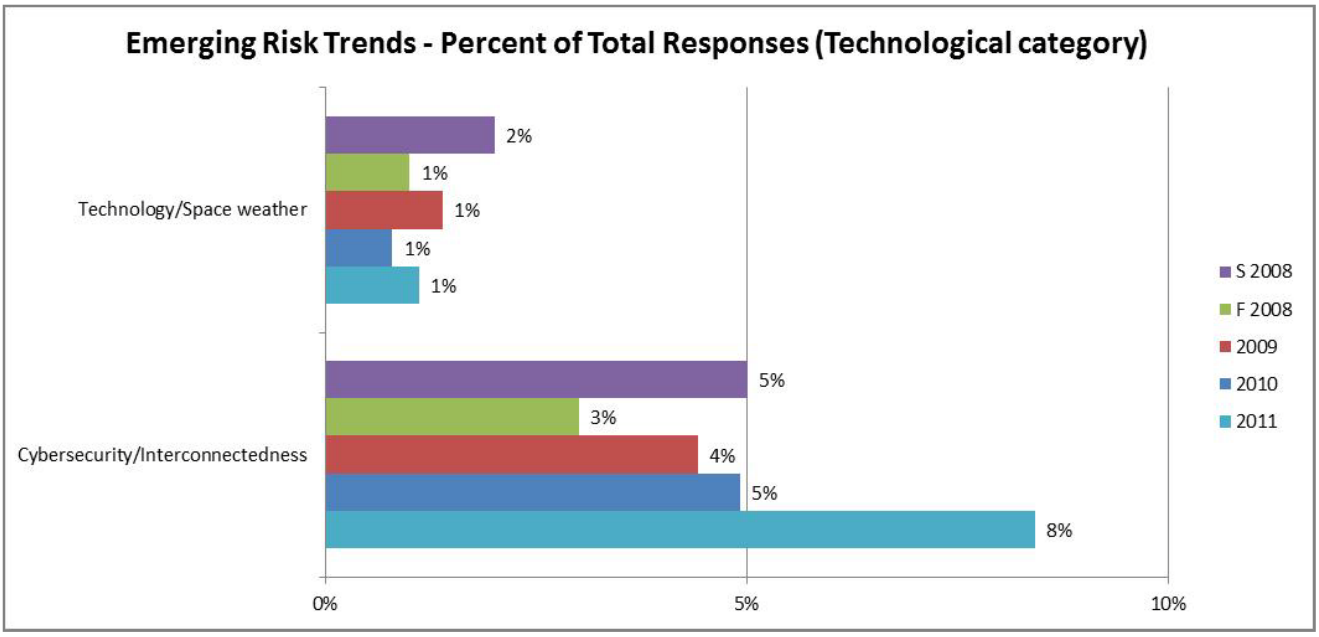
- Rise of Socialism in US
- Ins Co pick opaque assets (like hedge funds) to improve yield
- Failed and failing country economies (e.g., Greece)
- Sovereign debt
- Ability of states to repay bailouts
- **CAT Models significantly inaccurate**
- Specifically, deflation and long lasting double dip recession
- **Sovereign debt/economic failure**
- Public debt
- Inept U.S. Gov't
- Crisis of values
- **Prolonged global recession**
- Prolonged low interest rates
- Attitude, thoughts on future
- Debt coming due
- Government spending
- **Regulatory changes**
- Civil unrest
- Increased regulatory intervention
- Economic slowdown due to carbon hysteria
- Complexity and interconnectedness of these risks and others – how they will emerge
- Systemic financial crises related to European govt debt and austerity
- Debt inflation


Emerging Risk Trends - Percent of Total Responses (Economic category)
Financial volatility
15%
Blow up in asset prices
5%
14%
10%
6%
5%
Chinese economic hard landing
9%
6%
7%
9%
7%
Fall in value of US $
9%
10%
14%
10%
6%
Oil price shock/energy supply interruptions
13%
8%
10%
9%
7%
0%
5%
10%
15%
20%
S 2008
F 2008
2009
2010
2011


Emerging Risk Trends - Percent of Total Responses (Environmental category)
Inland flooding
1%
0%
1%
0%
1%
Earthquakes
2%
1%
1%
1%
1%
Tropical storms
2%
1%
2%
1%
1%
Loss of freshwater services
3%
2%
2%
2%
1%
Climate change
9%
5%
6%
5%
3%
0%
5%
10%
S 2008
F 2008
2009
2010
2011


Emerging Risk Trends - Percent of Total Responses (Geopolitical category)
Regional instability
1%
7%
6%
5%
7%
Retrenchment from globalization
2%
5%
4%
5%
2%
Transnational crime and corruption
2%
2%
2%
3%
1%
Failed and failing states
2%
6%
4%
8%
9%
Interstate and civil wars
3%
2%
2%
2%
2%
Proliferation of WMD
4%
3%
3%
4%
2%
International terrorism
4%
6%
6%
9%
4%
0%
5%
10%
S 2008
F 2008
2009
2010
2011


Emerging Risk Trends - Percent of Total Responses (Societal category)
Liability regimes
2%
1%
1%
1%
2%
Demographic shift
6%
5%
6%
6%
7%
Chronic diseases
2%
1%
1%
1%
2%
Pandemics/Infectious diseases
8%
7%
6%
5%
3%
0%
5%
10%
S 2008
F 2008
2009
2010
2011



Another way to review this data is as a percent of the total responses. For example, Climate change had 22 responses in this survey. In the previous analysis just shared, 22/161 = 14%. In this next section we will look at 22/725 = 3% and compare the results with previous surveys. **Bold** signifies higher than the average in the current survey and *Italics* signifies lower than the average.

Economic (43% average – 40%/40%/47%/43%/42% October 2011, November 2010, December 2009, November 2008, April 2008)

- 9% - 7%/9%/10%/8%/13% *Oil price shock*
- 10% - 6%/10%/14%/10%/9% *Fall in value of US $*
- 8% - 7%/9%/7%/6%/9% *Chinese economic hard landing*
- 8% - 5%/6%/10%/14%/5% *Blow up in asset prices*
- 15% - 15% Financial volatility

Environmental (11% - 8%/10%/12%/9%/17%)

- 6% - 3%/5%/6%/5%/9% *Climate change*
- 2% - 1%/2%/2%/2%/3% *Loss of freshwater services*
- 1% - 1%/1%/2%/1%/2% Natural catastrophe: Tropical storms
- 1% - 1%/1%/1%/1%/2% Natural catastrophe: Earthquakes
- 1% - 1%/0%/1%/0%/1% Natural catastrophe: Inland flooding

Geopolitical (28% - 28%/36%/26%/31%/18%)

- 6% - 4%/9%/6%/6%/4% *International terrorism*
- 3% - 2%/4%/3%/3%/4% *Proliferation of weapons of mass destruction* (WMD)
- 2% - 2%/2%/2%/2%/3% Interstate and civil wars
- 6% - 9%/8%/4%/6%/2% **Failed and failing states**
- 2% - 1%/3%/2%/2%/2% *Transnational crime and corruption*
- 4% - 2%/5%/4%/5%/2% *Retrenchment from globalization*
- 5% - 7%/5%/6%/7%/1% **Regional instability**

Societal (10% - 11%/7%/8%/9%/12%)
• 6% - 3%/5%/6%/7%/8% *Pandemics/Infectious diseases*
• 1% - 2%/1%/1%/1%/2% Chronic *diseases*
• 6% - 7%/6%/6%/5%/6% **Demographic shift**
• 1% - 2%/1%/1%/1%/2% **Liability regimes**
Technological (7% - 10%/6%/5%/4%/7%)
• 5% - 8%/5%/4%/3%/5% **Cyber security/Interconnectedness of infrastructure**
• 1% - 1%/1%/1%/1%/2% Technology/space weather

Question 2. Out of these five, what one emerging risk would you rank number one as having the greatest impact?
130 total responses

Economic – 73 responses 56% (48%/63%/65% Fall 2010/Fall 2009/Fall 2008)

• 4 responses	3% (9%/6%/12%)		Oil price shock/energy supply interruptions
• 3 responses	2% (11%/26%/18%)		Fall in value of US $
• 6 responses	5% (14%/4%/3%)	5	Chinese economic hard landing
• 8 responses	6% (10%/22%/25%)	4	Blow up in asset prices
• 52 responses	40%	1	Financial volatility

Environmental – 5 responses 4% (7%/12%/4%)

• 3 responses	2% (4%/6%/3%)		Climate change
• 0 responses	0% (2%/3%/1%)		Loss of freshwater services
• 1 response	1% (1%/2%/0%)		Natural catastrophe: Tropical storms
• 1 response	1% (0%/1%/0%)		Natural catastrophe: Earthquakes
• 0 responses	0% (0%/0%/0%)		Natural catastrophe: Inland flooding

Geopolitical – 28 responses 22% (28%/14%/18%)

• 2 responses	2% (4%/2%/3%)		International terrorism
• 2 responses	2% (7%/4%/3%)		Proliferation of weapons of mass destruction (WMD)
• 1 response	1% (5%/1%/1%)		Interstate and civil wars
• 16 responses	12% (8%/2%/2%)	2	Failed and failing states
• 0 responses	0% (0%/1%/1%)		Transnational crime and corruption
• 2 responses	2% (3%/1%/2%)		Retrenchment from globalization
• 5 responses	4% (1%/3%/4%)		Regional instability

Societal – 7 responses 5% (4%/2%/2%)

• 2 responses	2% (3%/2%/2%)		Pandemics/Infectious diseases
• 0 responses	0% (1%/0%/0%)		Chronic diseases
• 4 responses	3% (3%/5%/7%)		Demographic shift
• 1 response	1% (0%/0%/0%)		Liability regimes

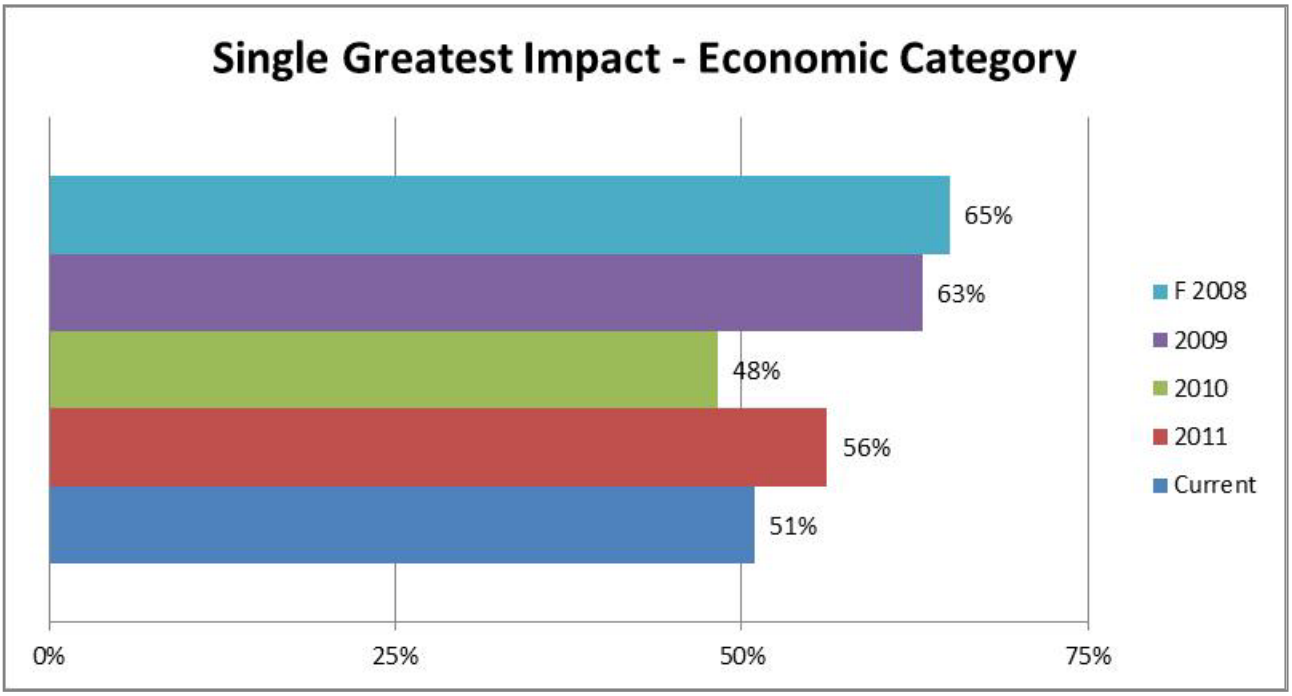
Technological – 10 responses 8% (9%/6%/6%)

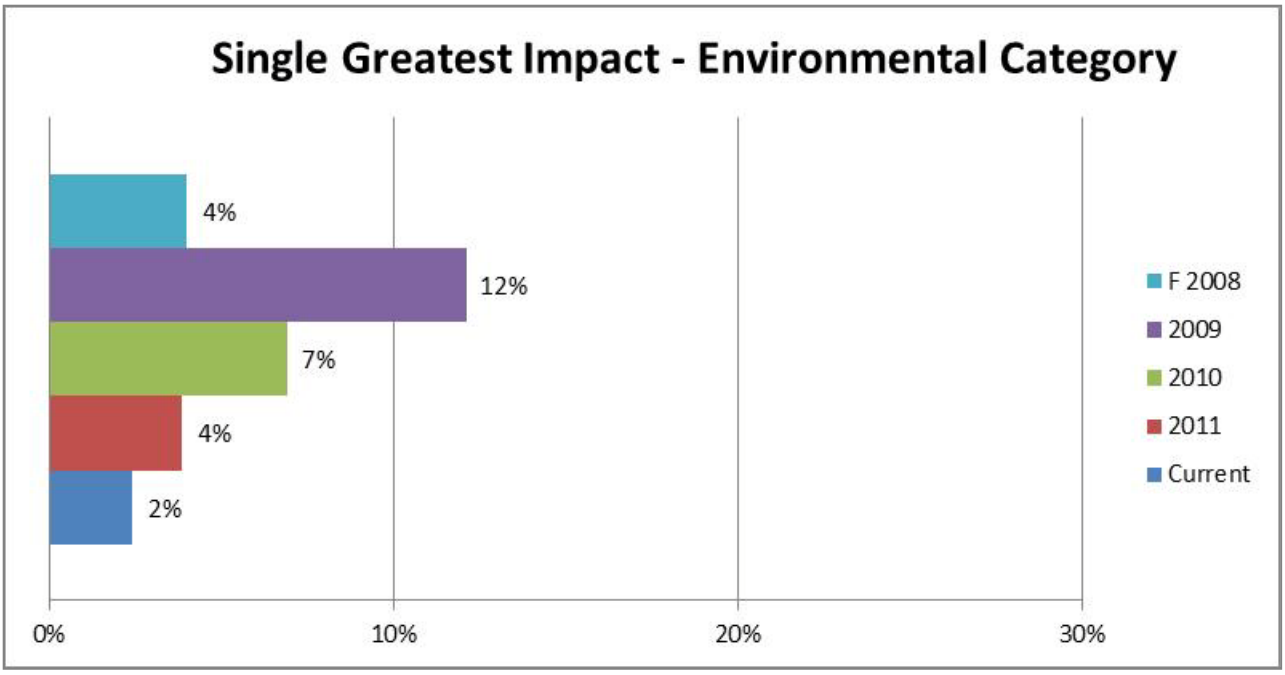
• 9 responses	7% (9%/4%/6%)	3	Cyber security/interconnectedness of infrastructure
• 1 response	1% (0%/1%/0%)		Technology/Space weather

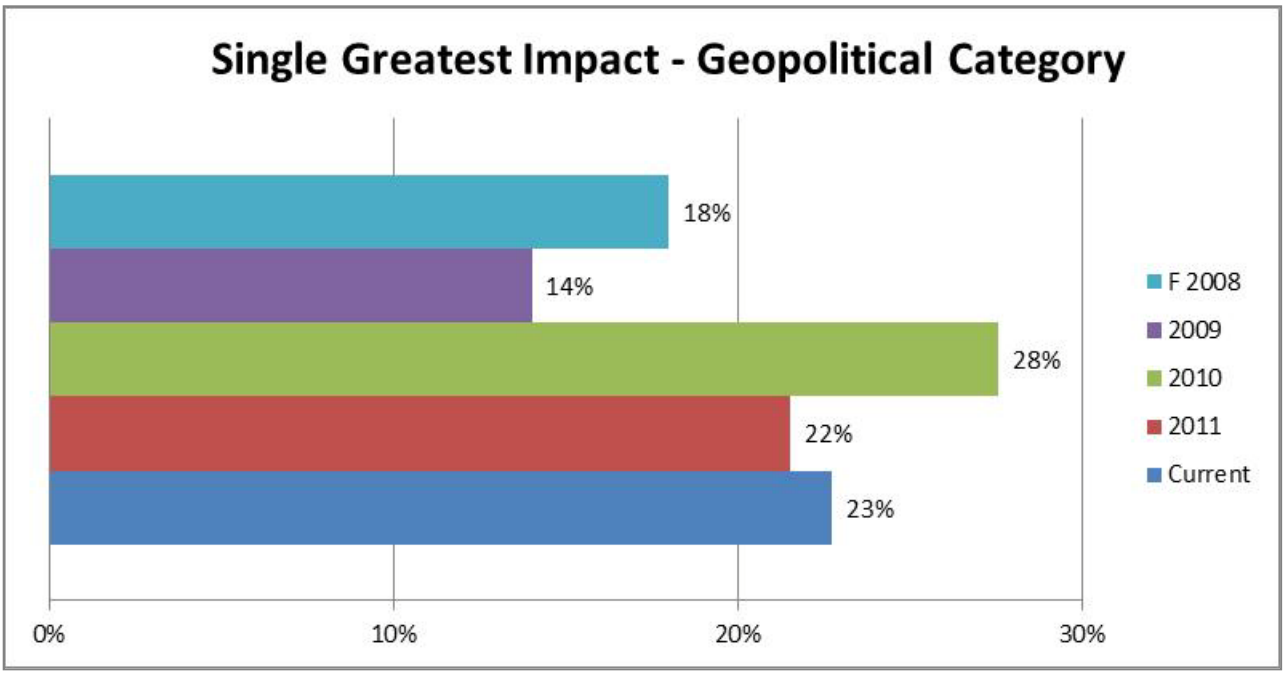
Other – 7 responses 5% (3%/3%/3%)

