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JOINT RISK MANAGEMENT SECTION

# Emerging Risks Survey

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## Sixth Risk Manager Survey of Emerging Risks

Emerging risks are a key component of enterprise risk management (ERM). Risk managers consider risks that develop over a long time horizon in addition to the short term risks involved with tactical planning and putting out fires. Emerging risks focus on outliers -- extreme events that do not occur frequently. Tactical plans, and even many regulatory capital requirements, ignore these outliers in their calculations. This makes it important for an entity's risk team to fill this gap by looking out into the future to consider how conditions could evolve. Deterministic scenarios are often used to identify detrimental, as well as positive, implications to the risk/return profile.

As new events occur, each provides ongoing entities with an opportunity to debrief and evolve their risk practices. The financial crisis started more than five years ago and continues to play out around the world. Many risk managers found during this period that they previously relied too much on their models and needed to bring back the qualitative aspects of risk management. They also discovered that tools measuring liquidity risk came up short, partly because common use of the term ignored the risk associated with funding rollover of debt. Natural disasters have highlighted the shortcomings of supply chains. Flooding in Thailand, the earthquake/tsunami in Japan, shipping closures due to Katrina, low water levels in the Mississippi River due to drought, and gasoline shortages following Hurricane Sandy all prompted discussions about how to avoid similar situations in the future. Looking at these events from a broad perspective enables solutions that are flexible and holistic, considering interactions and unintended consequences.

Predicting specific events to occur in the future is an exercise guaranteed to fail, but considering potential outcomes and using a mixture of quantitative and qualitative techniques can position a firm for success across a wide variety of circumstances.

Successful implementation of emerging risk management depends on the existing risk culture. A firm must be open to comments that suggest management's plans are not perfect. Contrarian views and skeptical thoughts must be as welcome as those which agree with the base case. Getting a broad range of perspectives allows better decisions to be made across varying conditions and business plans. Playing the "what-if" game in a relaxed atmosphere can yield ideas and improved practices.

A list of emerging risks, if truly thinking with a time horizon of 10 years or more, should not radically change from year to year. There will be some variation, mainly as specific risks cycle back to prominence after long periods of dormancy. One such risk identified in this iteration of the survey is drought conditions, and future versions of the survey will incorporate this risk more transparently.

Risks generating historical data that remain stable over time can be represented by a statistical distribution. Other risks are evolving in uncertain ways, have been forgotten in their dormancy, or are new. These latter types are termed emerging risks and typically do

not have a well-defined distribution. They require more thought when modeling their impact.

This survey attempts to track the thoughts of risk managers about emerging risks across time. It is the sixth survey of Emerging Risks conducted by the Joint Risk Management Section, a collaboration between the Casualty Actuarial Society, Canadian Institute of Actuaries, and Society of Actuaries. 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.

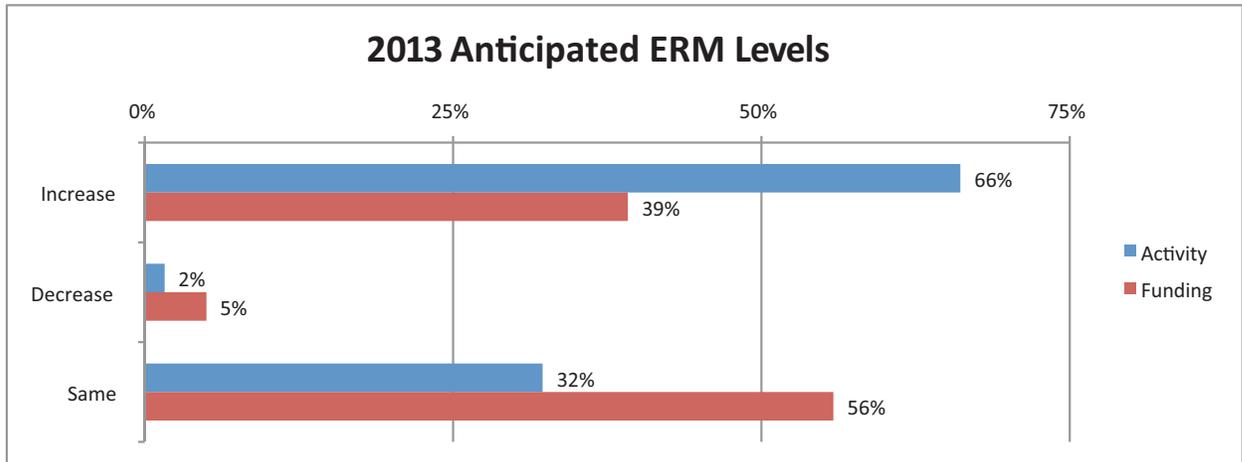
Enterprise risk management is sometimes interpreted as being the same as an economic capital calculation, but this falls into a trap of assuming that everything that counts can be counted. While models provide an important component of ERM, outlier events are not captured effectively using these tools. These events are often not included in recent historical data sets, so stress tests will do a better job of interpreting the impact of a negative outlier. Other extreme events are better explained qualitatively.

Note that detailed survey results can be found in Appendix II and that Appendix III includes the 2011 survey details for comparison.

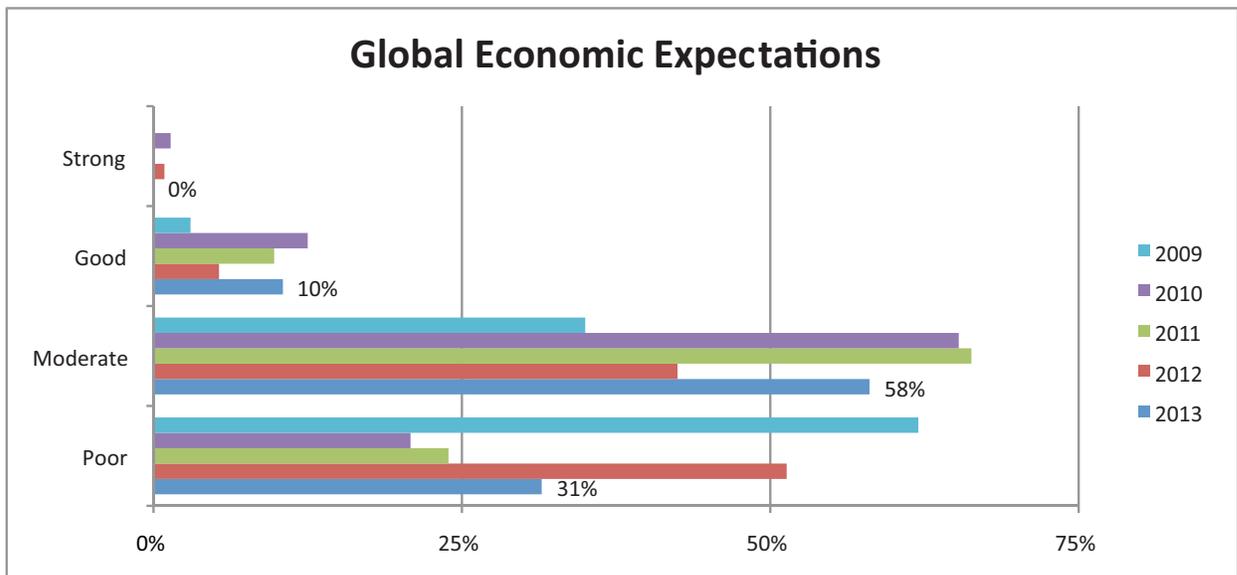
## **Executive Summary**

Risk managers report that risk tools are being used more frequently to improve decision making. These incorporate quantitative, qualitative and combination methods. Stress testing is being used to supplement economic capital calculations and consider alternative investment strategies and product designs. A major shortfall during the financial crisis was a lack of tools to test liquidity scenarios, and what-if stresses are being developed to aid planning for other potential outlier events. These include financial scenarios, improved building codes and rapidly improving cyber risk analysis. They report a balance needed between sophisticated models and simplified techniques based on experience that can be used to identify emerging risks and other outlier events. Quantification helps management get their arms around the magnitude of the risk in ways that qualitative assessments can't.

Many activities related to ERM continued to grow in 2012, especially those involving financial modeling. While reduced from last year's 50%, 41% reported internal staff growth in 2012. ERM activity grew at a slightly faster pace than the prior year (65%). In 2013 most expect an increase in activity (66%), but fewer than half (38%) anticipate an increase in funding. A small number (5%) anticipate decreased funding for ERM activities. As time passes from the financial crisis, the focus is turning to financial modeling of all risks.



Global economic expectations by survey respondents improved for 2013 from low levels last year. Over two-thirds anticipate a Good (10%) or Moderate (58%) economy. This improvement is consistent with other data collected in the survey that points toward a risk management community less focused on survival and able to consider a longer time horizon and preparation for broader risk possibilities.



### ***Emerging Opportunities***

Risk can be viewed in a number of ways. Risk managers tend to focus on volatility, downside risk, or solvency events. Initial risk management efforts focus on mitigation efforts, and some respondents viewed emerging risk efforts primarily as risk avoidance, but best practice is evolving toward those who incorporate strategic risks in their analysis and look at upside opportunities. When asked for examples, responses focused on instances where inconsistencies or niche products could be explored. One response shared an example of a warming climate’s impact on Canada, with longer growing seasons and improved shipping methods (northwest passage) providing an opportunity

for those ready to exploit it. Another respondent monitors the demographic shifts within markets for potential changes in financial instruments.

### **Leading Indicators**

Best practice approaches to incorporate leading indicators in action plans improved this year. These efforts, sometimes labeled key performance indicators (KPI) or key risk indicators (KRI), are attempting to provide information earlier in the decision making process. 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 reflecting retailer success or a spike in the credit default spread for a supplier reflecting vendor risk. Over half, 57%, reported having at least some leading indicators around emerging risks. The percentage reporting that they do not identify emerging risks has stabilized (25%). Examples reflected a move to incorporate triggers and thresholds, such as to help manage a liquidity crisis by putting in place mitigating actions well in advance of the event. Some reported using threat ratings to drive hedging actions and increased monitoring of specific risks (e.g., terrorism exposure).

While improvements were reported in peer review, communication, transparency and sophistication, a proper blend of quantitative sophistication and qualitative analysis is necessary. One respondent reflected the general tone of comments by stating: *We have come to the conclusion that for emerging risks it is far more informative and worthwhile to do stress tests based on scenarios developed specifically for the risk. Trying to use stochastic processes on a risk that is not well understood can lead to a false sense of security and can be misleading.*

### **Cognitive Bias**

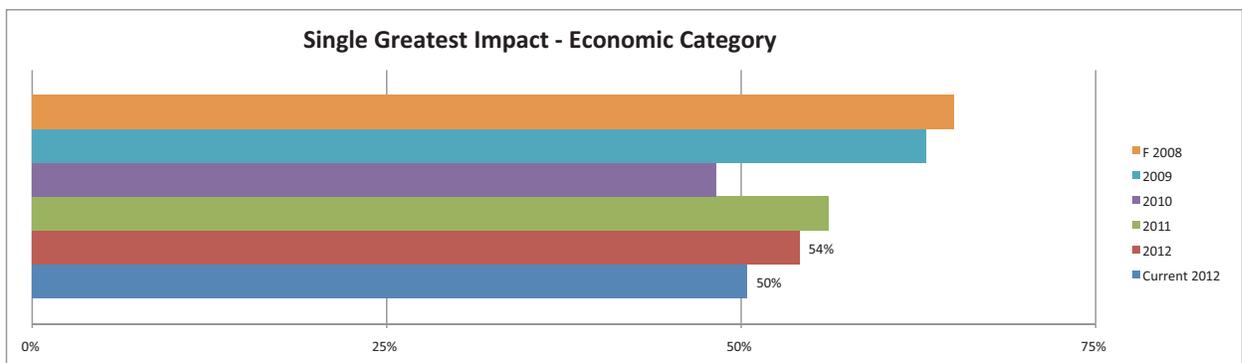
The recent book by Nassim Taleb, “Antifragile: Things that Gain from Disorder,” expands the author’s discussion of rare events to suggest actionable steps that could reduce the risk. When combined with the concepts presented by Frank Partnoy in “Wait”, the authors present the idea that systemic risk is reduced by allowing small random events to occur and stabilize the system. Taleb suggests that option-type instruments that prefer a volatile environment actually make positions safer. In the past this emerging risks survey has considered anchoring bias as described in Prospect Theory by Daniel Kahneman and Amos Tversky (summarized in Kahneman’s Thinking, Fast and Slow). Extending the concepts developing in these new books, interventionist efforts appear to be self-defeating unless used only when the entire system is at risk.

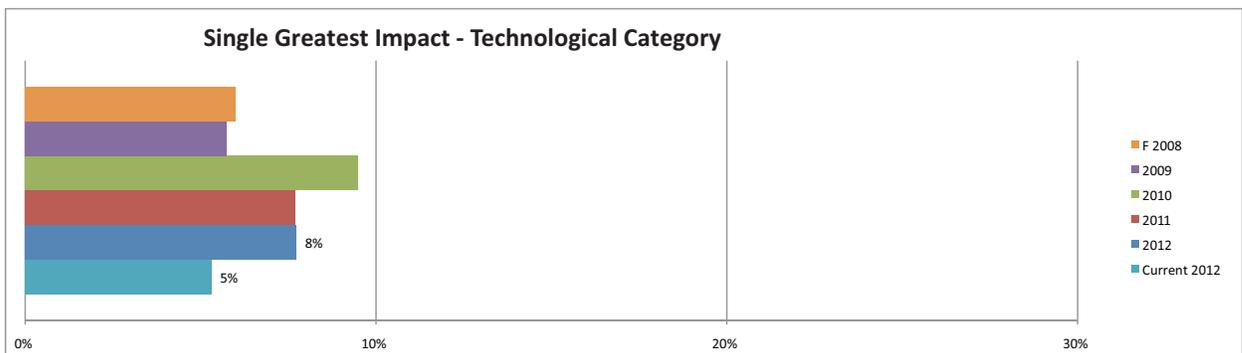
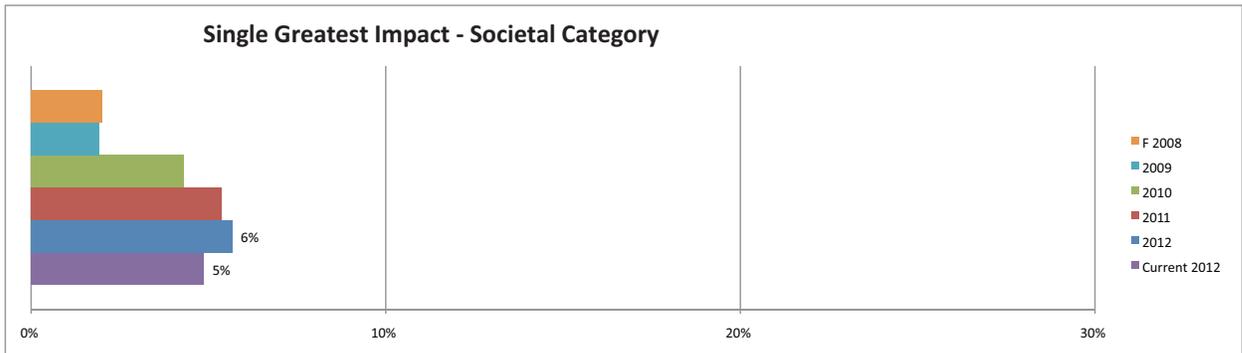
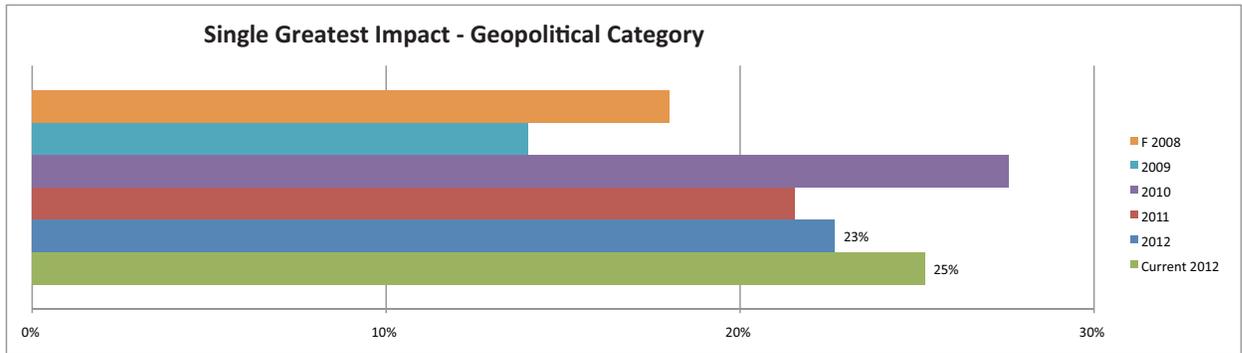
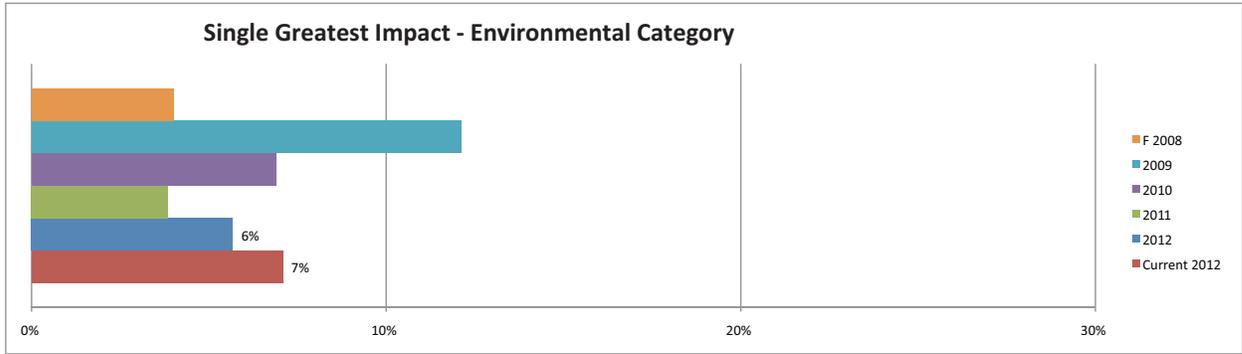
Since the previous iteration of this survey, a number of events have influenced the thinking of risk managers. Reverberations still echo from the 2008 financial crisis, but less so from the 2011 Japanese earthquake/tsunami and Arab Spring. Events in 2012 did not have as many worldwide implications. The continuing European sovereign debt crisis combined with weather related events like storms and drought, but no severe crisis occurred.

There were some interesting shifts in the 2012 results. The Economic category of risks continues to be the top choice ahead of the Geopolitical, Societal, Technological and Environmental categories. Yet it also shows that as time passes from the financial crisis, the Economic category's level of importance is fading. Finishing a strong number two (32% versus 37% for the Economic category), Geopolitical risks increased in total with *Failed and failing states* the only one of six risks to decrease (but at 7% still the second most common risk in the category to *Regional instability*, which recorded a new high of 9%). Other risks with new highs across the survey history were *Loss of freshwater services* (11%), *Interstate and civil wars* (14%), and *Liability regimes* (8%). New lows were recorded by risks *Oil price shock* (31%), *Chinese economic hard landing* (31%), *Pandemic/infectious diseases* (12%), *Natural catastrophes: Inland flooding* (1%), and *Natural catastrophes: Earthquakes* (2%). Despite recording new lows, some of these risks remain in the top five overall.

The evolving field of behavioral finance describes anchoring as the tendency to let recent events influence 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. In 2012 the survey closed shortly before Hurricane Sandy came ashore in the US Northeast or we would have added another interesting data point, likely with higher responses for *Natural catastrophes: Tropical Storms*. In this year's survey we see more evidence of anchoring. When looking at the five categories of risks considered, three show strong results that move percentages from last year's survey results toward the current risk percentages. The other two, Societal and Technological, have the smallest results and will be reviewed closely in the future. When asked for the current greatest risk, the Environmental category received a large increase, from 2% to 7%.

Note that, for ease of viewing, labels are included on graphs for only the most recent data points. (This next set of graphs has two data labels since it also includes the top current risk). All data points can be found in Appendix II.

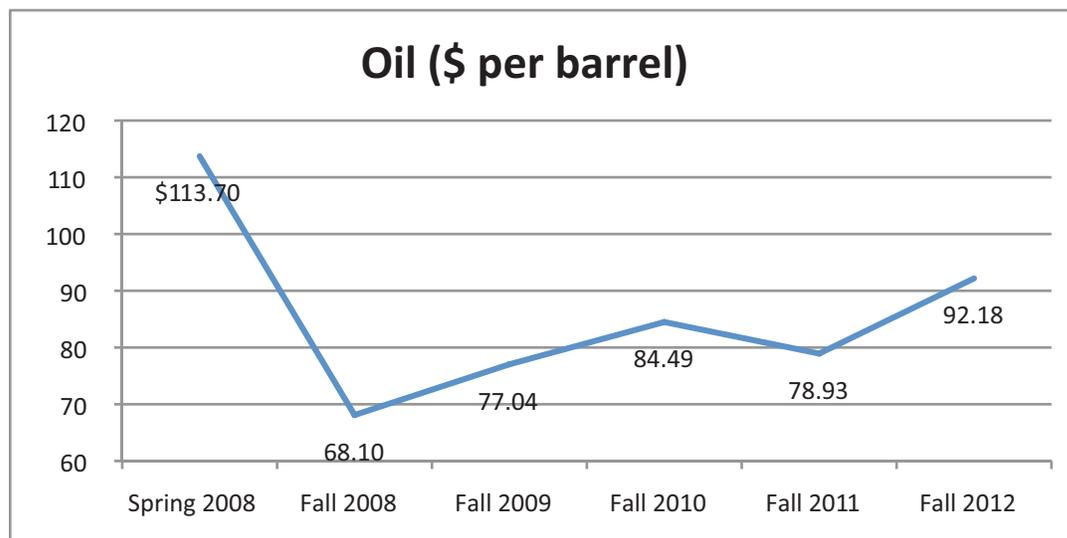
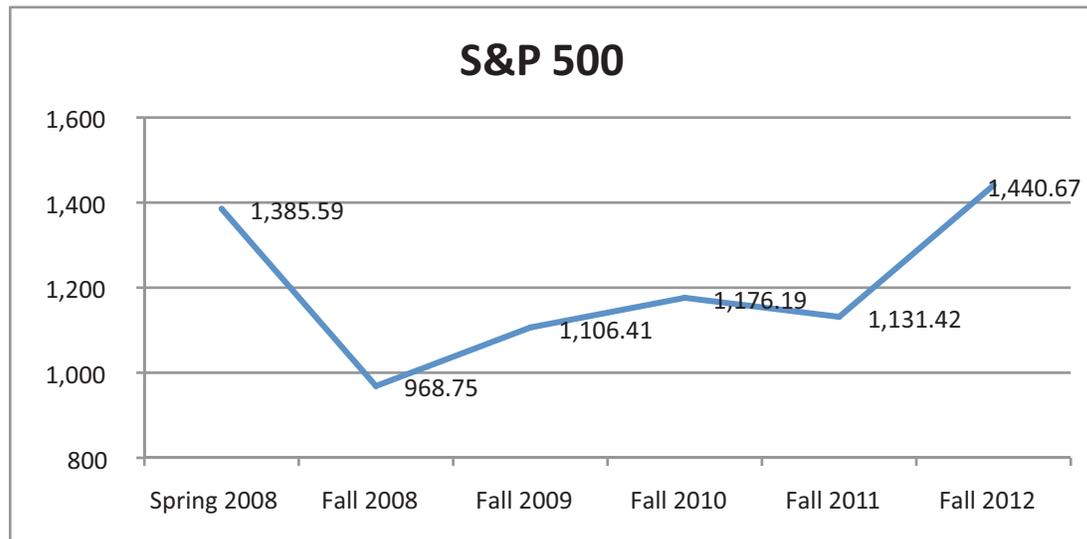


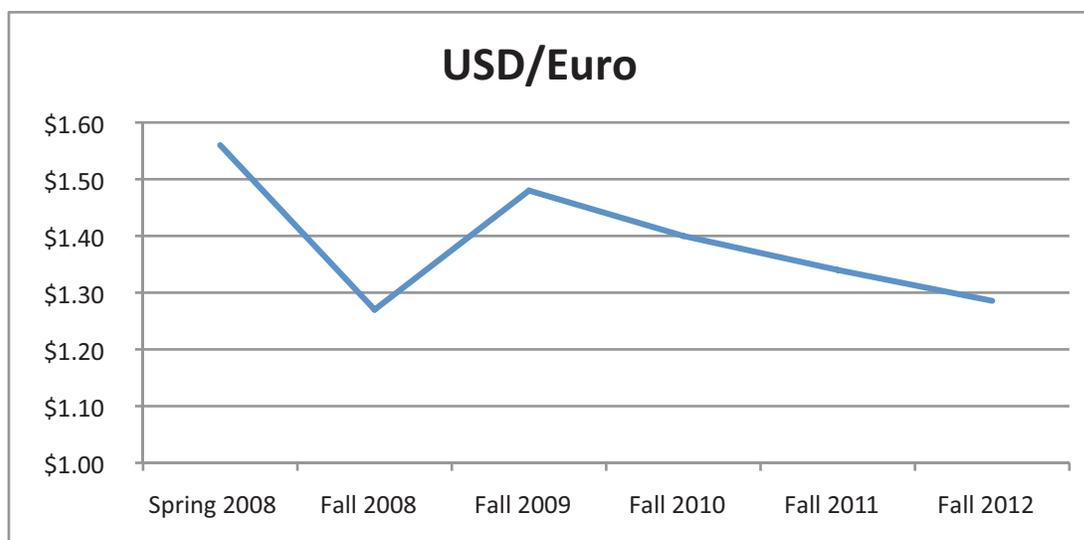


As in past reports, the survey results show that current values of the S&P 500, a barrel of oil, and the U.S. dollar relative to the Euro seem to anchor perceptions of risk. Results have evolved over time, generally led by current news topics. Only economic factors are

shown here, and the researcher would be interested in suggestions of other metrics that might be drivers of emerging risks.