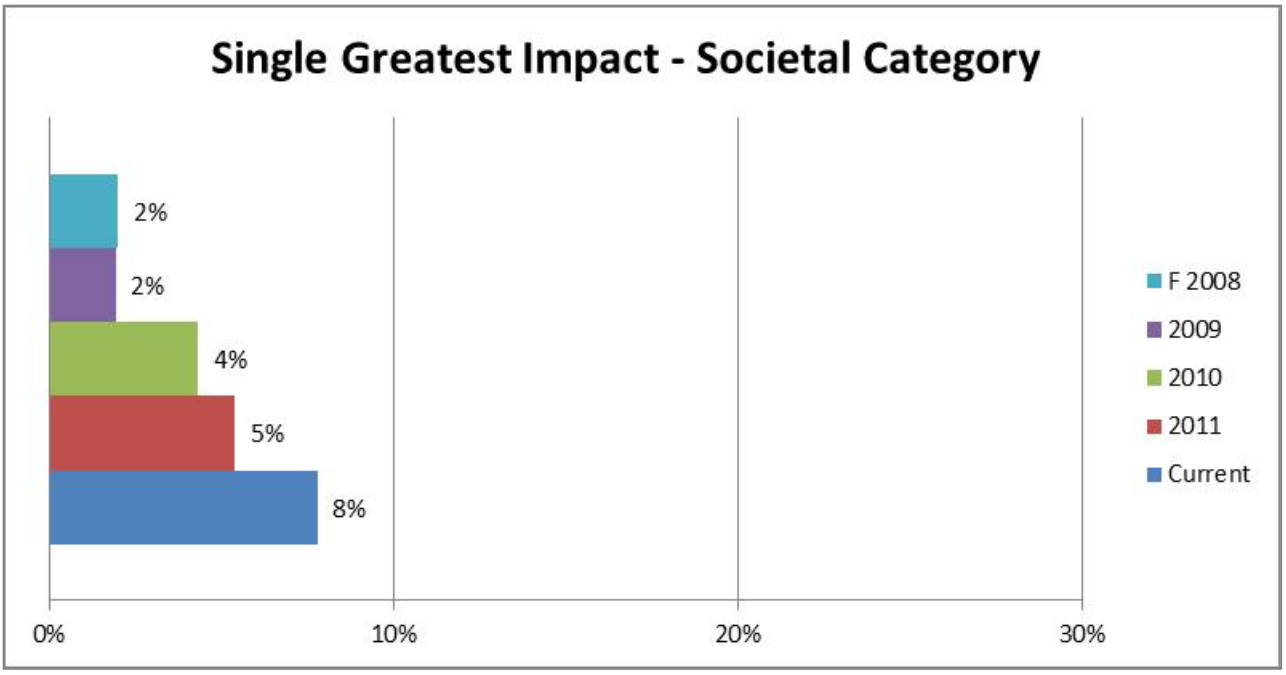
- Rise of Socialism in US

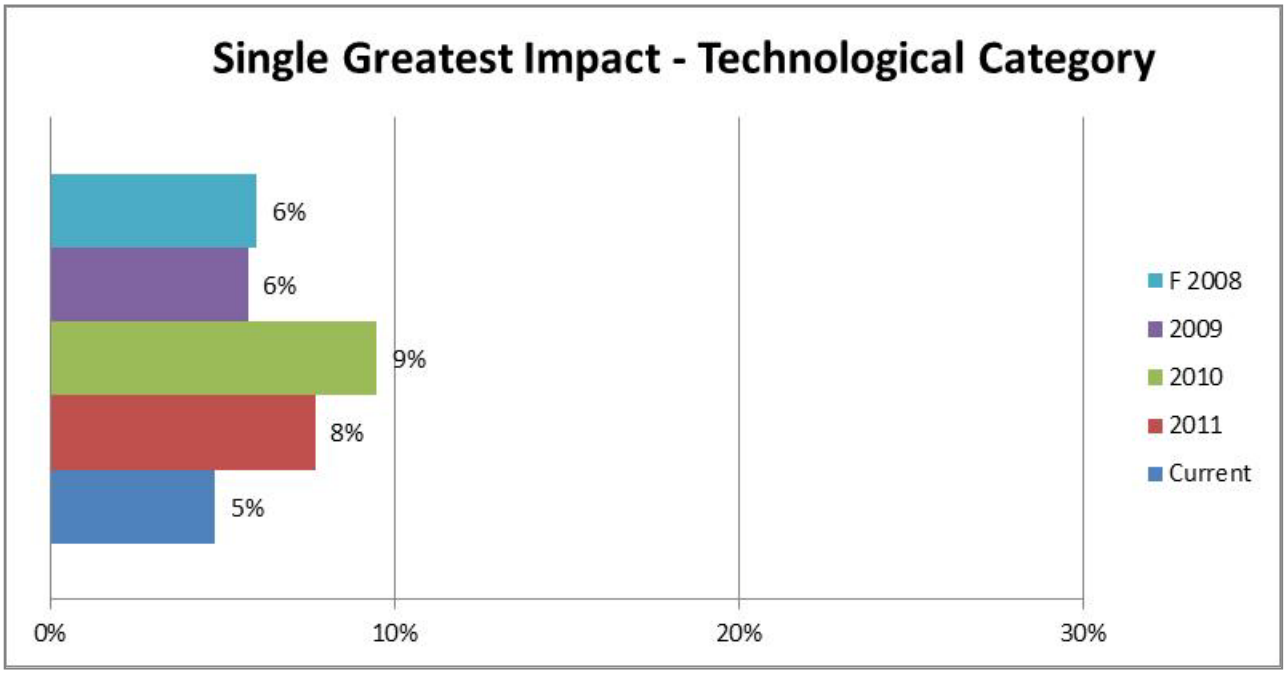
- Sovereign debt
- Ability to repay bailouts
- Natural Catastrophe: CAT models significantly inaccurate
- Volatility
- Civil unrest
- Regulatory intervention




Single Greatest Impact - Environmental Category
4%
12%
7%
4%
2%
0%
10%
20%
30%
F 2008
2009
2010
2011
Current


Single Greatest Impact - Geopolitical Category
18%
14%
28%
22%
23%
0%
10%
20%
30%
F 2008
2009
2010
2011
Current





Question 3. Of the 23 emerging risks, are there combinations that you believe will have a large impact over the next few years? These could occur at the same time (concurrent) or follow each other (sequential). Select up to three combinations of two risks each. A follow-up question applies to the first combination listed so make that the one you think will have the largest impact.

Total mentions (risks are numbered)
Economic – 48% (45%/53%/49% in previous surveys)

• 9% (10%/13%/12%)	1	3	Oil price shock
• 6% (13%/18%/12%)	2		Fall in value of US $
• 8% (10%/8%/6%)	3	4	Chinese economic hard landing
• 6% (7%/11%/14%)	4		Blow up in asset prices
• 19%	5	1	Financial volatility
Environmental – 7% (11%/13%/9%)			
• 2% (5%/6%/4%)	6		Climate change
• 2% (3%/2%/2%)	7		Loss of freshwater services
• 1% (2%/2%/2%)	8		Natural catastrophe: Tropical storms
• 2% (1%/1%/0%)	9		Natural catastrophe: Earthquakes
• 1% (1%/2%/1%)	10		Natural catastrophe: Inland flooding
Geopolitical – 32% (35%/25%/32%)			
• 6% 9% (6%/8%)	11		International terrorism
• 2% 4% (4%/3%)	12		Proliferation of weapons of mass destruction (WMD)
• 3% (4%/1%/3%)	13		Interstate and civil wars
• 9% (8%/3%/5%)	14	2	Failed and failing states
• 2% (2%/1%/1%)	15		Transnational crime and corruption
• 3% (4%/3%/4%)	16		Retrenchment from globalization
• 7% (5%/6%/8%)	17	5	Regional instability
Societal – 6% (5%/5%/8%)			
• 1% (4%/4%/7%)	18		Pandemics/Infectious diseases
• 1% (0%/1%/1%)	19		Chronic disease
• 3% (5%/4%/6%)	20		Demographic shift
• 1% (0%/1%/0%)	21		Liability regimes
Technological – 7% (4%/3%/2%)			
• 6% (3%/2%/1%)	22		Cyber security/Interconnectedness of infrastructure
• 1% (0%/1%/0%)	23		Technology/Space weather

Two risk combinations – 341 total responses

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		8	4	4	21	2	0	0	3	0	0	0	1	7	0	0	7	1	0	0	0	1	0
2		0	11	2	12	0	0	0	0	0	2	0	0	1	0	1	1	0	0	2	0	0	0
3		0	0	7	18	0	0	0	0	0	0	0	0	3	0	8	4	0	0	1	0	0	1
4		0	0	0	12	0	0	0	1	0	1	0	0	3	0	0	4	1	0	2	1	3	0
5		0	0	0	0	0	0	2	1	1	4	1	0	24	0	2	9	2	0	7	4	8	1
6						0	6	1	0	2	0	0	0	0	0	1	0	1	0	1	0	1	0
7						0	0	0	1	1	0	0	2	0	0	0	2	0	1	0	0	0	0
8						0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
9						0	0	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0
10						0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
11											0	6	3	3	1	1	4	1	0	0	0	12	0
12											0	0	1	2	0	0	4	0	0	0	0	0	0
13											0	0	0	5	1	0	3	0	0	0	0	2	0
14											0	0	0	0	1	3	8	1	0	2	0	0	0
15											0	0	0	0	0	1	0	0	0	0	0	8	0
16											0	0	0	0	0	0	2	0	0	1	0	1	0
17											0	0	0	0	0	0	0	0	0	0	0	1	0
18																		0	0	0	0	0	0
19																		0	0	4	0	0	0
20																		0	0	0	1	0	0
21																		0	0	0	0	0	0
22																						0	4
23																						0	0

Leading combinations were

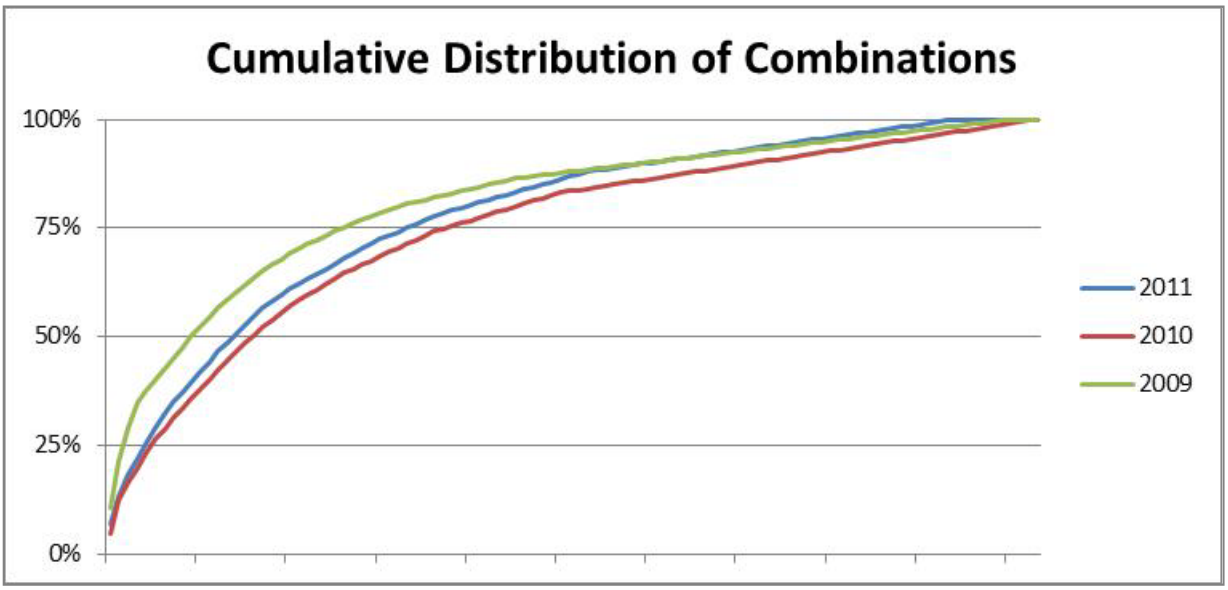
1. 24 responses
    - Financial volatility
    - Failed and failing states
2. 21 responses
    - Oil price shock/energy supply interruptions
    - Financial volatility
3. 18 responses
    - Chinese economic hard landing
    - Financial volatility
4. 12 responses
    - International terrorism
    - Cyber security/interconnectedness of infrastructure
4. 12 responses
    - Fall in value of US $
    - Financial volatility
4. 12 responses
    - Blow up in asset prices
    - Financial volatility
7. 11 responses
    - Fall in value of US $
    - Chinese economic hard landing
8. 9 responses
    - Financial volatility
    - Regional instability
9. 8 responses
    - Oil price shock/energy supply interruptions
    - Fall in value of US $
9. 8 responses
    - Chinese economic hard landing
    - Retrenchment from globalization
9. 8 responses
    - Fall in value of US $
    - Retrenchment from globalization
9. 8 responses
    - Financial volatility
    - Cyber security/Interconnectedness of infrastructure
9. 8 responses
    - Failed and failing states
    - Regional instability
9. 8 responses
    - Transnational crime and corruptions
    - Cyber security/Interconnectedness of infrastructure

Combinations by category

		2008	2009	2010	2011
Economics	Economics	34%	42%	29%	29%
Economics	Environmental	2%	3%	5%	3%
Economics	Geopolitical	22%	16%	21%	24%
Economics	Societal	2%	3%	2%	6%
Economics	Technological	1%	1%	3%	4%
Environmental	Environmental	7%	9%	7%	4%
Environmental	Geopolitical	2%	2%	3%	2%
Environmental	Societal	5%	3%	2%	2%
Environmental	Technological	0%	0%	0%	0%
Geopolitical	Geopolitical	16%	14%	20%	14%
Geopolitical	Societal	4%	2%	2%	1%
Geopolitical	Technological	1%	2%	3%	7%
Societal	Societal	2%	1%	2%	1%
Societal	Technological	1%	0%	1%	0%
Technological	Technological	0%	1%	0%	1%

Combinations by choice 1, 2, 3

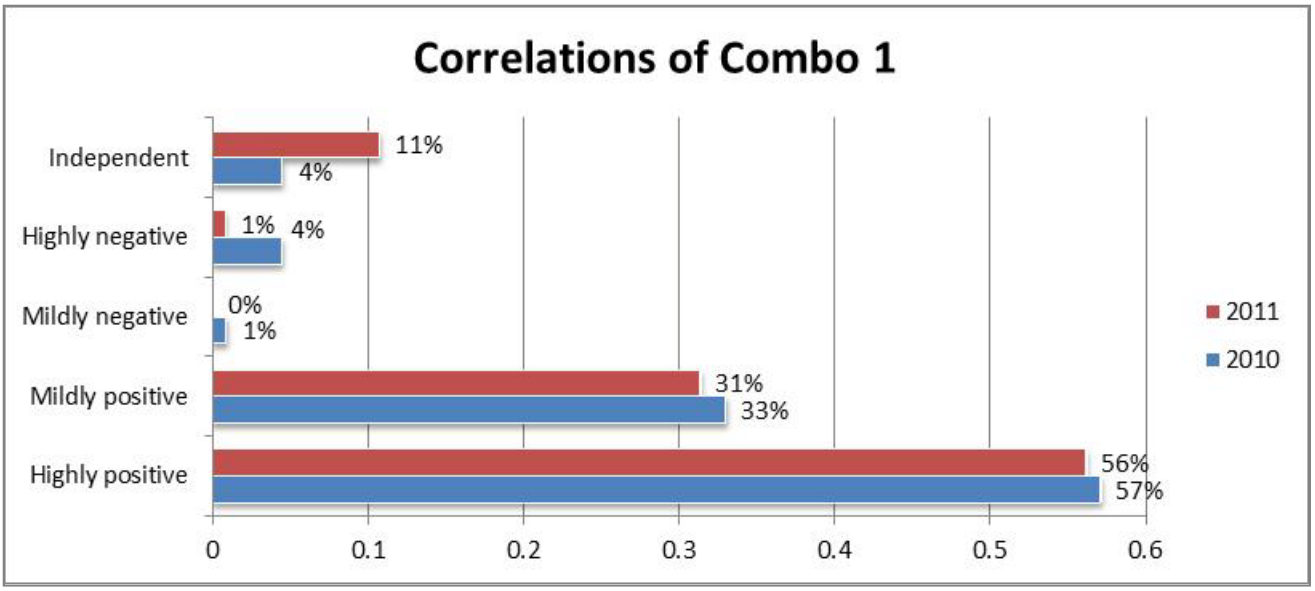
		Combo 1	Combo 2	Combo 3	Total	Combo 1	Combo 2/3
Economics	Economics	50	29	20	99	40%	29%
Economics	Environmental	5	2	3	10	4%	3%
Economics	Geopolitical	36	23	24	83	29%	24%
Economics	Societal	9	7	5	21	7%	6%
Economics	Technological	4	5	5	14	3%	4%
Environmental	Environmental	1	7	4	12	1%	4%
Environmental	Geopolitical	1	5	2	8	1%	2%
Environmental	Societal	1	2	3	6	1%	2%
Environmental	Technological	1	0	0	1	1%	0%
Geopolitical	Geopolitical	10	28	11	49	8%	14%
Geopolitical	Societal	2	0	3	5	2%	1%
Geopolitical	Technological	3	9	12	24	2%	7%
Societal	Societal	1	1	3	5	1%	1%
Societal	Technological	0	0	0	0	0%	0%
Technological	Technological	1	1	2	4	1%	1%
		125	119	97	341	100%	100%



				Avg prior to	
	2009	2010	2011	Current Yr	Avg/Curr Yr
First quartile	3	6	5	4.5	0.90
Second quartile	10	17	15	13.5	0.90
Third quartile	27	38	34	32.5	0.96
Total	101	104	95	102.5	1.08
Remaining	152	149	158		
					96

Question 4. For the first combination listed in Question 3, do you feel that the risks chosen will operate independently or be correlated?

- 68 responses 56% (57%) Highly positively correlated
- 38 responses 31% (33%) Mildly positively correlated
- 0 response 0% (1%) Mildly negatively correlated
- 1 responses 1% (4%) Highly negatively correlated
- 13 responses 11% (4%) Independent
- 1 responses 1% (0%) Not applicable



Question 5. A believer in Thomas Malthus' theory expects population to increase faster than its means of subsistence. For this question, let's expand Malthusian concerns beyond food to include other resources such as commodities, water, and energy. Which risks, in combination, would most likely lead to these concerns becoming reality? (please select no more than three)

127 respondents chose at least one for a total of 353 responses (2.8 average)

Economic – 89 responses (25%)
- 57 responses 45% 2 Oil price shock/energy supply interruptions
- 6 responses 5% Fall in value of US $
- 6 responses 5% Chinese economic hard landing
- 5 responses 4% Blow up in asset prices
- 15 responses 12% Financial volatility

Environmental – 115 responses (33%)
- 36 responses 28% 3 Climate change
- 63 responses 50% 1 Loss of freshwater services
- 5 responses 4% Natural catastrophe: Tropical storms
- 6 responses 5% Natural catastrophe: Earthquakes
- 5 response 4% Natural catastrophe: Inland flooding

Geopolitical – 91 responses (26%)
- 6 response 5% International terrorism
- 2 response 2% Proliferation of weapons of mass destruction (WMD)
- 16 responses 13% Interstate and civil wars
- 23 responses 18% 5T Failed and failing states
- 6 responses 5% Transnational crime and corruption
- 14 responses 11% Retrenchment from globalization
- 24 responses 19% 4 Regional instability

Societal – 45 responses (13%)

• 18 responses 14% Pandemics/Infectious diseases
• 4 responses 3% Chronic diseases
• 23 responses 18% 5T Demographic shifts
• 0 responses 0% Liability regimes

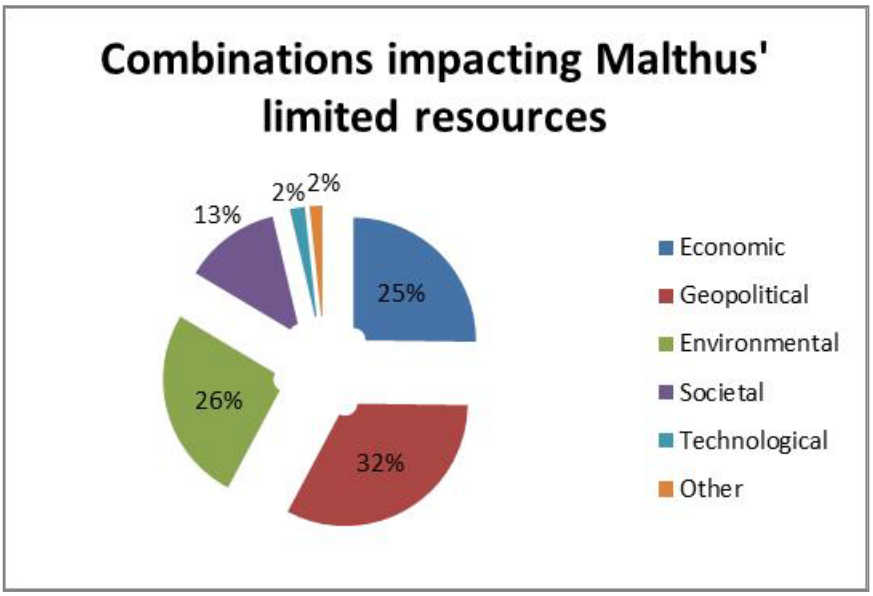
Technological – 7 responses (2%)

• 5 responses 4% Cyber security/Interconnectedness of infrastructure
• 2 responses 2% Technology/Space weather

Not Sure – 0 responses (0%)

Other – 6 responses (2%)

- **Do not accept the premise**
- Repressive regimes
- Theory is flawed
- Shareholder maximization (unsustainable growth)
- Failure to expand women's rights
- Malthusian model is preindustrial and may no longer apply



Question 6. Some risk managers seek ways to exploit risk by finding opportunities to add those that are mispriced or provide diversification. Which, if any, emerging "opportunities" do you monitor?

- None
- Financial volatility and asset mispricing – concern over personal retirement and job.
- Political agendas frequently distort economic fundamentals. This leads to artificial low interest rates and affects commodity prices as well.
- Flood risk; climate change; new technology

- Alternative energy – Personal belief that sources of energy will change in my lifetime. I believe the changes could have positive financial and environmental impacts.
- Clean water as an investment theme
- Mergers and acquisitions, because they can help diversify risks.
- Financial volatility – impact on company assets
- Blow up in asset prices – provides the greatest potential differentiation in our industry
- Federal health care reform. Many acts are ill-defined.
- Unsure
- None
- None
- n/a
- none.
- None planned today
- None
- International CAT – to diversify our property-heavy US exposure.
- Financial volatility related products such as structure notes. Just wait for the next phase of economic cycle to arrive.
- Demographic changes – may lead to product opportunities that hedge existing products
- NA
- None
- Energy and food opportunities, since I can connect what I see on the ground to an economic hypothesis and practical investment opportunities.
- Inflation
- I monitor negative black swans: war and financial events. There is a high probability of regional war in the Middle East that will be quite unlike anything we've ever seen before.
- It is likely that European debt problems will not be contained.
- Financial volatility – I&A product pricing
- On a personal level, I monitor housing due to the current state of this market in the U.S. From an organizational level, we monitor all types of assets and have invested, amongst things, in large commercial real estate properties which can be purchased at a steep discount while realizing significant gains over time.
- None
- Sovereign & credit spreads
- Changing customer preferences, unmet customer needs
- Continuing instability and lack of confidence. Can I bring people a product they're willing to pay for that mitigates these feelings.
- Failed and failing states because of the flow on impact to my own organisation's balance sheet
- Blow up in asset prices or the change in the interest rates. This would have overall impact on both "fair value" of assets and liabilities. This would eventually affect financial volatility.