	<b>S&amp;P 500</b>	<b>Oil (per barrel)</b>	<b>USD/Euro</b>
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
Fall 2012	1,440.67	92.18	1.29





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](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. Using consistent sources, by then 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 asset 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 to his first term as President. The next survey 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 slow recovery. The top four emerging risks from the third iteration of the survey were

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. The U.S. stock market was down 4% overall and very volatile during the year, oil was down 7% and the dollar had further strengthened against the Euro by 4%.

The original list of risks was developed by the World Economic Forum for their annual Global Risks survey. There is a balance required between keeping the list current and being able to show trends. The WEF has aggressively updated their risks, which is somewhat surprising since their stated time horizon is 10 years, but this research has tried to maintain stability for trending purposes. For the 2011 survey the risks were updated. One risk was moved to a different category, two combined and one added. The changes are described in Appendix I. Comparisons have been adjusted for trending. Most of the top six results continue to come from the Economic category. The new risk, *Financial volatility*, resonated with risk managers as they made it the top selection.

Survey 5 (October 2011)

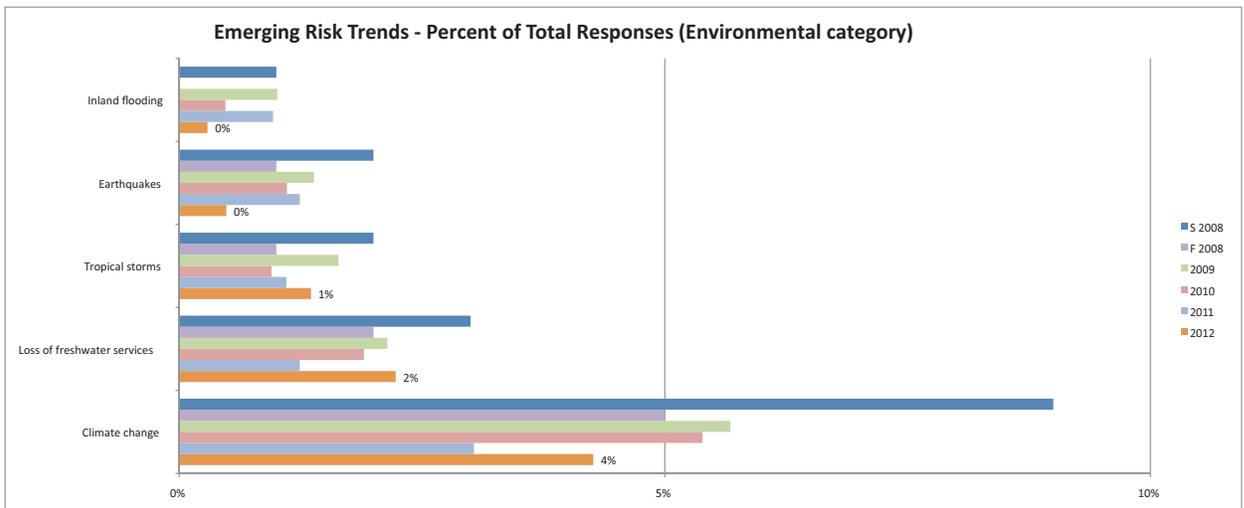
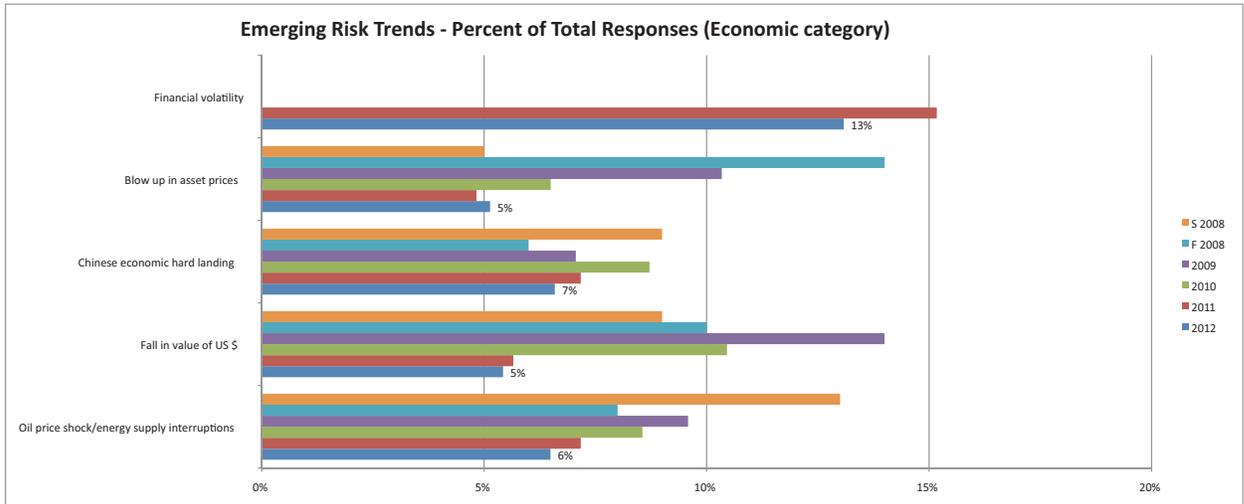
1. *Financial volatility* (68%)
2. *Failed and failing states* (42%)
3. *Cyber security/interconnectedness of infrastructure* (38%)
4. *Chinese economic hard landing* (32%)
4. *Oil price shock* (32%)
4. *Regional instability* (32%)

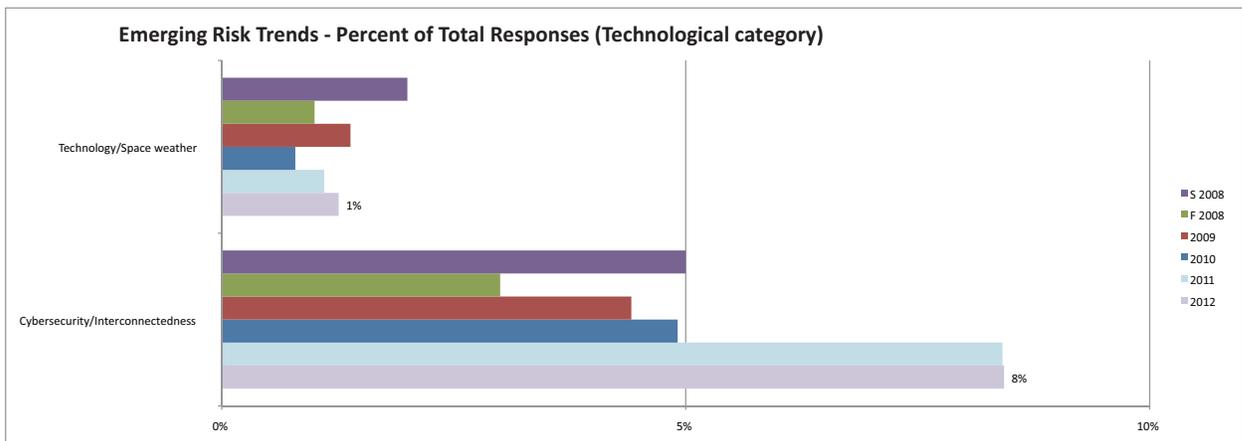
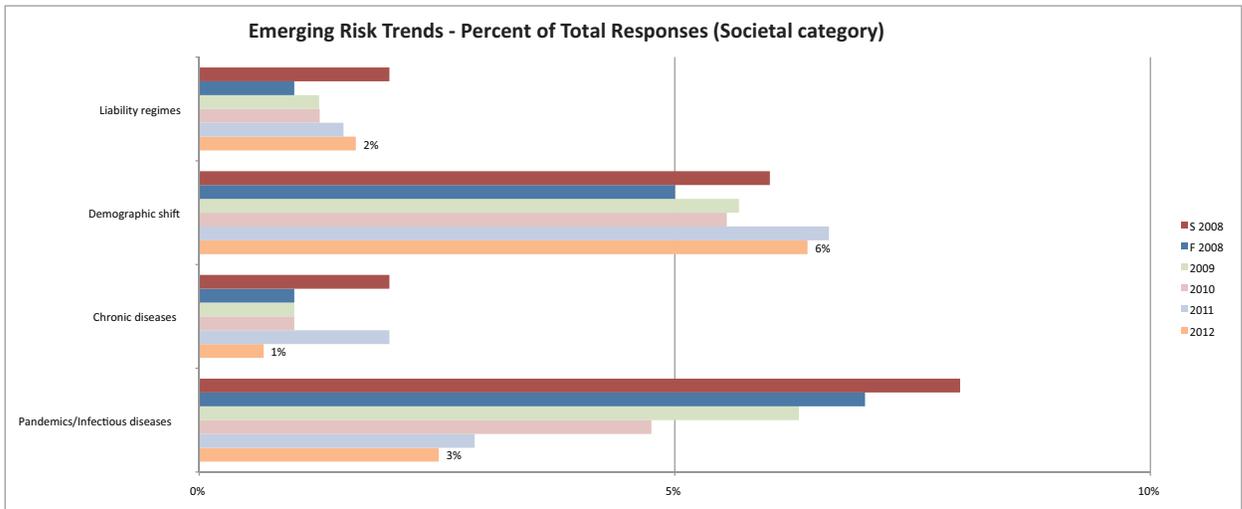
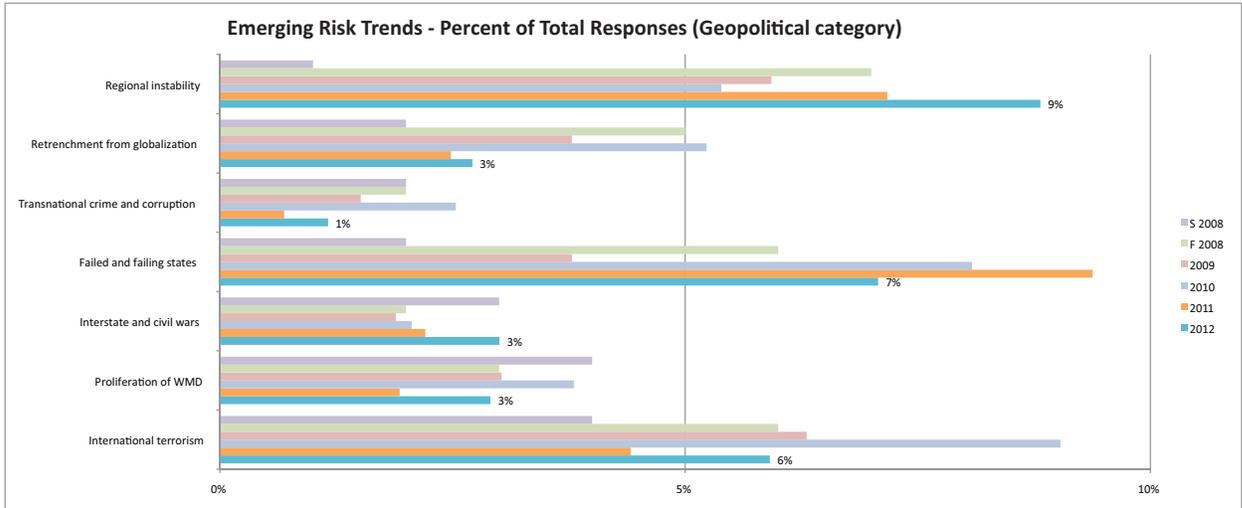
For the current version of the survey the risks were reviewed but not changed. Equity markets surpassed the levels of spring 2008 for the first time, while oil prices rebounded and the dollar strengthened. The results were less concentrated.

Survey 6 (October 2012)

1. Financial volatility (62%)
2. Regional instability (42%)
3. Cyber security/interconnectedness of infrastructure (40%)
4. Failed and failing states (33%)
5. Chinese economic hard landing (31%)

The following set of charts show historically the results by category and risk.