- US real estate investment
- Support for renewable energy; Tort reform
- Asset prices – opportunity to acquire assets at favourable prices
- None – goal is more defensive in nature
- Major catastrophes pressures to greater demand and high insurance prices.
- Market dislocations for business growth and investment opportunities
- Riskier, but higher yielding assets that pay for increased risk through their diversification benefit.
- Cheaper capital provision e.g., cat bonds in lieu of traditional cat reinsurance.
- None
- N/A
- Financial volatility. It impacts directly the value of guarantees (liabilities).
- Can't answer
- None, for my business
- Personal income and home prices: only when home price distributions become better aligned with personal income distributions (30% of income being used for mortgages, insurance, taxes) will the economy stabilize.
- 1. Natural catastrophes come in many forms and regions that can create both pricing arbitrage and diversification opportunities
- 2. We monitor most things on the list because of extensive correlations to the global and regional economies which in turn affects the insurance world across Life, Health, & Pensions and Property & Casualty.
- Regulatory activity, as this may lead to improve product
- Investment opportunities
- n/a
- none
- Mispriced products – Competition driven pricing instead of risk-based pricing
- Consumer protection and disclosure issues
- Regional instability and its impact on the growth of the industry.
- Demographics/Technology

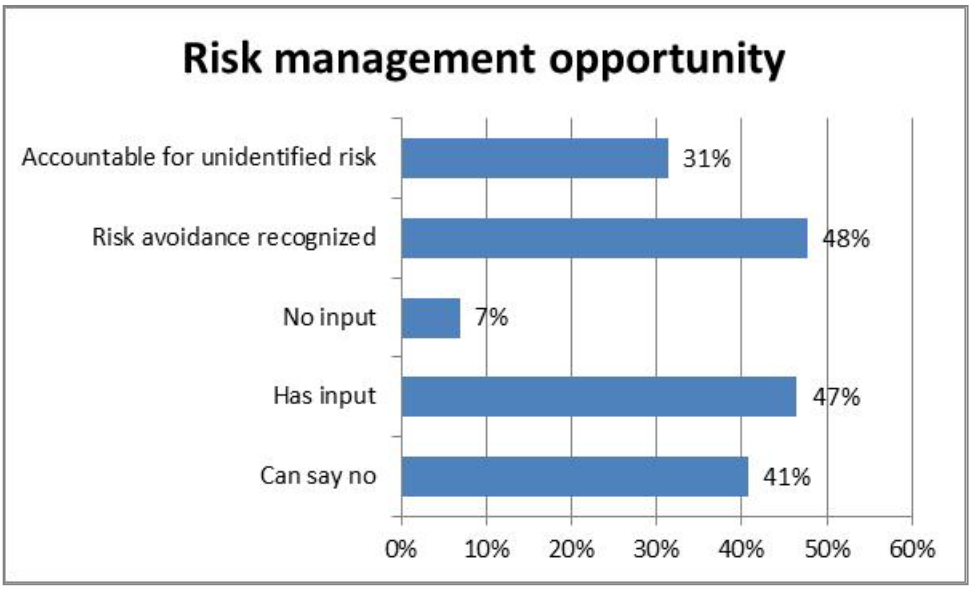
Question 7. The true measure of an ERM program is how it is received by the board and senior management. Which of these is true in your situation? (please select all that apply)

149 responses - percentages back out those stating question is not applicable to them

- 35 responses 41% Our ERM function can say no to a strategic opportunity
- 49 responses 47% Our ERM function has input but not a vote when a strategic opportunity is being considered
- 40 responses 7% Our ERM function has no input when a strategic opportunity is being considered
- 6 responses 48% If the firm avoided a risk identified by the ERM department, the value of the department is recognized
- 41 responses 31% If the firm was subjected to a risk not identified, the ERM department would be held accountable

- 27 responses Not applicable

Note that for the first 2 responses there were 3 who chose both so 81 (84%) could say no to a strategic opportunity and/or have input

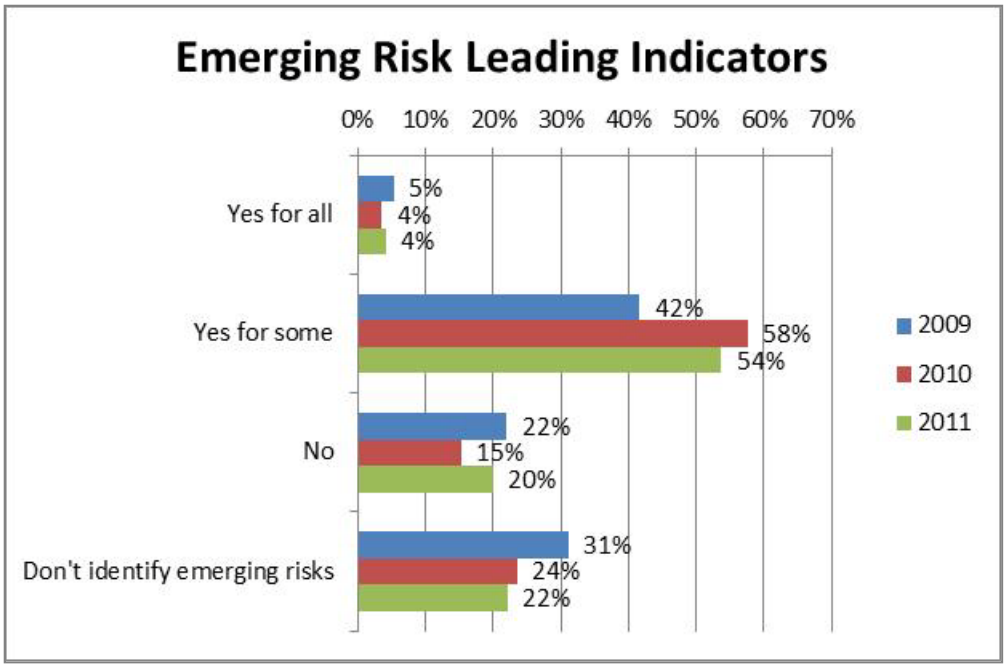


Section 2: Leading Indicators

Question 1. Once an emerging risk is identified, do you select leading indicators to measure changing likelihoods? (Example: In 2009, the threat of missiles fired by North Korea received much publicity. One company monitored investment flows to/from North or South Korea as an advance indication of this threat.)

127 responses (Fall 2010/Fall 2009 for comparison) percentages back out those stating question is not applicable to them

- 4 responses 4% (4%/5%) Yes for all
- 51 responses 54% (58%/42%) Yes for some
- 19 responses 20% (15%/22%) No
- 21 responses 22% (24%/31%) We do not formally identify emerging risks
- 18 responses Not sure
- 14 responses Not applicable



Question 2. If yes, please provide examples.

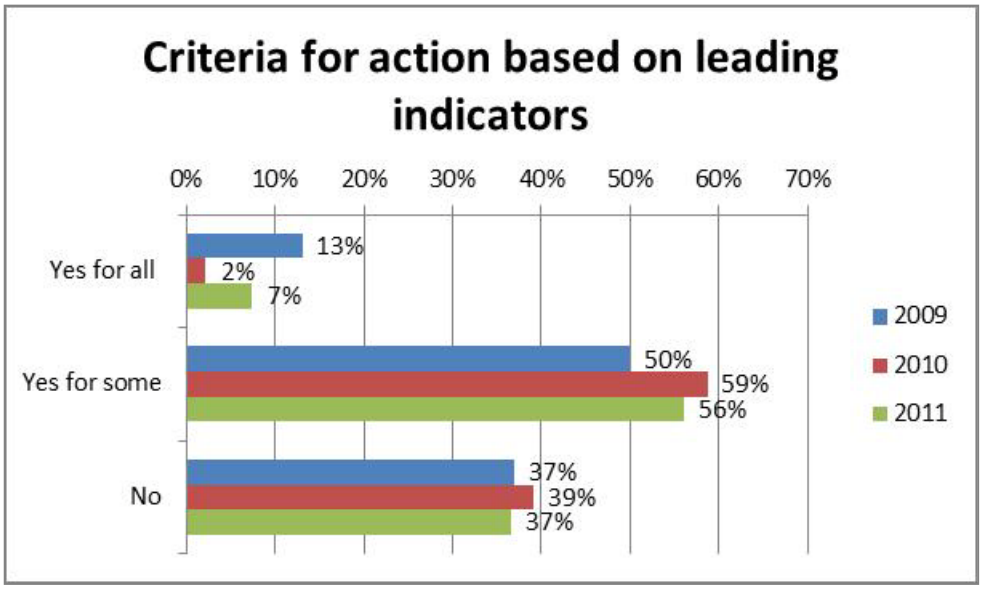
- Monitoring world stock markets, futures
- CRO and research arm monitor various risks
- We read Bloomberg articles
- General credit risk is adjusted by remote geographical and sector performance.
- Mapping the problem
- Actuarial quantifies risk with assumptions. Our actuarial department quantifies worst case scenarios of the pandemic concerns several years ago.
- Risk: shift in buying preferences – monitor spending patterns, emerging competitors providing alternative services, etc.
- Pandemics – WHO and CDC alerts and tracking of cases.
- Our company monitors economic outlook for consideration in strategic planning.
- Nuclear Reactor Meltdown. The indicators are the location map and scale of the nuclear reactors and set concentration limit on the total net amount at risk insured around them.
- H1N1 virus – monitor number, location and fatalities of reported cases
- For example, the risk of failure of U.S. debt. We monitor bills passed and other regulatory actions/re-actions. The positions of the NAIC and how this may impact our business. Should the risk be increased, we will test the potential financial impact this may have on our organizations (reserves, capital, etc.)
- Oil price/growth rate in energy consumption
- Weather markers for climate change and tropical storms
- Usually related financial outcomes, or key indicators, at least to the extent they can be determined
- Monitor state's reactions to national regulatory developments and begin scoping possible impacts on products and marketing

- Not quantitative but some of the regulatory or public policy was good indicators that (including risk) could be expected among industry.
- For example in stock prices, debt instrument issued by the same entity are more sensible to change.
- For Euro crisis monitor credit spread changes.
- For Cell phone cancer risk monitor articles
- Greece Debt Crisis – Leading Indicator European Stock Market
- Changing regulatory requirements as a result of National Health … monitor proposals for changing regs by state DOI
- No comment
- For regulatory risk, we monitor the local government "activities" (e.g., comments in the press), as well as regulations in other countries in the region (South East Asia).
- Not able to disclose
- Mispriced products – By looking at the financial results of the Firms
- Consumer protection – By ensuring that rules and regulations on it are followed by the industry.
- Monitoring of level of web traffic around issues of interest for many risks.

Question 3. If you identify leading indicators of emerging risks, do you have criteria for when to take action to mitigate (or accept) the risk?

51 responses

- 3 responses 7% (2%/13%) Yes for all
- 23 responses 56% (59%/50%) Yes for some
- 15 responses 37% (39%/37%) No
- 9 responses Not sure
- 1 response Not applicable



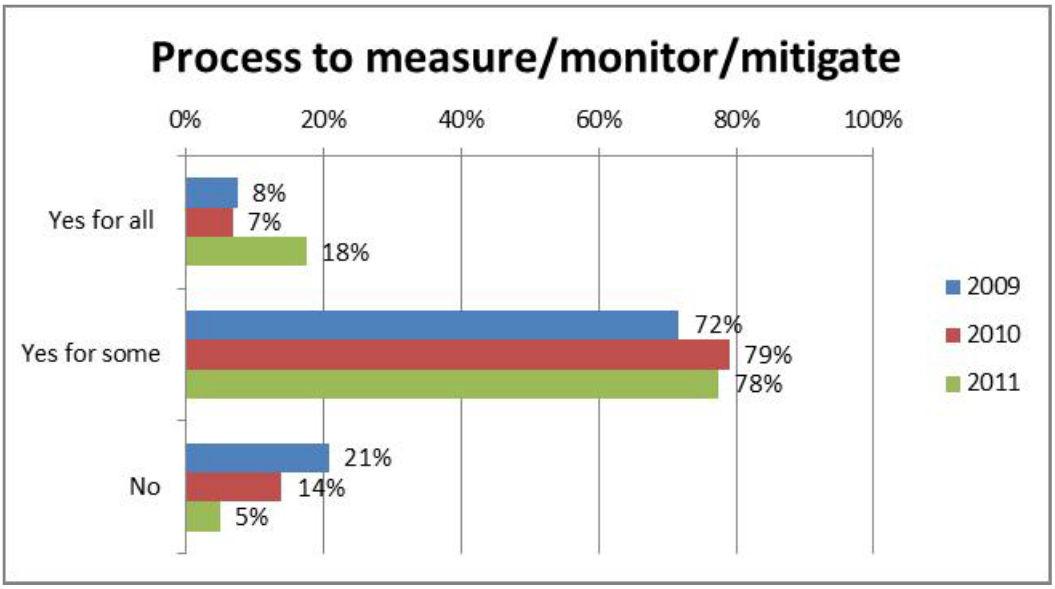
Question 4. If yes, please provide examples.

- Sum of foreign credit defaults drives domestic assumptions made.
- Get ready to intervene based on criteria
- We use a "threat rating" scheme, and when our evaluation of a risk tells us that 1) the risk is active and tangible, and 2) the impact on our firm is beginning to become estimable, mitigation steps are triggered.
- We have policies with triggers for actions.
- Monitor the total NAAR and if exceeding the limit, use stop loss reinsurance to mitigate the risk
- If the risk may result in a loss of x% of earnings or an impacts in y% of capital. Also, the proximity of when the risk event will occur will also impact if we need to take action.
- Manage long/short position on property cat exposure based on advance view of tropical weather season.
- CDS rate beyond 400 basis points related to treasure bills often means liquidity risks even before it is reflected in stock price.
- Risk of Inadequate Capital
- At some point contract exclusions or avoidance of a line of business are required.
- Not able to disclose
- By ensuring that rules and regulations are water tight and making sure that industry complies with those rules.

Question 5. Once an emerging risk is identified, do you have a process to measure, monitor, and/or mitigate the risk?

47 responses

• 7 responses	18% (7%/7%)	Yes for all
• 31 responses	78% (79%/72%)	Yes for some
• 2 responses	5% (14%/21%)	No
• 6 responses		Not sure
• 1 responses		Not applicable



Question 6. If yes, please provide examples.

- We have ownership in various sectors that provides early measurement of general performance.
- We have a Heat Map, one person is responsible for each line
- The risk is the uncertainty of health care reform, specifically, how the Exchange will impact my company's business. Actuarial is running different projections with varying assumptions.
- We use a "threat rating" scheme, and when our evaluation of a risk tells us that 1) the risk is active and tangible, and 2) the impact on our firm is beginning to become estimable, mitigation steps are triggered.
- BU ERM function partner with group ERM to coordinate the response.
- Quarterly Emerging and Catastrophe Risk Committee meetings identify the risks and assign investigation and monitoring tasks to relevant departments.
- Monitor risk by tracking other organizations that are monitoring the risk (e.g., WHO, CDC)
- For instance observing credit default swap spreads to understand volatility of corporate bond credit spreads
- Reduce energy use
- High concentration in an asset class or regional mix
- See regulatory example
- Stop increasing exposition, daily evaluations.
- Measurement is done by evaluating scenarios which gives ideas for monitoring and mitigation. For climate change, scenarios identify the key pressure points, which can then be monitored and reacted to. This is embryonic though.
- We have formal emerging risk inventory and committee to review/follow up on the risk.
- We have a dashboard tracking emerging risks.

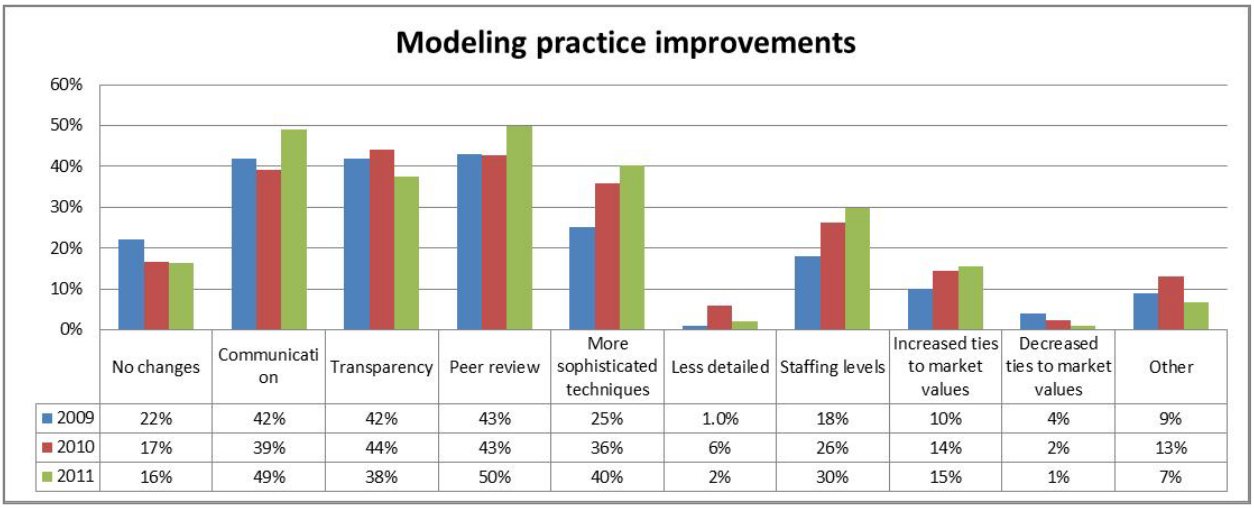
- For regulatory risks, we monitor the regulator activities, and other regulatory development in the region.
- Initial tremors in investment banking and finance sectors led us to divest of all investment banking debt held in our general account prior to Bear collapse.

Section 3: Methodology

Question 1. Models have received increased scrutiny and review over the past several years. How have your modeling practices improved over the past year? (please select all that apply)

275 responses from 121 (2.3 average)

- 17 responses 16%(17%/22%) No changes
- 51 responses 49% (39%/42%) Communication
- 39 responses 38% (44%/42%) Transparency
- 52 responses 50% (43%/43%) Peer review
- 42 responses 40% (36%/25%) More sophisticated techniques
- 2 responses 2% (6%/1%) Less detailed
- 31 responses 30% (26%/18%) Staffing levels
- 16 responses 15% (14%/10%) Increased ties to market value
- 1 response 1% (2%/4%) Decreased ties to market value
- 17 responses Not applicable
- 7 responses 7% (13%/9%) Other
    - I don't know
    - Revamping
    - Tying each Corporate Risk Tolerance Statement to the output of a Capital Model
    - System conversion/validation
    - Big controls architecture around them
    - External validation
    - Greater data accuracy and completeness focus and validation against actual.