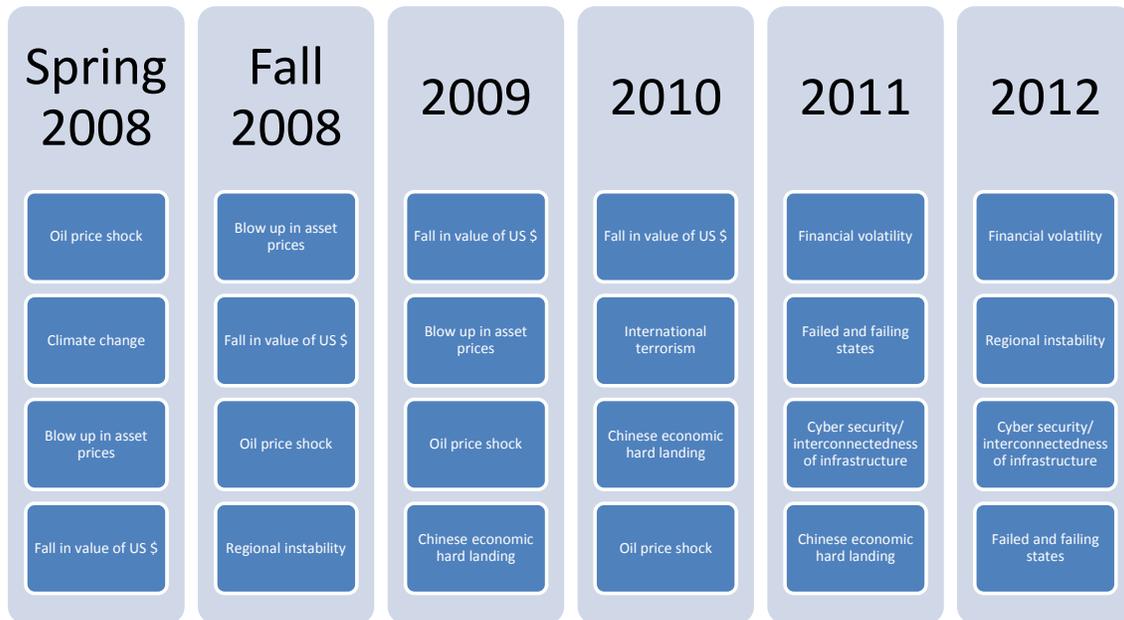




## Trending Results

The evolution of the top four risks chosen provides evidence that trends can be relied on in this survey. The general continuity between surveys is very reassuring, while new risks

are worked in. The emergence of *Cyber security/interconnectedness of infrastructure* and two Geopolitical risks, *Regional instability* and *Failed and failing states*, shows how concerns are evolving from the Economic category to other areas.



*Climate change*, much as it is in reality, is an enigma in this survey. In last year's survey it had dropped from a high of 40% to a low of 14%, but this year it surged to 20% of responses.

Interestingly, when asked for a single emerging risk the respondents' top choices nearly overlap the earlier result. With Middle Eastern tensions building in Fall 2012, the top five risks listed overlap with four of the risks listed when the top five are selected.

#### Top emerging risk October 2012

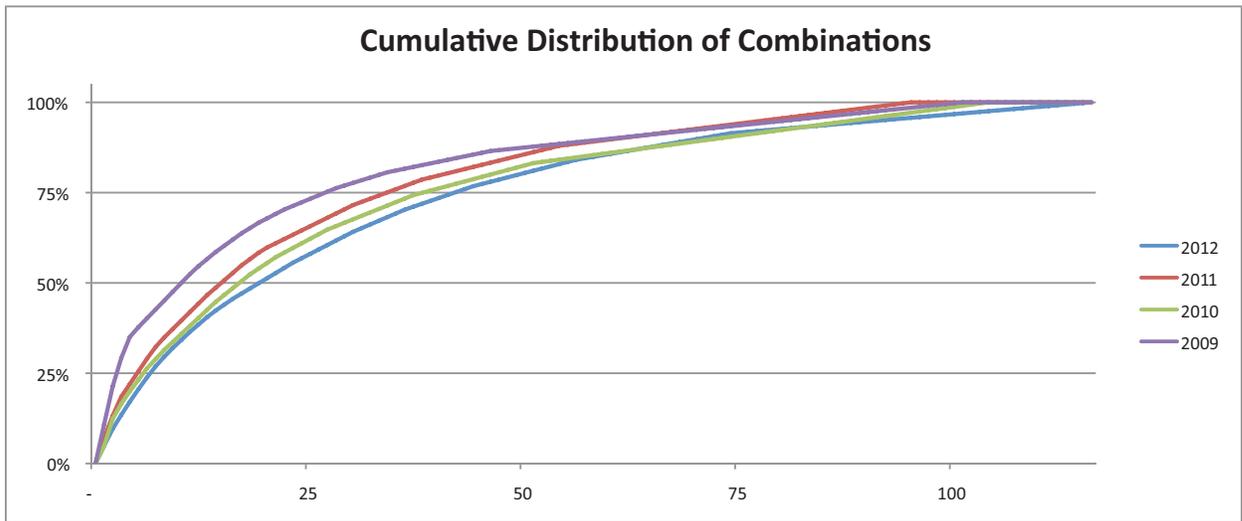
1. *Financial volatility* (28%)
2. *Blow up in asset prices* (9%)
3. *Failed and failing states* (8%)
4. *Cyber security/interconnectedness of infrastructure* (7%)
4. *Regional instability* (7%)

Each survey has been conducted in periods with unique characteristics that drove results. The perceived risks of geopolitical instability are rising, while risk managers move away from a focus on Economic risks from the financial crisis. The real scenario, of course, remains to play out.

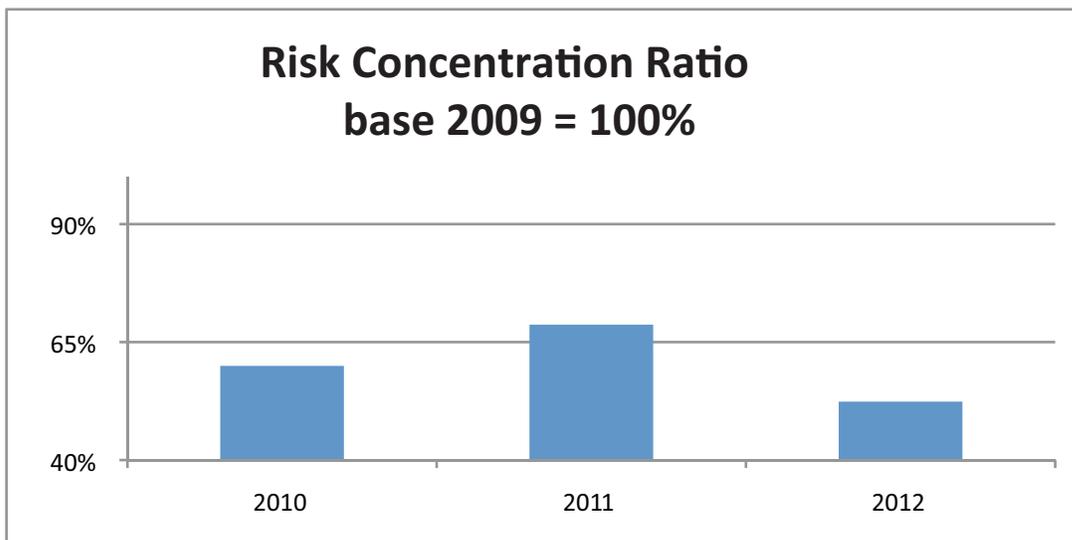
### **Risk Combinations**

The survey again asked about concerns due to risk combinations. Five of the top six combinations included *Financial volatility*, chosen with *Oil price shock* (5%), *Blow up in asset prices* (5%), *Chinese economic hard landing* (4%), *Failing and failing states* (3%),

and Fall in value of US \$ (3%). The top combinations not including *Financial volatility* consisted of *International terrorism and Proliferation of weapons of mass destruction (WMD)* with 4%, third overall. *Oil price shock* was the second highest risk mentioned. The top three category combinations all consisted of Economic and Geopolitical risks, with Economic-Economic (29%) followed by Economic-Geopolitical (21%) and Geopolitical-Geopolitical (18%). The next highest category was Economic-Societal with 6%.

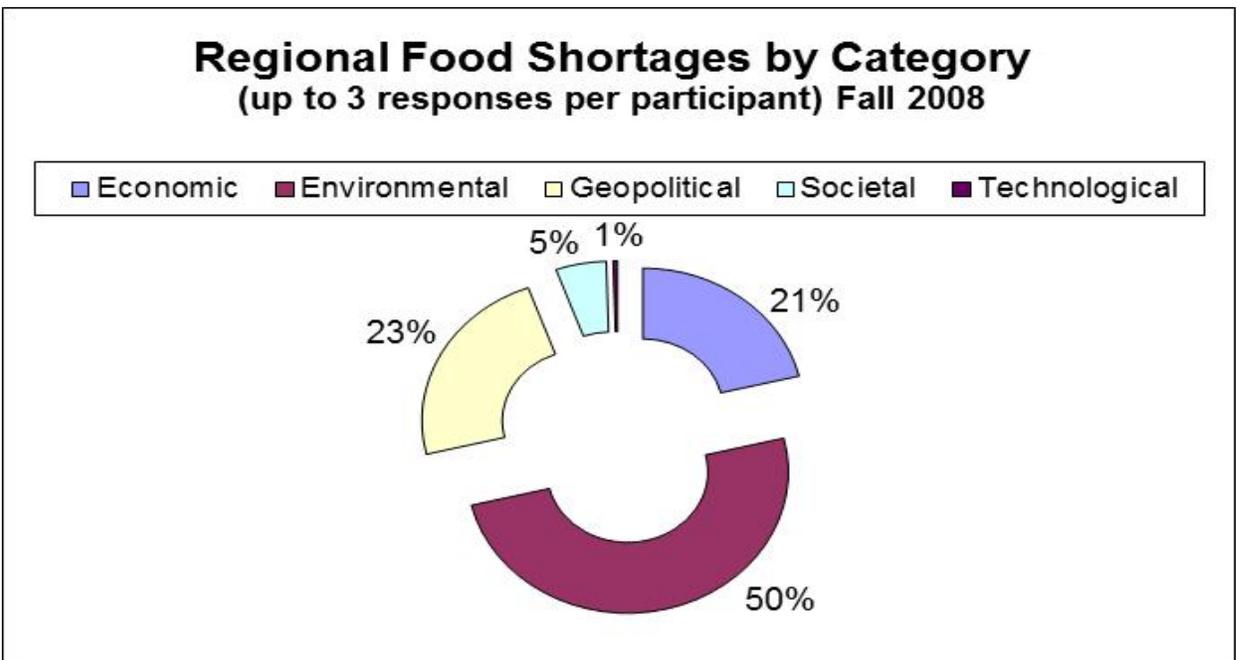
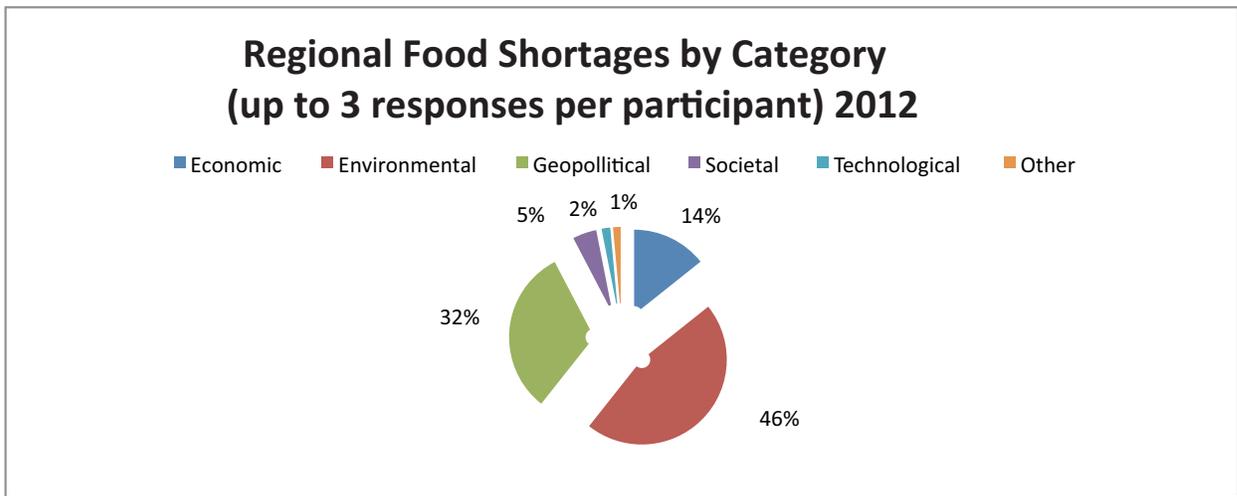


There are 253 possible two-risk combinations among the 23 risks. The distribution of results was the least concentrated so far, as can be seen in the accompanying chart. The period immediately following the financial crisis might be the most extreme we will see, so 2009 is used as the base year of 100% for the Risk concentration ratio. Comparisons are made at the 25<sup>th</sup> percentile, median (50<sup>th</sup> percentile) and the 75<sup>th</sup> percentile, and then combined. A higher number reflects greater concerns.



As a relative measure, the Risk Concentration Ratio represents the current feeling among the risk management community. They are less focused on a potential crisis this year so other results present more broadly.

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 we returned to the regional food shortage question. Respondents were asked to include up to three risks. Results were primarily spread across Environmental (46%), Geopolitical (32%), and Economic risks (14%). This represents a shift toward Geopolitical and away from Economic since the same question was asked in Fall 2008. This likely reflects a reduced anchoring effect from the financial crisis.



The top two specific risks chosen were *Climate change* (18%) and *Loss of freshwater services* (13%). Rounding out the top 5 were *Regional instability* (11%), *Natural catastrophe: Inland flooding* (9%) and *Oil price shock* (9%).