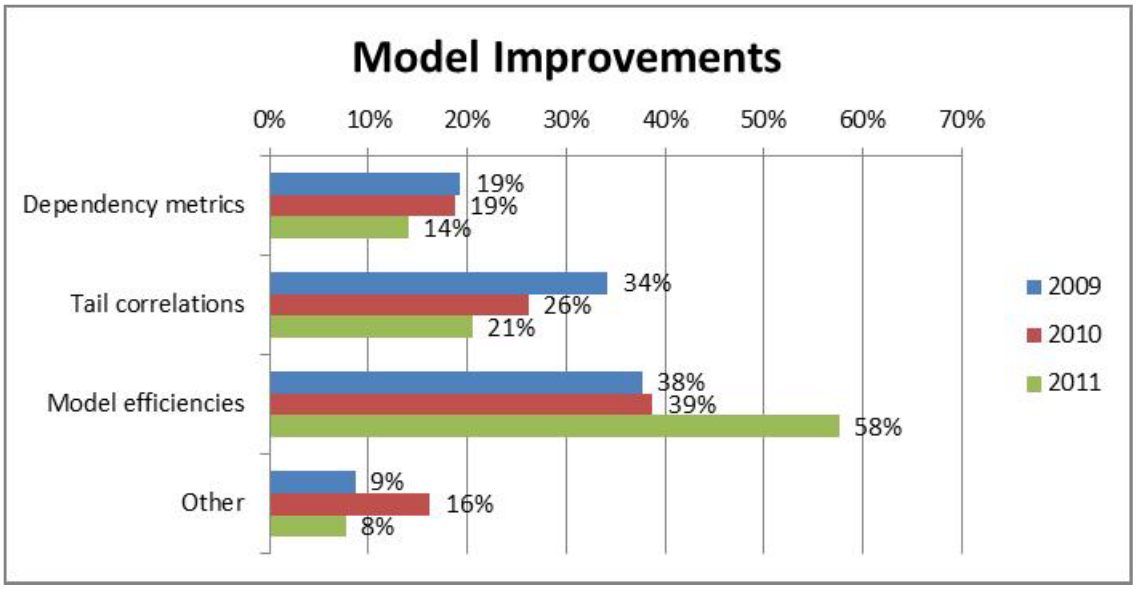


	No changes	Communication	Transparency	Peer review	More sophisticated techniques	Less detailed	Staffing levels	Increased ties to market values	Decreased ties to market values	Other
2009	22%	42%	42%	43%	25%	1.0%	18%	10%	4%	9%
2010	17%	39%	44%	43%	36%	6%	26%	14%	2%	13%
2011	16%	49%	38%	50%	40%	2%	30%	15%	1%	7%

Question 2. What do you expect to be the primary source of modeling improvements in the next few years? (please select one)

114 responses

- 11 responses 14% (19%/19%) Dependency metrics
- 16 responses 21% (26%/34%) Tail Correlations (e.g., using copulas)
- 45 responses 58% (39%/38%) Model efficiencies (fewer scenarios, faster run time)
- 36 responses Not sure
- 6 responses 8% (16%/9%) Other
    - Common shocks; validation via deterministic stress testing
    - Linking Corporate Risk Tolerance Statements to Localized Risk Limits
    - Better hardware/software integration
    - Continuing model validation activities
    - Focus on the tail
    - Improved data



Question 3. Please share instances where quantification efforts have enabled better decision making.

26 responses

- Having an economic view of interest rates – implemented interest rate floors
- Medical cost trends, provider modeling for health insurance
- Company has been able to better describe its risk appetite and current risk profile, which has led to quicker decisions on when to pull risky products or introduce them.
- None that I can think of.
- Better portfolio construction considering integrated economic scenarios.
- Statistical measurement of future market performance has established clear risk limits.
- We have ranges of impact to our business from health care reform. This has been shared with our strategic development team.
- None
- n/a
- NA
- Capital Modeling results applied to Earnings Volatility Risk Tolerance Statements have prompted discussion of the risk inherent in our strategic plans.
- Implementation of product-related metrics to complement our risk-adjusted ROE.
- Quantifying the impact of possible economic scenarios on in force product lines provided clarity on the risks the organization was taking and, in fact, indicated that the potential losses were much greater than had been assumed. This evidence was critical in getting senior management buy-in to product feature changes that would reduce risk, even though they would hurt competitiveness of the products.
- NA
- Emerging recognition of the future costs of entitlement programs

- The use of our models has been helpful when considering multiple alternatives within a strategic decision.
- Concentration over a threshold, albeit the threshold may be qualitatively derived
- A recent reverse stress testing exercise highlighted a dependency which management and the Board had not fully appreciated previously.
- Not yet. Need more time for those.
- Risk aggregation helped to identify opportunities where they are considered too risky when they are viewed alone.
- Equity risk
- Evaluation of reinsurance contracts
- Property portfolio aggregation management
- Identifying volatility as a risk that needs to be mitigated
- Identification of strong correlations (e.g., with logistic curves) between key economic time series and residential mortgage defaults
- Not sure

Question 4. Please share instances where qualitative analysis has enabled better decision making.

20 responses

- Acquisitions – qualitative assessment of risks helping to aid pricing
- Rigorous review of acquisition candidates, product design
- No good example
- None that I can think of.
- Collaborative efforts from various division heads have elevated the importance of various operational risks.
- Same as above
- None
- n/a
- NA
- Regular (18 mos) analysis of Top Risks by company officers, including voting on likelihood and impact, resulting in a "heat map". Upper right quadrant risks (likely, and severe) get special attention.
- Corp response to Dodd Frank
- Communication, transparency and accountability of models.
- NA
- Emerging recognition of the causes of unsustainable public debt
- The model input is helpful, but in the end, key issues around regulation and reputation ultimately have significant weight and are very qualitative.
- Not yet. Need more time for those.
- Operational risk
- Fundamental analysis in stocks
- Scenario approaches identified contract wording risks on large (very very) limit policies when thought through the lens of what events might use up all those

limits. And what kinds of disputes and external party correlations may occur (an equally bloodied counterparty may not behave as well as if they are whole and healthy), resulting in refusal to write despite high credit ratings.

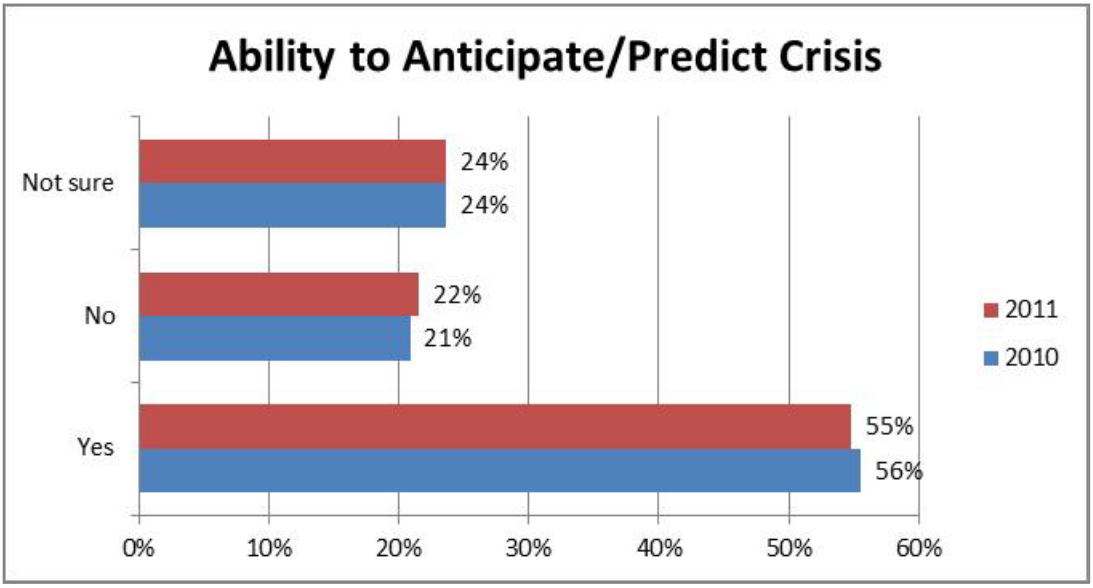
- Not sure

Section 4: Predictions

Question 1. Is it possible to anticipate/predict a crisis? (please select one)

117 responses

- 51 responses 55% (56%) Yes
- 20 responses 22% (21%) No
- 22 responses 24% (24%) Not sure



Unfortunately the survey did not allow both a comment and a vote. The researcher has attempted to categorize each comment into the categories Yes/No/Not sure.

- 55 responses 47% Yes
- 29 responses 25% No
- 11 responses 9% Sometimes
- 22 responses 19% Not sure

24 comments

- It depends on the situation
- Sometimes. Subprime was clearly predictable, the regulatory response was not.
- Possible – but see below
- Often, but not always
- But not with certainty – just indicator that likelihood has increased etc.
- It all depends on the availability, accuracy and timing of leading indicators of such crisis

- Sometimes
- Not predict, but anticipate and prepare for (fire drill philosophy)
- No but effect could be mitigated
- Anticipating a potential crisis is possible; predicting the actual occurrence, not so much
- Some yes others no
- Usually no, sometimes yes
- Preparedness and prediction are not the same
- Yes but very very difficult
- Yes, but with limited accuracy
- Some are, most aren't
- Perceived yes because correct predictions are noted. Make enough and you'll "predict" some.
- Not as to timing; but you can work on readiness
- But not likely
- If a crisis were predictable and understood, it would not become a crisis
- One can not predict a crisis, however one can be prepared in case a crisis happens.
- The combination of the house price bubble, draining of home equity with second liens and cash-out refinances, and growing unaffordability of homes together with sophisticated loans given to unsophisticated borrowers created a perfect storm that was "obvious", but risk managers were afraid to confront in the "bull market". There was a fear that addressing it would pop it.
- I don't believe so. But we can "suggest" some possible outcomes based on what we see in the marketplace.
- Some crises might be predicted but with unknown timing and severity

Question 2. If you consider yourself a risk manager, is predicting the future part of your job?

116 responses

- 35 responses 63% Yes
- 40 responses 37% No
- 26 responses Not applicable

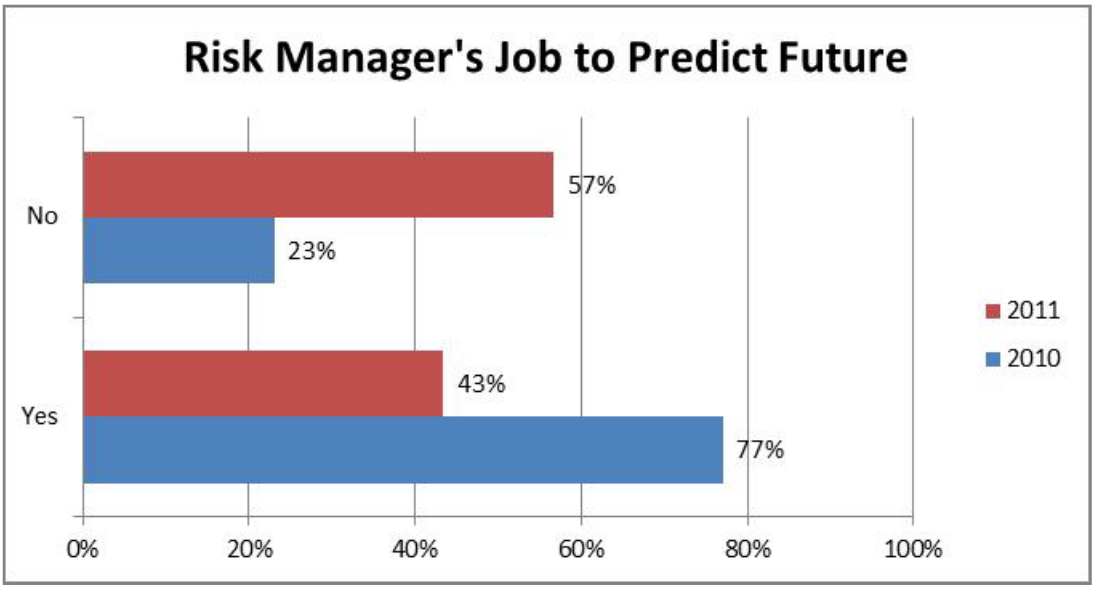
Unfortunately the survey did not allow both a comment and a vote. The researcher has attempted to categorize each comment into the categories Yes/No/Not applicable (considering multiple futures was labeled yes).

- 39 responses 43% (77%) Yes
- 51 responses 57% (23%) No
- 26 responses Not applicable

15 comments

- Not predicting, but understanding consequences of multiple potential future scenarios

- Only within a certain range and based upon clear facts. But you always need to remember that you risk your credibility when you try to make predictions about the unknown.
- Not predicting the future, but recognizing potential outcomes.
- The job is to identify exposures to risk and take steps to minimize the impact if the risk actually comes to pass.
- Yes, but more predicting the possible outcomes than the one specific outcome
- Predicting, no. evaluating possible future scenarios, yes.
- To some extent
- It is better to plan for scenarios that are possible or trending in a direction, than spend time trying to predict specifics.
- Predicting possible futures is
- Risk management is about developing plausible future outcomes and understanding the impact of all of them, not predicting which is correct
- Scenarios rather than prediction
- Other than identifying possibilities
- Playing what ifs
- Not ALL crises are predictable, only SOME are. For those that ARE, predicting is part of my job. For those that ARE NOT, limiting exposure IN THE EVENT of a crisis is achieved through advance and concurrent mitigation.
- One cannot predict the future, however one can be prepared for different future scenarios



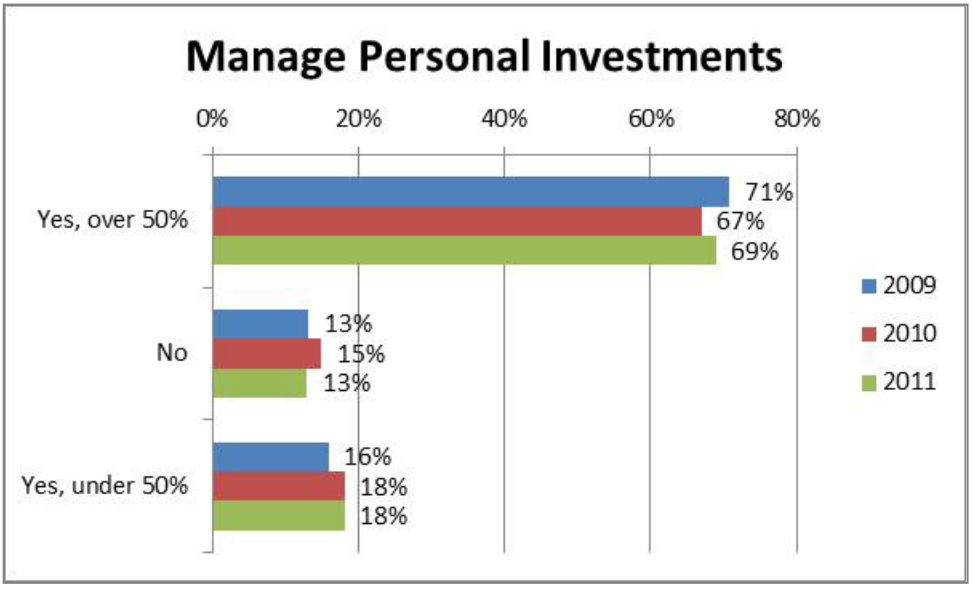
Section 5: Current topics

Question 1. Do you manage your personal investments?

116 responses

- 80 responses 69% (67%/71%) Yes, for more than 50% of portfolio

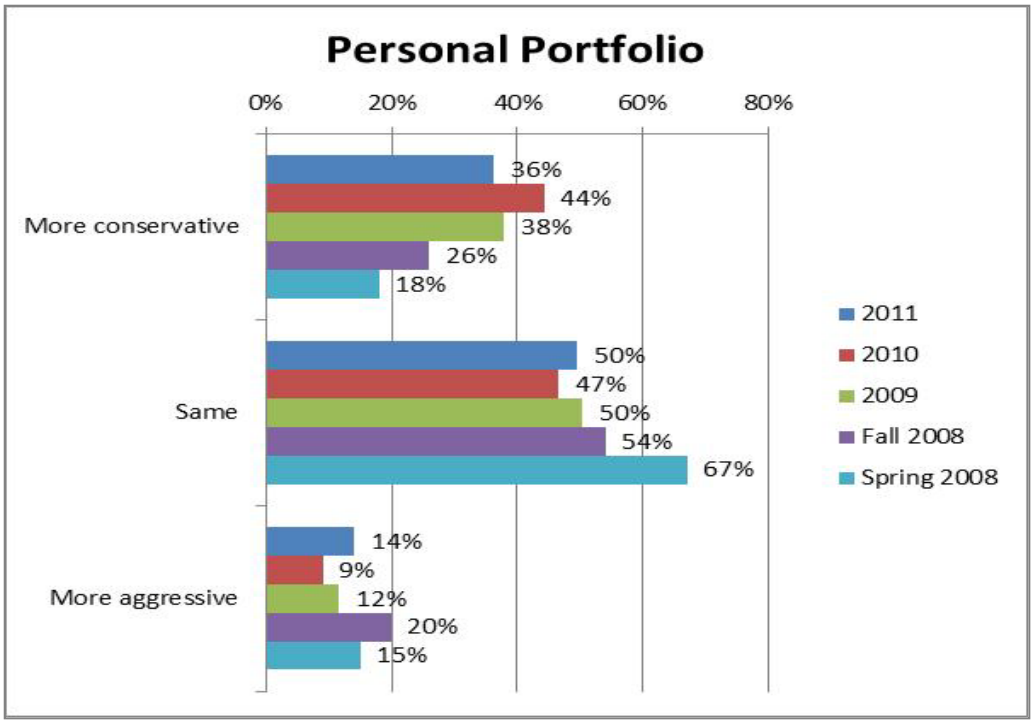
- 15 responses 13% (15%/13%) No
- 21 responses 18% (18%/16%) Yes, for less than 50% of portfolio



Question 2. Currently, your personal investment portfolio is:

116 responses

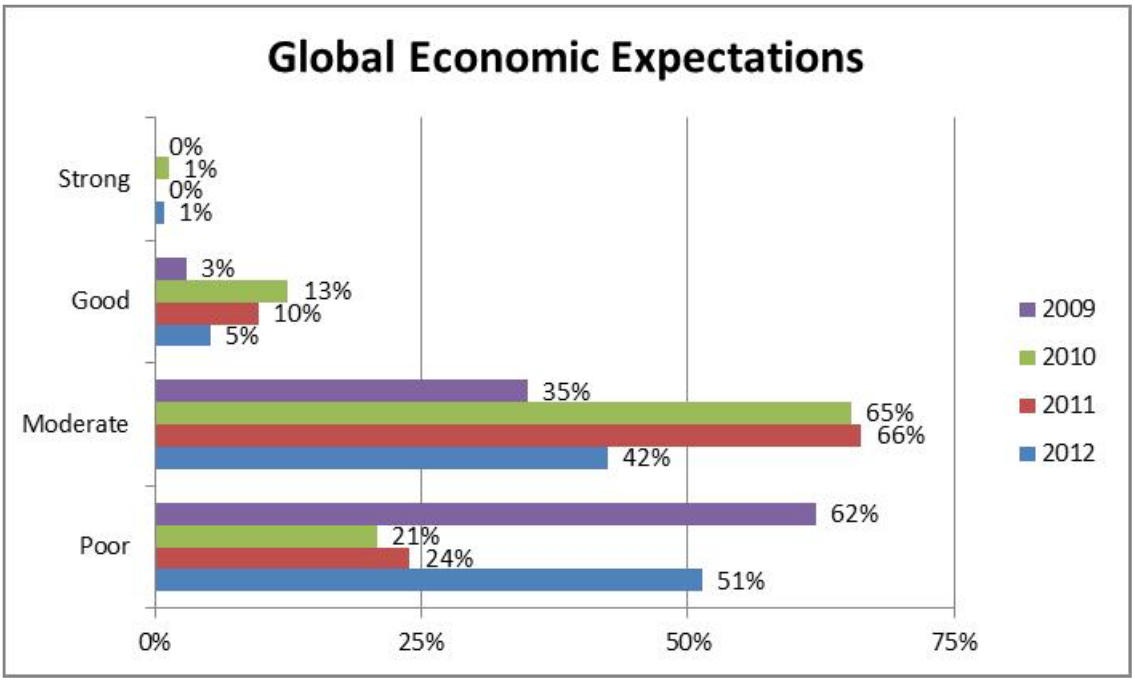
- 58 responses 36% (44%/38%/26%/18%) More conservative than usual
- 48 responses 50% (47%/50%/54%/67%) Same as usual
- 6 responses 14% (9%/12%/20%/15%) More aggressive than usual
- 1 responses Not sure
- 3 responses Prefer not to answer



Question 3. Your expectations for the 2012 global economy are:

116 responses percentages are expectations for 2012 and previous expectations for 2011/2010/2009

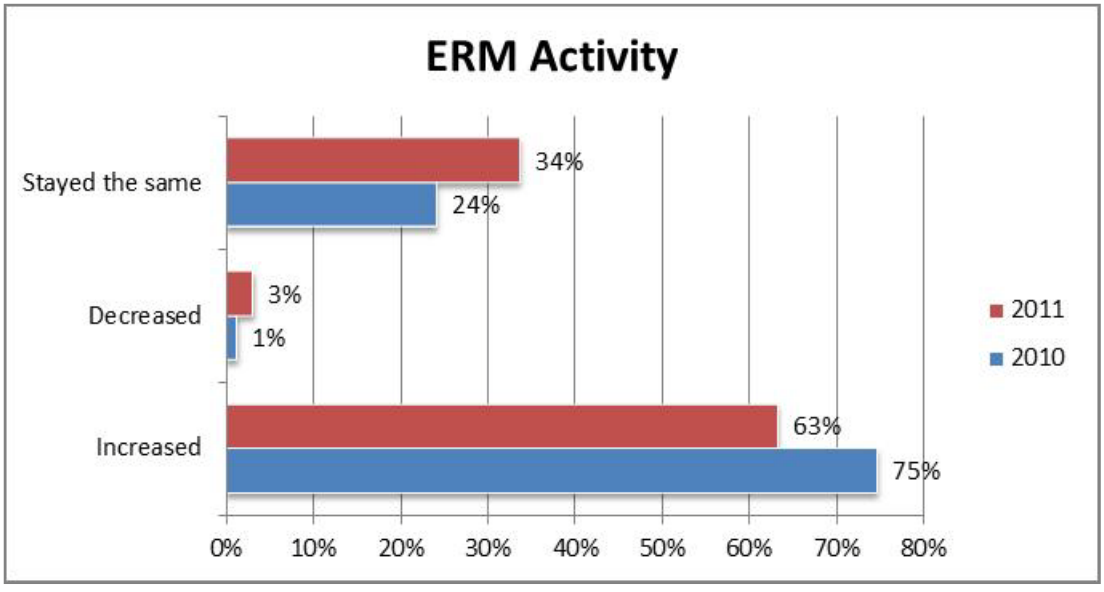
- 58 responses 51% (24%/21%/62%) Poor
- 48 responses 42% (66%/65%/35%) Moderate
- 6 responses 5% (10%/13%/3%) Good
- 1 responses 1% (0%/1%/0%) Strong
- 3 responses Not sure



Question 4. Did you experience a change in the level of ERM-focused activities for your organization or clients in 2011?