When considering risk combinations, the survey suggests that these risks can be either sequential or simultaneous. This encourages respondents to consider risk interactions as well as unintended consequences. An example to help clarify was the nearly simultaneous Kanto earthquake and typhoon that impacted Japan in September 1923. There are some who think that they were not independent events, that the low pressure associated with the typhoon may have impacted the timing of the earthquake. Runaway cooking fires grew due to the earthquake, but were much more destructive due to the winds of the typhoon. Well over 100,000 died.

## **Conclusions**

Emerging risks are tricky to manage. Unintended consequences and interactions with other risks are only understood in hindsight, so risk “experts” who profess complete knowledge and a cookie cutter approach should be treated with suspicion. Behavioral finance is a key for interpreting emerging risks, especially anchoring. Recent concerns greatly influence future concerns, as we have seen for several years. While the research seeks out new perspectives from respondents, results have been consistent and trends can be measured. As the time since the worst of the financial crisis passes, respondents expand their time horizon and listed choices broaden.

ERM is at a crossroads. Many are being asked to do more without additional funding. Some complete the bare minimum to deflect external stakeholders. Others are finding their efforts receiving more exposure but not in ways that add value. Happily, there are some best practice firms that have incorporated risk into their strategic planning process. By extending their time horizon and seeking out alternative perspectives as they analyze their risk profile, this creates a competitive advantage. Current challenges like low interest rates may create an opportunity to identify bubbles and other mispriced assets and liabilities by being skeptical. Perhaps some companies have learned from past experience, where funding liquidity risk was accepted since models and capital requirements ignored the risk.

As this report is being written in early 2013 the Middle East is stressed, with Syria in civil war and Iran causing international controversy over its nuclear program. Cyber hacking is increasingly 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. Perhaps the largest risk is that of uncertain government regulation.

## 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. The North American based CRO Council was also invited to participate. A total of 219 responses were received. This represents greater than 5% of completed surveys relative to the number distributed (over 2,500 to JRMS) and represents an increase over previous research. This is the sixth 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, November 2010 and October 2011. This year's survey was conducted in October 2012. For background purposes, articles and previous research reports can be found at:

All surveys and articles

<http://www.soa.org/research/research-projects/risk-management/research-2012-emerging-risks-survey.aspx>

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/research/research-projects/risk-management/research-2009-emerging-risks-survey.aspx>

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>

November 2011

- Research report <http://www.soa.org/research/research-projects/risk-management/research-2011-emerging-risks-survey.aspx>

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](http://www.weforum.org) . The 23 risks utilized in this survey are described in detail in Appendix I. They differ slightly from some previous years as Infectious disease was combined with Pandemics, and Financial volatility was added. Demographics was moved from the Economics category to Societal to better reflect its impact. There were no changes in the current year. Each risk has been categorized as either Economic (5 risks), Environmental (5), Geopolitical (7), Societal (4) or Technological (2). The current survey continues its evolution, adding and subtracting a few questions while leaving the core of the survey intact. Responses to open ended questions are edited only for obvious spelling corrections.

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 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 228 anonymous 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 (but not always) excluded from percentages. In addition, many questions allowed or sought out comments and examples. As always, this was the most thought provoking part of the survey.

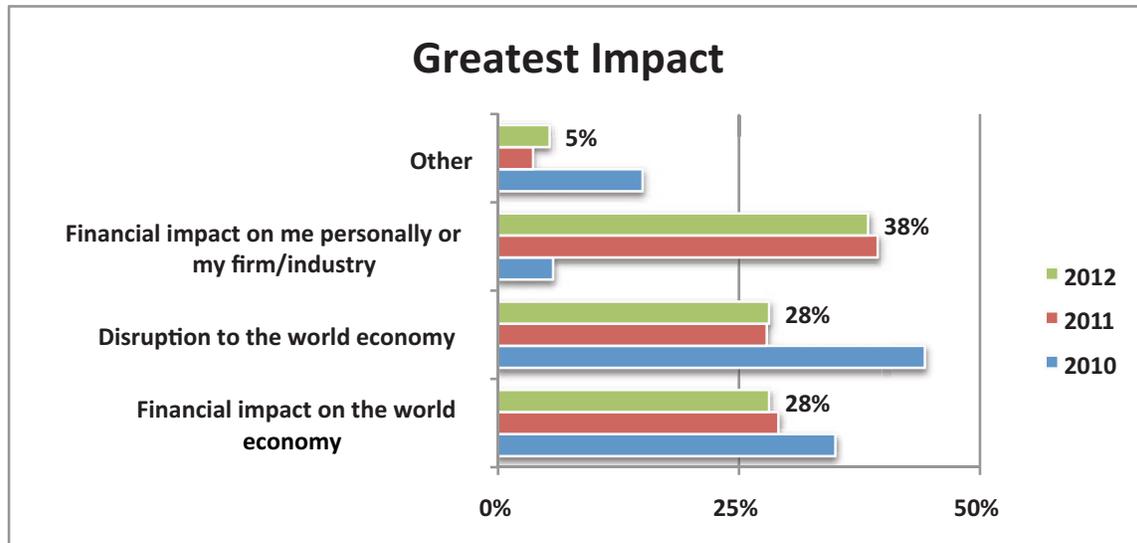
### ***Introductory Questions***

Previous emerging risk surveys found that recent events have an anchoring effect on responses. Anchoring was first described by Daniel Kahneman and Amos Tversky during their work developing prospect theory, with Kahneman awarded the 2002 Nobel Prize in Economics. A recent event, real or random, anchors the respondent's thoughts and makes similar events seem more likely in the future. For example, the 2008 survey results had a high concentration within the Economic risk category that seemed to scale back as time passed from the financial crisis. The Mumbai terrorist attack in November 2008 provided a striking example. It occurred while the survey was open and impacted the remaining surveys. Oil prices have been another indicator, and in 2011 the Arab Spring events seem to have impacted the results. Unfortunately this survey closed before Hurricane Sandy struck in the northeast US, or another useful data point would have presented itself. Risk managers who keep this bias in mind are better able to overcome it through awareness. The survey also looks at averages and trends across multiple 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. The answer most commonly reported in the survey relates to the financial impact on the individual/firm/industry (38%), with financial impact (28%) 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 and broader consequences than expected.

- 28% (29% 2011 survey)      Financial impact on the world economy
- 28% (28%)                      Disruption to the world economy
- 38% (39%)                      Financial impact on me personally or my firm/industry
- 5% (4%)                         Other

An interesting response in the *Other* category was “Disruption in my grandchildren's wellbeing”. This would be a good way to live life in general.



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.

Definitions of the 23 risks are provided in Appendix I but they are also listed here for convenience.

#### **Economic Risks**

- Oil price shock
- Fall in value of US dollar
- Chinese economic hard landing
- Blow up in asset prices
- Financial volatility

#### **Environmental Risks**

- Climate change
- Loss of freshwater services
- Natural Catastrophe: Tropical Storms
- Natural Catastrophe: Earthquakes
- Natural Catastrophe: Inland Flooding

#### **Geopolitical Risks**

- International Terrorism
- Proliferation of Weapons of Mass Destruction
- Interstate and civil wars
- Failed and failing states
- Trans-national crime and corruption

- Retrenchment from globalization
- Regional instability

### **Societal Risks**

- Pandemics/Infectious disease
- Chronic diseases
- Demographic shift
- Liability Regimes

### **Technological Risks**

- Cyber security/Interconnectedness of infrastructure
- Technology/Space weather

The 23 emerging risks used in this iteration of the survey were reviewed and left unchanged from 2011. 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 seems more consistent with a shorter time horizon than used here. Several changes have been made in the list since 2008 as suggestions are made and risks evolve. For example, *Financial volatility* was added as a risk in the 2011 survey. Incorporating drought conditions and inland storms will be considered for the 2013 survey.

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

- |                 |                   |
|-----------------|-------------------|
| • Economic      | 50% (51% in 2011) |
| • Environmental | 7% (2%)           |
| • Geopolitical  | 25% (23%)         |
| • Societal      | 5% (8%)           |
| • Technological | 5% (5%)           |
| • Other         | 7% (11%)          |

The Economic category continued as the top choice, receiving just over half of the support as *Financial volatility* risk dominated the other choices. Environmental risk rebounded to 7% of responses, and the Societal category dropped off from the previous survey (8%) to 5%.

Many of the “other” responses were associated with government intervention, whether it was the EU crisis, debt levels or changing and uncertain regulation. Additional responses expressed concern with a low interest rate scenario and natural catastrophes. All but one of the risks (*Natural catastrophe: Inland flooding*) was chosen by at least one survey respondent.

The top choices were

- 26% *Financial volatility*
- 12% *Blow up in asset prices*
- 8% *Failed and failing states*
- 7% *Regional instability*
- 5% *Oil price shock*
- 5% *Cyber security/Interconnectedness of infrastructure*

Of the Economic risks, only *Fall in value of US \$ and Chinese economic hard landing* fell outside the top 6 (barely).

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

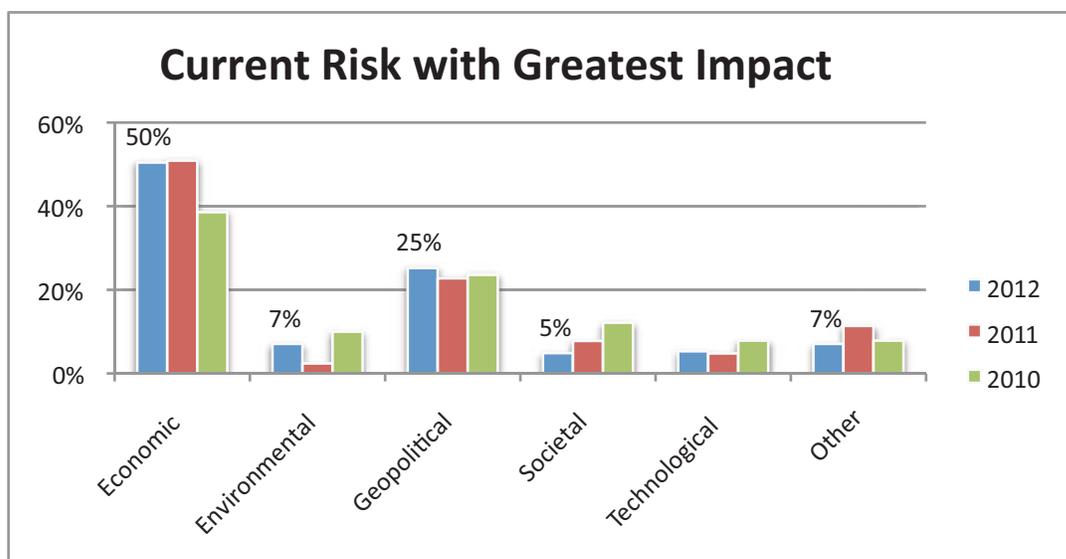
- *Fall in value of US \$ (from 2% to 4%)*
- *Blow up in asset prices (from 7% to 12%)*
- *Climate change (from 1% to 3%)*
- *Loss of freshwater services (from 1% to 3%)*
- *Proliferation of weapons of mass destruction (from 1% to 3%)*

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

- *Financial volatility (from 32% to 26%)*
- *Retrenchment from globalization (from 2% to 1%)*
- *Pandemics/infectious diseases (from 4% to 2%)*
- *Demographic shift (from 3% to 1%)*

The Geopolitical category results are very interesting. Despite both risks ranking in the top four, *Regional instability* materially increased while *Failed and failing states* fell back. This category especially seems to be anchored by current events, and in late 2012 Syria, along with Iran and its nuclear ambitions, were headlining the news, while Egypt had not yet erupted.

The Economic category also showed some movement within its five risks. *Financial volatility and Chinese economic hard landing* gave ground to *Oil price shock, Fall in value of US \$ and Blow up in asset prices* while overall remaining steady.



## Section 1: Emerging Risks

### Top 5: Geopolitical increases but Economic category leads

After asking which risk has the current greatest impact, 228 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. By 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. In 2011 events included the Japanese tsunami and nuclear disaster, the Arab Spring, and the evolving European debt crisis. The current survey continues to move further away from the financial crisis, but tensions in the Middle East (Syria, Iran) continue. Hurricane Sandy occurred since the survey closed so is not reflected here. There is never a dull moment, and a crisis is really not that unusual.

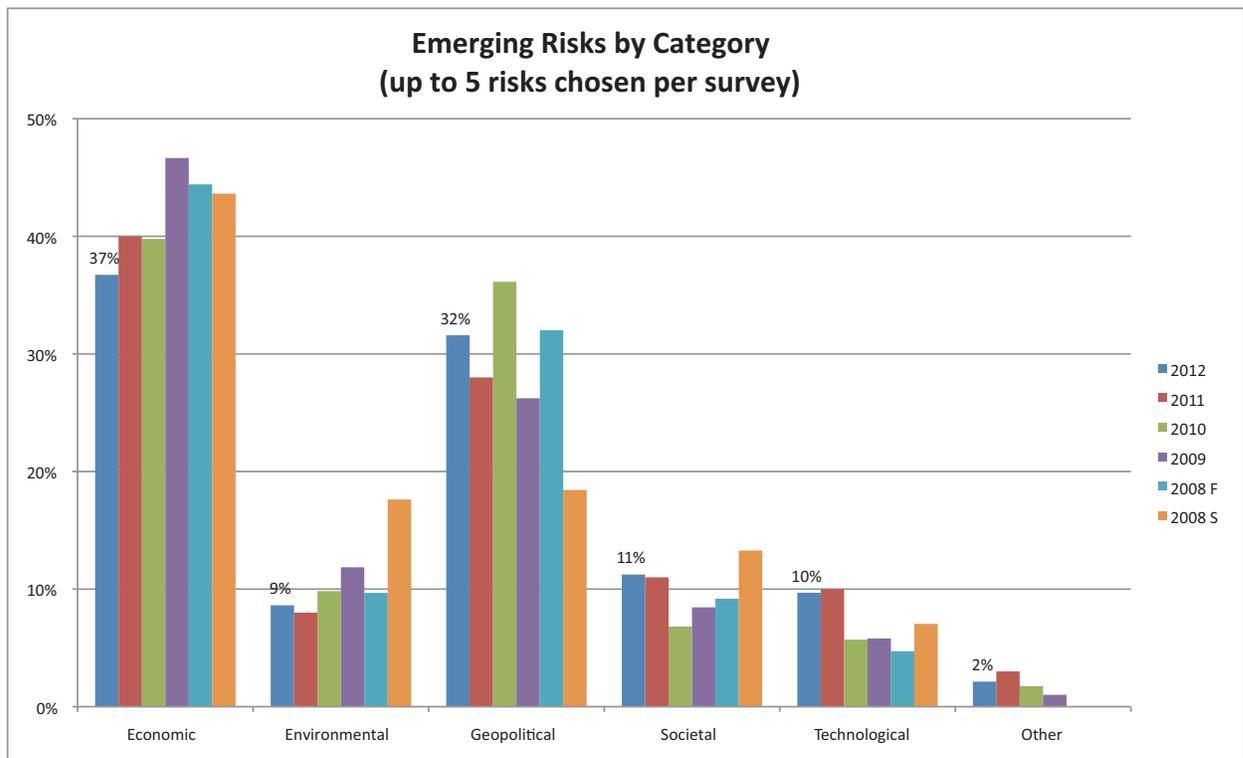
Not all respondents chose to list five risks. While 78% shared the maximum five risks, the average was 4.53, up from 4.26 a year earlier. Percentages in this survey are based on the number of respondents who answered the specific survey question. This allows consistent comparison with previous and subsequent survey iterations. For example, 219 respondents answered Question 1 and 67 included *Blow up in asset prices* as one of their (up to 5) responses. Thus 31% ( $67/219 = 0.31$ ) 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 1,032 responses were received, including 22 (2%) in the Other category. The results distributed by category (using percentages of total responses) are:

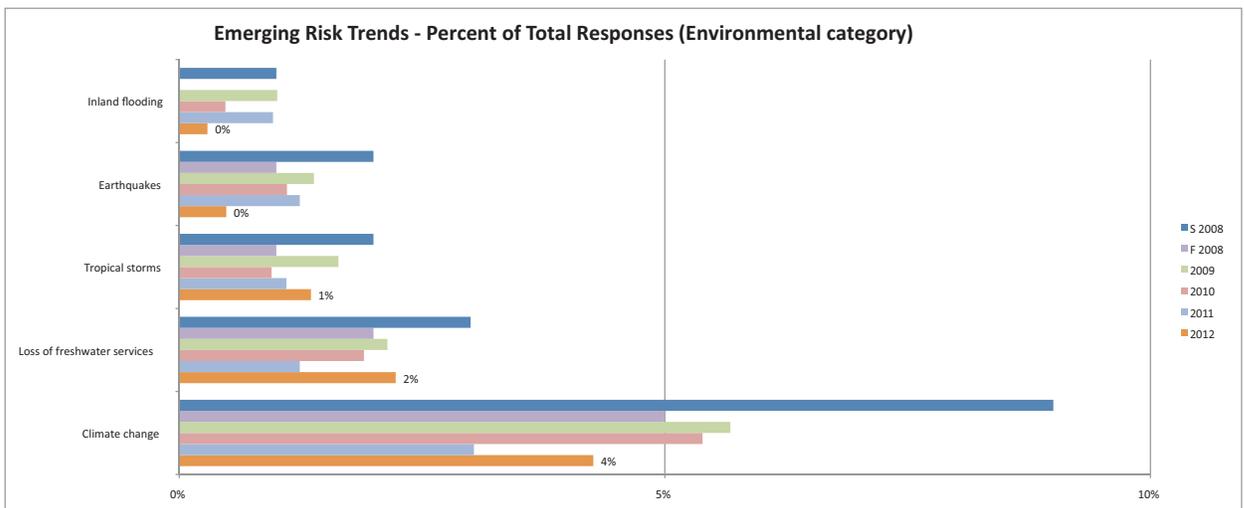
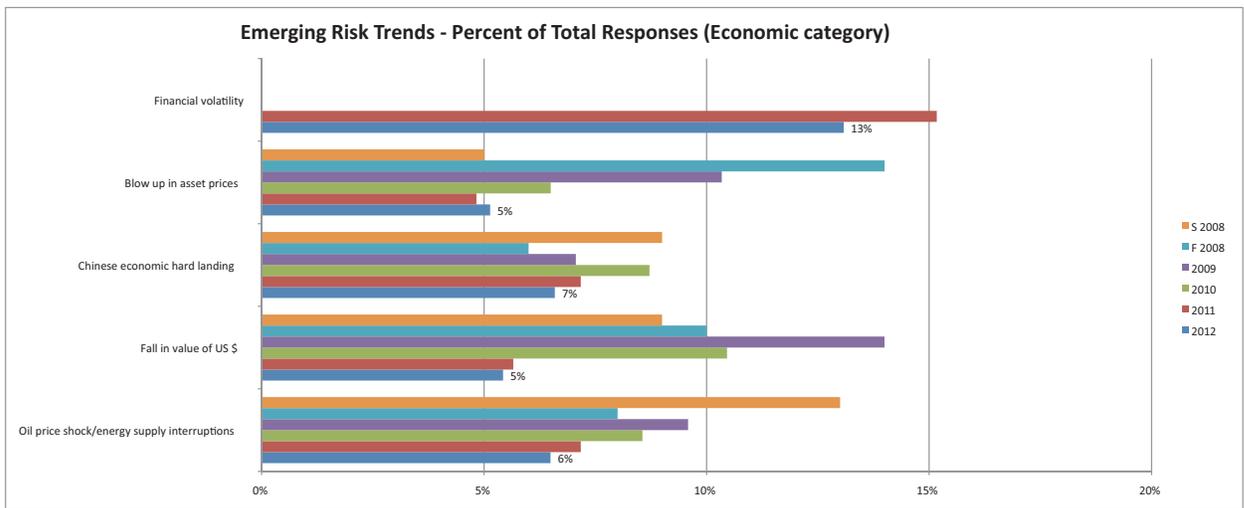
1. Economic 37% (40%/40%/47%/44%/44% in past surveys with most recent listed first)
2. Geopolitical 32% (28%/36%/26%/32%/18%)
3. Societal 11% (11%/7%/8%/9%/13%)
4. Technological 10% (10%/6%/6%/5%/7%)
5. Environmental 9% (8%/10%/12%/10%/18%)

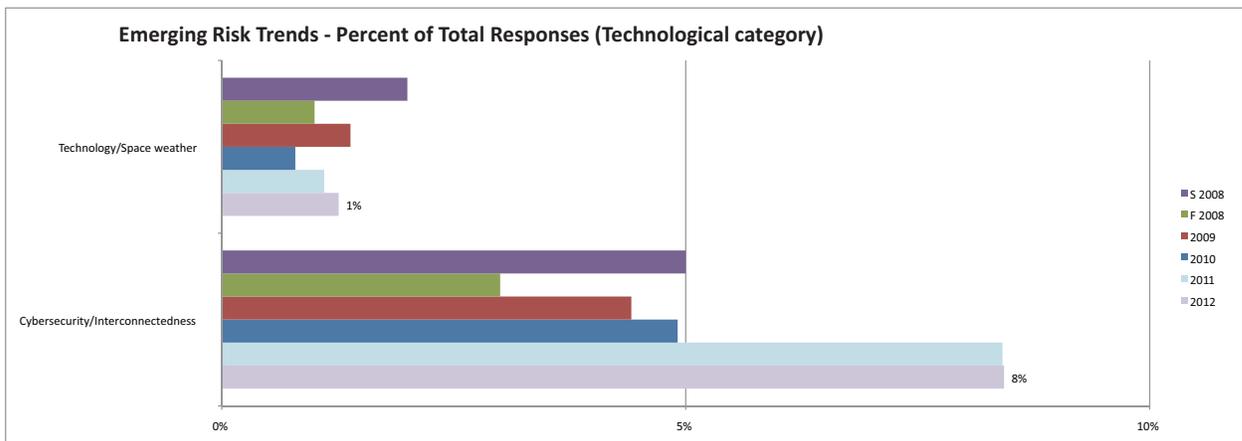
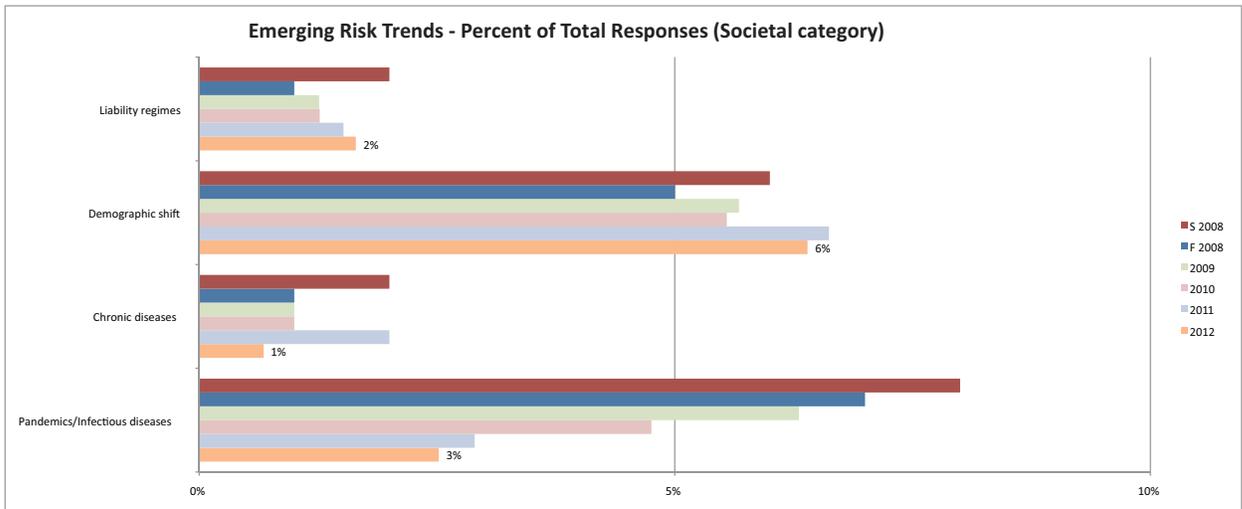
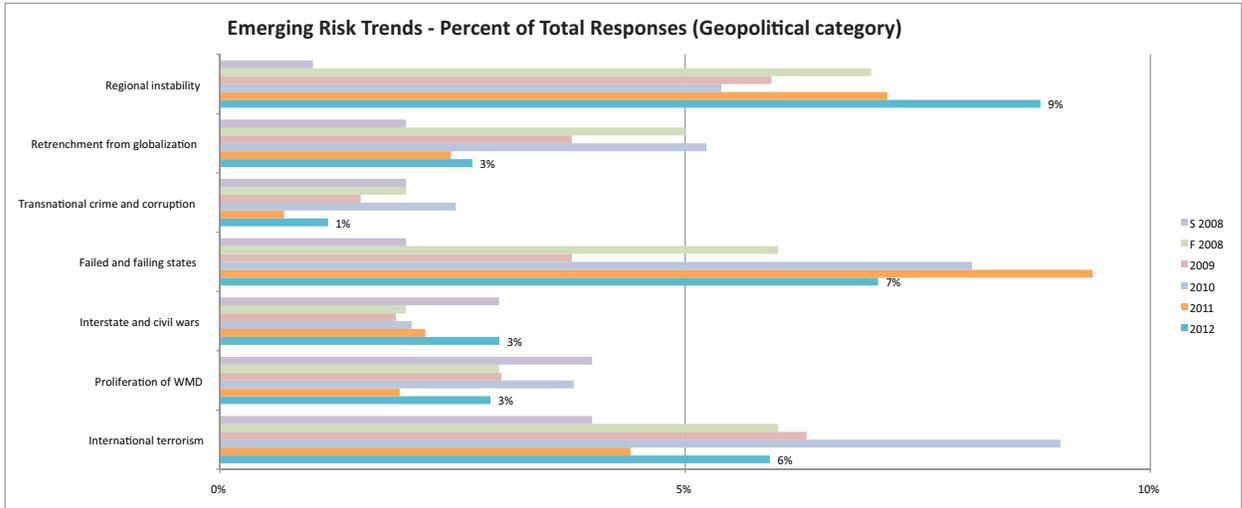
Across the six surveys to date this is the smallest response yet for the Economic category and ties the highest recorded by Societal and Technological. This could reflect burnout of the anchoring effect tied to the 2008 financial crisis or a broader cohort of respondents.