98 responses

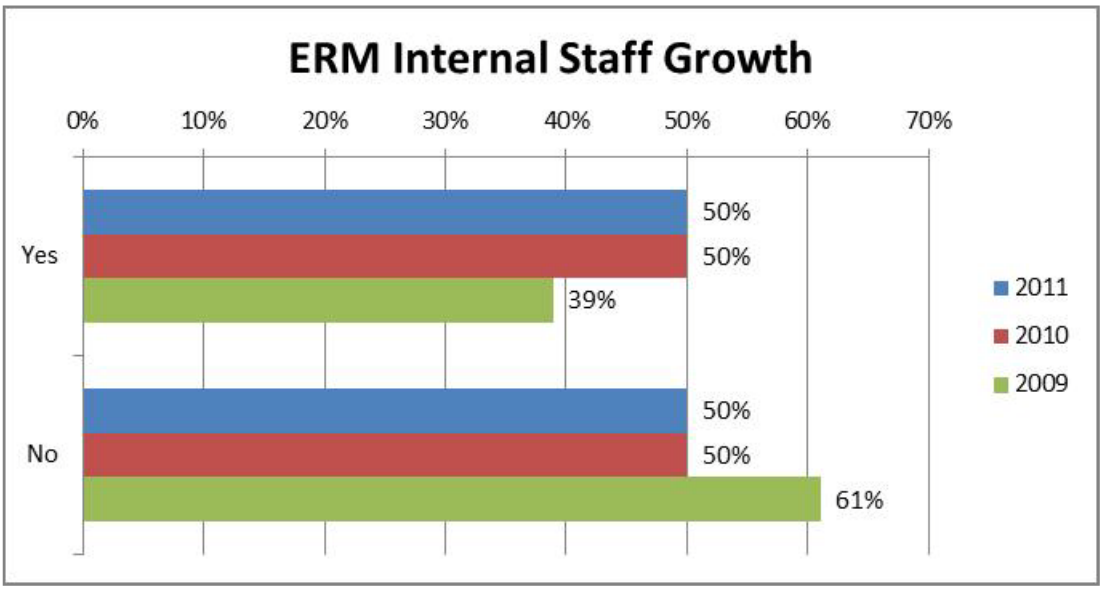
- 62 responses 63% (75%) Increased
- 3 responses 3% (1%) Decreased
- 33 responses 34% (24%) Stayed the same
- 3 responses Not sure
- 15 responses Not applicable



Question 5. Did your internal ERM staff increase in 2011?

86 responses

- 43 responses 50% (50%/39%) Yes
- 43 responses 50% (50%/61%) No
- 11 responses Not sure
- 18 responses Not applicable



Question 6. Do you anticipate a change in the level of ERM-focused activities for your organization or clients in 2012 relative to 2011?

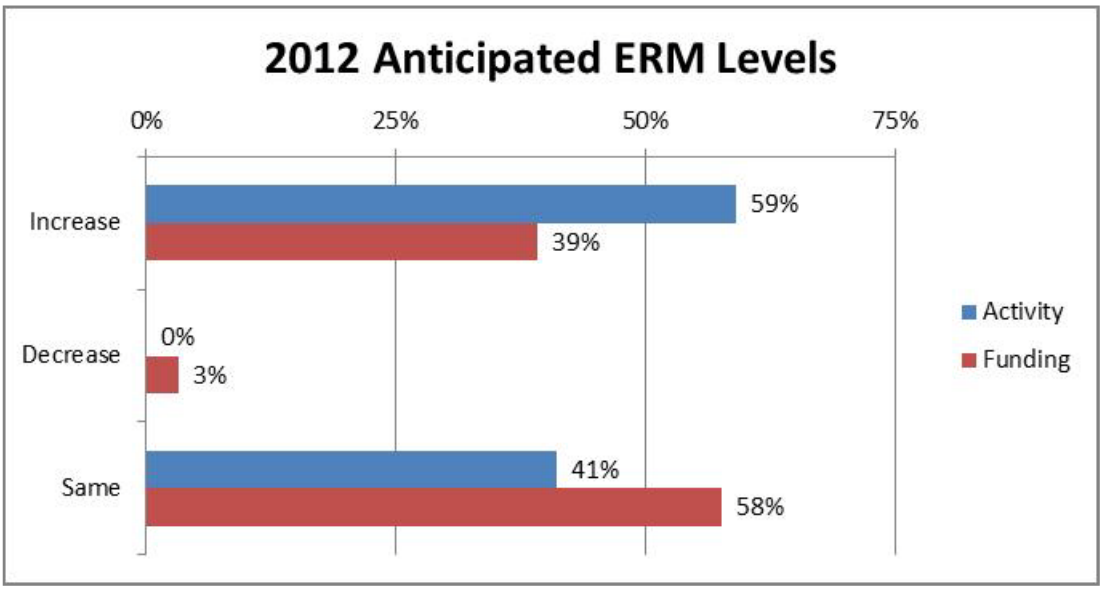
100 responses

- 59 responses 59% (64%) Increase
- 0 responses 0% (1%) Decrease
- 41 responses 41% (28%) Stay the same
- 5 responses Not sure
- 10 responses Not applicable

Question 7. Do you anticipate a change in the level of funding dedicated to ERM-focused activities for your organization or clients in 2011 relative to 2010?

92 responses

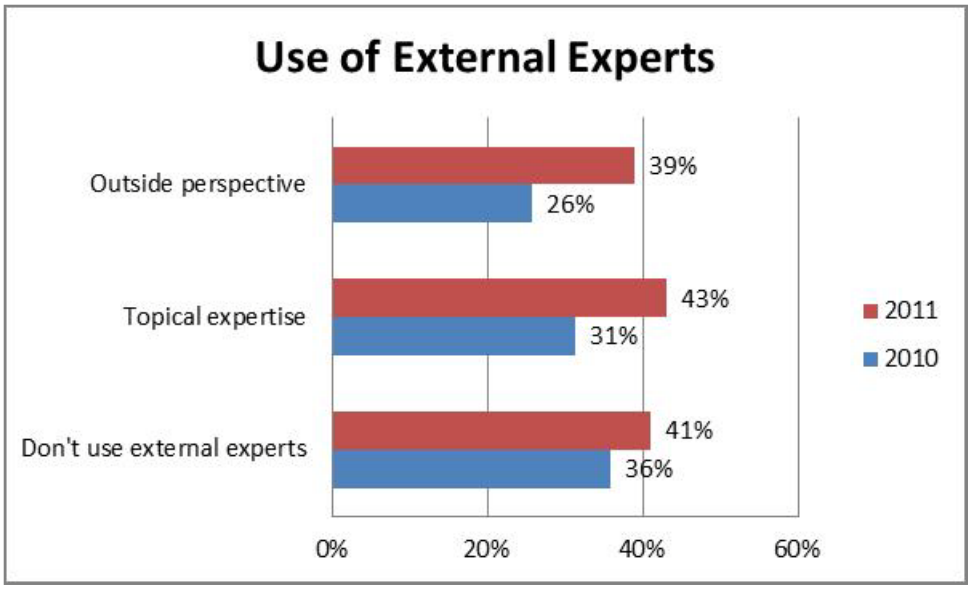
- 36 responses 39% (47%) Increase
- 3 responses 3% (4%) Decrease
- 53 responses 58% (49%) Stay the same
- 12 responses Not sure
- 10 responses Not applicable



Question 8. Why do you use external experts for ERM? (please select all that apply)

103 responses from 88 surveys (1.2 average)

- 42 responses 41% (36%) Don't use external experts
- 44 responses 43% (31%) Topical expertise
- 40 responses 39% (26%) Outside perspective
- 8 responses 8% (8%) Other
    - Peer review
    - Limited specific use
    - Model building
    - Increase credibility of ERM works
    - New compliance demands
    - NA
    - To establish a formalized ERM process
    - Not applicable
- Comments
    - Don't use any
    - Isolated use



Section 6: Demographics

If you are retired, respond based on your most recent career path.

Question 1: Have you completed this survey in the past?

96 responses

- 37 responses 39% Yes
- 59 responses 61% No
- 18 responses Not sure

Question 2: Do you have an actuarial credential?

114 responses

- 109 responses 96% Yes
- 5 responses 4% No

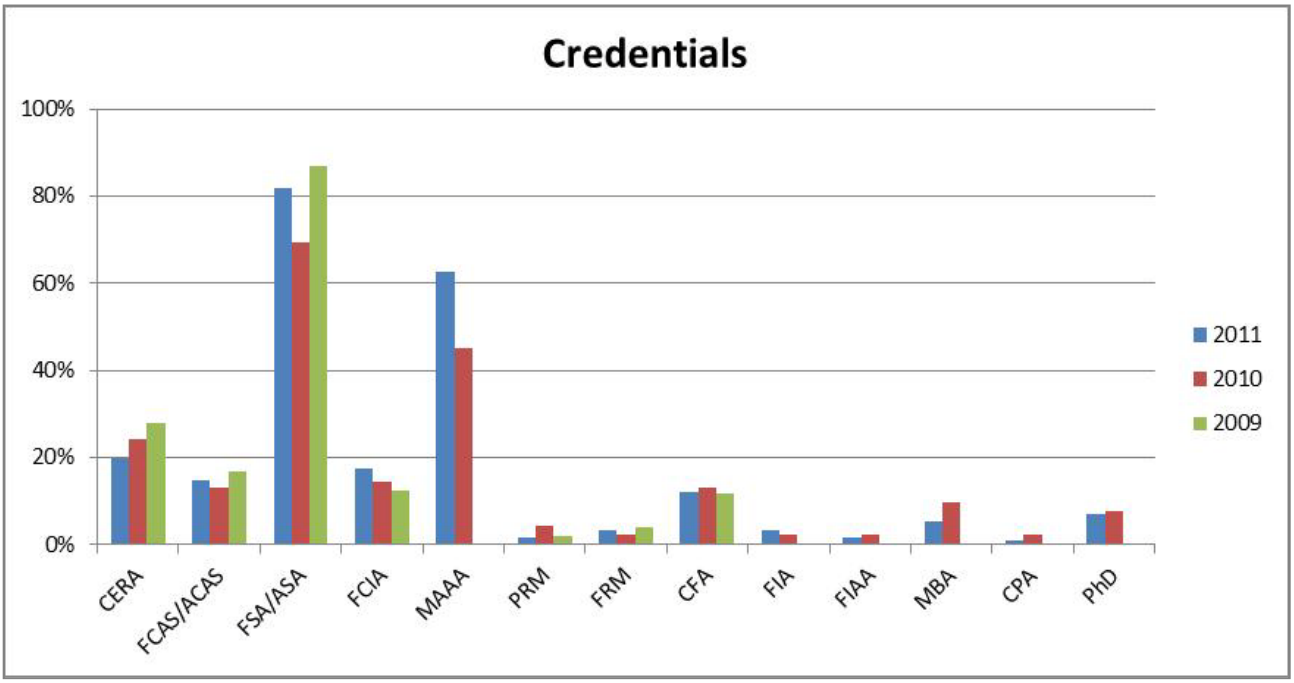
Question 3: What credentials do you currently hold? (please select all that apply)

288 responses from 115 surveys (2.5 average)

Percentages are based on 115 surveys.

- 23 responses 20% (24%/28%/27% in previous surveys) CERA
- 94 responses 82% (69%/87%) FSA/ASA
- 17 responses 15% (13%/17%) FCAS/ACAS
- 20 responses 17% (14%/13%) FCIA
- 72 responses 63% (45%) MAAA
- 2 responses 2% (4%/2%) PRM
- 4 responses 3% (2%/4%) FRM
- 14 responses 12% (13%/12%) CFA

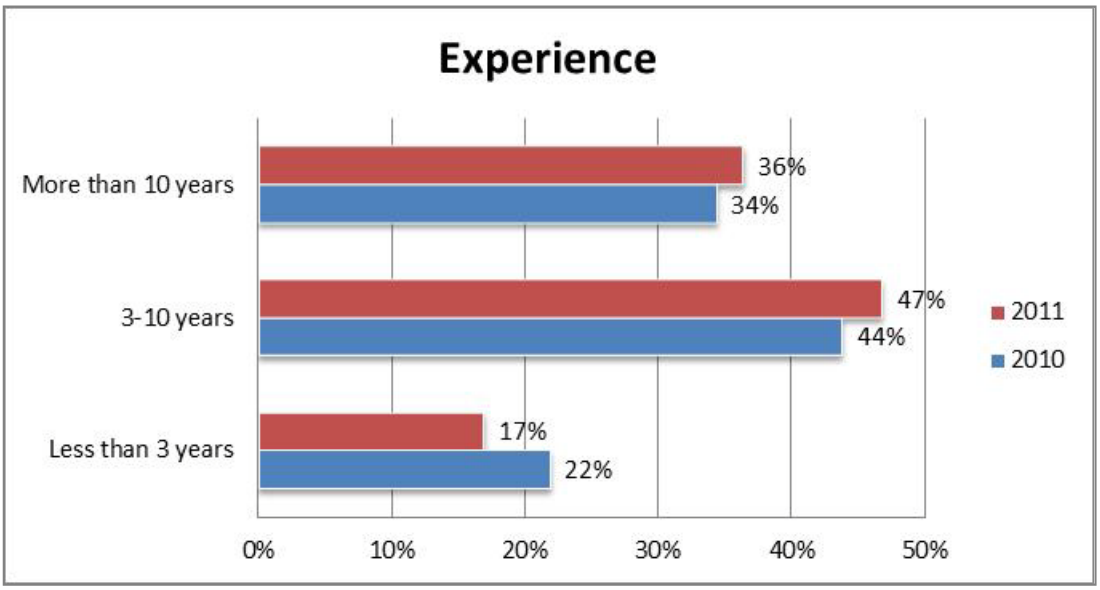
- 4 responses 3% (2%) FIA
- 2 responses 2% (2%) FIAA
- 6 responses 5% (10%) MBA
- 1 response 1% (2%) CPA
- 8 responses 7% (8%) PhD
- 7 responses 6% (5%) Other actuarial credential (please specify)
    - 1 FIA (France)
    - 1 FCA
    - 1 FHAS
    - 1 FASSA
    - 1 CONAC Mexico
    - 1 CQF
    - 1 BSc
- 13 responses 11% (12%) Other non-actuarial credential (please specify)
    - BA
    - FLMI (5)
    - LLB
    - MA
    - CPCU (2)
    - ARM
    - JD (2)
    - CLU
    - ChFC
    - Bachelors in Business Administration
    - RHU



Question 4: How long have you been a risk manager?

114 responses

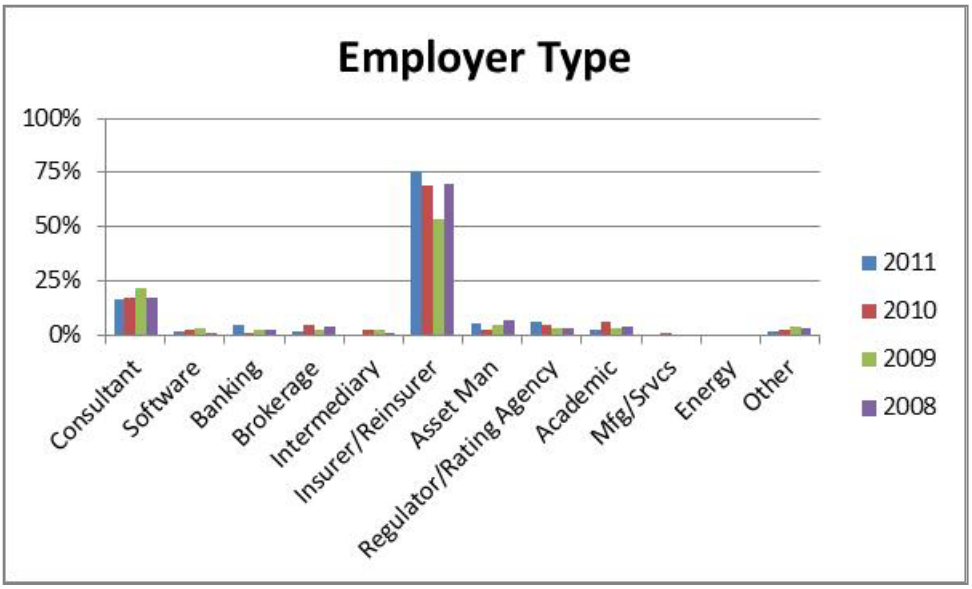
- 37 responses Not applicable
- 13 responses 17% (22%) Less than 3 years
- 36 responses 47% (44%) 3-10 years
- 28 responses 36% (34%) More than 10 years



Question 5. Employer type (please select all that apply)

132 responses with 114 unique (1.1 average)

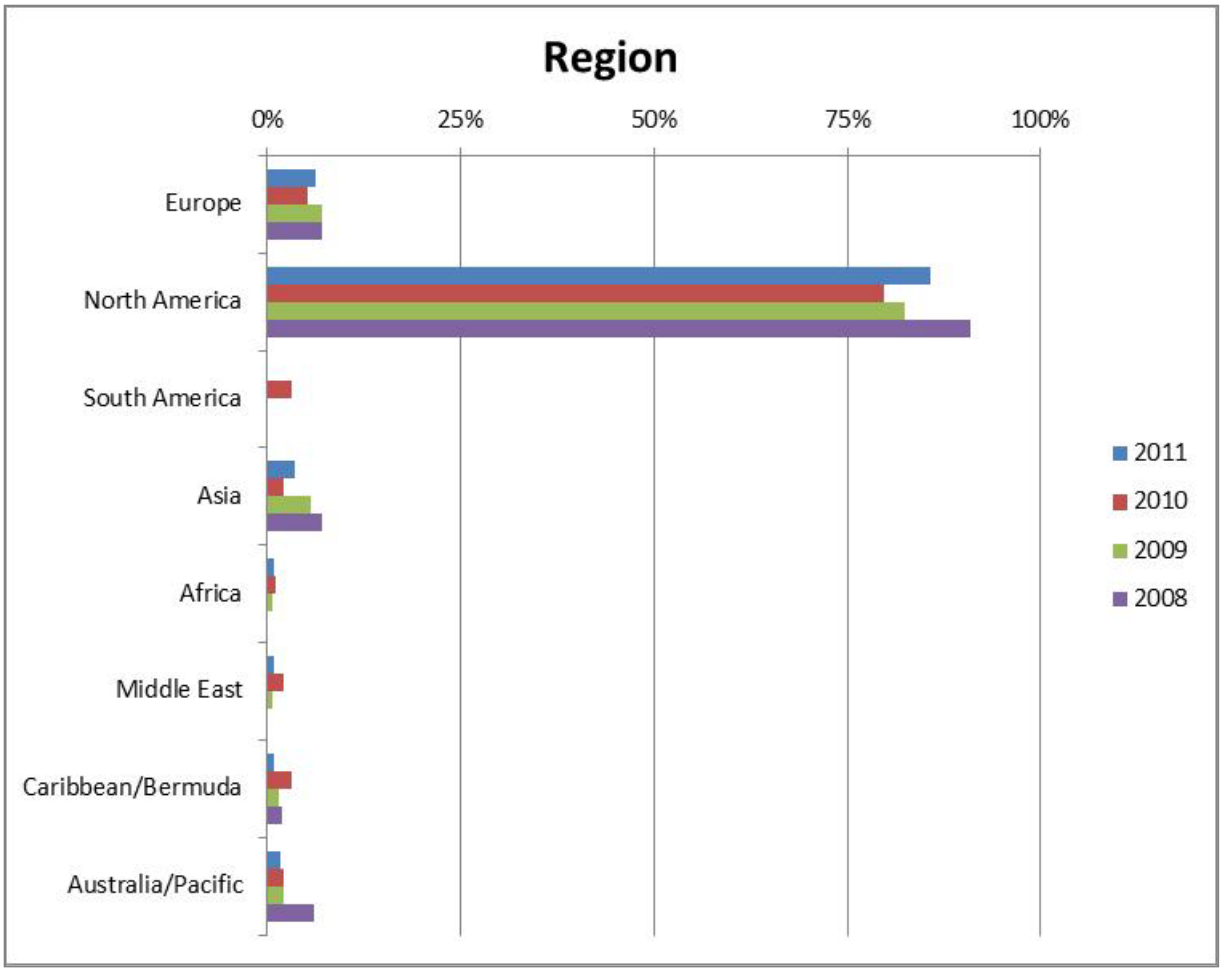
- 19 responses 17% (17%/21%/17%) Consultant
- 2 responses 2% (2%/3%/1%) Software
- 5 responses 4% (1%/3%/2%) Banking
- 2 responses 2% (4%/3%/4%) Brokerage
- 0 responses 0% (2%/3%/1%) Intermediary
- 86 responses 75% (69%/54%/70%) Insurance/Reinsurance Company
- 6 responses 5% (2%/4%/7%) Asset Management
- 7 responses 6% (4%/3%/3%) Regulator/Rating Agency
- 3 responses 3% (6%/3%/4%) Academic
- 0 responses 0% (1%/0%/0%) Manufacturing/Services
- 0 responses 0% Energy
- 2 responses 2% (2%/4%/3%) Other
    - Government
    - Insurance operations within banking enterprise