The Geopolitical category saw surges in *International terrorism, Proliferation of weapons of mass destruction (WMD), Interstate and civil wars, and Regional instability*. This category continues to be volatile from year to year. The chart shows that Economic and Geopolitical risks remain the highest and recent trends are found there too. Within the Economic category, *Financial volatility* risk remained the top choice overall and *Chinese economic hard landing* was fifth. The other category with two of the top five emerging risks in 2012 was Geopolitical, with *Regional instability* at #2 and *Failed and*

*failing states* at #4. Societal and Technological risks maintained their 2011 increases. Increasing trends (at least 2 consecutive years) include *Natural catastrophe: Tropical storms, Regional instability, Liability regimes, Cyber security/interconnectedness of infrastructure, and Technology/space weather*. Decreasing trends included *Oil price shock, Chinese economic hard landing, and Pandemics/Infectious diseases*. Some categories rebounded materially after falling in the previous survey. These included *Blow up in asset prices, Climate change, Loss of freshwater services, International terrorism, Proliferation of weapons of mass destruction (WMD), Transnational crime and corruption, and Retrenchment from globalization*. Dropping after a strong increase in the last survey were *Natural catastrophe: Inland flooding and Failed and failing states*. Last year's river flooding in the US and the tsunami in Japan, along with the Arab Spring, appear to have driven some of the results in 2011.





The top five 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. Multiple responses were encouraged, up to 5.

The percentages shown here use the number of respondents in the divisor, so 62% shows how many included that risk as one of the five chosen.

- |                      |  |
|----------------------|--|
| 1. 62% (68% in 2011) | <i>Financial volatility</i>                                |
| 2. 42% (32%)         | <i>Regional instability</i>                                |
| 3. 40% (38%)         | <i>Cyber security/interconnectedness of infrastructure</i> |
| 4. 33% (42%)         | <i>Failed and failing states</i>                           |
| 5. 31% (32%)         | <i>Chinese economic hard landing</i>                       |

One of the most interesting results of this year's survey relative to previous years is the changes within the Geopolitical and Societal categories. Some risks even reversed last year's changes. Within the Environmental category, *Climate change* rebounded to 20% from a low of 14% in 2011. *Loss of freshwater services* nearly doubled from 6% to a new high of 11%. These increases came at the expense of *Natural catastrophe: Earthquakes*, with a 2% response down from 6% last year and previous low of 5%, and *Natural catastrophe: Inland flooding*, recording 1% versus last year's 4% for a new record low. Events in 2011 like the Japanese tsunami appear to have faded into memory, replaced by news of melting ice caps and reports of drought.

The Geopolitical category, similarly driven by events surrounding the Arab Spring in 2011, now appear to be reacting to increased tensions in the Middle East and the Eurozone crisis. *Failed and failing states* was the only risk in this category to drop (42% to 33%), while increases were recorded by *Regional instability* (32% to 42%), *International terrorism* (20% to 28%), *Proliferation of weapons of mass destruction* (9% to 14%), *Transnational crime and corruption* (3% to 5%), *Retrenchment from globalization* (11% to 13%), and *Interstate and civil wars* (10% to 14%).

The *Cyber security/interconnectedness of infrastructure* (38% to 40%) response continues its march upwards, and remains in third place.

Within the Societal category the results were stable, with *Demographic shift* (30%) and *Pandemics/Infectious diseases* (12%) with double digit responses.

Responses that fell for at least two consecutive years were *Oil price shock* (32% to 31%) and *Chinese economic hard landing* (32% to 31%). Despite the reductions they 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. In general the results seem to be more spread out in 2012 than in previous years.

Most of the Other responses to Question 1 in this Section referenced in some way the public debt crisis, either specifically mentioning European sovereign debt or generically including all government debt and the changing regulatory environment. In addition, food shortages/cost, food security, soil degradation/reduced carrying capacity focused on the results of risk interactions. One response pointed out a shortcoming of the survey's choices of emerging risks by suggesting that *Natural catastrophe: Tropical storms* should

incorporate all storms, meaning inland convection storms as well. The researcher notes that drought should be incorporated into the survey more clearly as well.

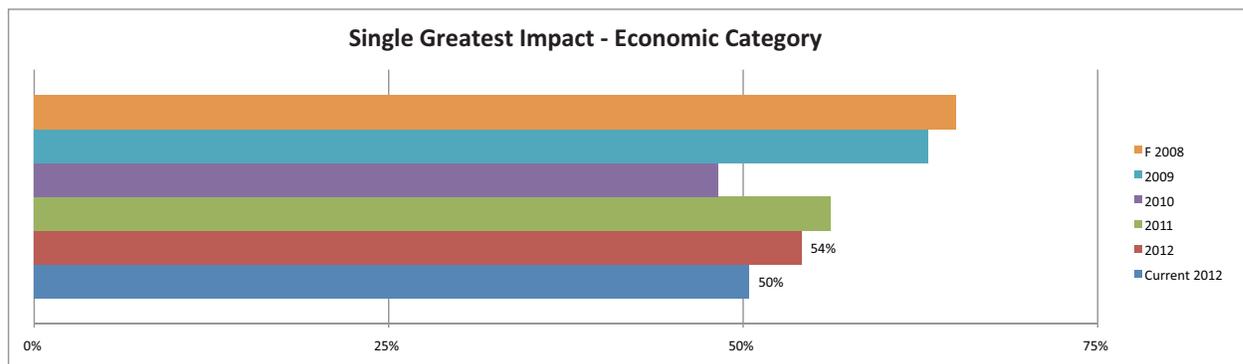
One method to analyze this data over time is to highlight those risks reported in the current survey above their long-term averages. For this purpose the data were analyzed with responses as a percentage of all responses, rather than as a percentage of surveys collected. Of the five primary categories, three were higher than their average over the six survey cycles. Geopolitical (32% vs. 29% average), Societal (11% vs. 10% average) and Technological (10% vs. 7% average) all satisfied this criteria. Among individual risks, only five of the 23 beat their average. The greatest differential was 3% for *Regional instability*. For the second year, eleven are trending below the average, led by a 4% below average result for *Fall in value of US \$* (leader for the second consecutive year). Four of the five risks are below their long term average for the Economic category, while the Geopolitical category has three out of seven above their longer term average.

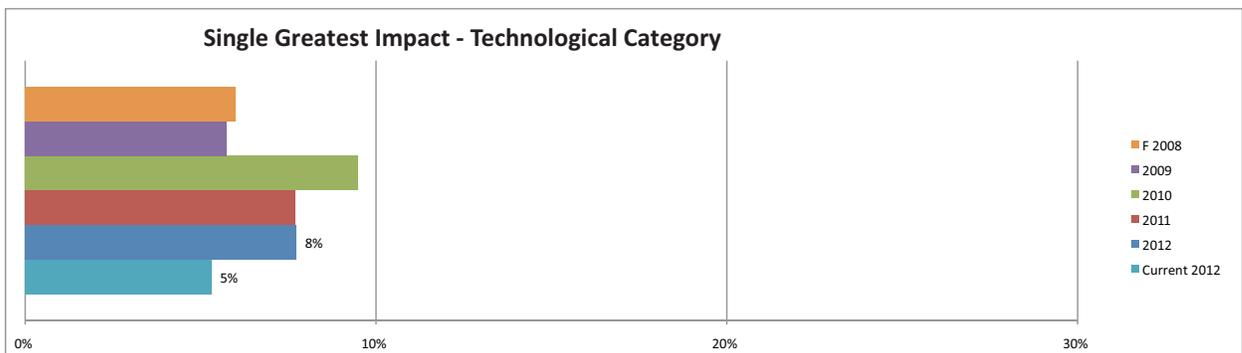
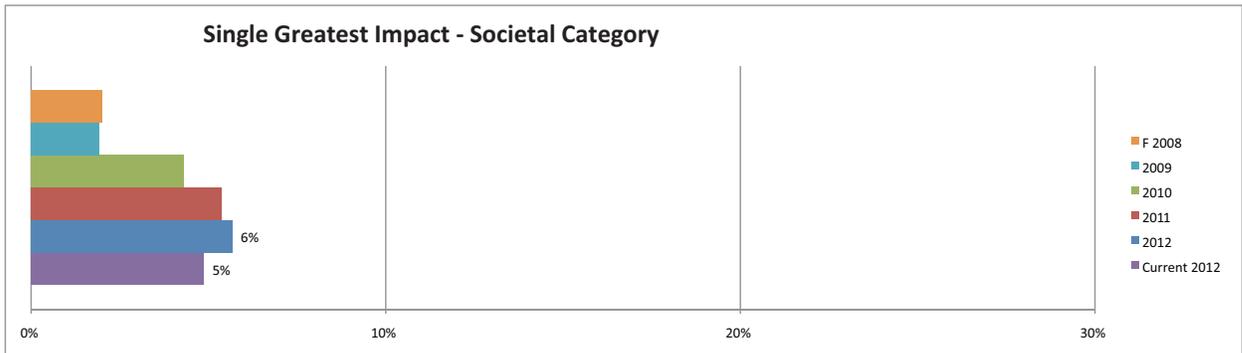
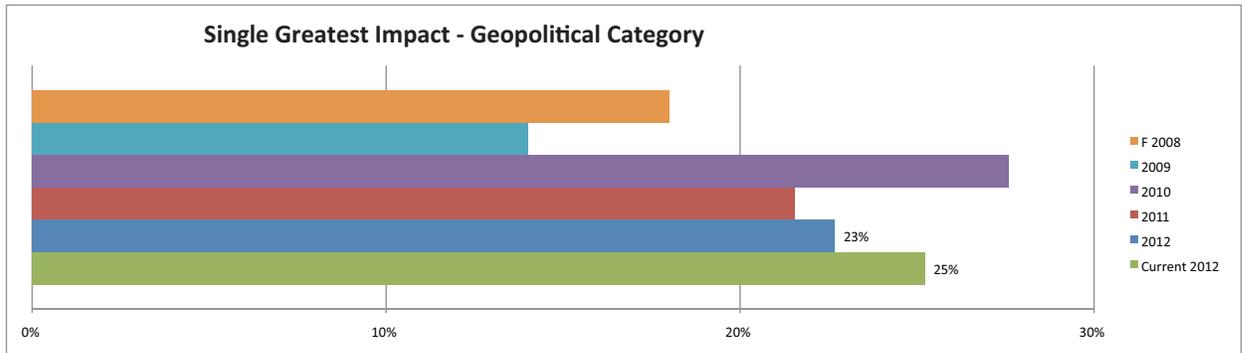
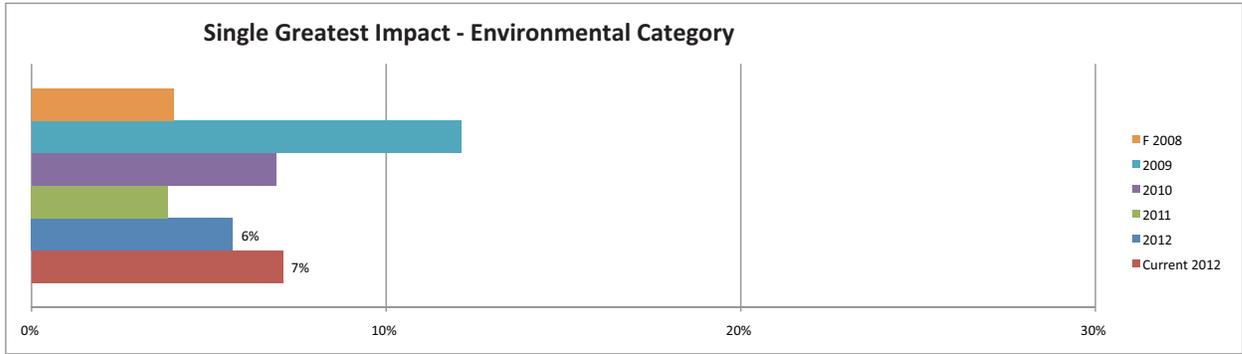
### Top Emerging Risk: *Financial volatility*

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 a distant second. Technological risks maintained the third spot, with the Societal and Environmental categories in a tie for the final two positions. The overall results were consistent with the prior survey.

1. 54% (56%/48%/63%/65%) Economic
2. 23% (22%/28%/14%/18%) Geopolitical
3. 8% (8%/9%/6%/6%) Technological
4. 6% (5%/4%/2%/2%) Societal
5. 6% (4%/7%/12%/4%) Environmental

In the accompanying charts, 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 Economic, Environmental, and Geopolitical categories as might be expected by the anchoring theory of behavioral finance. Only the Societal category, with risks that take longer to play out like *Demographic shift*, and Technological did not follow this trend.