Question 6: Primary Region (please select one)

112 responses

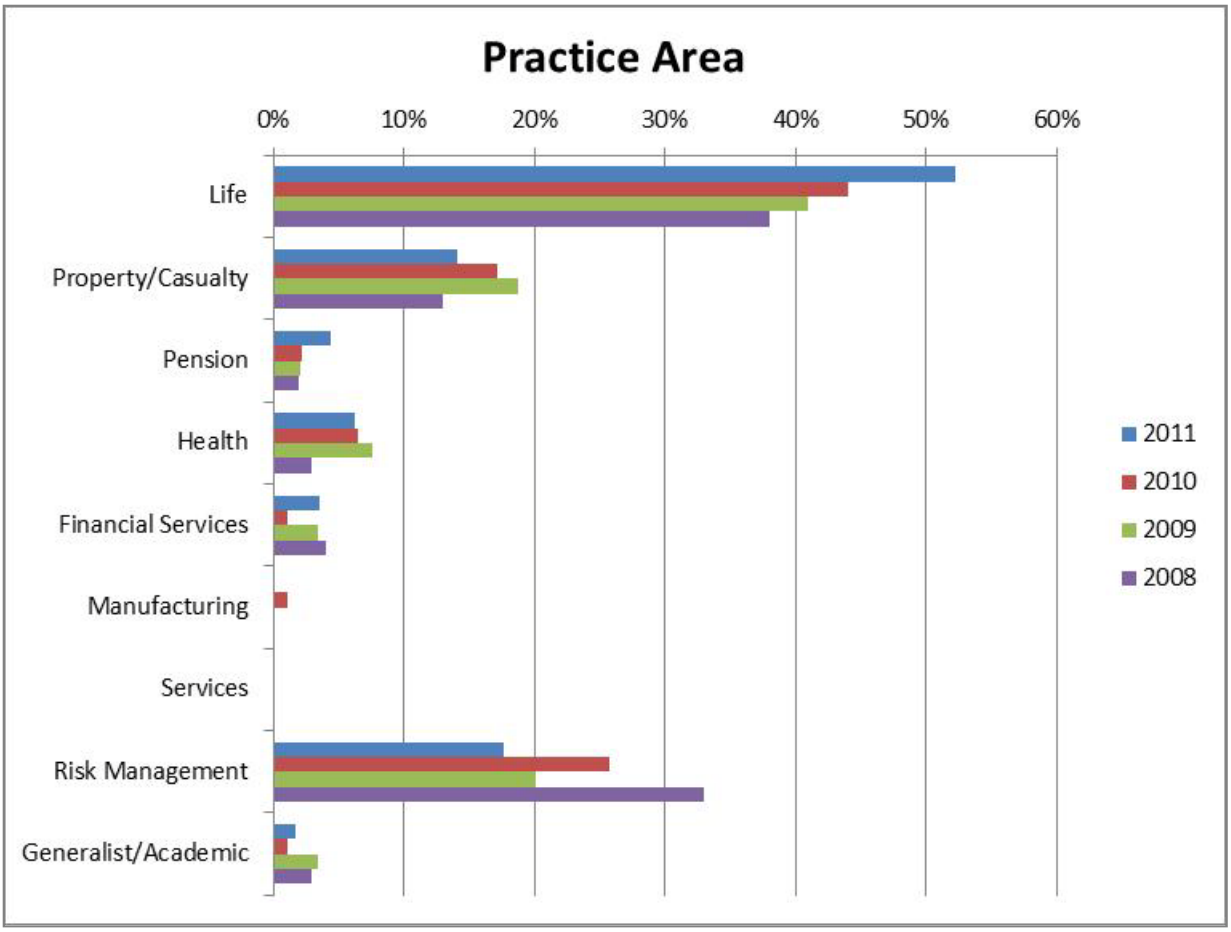
- 7 responses 6% (5%/7%/7%) Europe
- 96 responses 86% (80%/82%/91%) North America
- 0 responses 0% (3%/0%0%) South America
- 4 responses 4% (2%/6%/7%) Asia
- 1 response 1% (1%/1%/0%) Africa
- 1 response 1% (2%/1%/0%) Middle East
- 1 response 1% (3%/1%/2%) Caribbean/Bermuda
- 2 responses 2% (2%/2%/6%) Australia/Pacific
- 2 responses Other
    - Global focus
    - United States



Question 7: Primary area of practice (please select one)

113 responses

- 59 responses 52% (44%/41%/38%) Life
- 16 responses 14% (17%/19%/13%) Prop/Cas (Gen'l Insurance, Non-Life)
- 5 responses 4% (2%/2%/2%) Pension
- 7 responses 6% (6%/8%/3%) Health
- 4 response 4% (1%) Financial Services (non Insurance)
- 0 response 0% (1%) Manufacturing
- 0 responses 0% (0%) Services
- 20 responses 18% (26%/20%/33%) Risk Management
- 2 responses 2% (1%/3%/3%) Generalist/Academic
- 4 response Other
    - Responsibility crosses many of these areas
    - Education
    - Mortgage guaranty
    - Regulator



Question 8. Do you belong to the Joint Risk Management Section, sponsored by the Casualty Actuarial Society, Canadian Institute of Actuaries, and the Society of Actuaries?

114 responses

- 92 responses 81% (75%/85%/85%) Yes
- 22 responses 19% (25%/15%/15%) No

Question 7. Do you have any comments or suggestions for future iterations of this survey?

- None
- No
- No
- Keep them quick to complete
- Allow more than one "other" in the list of 23 risks. Also, allow "other" risks identified to carry forward automatically to future questions involving the list of 23.
- It was VERY misleading to suggest the survey could be answered in 10 minutes.
- No

- I have tried to answer questions because I was asked to – but many questions seem out of context and I answered them as a business owner rather than a pension actuary – more clarity at the outset would help frame the questions
- Clarify whether respondents have an official RM role within their firms, or are loosely affiliated with it.
- NO
- ERM seems to be focusing more and more on the quantitative side with focus on operational/business risk causing very polarized views on their applicability to ERM. I am on the side of keenly understanding operational/business risk on a granular leading to aggregate level informed by capital modeling and quant considerations: What do others think is the right balance and why?
- None
- No
- The survey should be based on the respondents "Employer Type". Many of the questions are not to the point if the respondent is a regulator rather than the industry practitioner.

Thanks for your participation!

[Researcher's notes for future questions]

Add questions probing

- Does an emerging risk leading indicator ever get dropped? Why?
- What blogs and other sources do you follow?
- What actions have been taken because of work done on emerging risks?
- Time horizon
- Low probability crisis you worry about
- What actions do you take between crises to remain influential
- How prepared is your firm for a major risk event that has never happened before?
- How prepared is your firm for a major risk event of a type that has not happened for more than 10 years?

Appendix III - Survey Results 2010

The following includes both the survey as well as the responses. There were 141 respondents to the survey. Not all respondents answered every question. The percentages below reflect the number of responses received divided by the number who answered the specific question. Some totals may not add to 100% due to rounding.

Emerging risks have either not previously occurred or have not occurred for so long that they are not considered possible. The lack of credible historical data creates a formidable challenge for risk managers. These risks often seem obvious after they occur but are not considered in advance. Many risk managers are trying to be better prepared by identifying potential emerging risks and prioritizing those that might have the greatest potential impact on society. While completing the survey please consider a time horizon that extends beyond a business plan time frame (often 3-5 years). This survey is sponsored by the Joint Risk Management Section (Canadian Institute of Actuaries, Casualty Actuarial Society and Society of Actuaries). The complete results will be available on the Section webpage at www.soa.org. A summary article is also expected to be published in an upcoming JRMS newsletter.

Default Question Block

Previous surveys have found that respondents tend to be anchored in the present with their responses. It is thought that knowledge of that tendency will help you understand and compensate for it, so we will start by asking you about today's risks. The following questions will ask you to identify emerging risks that you expect to have the greatest impact over the next few years.

Greatest impact can have various meanings. How do you define it?

- 49 responses 35% Financial impact on the world economy
- 62 responses 44% Disruption to the world economy
- 8 responses 6% Financial impact on me personally
- 21 responses 15% Other
    - Quality of life on this planet
    - Financial impact on my company
    - Pandemic, nuclear, catastrophe, etc.
    - Greatest impact on large insurers' financial condition
    - Impact is defined relative to economic profits and/or capital
    - Financial impact to firm
    - Financial impact on my employer
    - Disruption to insurance company operation
    - Impact on viability of life insurance industry
    - Financial impact on a specific industry – in this case insurance
    - Greatest impact on my company
    - To my clients' companies
    - Societal and economic disruption

- Financial impact on company I work for
- A disruption to finances, economy, services, etc.
- Impact on my company
- Impacting US business environment
- The ones affecting wider areas for longer duration
- Financial impact on US economy
- Current and future activities of company and industry

What is the risk that currently has the greatest impact?
The 23 risks shown were developed by the World Economic Forum in 2007. More detailed definitions of these risks can be found at the World Economic Forum website (also summarized in Appendix I).

174 total responses

Economic – 64 responses (46%)

• 7 responses	5%		Oil price shock
• 16 responses	11%	2	Fall in value of US $
• 11 responses	8%	T3	Chinese economic hard landing
• 10 responses	7%	5	Fiscal crises caused by demographic shift
• 20 responses	14%	1	Blow up in asset prices

Environmental – 17 responses (10%)

• 8 responses	6%	Climate change
• 4 responses	3%	Loss of freshwater services
• 1 responses	1%	Natural catastrophe: Tropical storms
• 0 responses	0%	Natural catastrophe: Earthquakes
• 1 response	1%	Natural catastrophe: Inland flooding

Geopolitical – 28 responses (16%)

• 6 responses	4%	International terrorism
• 6 responses	4%	Proliferation of weapons of mass destruction (WMD)
• 7 responses	5%	Interstate and civil wars
• 6 responses	4%	Failed and failing states
• 1 responses	1%	Transnational crime and corruption
• 5 responses	4%	Retrenchment from globalization
• 2 responses	1%	Regional instability

Societal – 5 responses (3%)

• 5 responses	4%	Pandemics
• 0 responses	0%	Infectious diseases
• 2 responses	1%	Chronic diseases
• 0 responses	0%	Liability regimes

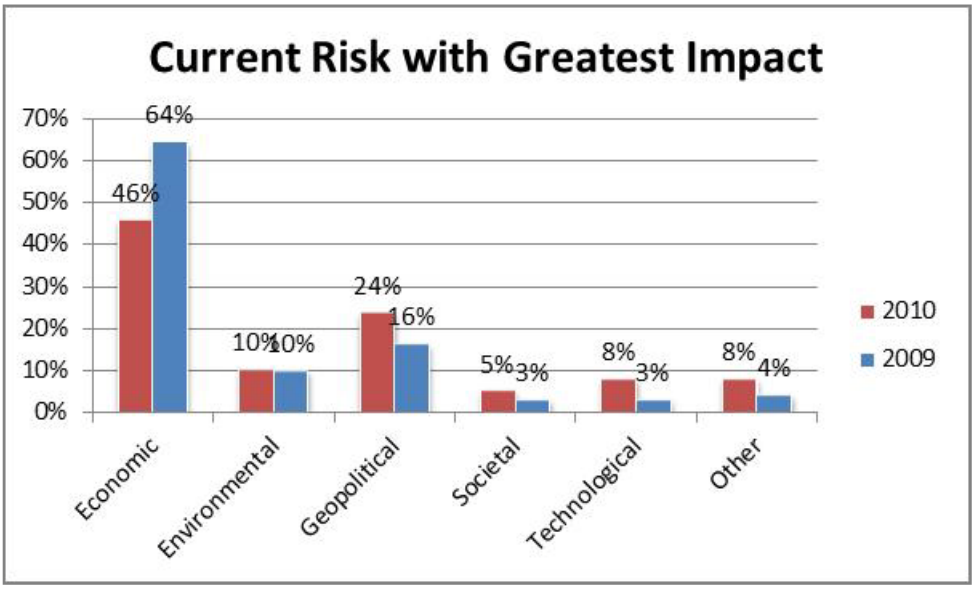
Technological – 5 responses (3%)

• 11 responses	8%	T3	Breakdown of critical information infrastructure (CII)
• 0 responses	0%		Nanotechnology

Other – 11 responses (8%)

- Social instability due to unemployment
- Continued growth of and dependence on government
- Failing US economy, particularly its impact on the commercial mortgage sector

- Decline in general interest rates
- Low interest rate environment
- Off balance sheet liabilities of governments in the developed world
- Fiat currencies
- Indebtedness
- Environmental damage
- Extended political, fiscal, policy &/or regulatory uncertainty



Section 1: Emerging Risks

Question 1. Please choose up to five (5) emerging risks that you feel will have the greatest impact over the next few years.

631 total responses from 134 surveys
Divisor in percentages for major categories is 631 – for individual categories it is 134.

- 0 7surveys
- 1 1 survey (1%)
- 2 1 survey (1%)
- 3 9 surveys (7%)
- 4 14 surveys (10%)
- 5 109 surveys (81%)

Economic – 251 responses 40% (previous surveys F2009/F2008/S2008 47%/44%/44%)

• 54 responses 40% (45%) 4 Oil price shock
• 66 responses 49% (66%) 1 Fall in value of US $
• 55 responses 41% (33%) 3 Chinese economic hard landing

• 35 responses 26% (27%) Fiscal crises caused by demographic shift
• 41 responses 31% (49%) Blow up in asset prices

Environmental – 62 responses 10% (12%/10%/18%)

• 34 responses 25% (27%) Climate change
• 12 responses 9% (10%) Loss of freshwater services
• 6 responses 4% (8%) Natural catastrophe: Tropical storms
• 7 responses 5% (7%) Natural catastrophe: Earthquakes
• 3 responses 2% (5%) Natural catastrophe: Inland flooding

Geopolitical – 228 responses 36% (26%/32%/18%)

• 57 responses 43% (30%) 2 International terrorism
• 24 responses 18% (14%) Proliferation of weapons of mass destruction (WMD)
• 13 responses 10% (9%) Interstate and civil wars
• 51 responses 38% (18%) 5 Failed and failing states
• 16 responses 12% (7%) Transnational crime and corruption
• 33 responses 25% (18 %) Retrenchment from globalization
• 34 responses 25% (28%) Regional instability

Societal – 43 responses 7% (8%/9%/13%)

• 23 responses 17% (25%) Pandemics
• 7 responses 5% (5%) Infectious diseases
• 5 responses 4% (4%) Chronic diseases
• 8 responses 6% (6%) Liability regimes

Technological – 36 responses 6% (6%/5%/7%)

• 31 responses 23% (21%) Breakdown of critical information infrastructure (CII)
• 5 responses 4% (7%) Nanotechnology

Other – 11 responses (2%)

- Solar storms
- Pollution
- Failure of European Fiscal Union
- Decline in general interest rates
- Off balance sheet liabilities of governments in developed markets
- Fiat currencies
- Indebtedness
- Cyber crime
- Political, policy, fiscal or regulatory uncertainty
- Peak oil
- Eurozone break up

Another way to review this data is as a percent of the total responses. For example, Climate change had 34 responses in this survey. In the previous analysis just shared, 34/134 = 25%. In this next section we will look at 34/631 = 5% and compare the results from all 4 surveys. **Bold** signifies higher than the average in the current survey and *Italics* signifies lower than the average.

Economic (43% average – 40%/47%/43%/42% November 2010, December 2009, November 2008, April 2008)

- 10% - 9%/10%/8%/13% *Oil price shock*
- 11% - 10%/14%/10%/9% *Fall in value of US $*
- 8% - 9%/7%/6%/9% **Chinese economic hard landing**
- 6% - 6%/6%/5%/6% Fiscal crises caused by demographic shift
- 9% - 6%/10%/14%/5% *Blow up in asset prices*

Environmental (12% - 10%/12%/9%/17%)

- 6% - 5%/6%/5%/9% *Climate change*
- 2% - 2%/2%/2%/3% Loss of freshwater services
- 2% - 1%/2%/1%/2% *Natural catastrophe: Tropical storms*
- 1% - 1%/1%/1%/2% Natural catastrophe: Earthquakes
- 1% - 0%/1%/0%/1% *Natural catastrophe: Inland flooding*

Geopolitical (28% - 36%/26%/31%/18%)

- 6% - 9%/6%/6%/4% **International terrorism**
- 4% - 4%/3%/3%/4% Proliferation of weapons of mass destruction (WMD)
- 2% - 2%/2%/2%/3% Interstate and civil wars
- 5% - 8%/4%/6%/2% **Failed and failing states**
- 2% - 3%/2%/2%/2% **Transnational crime and corruption**
- 4% - 5%/4%/5%/2% **Retrenchment from globalization**
- 5% - 5%/6%/7%/1% Regional instability

Societal (9% - 7%/8%/9%/12%)

- 5% - 4%/5%/5%/6% *Pandemics*
- 2% - 1%/1%/2%/2% *Infectious diseases*
- 1% - 1%/1%/1%/2% Chronic diseases
- 1% - 1%/1%/1%/2% Liability regimes

Technological (6% - 6%/5%/4%/7%)

- 4% - 5%/4%/3%/5% **Breakdown of critical information infrastructure (CII)**
- 1% - 1%/1%/1%/2% Nanotechnology

Question 2. Out of these five, what one emerging risk would you rank number one as having the greatest impact?
116 total responses

Economic – 56 responses		**48%**	**(63%/65% Fall 2009/Fall 2008)**
• 11 responses	9% (6%/12%)	T4	Oil price shock
• 13 responses	11% (26%/18%)	2	Fall in value of US $
• 16 responses	14% (4%/3%)	1	Chinese economic hard landing
• 4 responses	3% (5%/7%)		Fiscal crises caused by demographic shift
• 12 responses	10% (22%/25%)	3	Blow up in asset prices
Environmental – 8 responses		**7%**	**(12%/4%)**
• 5 responses	4% (6%/3%)		Climate change
• 2 response	2% (3%/1%)		Loss of freshwater services
• 1 responses	1% (2%/0%)		Natural catastrophe: Tropical storms
• 0 responses	0% (1%/0%)		Natural catastrophe: Earthquakes

• 0 responses 0% (0%/0%) Natural catastrophe: Inland flooding

Geopolitical – 32 responses 28% (14%/18%)

• 5 responses 4% (2%/3%) International terrorism

• 8 responses 7% (4%/3%) Proliferation of weapons of mass destruction (WMD)

• 6 responses 5% (1%/1%) Interstate and civil wars

• 9 responses 8% (2%/2%) Failed and failing states

• 0 responses 0% (1%/1%) Transnational crime and corruption

• 3 responses 3% (1%/2%) Retrenchment from globalization

• 1 responses 1% (3%/4%) Regional instability

Societal – 5 responses 4% (2%/2%)

• 4 responses 3% (2%/2%) Pandemics

• 0 responses 0% (0%/0%) Infectious diseases

• 1 responses 1% (0%/0%) Chronic diseases

• 0 responses 0% (0%/0%) Liability regimes

Technological – 11 responses 9% (6%/6%)

• 11 responses 9% (4%/6%) T4 Breakdown of critical information infrastructure (CII)

• 0 response 0% (1%/0%) Nanotechnology

Other – 4 responses 3% (3%/3%)

- Off balance sheet liabilities of governments in developed markets
- Fiat currencies
- Political, policy, fiscal or regulatory uncertainty
- Peak oil

Question 3. Of the 23 emerging risks, are there combinations that you believe will have a large impact over the next few years? These could occur at the same time (concurrent) or follow each other (sequential). Select up to three combinations of two risks each.

Total mentions (risks are numbered)

Economic – 45% (53%/49% in previous surveys)

• 10% (13%/12%)	1	T2	Oil price shock
• 13% (18%/12%)	2	1	Fall in value of US $
• 10% (8%/6%)	3	T2	Chinese economic hard landing
• 5% (4%/6%)	4		Fiscal crises caused by demographic shift
• 7% (11%/14%)	5	6	Blow up in asset prices

Environmental – 11% (13%/9%)

• 5% (6%/4%)	6	Climate change
• 3% (2%/2%)	7	Loss of freshwater services
• 2% (2%/2%)	8	Natural catastrophe: Tropical storms
• 1% (1%/0%)	9	Natural catastrophe: Earthquakes
• 1% (2%/1%)	10	Natural catastrophe: Inland flooding

Geopolitical – 35% (25%/32%)

• 9% (6%/8%)	11	4	International terrorism
• 4% (4%/3%)	12		Proliferation of weapons of mass destruction (WMD)
• 4% (1%/3%)	13		Interstate and civil wars
• 8% (3%/5%)	14	5	Failed and failing states
• 2% (1%/1%)	15		Transnational crime and corruption
• 4% (3%/4%)	16		Retrenchment from globalization
• 5% (6%/8%)	17		Regional instability

Societal – 5% (5%/8%)

• 2% (3%/5%)	18	Pandemics
• 2% (1%/2%)	19	Infectious diseases
• 0% (1%/1%)	20	Chronic disease
• 0% (1%/0%)	21	Liability regimes

Technological – 4% (3%/2%)

• 3% (2%/1%)	22	Breakdown of critical information infrastructure (CII)
• 0% (1%/0%)	23	Nanotechnology

Two risk combinations – 315 total responses

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		**15**	**11**	2	6	4	4	1	0	0	**8**	0	1	1	1	1	2	0	0	0	0	3	0
2			**24**	**7**	**10**	2	0	0	0	0	3	0	0	**7**	1	**7**	1	1	0	0	0	3	0
3				1	**10**	0	0	0	0	0	1	0	0	2	1	**7**	3	0	0	0	0	0	0
4					5	2	0	1	0	0	0	0	1	6	0	1	2	2	0	0	0	1	1
5						2	0	0	0	0	0	0	0	6	0	2	1	1	0	1	1	1	0
6							**7**	6	1	4	1	1	1	1	0	0	1	0	0	0	0	0	0
7								0	1	0	1	0	1	1	0	0	1	1	1	0	0	0	0
8									0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
9										1	1	0	0	0	0	0	0	1	1	0	0	0	0
10											0	0	0	0	0	0	0	0	1	0	0	0	0
11												**13**	**7**	**8**	3	0	3	0	1	0	0	4	0
12													5	2	1	1	2	0	1	0	0	0	0
13														4	1	0	3	0	0	0	0	0	0
14															0	3	3	1	2	0	0	1	0
15																0	1	0	0	0	0	4	0
16																	3	0	0	0	0	0	0
17																		2	0	0	0	1	0
18																			5	0	0	0	0
19																				1	0	0	0
20																					0	0	1
21																						2	0
22																							1
23																							

Leading combinations were

10. 24 responses
    - Fall in value of US $
    - Chinese economic hard landing
11. 15 responses
    - Oil price shock
    - Fall in value of US $
12. 13 responses (not in top 5 in 2009)
    a. International terrorism
    b. Proliferation of weapons of mass destruction (WMD)
13. 10 responses (leading response in 2009)
    - Fall in value of US $
    - Blow up in asset prices
14. 10 responses (not in top 5 in 2009)
    - Chinese economic hard landing
    - Blow up in asset prices
15. 8 responses
    a. Oil price shock
    - International terrorism
16. 8 responses
    - International terrorism
    - Failed and failing states
17. 7 responses
    - Fall in value of US $
    - Fiscal crises caused by demographic shift
18. 7 responses
    - Climate change
    - Loss of freshwater services
19. 7 responses
    - International terrorism
    - Failed and failing states
20. 7 responses
    - Fall in value of US $
    - Failed and failing states
21. 7 responses
    - Fall in value of US $
    - Retrenchment from globalization
22. 7 responses
    - Chinese economic hard landing
    - Retrenchment from globalization

Combinations by category

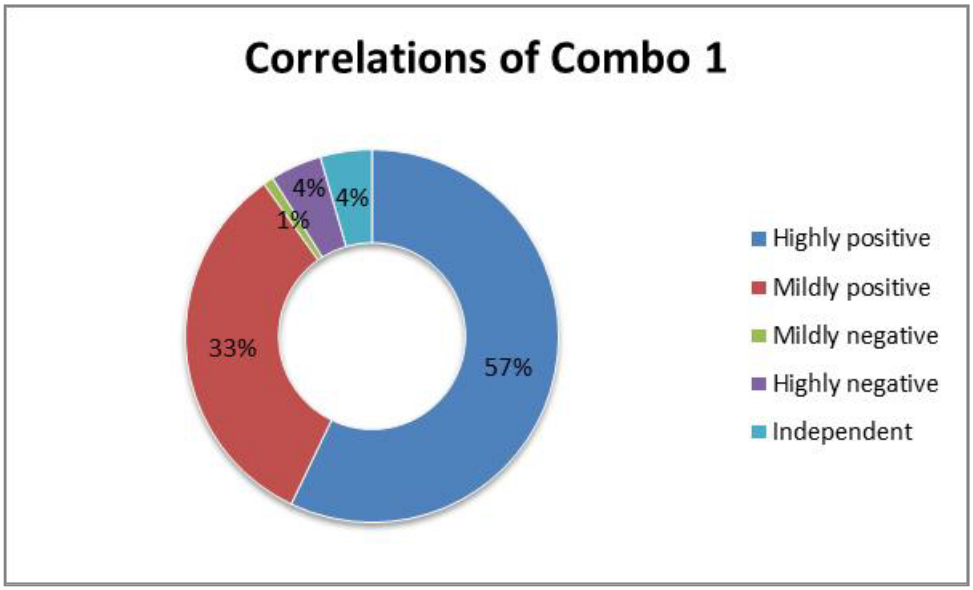
		2010	2010%	2009%	2008%
Economic	Economic	91	29%	42%	34%
Economic	Environmental	16	5%	3%	2%
Economic	Geopolitical	66	21%	16%	22%
Economic	Societal	6	2%	3%	2%
Economic	Technological	9	3%	1%	1%
Environmental	Environmental	21	7%	9%	7%
Environmental	Geopolitical	11	3%	2%	2%
Environmental	Societal	5	2%	3%	5%
Environmental	Technological	0	0%	0%	0%
Geopolitical	Geopolitical	63	20%	14%	16%
Geopolitical	Societal	7	2%	2%	4%
Geopolitical	Technological	10	3%	2%	1%
Societal	Societal	6	2%	1%	2%
Societal	Technological	3	1%	0%	1%
Technological	Technological	1	0%	1%	0%
		315	100%	99%	99%

Combinations by choice 1, 2, 3

		Combo 1	Combo 2	Combo 3	Total	Combo 1	Combo 2/3
Economics	Economics	46	25	20	91	41%	29%
Economics	Environmental	5	6	5	16	4%	5%
Economics	Geopolitical	23	28	15	66	20%	21%
Economics	Societal	2	2	2	6	2%	2%
Economics	Technological	3	3	3	9	3%	3%
Environmental	Environmental	9	7	5	21	8%	7%
Environmental	Geopolitical	3	3	5	11	3%	3%
Environmental	Societal	0	1	4	5	0%	2%
Environmental	Technological	0	0	0	0	0%	0%
Geopolitical	Geopolitical	17	24	22	63	15%	20%
Geopolitical	Societal	0	1	6	7	0%	2%
Geopolitical	Technological	3	5	2	10	3%	3%
Societal	Societal	2	2	2	6	2%	2%
Societal	Technological	0	2	1	3	0%	1%
Technological	Technological	0	0	1	1	0%	0%
		113	109	93	315	100%	100%

Question 4. For the first combination listed in Question 3, do you feel that the risks chosen will operate independently or be correlated?

- 64 responses 57% Highly positively correlated
- 37 responses 33% Mildly positively correlated
- 1 response 1% Mildly negatively correlated
- 5 responses 4% Highly negatively correlated
- 5 responses 4% Independent
- 0 responses 0% Not applicable



Question 5. Many of the emerging risks could lead to major changes in China's financial relationship with the rest of the world. For this question, consider primarily changes in currency, commercial and investment relationships. Which risks, in your opinion, would be most likely to lead to this potential event? (please select no more than three)

113 respondents chose at least one for a total of 308 responses (2.7 average)

Economic – 224 responses (73%)
• 49 responses 16% 3 Oil price shock
• 74 responses 24% 1 Fall in value of US $
• 70 responses 23% 2 Chinese economic hard landing
• 14 responses Fiscal crises caused by demographic shift
• 17 responses 6% 5 Blow up in asset prices
Environmental – 13 responses (4%)
• 4 responses Climate change
• 8 responses Loss of freshwater services
• 0 responses Natural catastrophe: Tropical storms
• 0 responses Natural catastrophe: Earthquakes
• 1 response Natural catastrophe: Inland flooding

Geopolitical – 58 responses (19%)

• 2 response	International terrorism
• 1 response	Proliferation of weapons of mass destruction (WMD)
• 5 responses	Interstate and civil wars
• 8 responses	Failed and failing states
• 3 responses	Transnational crime and corruption
• 29 responses 9%	4 Retrenchment from globalization
• 10 responses	Regional instability

Societal – 4 responses (1%)

• 2 responses	Pandemics
• 2 responses	Infectious diseases
• 0 responses	Chronic diseases
• 0 responses	Liability regimes

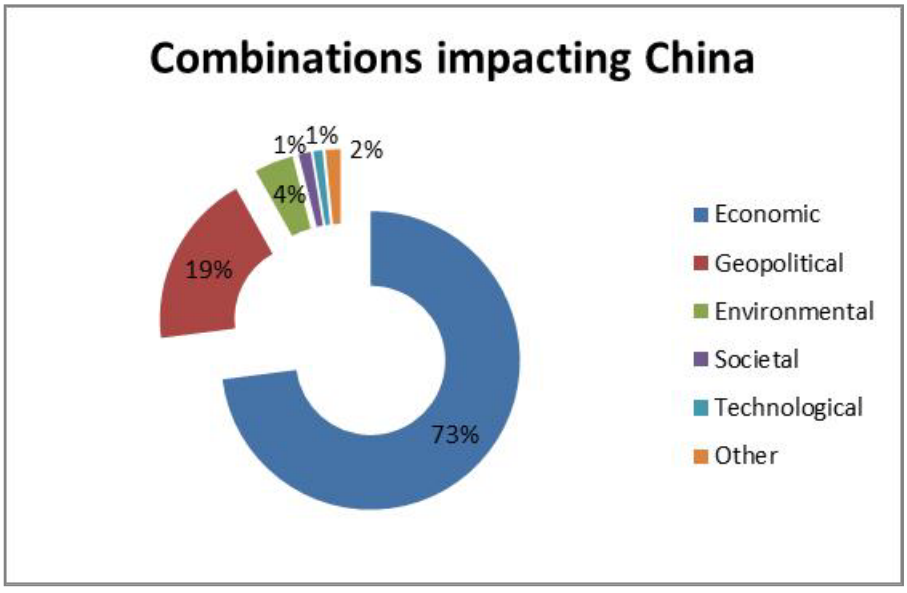
Technological – 3 responses (1%)

• 3 responses	Breakdown of critical information infrastructure (CII)
• 0 responses	Nanotechnology

Not Sure – 1 response (0%)

Other – 5 responses (1%)

- Falling interest rates
- Pollution (China)
- Government deficits
- Population vs. food pressures
- Eurozone break-up



Question 6. Some risk managers seek ways to exploit risk by finding opportunities to add those that are mispriced or provide diversification. Which, if any, emerging "opportunities" do you monitor?

- Acquisition, climate change/sustainability, demographic shift

- $US
- Exchange rate opportunities
- Precious metals
- Federal Reserve activity will likely drive down US dollar, leading to increase in the quoted price of oil
- Exploit risk by finding opportunities to add those that are mispriced
- None
- None
- All
- Asset price dislocations
- Underpriced assets
- Hedging opportunities
- Generally scanning for opportunities when asset prices decline to unreasonable levels
- Potential regulatory changes affecting product design
- None
- Electromagnetic pulse from geomagnetic storm (from the sun) or high altitude nuclear attack
- Convergence of social and private protection schemes (European point of view)
- US exchange rates
- None
- Regulatory risk
- None
- Correlation
- Price of gold and commodities
- None
- Prices to insure against terrorism, nat cats and pandemic
- Fall in value of US dollar
- N/A
- None
- Fear of asset prices dropping hard/oil
- None
- None
- Diversification
- Commodities
- The commodities markets – artificially underpriced at the moment – this is supported by governments (mainly US, China and EU) – they may no longer be able to afford to do so
- None
- I watch countries to see which ones are opening up their markets to trade vs. retrenching with tariffs and other constraints
- Commodity prices, US$, globalization/trade
- Climate change
- Market opportunities in the life insurance industry resulting from other companies becoming more capital-stressed, earnings-stressed, and growth-challenged in the

wake of poor variable annuity experience or other market melt-down balance sheet challenges

Section 2: Leading Indicators

Question 1. Once an emerging risk is identified, do you select leading indicators to measure changing likelihoods? (Example: In 2009, the threat of missiles fired by North Korea received much publicity. One company monitored investment flows to/from North or South Korea as an advance indication of this threat.)

107 responses (Fall 2009 for comparison) percentages back out those stating question is not applicable to them

- 3 responses 3% (5%) Yes for all
- 49 responses 49% (35%) Yes for some
- 13 responses 13% (19%) No
- 20 responses 20% (26%) We do not formally identify emerging risks
- 14 responses 14% (15%) Not sure
- 8 responses Not applicable

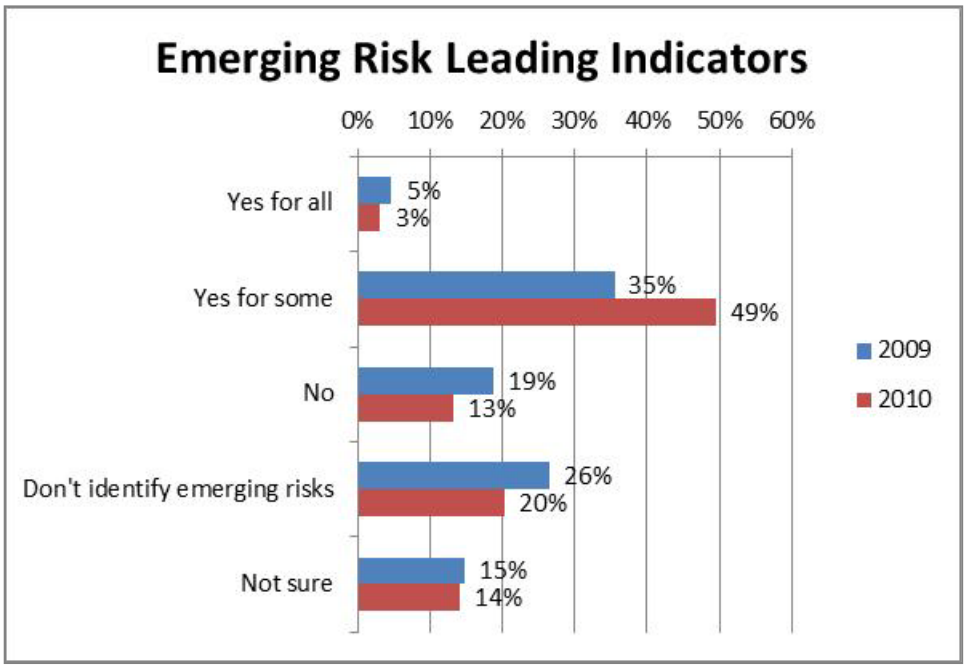
Question 2. If yes, please provide examples.

- ALM for markets/interest rates
- Analysis based upon the most comprehensive data available. Also, many "what if" scenarios considered.
- Water supplies, climate change
- Choose not to share.
- Example
- Early warning indicators (e.g., Pandemics – world wide monitoring of flu outbreaks and combinations), Exposure concentrations studies, Scenario analysis (e.g., impact of demographic shifts on insurance liability payments), market based pricing (e.g., market price of oil, currency, etc.)
- Probability of Broker Default – Watch the CDS price moves over time
- As they relate to the Employee (Group) Benefits market:/1. 2008 financial meltdown and subsequent economic downturn: ad hoc groups formed to monitor gov't spending proposals, interest rates and employment statistics./ 2. Healthcare reform: ad hoc groups formed to analyze the law and surrounding news & research to anticipate the impact on brokers, employers and the healthcare industry (both as a buyer and supplier).
- Unemployment is a leading indicator for home price appreciation (depreciation) and mortgage defaults.
- Unfortunately, there aren't a lot of good leading indicators. One has to get in the trenches and dig for information on a regular basis. I monitor hundreds of articles and newsletters on a daily basis concerning financial risks and international conflict. From my experience, to get serious about monitoring emerging risks

means that one must subscribe to a service such as that provided by Stratfor.Com. I run my own free service on emerging risks. Before the global financial crisis hit in 2008, there was a noticeable change in articles pointing out that disaster was coming. Not exactly a flood of articles, but enough to notice. The last straw for me was when the chief economist of Merrill Lynch produced a new report in December, 2007 indicating a 100% probability of recession in 2008. I have been noticing a similar trend in articles that point out something new is going on in the Middle East. War is coming, but it will be different this time. It will be unlike anything we've ever seen before. It is likely that this will be a huge shock. I am also picking up reports that indicate China will run into big trouble in the not too distant future. For example, just yesterday Chinese Communist elders called for free speech in China. Also the fact that China must maintain a growth rate of 8% or more in order to maintain social stability indicates that big problems are ahead. Another emerging risk that is almost impossible for people to take seriously is the possibility of nuclear war. Of course, the fact that people don't take it seriously is a warning sign. The key indicators are based on the 20th century historical signs of war. The key leading indicator is empires in decline – America. Another indicator is economic volatility, such as the volatility caused by the global economic crisis. The last indicator is ethnic conflict, such as conflict in the Middle East. When all three are present – like they are today – then the risk of a major war is very real. For example, war in the Middle East could act as a catalyst for a war involving America, Russia and China.

- Pandemic alert level
- CDS as indicator for Credit Risk, Events happening in U.K. and European insurance industry can be a leading indicator to North America regarding the regulatory risk.
- We track changes in climate and solar activity.
- Actions taken by governments to reduce pension and medical benefits for current and future retirees.
- Political risk indicators
- Inflation, government debt
- Growing hostilities between two countries
- Value of dollar. Price of gold. Size of US deficit and debt.
- For retreat of globalization, political shift in major countries.
- N/A
- We look at CDS swap spreads as an indication of the strength of sovereign debt.
- Monitoring of pandemics.
- Delphi analysis
- The amount of Euro investments China will make instead of USD
- Pandemics, WHO and CDC outputs
- We try to identify any area where there is significant increase in growth rate.
- Climate change – CO2 level in atmosphere
- Inflation can be measured by CPI, and is highly correlated with GDP and interest rates, but it is not clear which of the three will be the leading indicator, so watching them all. Our big concern is the rise in interest rates.

- Sea surface temperatures as a guide to how active a windstorm season in the Gulf of Mexico will be.



Question 3. If you identify leading indicators of emerging risks, do you have criteria for when to take action to mitigate (or accept) the risk?

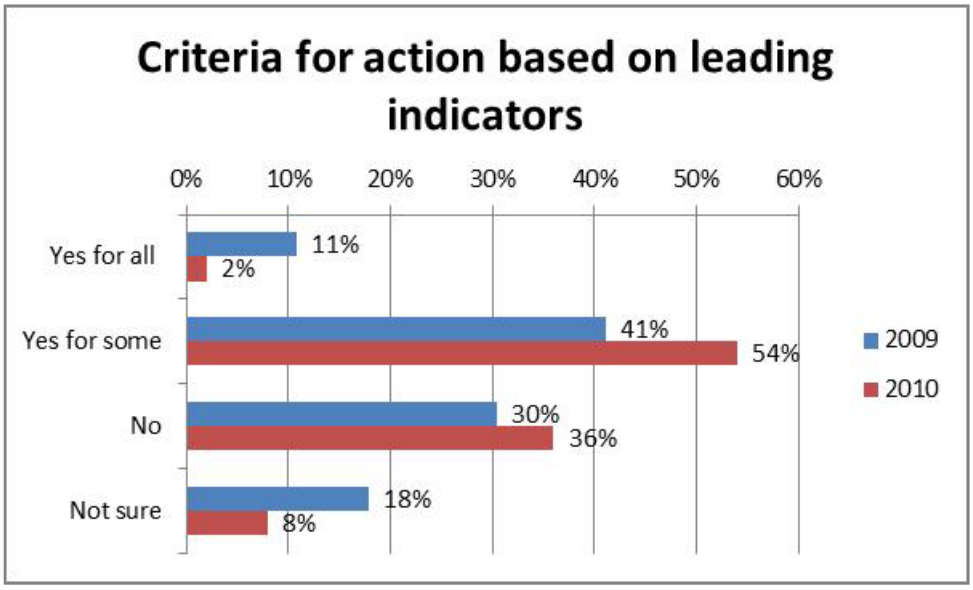
57 responses

- 1 responses 2% (10%) Yes for all
- 27 responses 54% (39%) Yes for some
- 18 responses 36% (29%) No
- 18 responses 8% (17%) Not sure
- 4 responses (5%) Not applicable

Question 4. If yes, please provide examples.

- Risk appetite and tolerance limits.
- Currently, mostly by the seat of our pants.
- Example
- Prioritization based on assessed impact and assessment relative to ERM internal impact limits.
- If the equity market exposure exceeds a risk tolerance, we will increase our hedge position. We can also re-price, stop new sales, increase fee etc.
- Product design, hedging
- Purchase gold and commodities
- N/A
- Sell USD Investments

- Pandemic – planned several scenarios for how our business would continue.
- The increase in Alt-A and Subprime production in 2006 & 2007 prompted a flag for recent vintage collateral.



Question 5. Once an emerging risk is identified, do you have a process to measure, monitor, and/or mitigate the risk?

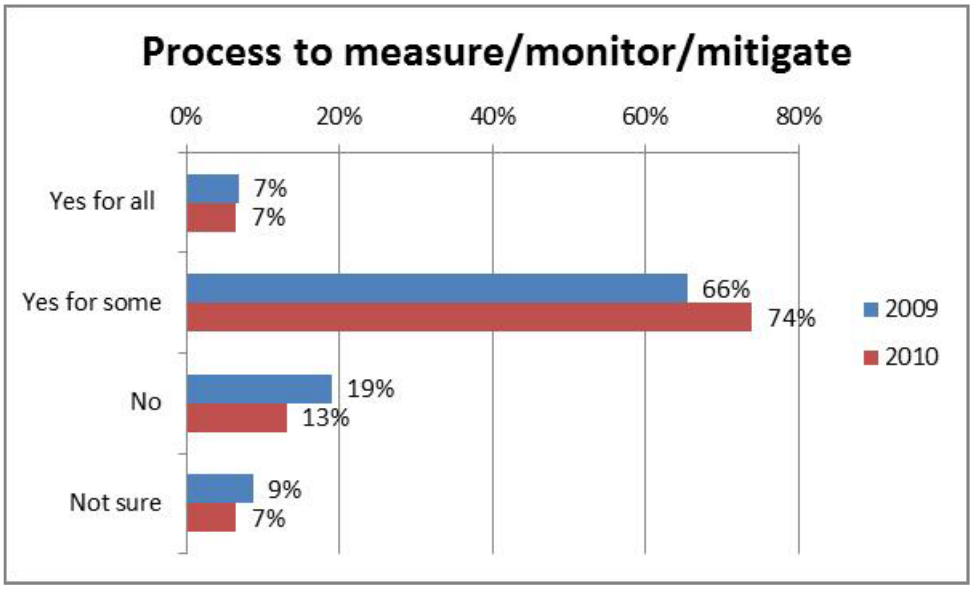
58 responses

- 3 responses 7% (7%) Yes for all
- 34 responses 74% (66%) Yes for some
- 6 responses 13% (19%) No
- 3 responses 7% (9%) Not sure

Question 6. If yes, please provide examples.

- Again, seat of the pants. Nothing that would be worthy of the North American Actuarial Journal.
- Quantify sensitivity of Economic balance sheet to plausible but highly unfavorable shock in the emerging risk factor.
- Example
- Given the large number of emerging risks, tracking, monitoring and engaging in actions to mitigate the risk requires prioritization. We have an internal team dedicated to this process for a large number of emerging risks.
- See previous answer
- Ad hoc depending on particulars of risk
- Using the previous example, the hedge position and the investment process is pre-determined. When the equity risk exposure reaches certain limit, the investment area will increase the hedge position accordingly.

- We don't need to make changes.
- Web scanning
- Purchase gold and commodities
- N/A
- Go to long term low risk investments (e.g., buying land)
- We stopped investment in recent vintage collateral
- Inflation/rising interest rates: Model the risk; monitor interest rates, CPI, GDP; hedge tail risk
- We have a regular forum where actions to monitor, mitigate and/or measure Emerging Risks are decided. Impact of a China hard landing, for example, is actioned through our Stress & Scenario testing group in conjunction with actuaries.



Section 3: Methodology

Question 1. During the recent financial crisis reliance on models was considered part of the problem. How have your modeling practices improved over the past year? (please select all that apply)

215 responses from 97 (2.2 average)

- 14 responses 17% No changes
- 33 responses 39% Communication
- 37 responses 44% Transparency
- 36 responses 43% Peer review
- 30 responses 36% More sophisticated techniques
- 5 responses 6% Less detailed
- 22 responses 26% Staffing levels
- 12 responses 14% Increased ties to market value

- 2 responses 2% Decreased ties to market value
- 13 responses Not applicable
- 11 responses 13% Other
    - Explicit consideration of deterministic tail scenarios
    - Controls -> loss of flexibility
    - More attention to tail events
    - Supplement with scenario testing
    - Less reliance on models, more reliance on imagination
    - Less use of modeling in general
    - More conservatism
    - Faster processing speed
    - Model policy requires documentation, etc.
    - More sense checks using simpler methods
    - Higher classification details for stress test manipulation

Question 2. When generating financial models for internal economic capital purposes, how many years do you run them out? (please select one)

96 responses

- 8 responses 11% Short (e.g., 1 year)
- 23 responses 30% Intermediate (e.g., 3-5 years)
- 34 responses 45% Long (e.g., 30 years)
- 7 responses 9% Not Sure
- 3 responses Not calculated
- 17 responses Not applicable
- 4 responses 5% Other
    - 1-year shock, implications modeled long-term
    - We use a variety of timeframes (e.g., 1-year MCEV, Scenario Analysis over multi-year horizon, etc.)
    - 10
    - To ultimate

Question 3. Do you include new business in your analysis for Question 2?

72 responses

- 41 responses 57% Yes
- 26 responses 36% No
- 0 responses 0% Economic capital is not calculated
- 5 responses 7% Not applicable

Question 4. What do you expect to be the primary source of modeling improvements in the next few years? (please select one)

96 responses

- 15 responses 16% Dependency metrics
- 21 responses 22% Tail Correlations (e.g., using copulas)
- 31 responses 32% Model efficiencies (fewer scenarios, faster run time)
- 16 responses 17% Not sure
- 13 responses 14% Other
    - Stochastics
    - Extreme value theory
    - Managing model risk
    - Refresh speed
    - Replicating portfolio technology
    - Black swan events
    - New software
    - Better reflection of underlying processes
    - Less faith in models
    - Consensus on economic capital modeling – 1 yr vs. run out
    - Blending stochastic models with stress/scenario testing
    - Varied correlation and interdependency modeling
    - Data granularity

Question 5. Please share instances where quantification efforts have enabled better decision making.

24 responses

- ALM
- Too early to tell
- Whether to macro hedge equity risk
- None yet
- Quantification of plausible range of losses due to tracking error and differences in realized from implied volatility made hedge solely using rebalanced futures appear less preferable than hedge with a static component.
- Quantification of tail risk by use of "quasi" extreme value theory
- Product line decision making (in/out of products)
- Improved modeling gave better assessment of guaranteed living benefits risks, leading to changes in product design to offer less risky benefits.
- Better understanding of mortality and lapse experience
- Reinsurance decision making/evaluation of new business opportunities
- Quantification efforts are used to understand the interconnectivities between various factors and to confirm some management decisions. After all, if the results don't make sense, we'll question if the model is working properly.

- Study of correlation among assets and assets and asset sectors led to better understanding of true risk in investment portfolio.
- We have not used quantification for decision making. We depend more on qualitative information.
- VaR Modeling of $ impact of position limits
- New fixed rate annuity was priced stochastically using VaR and CTE measures.
- The introduction of property catastrophe models
- N/A
- Tail hedging
- Identifying and measuring volatility risk (vega).
- Catastrophe reinsurance, providing ranges around expected operating/strategic plan projections
- Better diversification using quantified classification across and within asset classes. Forced product asset allocation diversification aligned incentives with policyholders.
- Reduced exposure to pandemic risk
- Modeling interest rate tail risk resulted in hedging tail risk with swaptions.
- Capital planning; reinsurance purchase; strategy

Question 6. Please share instances where qualitative analysis has enabled better decision making.

18 responses

- Risk profile discussion and analysis
- Too early to tell
- None yet
- Analysis of likely liquidity of liabilities varying by distribution channel based on qualitative explanation of why liquidity would vary helped in liquidity planning.
- Use of heat maps to prioritize risks
- Better understanding of mortality and lapse experience
- Monitoring of risk aggregation/Supplement stochastic models
- Since historical data has limitation (or isn't relevant) to be used for future projection, qualitative analysis is always important, such as to identify the 'unexpected' events.
- Our strategic objectives were built using qualitative analysis.
- Using two models – one a very simple model to check direction and magnitude of larger model
- Qualitative inputs to quantification of asbestos liabilities/recognition that property cat models do not provide answers and must be augmented with qualitative analyses
- N/A
- Scenario analysis
- My company avoided Freddie Mac and Fannie Mae direct investments by noticing when board members dumped their stock and left the board and then

investigating further to notice that risk culture had deteriorated and lobbying and turf protection had taken over.
- Underlying credit analysis and underwriting and timely proactive exit or restructurings.
- Reduced exposure to political risk
- Showing relative cost of persisting low interest rate risk vs. rising interest rates, and showing results under two dramatically different views of interest rate volatility led to decision not to hedge low interest rate risk and not to make business decisions based on any single scenario or any single general direction of future interest rates.
- Stress and scenario testing e.g., stagflation; US downgrade

Section 4: Predictions

Question 1. Is it possible to anticipate/predict a crisis? (please select one)

96 responses

- 40 responses 56% Yes
- 15 responses 21% No
- 17 responses 24% Not sure

Unfortunately the survey did not allow both a comment and a vote. The researcher has attempted to categorize each comment into the categories Yes/No/Not sure.

- 56 responses 58% Yes
- 20 responses 21% No
- 20 responses 21% Not sure

24 comments

- Sometimes
- Anticipate = make preparations for bad luck
- Someone always makes the right guess
- It is possible to predict the "increased likelihood of a crisis" but not possible to definitively predict an actual crisis
- A few contrarians appear to see it coming, but most observers grossly underestimate the severity.
- You can likely anticipate crises in a general sense, but it's difficult to predict how they will play out.
- Depends on the nature of the crisis
- Yes…if data is there, but it's being ignored. No…if crisis is a result of unforeseen circumstances
- Sometimes. We knew there was a real estate bubble but few responded to it until it was too late.
- The fundamental cause of a crisis is that is very difficult to predict and be believed
- Depends on the crisis

- Limited predictive ability, generally not including ability to estimate timing or magnitude
- Not with any consistency
- It is possible to anticipate some crisis but it's a minority
- Depends on the crisis
- Sometimes, but timing difficult to predict
- Sometimes
- Sometimes
- Anticipate – yes; predict – no
- To be prepared to react is the goal
- A crisis that can be predicted may be avoidable. The point is to be prepared if an unpredicted crisis happens.
- While markets are mostly efficient, the astute investor will notice potential bubbles along the way. Even by avoiding 2 potential bubbles for each one that plays out it is a successful strategy.
- It is possible to be opportunistically defensive and proactive to dynamically adjust risk appetite to minimize losses
- Sometimes

Question 2. If you consider yourself a risk manager, is predicting the future part of your job?

94 responses

- 36 responses 63% Yes
- 21 responses 37% No
- 20 responses Not applicable

Unfortunately the survey did not allow both a comment and a vote. The researcher has attempted to categorize each comment into the categories Yes/No/Not applicable (considering multiple futures was labeled yes).

- 71 responses 77% Yes
- 21 responses 23% No
- 20 responses Not applicable

17 comments

- Yes and no. predicting the future is not part of my job. But, making sound decisions based on models (with limitation) is.
- Oracle/soothsayer is the name of that job
- Job is to predict a wide range of possible future outcomes, not to predict "the" future
- Forecasting a range of possible outcomes (not "predicting")
- Defining possible scenarios is part of my job.
- In some cases, when leading indicators are available
- Considering as many futures as possible is part of the job

- Demonstration of trends can indicate what could happen in the future.
- Rather pointing out likely developments – not so much one specific future
- No, is predicting and analyzing probability of future scenario and identifying mitigation actions
- Stress testing
- Not right wording choice
- Contemplating possible futures and laying out contingency plans is part of the job, not predicting the exact future.
- To be prepared to react is the goal
- While a risk manager should have a view of the future, he should be prepared for any realization of that future.
- It is possible to be opportunistically defensive and proactive to dynamically adjust risk appetite to minimize losses
- Yes but with difficulty

Section 5: Current topics

Question 1. Do you manage your personal investments?

94 responses

- 63 responses 67% (71%) Yes, for more than 50% of portfolio
- 14 responses 15% (13%) No
- 17 responses 18% (16%) Yes, for less than 50% of portfolio

Question 2. Currently, your personal investment portfolio is:

95 responses

- 39 responses 41% (36%/26%) More conservative than usual
- 41 responses 43% (48%/54%) Same as usual
- 8 responses 8% (11%/20%) More aggressive than usual
- 0 responses 0% (2%/0%) Not sure
- 7 responses 7% (2%/0%) Prefer not to answer

Question 3. Your expectations for the 2011 global economy are:

94 responses percentages are expectations for 2011 and previous expectations for 2010/2009

- 22 responses 23% (21%/61%) Poor
- 61 responses 65% (65%/35%) Moderate
- 9 responses 10% (13%/3%) Good
- 0 responses 0% (1%/0%) Strong
- 2 responses 2% (0%/1%) Not sure

Question 4. Did you experience a change in the level of ERM-focused activities for your organization or clients in 2010? (comparison is to similar question asked a year ago regarding anticipated changes, so the reader can think of it as an actual to expected comparison)

94 responses

- 62 responses 66% (66%/65%) Increased
- 1 responses 1% (1%/3%) Decreased
- 20 responses 21% (23%/21%) Stayed the same
- 3 responses 3% (9%/10%) Not sure
- 8 responses Not applicable

Question 5. Did your internal ERM staff increase in 2010?

94 responses

- 34 responses 41% (36%) Yes
- 34 responses 41% (56%) No
- 14 responses 17% (8%) Not sure
- 12 responses Not applicable

Question 6. Do you anticipate a change in the level of ERM-focused activities for your organization or clients in 2011 relative to 2010?

94 responses

- 56 responses 64% (62%/65%) Increase
- 1 response 1% (1%/3%) Decrease
- 25 responses 28% (30%/21%) Stay the same
- 6 responses 7% (6%/10%) Not sure
- 6 responses Not applicable

Question 7. Do you anticipate a change in the level of funding dedicated to ERM-focused activities for your organization or clients in 2011 relative to 2010?

94 responses

- 36 responses 41% (49%/33%) Increase
- 3 responses 3% (2%/8%) Decrease
- 37 responses 43% (39%/48%) Stay the same
- 11 responses 13% (10%/11%) Not sure
- 7 responses Not applicable

Question 8. Why do you use external experts for ERM? (please select all that apply)

109 responses from 88 surveys (1.2 average)

- 39 responses 36% Don't use external experts
- 34 responses 31% Topical expertise
- 28 responses 26% Outside perspective
- 8 responses 8% Other
    - Validation/review
    - Validation
    - Solvency II
    - Peer Review, comparison to industry
    - Validation
    - Model peer review
    - Model usage and validation

Section 6: Demographics

If you are retired, respond based on your most recent career path.

Question 1: What credentials do you currently hold? (please select all that apply)

212 responses from 96 surveys (2.2 average)

Percentages are based on 96 surveys.

- 22 responses 24% (28%/27% in previous surveys) CERA
- 63 responses 69% (87%) FSA/ASA
- 12 responses 13% (17%) FCAS/ACAS
- 13 responses 14% (13%) FCIA
- 41 responses 45% MAAA
- 4 responses 4% (2%) PRM
- 2 responses 2% (4%) FRM
- 12 responses 13% (12%) CFA
- 2 responses 2% FIA
- 2 responses 2% FIAA
- 9 responses 10% MBA
- 2 responses 2% CPA
- 7 responses 8% PhD
- 5 responses 5% Other actuarial credential (please specify)
    - 1 SAV-ONA – Switzerland
    - 2 Aktuar (DAV) – Germany
    - 1 Italian Actuarial Certification
    - 1Actuaire Qualifie (France)
    - 1 Austrian
    - 1 AIA
- 11 responses 12% Other non-actuarial credential (please specify)
    - MSc

- ChFC
- PMP
- FLMI (4)
- FFSI
- CLU (2)
- MPA
- MA
- JD
- CQF
- RHU

Question 2: How long have you been a risk manager?

93 responses

- 29 responses 31% (31%) Not applicable
- 14 responses 15% (15%) Less than 3 years
- 28 responses 30% (27%) 3-10 years
- 22 responses 24% (26%) More than 10 years

Question 3. Employer type (please select all that apply)

105 responses with 94 unique (1.1 average)

- 16 responses 17% (21%/17%) Consultant
- 2 responses 2% (3%/1%) Software
- 1 responses 1% (3%/2%) Banking
- 4 responses 4% (3%/4%) Brokerage
- 2 responses 2% (3%/1%) Intermediary
- 65 responses 69% (54%/70%) Insurance/Reinsurance Company
- 2 responses 2% (4%/7%) Asset Management
- 4 responses 4% (3%/3%) Regulator/Rating Agency
- 6 responses 6% (3%/4%) Academic
- 1 response 1% (0%/0%) Manufacturing/Services
- 0 responses Energy
- 2 responses 2% (4%/3%) Other
    - Service provider
    - Commodity trade

Question 4: Primary Region (please select one)

94 responses

- 5 responses 5% (7%) Europe
- 75 responses 80% (82%) North America
- 3 responses 3% (0%) South America
- 2 responses 2% (6%) Asia
- 1 response 1% (1%) Africa

- 2 response 2% (1%) Middle East
- 3 responses 3% (1%) Caribbean/Bermuda
- 2 responses 2% (2%) Australia/Pacific
- 1 responses 1% (0%) Other
  - Worldwide sales

Question 5: Primary area of practice (please select one)

93 responses

- 41 responses 44% (41%/38%) Life
- 16 responses 17% (19%/13%) Prop/Cas (Gen'l Insurance, Non-Life)
- 2 responses 2% (2%/2%) Pension
- 6 responses 6% (8%/3%) Health
- 1 response 1% Financial Services (non Insurance)
- 1 response 1% Manufacturing
- 0 responses 0% Services
- 24 responses 26% (20%/33%) Risk Management
- 1 response 1% (3%/3%) Generalist/Academic
- 1 response 1% (3%/2%) Other
  - Investment Portfolio Management

Question 6. Which of these groups/sections of the SOA and its partners do you belong to?

206 responses from 58 surveys (3.6 average)

- 61 responses 75% (85%/85%) Joint Risk Management Section
- 35 responses 43% (46%/47%) Investment Section
- 34 responses 42% (42%/40%) Financial Reporting Section
- 3 responses 4% (3%/4%) Pension Section
- 11 responses 14% (13%/12%) Health Section
- 12 responses 15% (22%/13%) International Section
- 9 responses 11% (8%/12%) Forecasting and Futurism Section
- 23 responses 28% (28%) Reinsurance Section
- 18 responses 22% (15%/20%) International Network of Actuarial Risk Managers (INARM)

Question 7. Do you have any comments or suggestions for future iterations of this survey?

- Provide a facility for changing responses
- Shorter
- Make it possible to back up and edit responses.
- Survey seems reasonable…
- NO

- Importance of the emerging risks under consideration depends on the line of business one looks at. Suggestion to formulate corresponding questions accordingly.
- Regulatory reform, healthcare reform, pension reform, politics and country risk.

Thanks for your participation!

[Researcher's notes for future questions]

Add questions getting at

- For demographics ask specifically if respondent does not have an actuarial credential
- Does an emerging risk leading indicator ever get dropped? Why?
- What blogs and other sources do you follow?
- What actions have been taken because of work done on emerging risks?