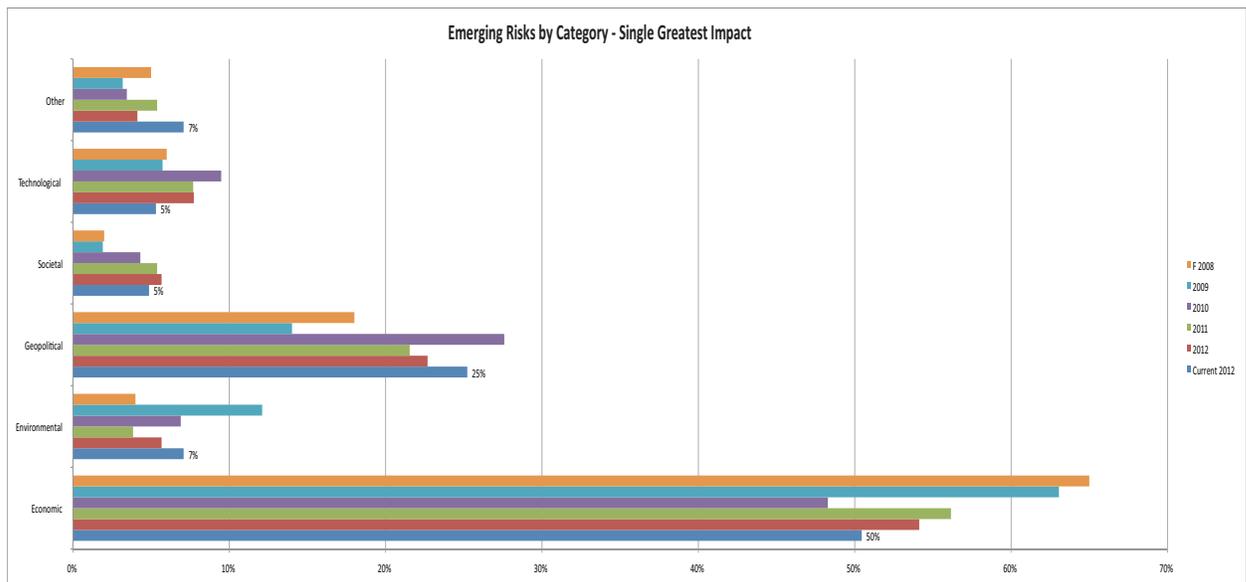


The same bifurcation occurs here in the Geopolitical category that was seen in Question 1, with *Failed and failing states* moving up to the second overall rank and *Regional instability* also showing a strong increase, while others in the category decreased.

*Financial volatility* is the risk that respondents are most worried about, and again dominated with 28% (down from 40%) of the responses.

The Economic and Geopolitical categories each had two of the top five specific responses, along with *Cyber security/interconnectedness of infrastructure* in a tie for fourth. Results were less concentrated in this survey than last year, with only 37% explained by the top two responses and 59% by the top 5. Respondents seem less panicked about the immediate future than they were last year. While there is still great uncertainty in the markets and regionally, the broader results seem to signal that risk managers feel they can work through these issues. Time will tell if this interpretation is correct. Interestingly, the major risk increases fell to three risks, *Fall in value of US \$* (2% to 7%), *Blow up in asset prices* (6% to 9%), and *Climate change* (2% to 5%). All had been falling in recent surveys. *Cyber security* threats continue in the minds of risk managers, maintaining a 7% response rate.

1. 28% (40% in 2011) *Financial volatility*
2. 9% (6%) *Blow up in asset prices*
3. 8% (12%) *Failed and failing states*
- 4T. 7% (7%) *Cyber security/interconnectedness of infrastructure*
- 4T. 7% (4%) *Regional instability*



## Risk Combinations

As we saw in the period leading up to the financial crisis, and ongoing regional tensions throughout the world, no one can fully understand all of the interactions between risks and how it will all play out. Examples might be interactions between the sovereign debt crisis in Europe and a natural disaster stressing freshwater availability, 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 does 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 bureaucratic 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 tsunami led to supply chain stress scenarios that had not previously been considered.

In Question 3 of Section 1, risk combinations are considered. These results can be looked at from several perspectives. Each respondent could choose up to three combinations of two risks. Respondents were asked to list their top combination first for a follow-up question. 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 (46%) and Geopolitical (32%) are the most frequent response categories when identified in isolation. There was movement toward the Environmental and Societal categories, while the Technological category gave back some of its gains from last year.

- |              |               |
|--------------|---------------|
| 1. 46% (48%) | Economic      |
| 2. 32% (32%) | Geopolitical  |
| 3. 9% (7%)   | Environmental |
| 4. 7% (6%)   | Societal      |
| 5. 5% (7%)   | Technological |

Individual risks were led by the same major categories. *Financial volatility* as the top response was included 15% of the time, with *Oil price shock* (9%) the second most frequent response.

- |                      |                                      |
|----------------------|--------------------------------------|
| 1. 15% (19% in 2011) | <i>Financial volatility</i>          |
| 2. 9% (9%)           | <i>Oil price shock</i>               |
| 3. 8% (9%)           | <i>Failed and failing states</i>     |
| 4. 8% (6%)           | <i>Blow up in asset prices</i>       |
| 5. 7% (8%)           | <i>Chinese economic hard landing</i> |
| 6. 7% (7%)           | <i>Regional instability</i>          |

While *Financial volatility* dominates the combination category as it does when considering individual risks, several other risks had small increases. *Blow up in asset prices*, *Climate change*, and *Proliferation of weapons of mass destruction (WMD)* each increased by 2%, with the latter two doubling from 2% to 4%. *Financial volatility* was the only risk that dropped by 2% or more, with a 4% decrease. It is interesting to see that *Oil price shock*, which continues to receive less attention as an isolated risk, moved up to second place when considering its importance in combination with other risks. The risk combinations chosen show a broader dispersion, so a risk like *Cyber security/interconnectedness of infrastructure* that dropped from 6% to 5% continues to show

strength relative to its earlier response rates of 3% and lower. *Financial volatility* is one of the risks chosen for five out of the top six combinations. In order, its five companion risks are *Oil price shock*, *Blow up in asset prices*, *Chinese economic hard landing*, *Failed and failing states*, and *Fall in value of US \$*. The top two combinations not to include *Financial volatility* were *International terrorism/Proliferation of weapons of mass destruction (WMD)* in 3<sup>rd</sup> and *Fall in value of US \$ and Chinese economic hard landing* (7<sup>th</sup>).

The major category combinations were

- |                         |                               |
|-------------------------|-------------------------------|
| • 29% (29%/29%/42%/34%) | Economic – Economic           |
| • 21% (24%/21%/16%/22%) | Economic – Geopolitical       |
| • 18% (14%/20%/14%/16%) | Geopolitical – Geopolitical   |
| • 6% (6%/2%/3%/2%)      | Economic – Societal           |
| • 6% (4%/7%/9%/7%)      | Environmental – Environmental |
| • 4% (7%/3%/2%/1%)      | Geopolitical – Technological  |
| • 3% (4%/3%/1%/1%)      | Economic – Technological      |
| • 3% (3%/5%/3%/2%)      | Economic – Environmental      |
| • 2% (1%/2%/1%/2%)      | Societal – Societal           |
| • 2% (2%/3%/2%/2%)      | Environmental – Geopolitical  |
| • 2% (1%/2%/2%/4%)      | Geopolitical – Societal       |
| • 1% (2%/2%/3%/5%)      | Environmental – Societal      |
| • 1% (1%/<1%/1%/<1%)    | Technological – Technological |
| • 1% (0%/1%/<1%/1%)     | Societal – Technological      |
| • <1% (<1%/0%/<1%/0%)   | Environmental – Technological |

The combinations of the Economic and Geopolitical categories retained the top three positions. Increasing this year were concentrated positions, with Geopolitical-Geopolitical moving from 14% to 18% and Environmental-Environmental, up from 4% to 6% and improving its relative position. Reductions were seen for Economic-Geopolitical (24% to 21%) and Geopolitical-Technological (7% to 4%). Every potential combination received at least one vote in this year's survey.

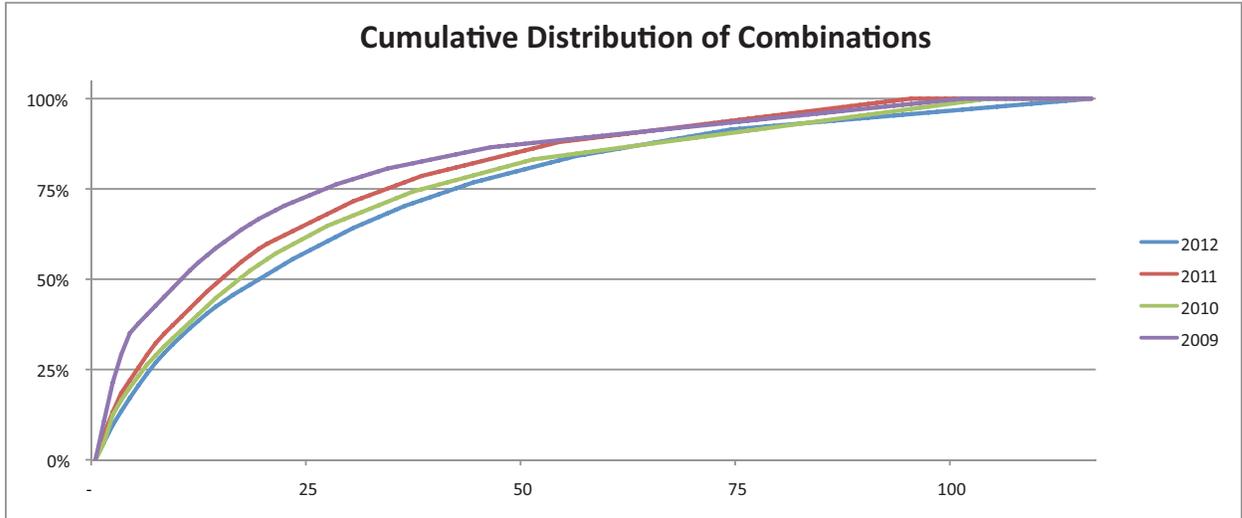
Leading combinations among the 491 responses were (top 10 are listed, including ties)

1. 24 responses
  - *Financial volatility*
  - *Oil price shock*
2. 23 responses
  - *Blow up in asset prices*
  - *Financial volatility*
3. 19 responses
  - *International terrorism*
  - *Proliferation of weapons of mass destruction (WMD)*
4. 18 responses

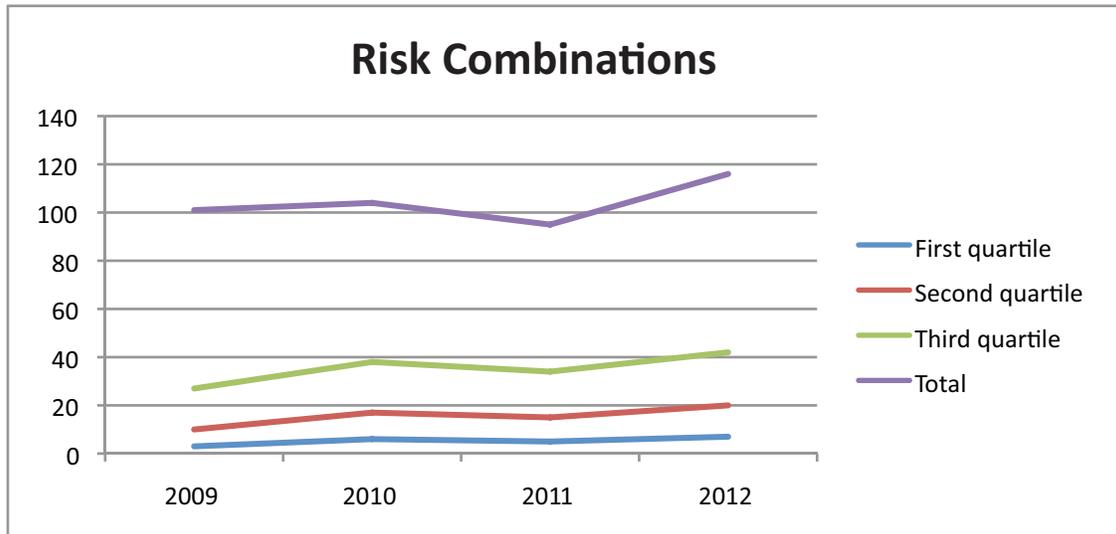
- *Chinese economic hard landing*
  - *Financial volatility*
5. 17 responses
    - *Failed and failing states*
    - *Financial volatility*
  6. 16 responses
    - *Fall in value of US \$*
    - *Financial volatility*
  7. 15 responses
    - *Fall in value of US \$*
    - *Chinese economic hard landing*
  8. 13 responses
    - *Failed and failing states*
    - *Regional instability*
  9. 12 responses
    - *International terrorism*
    - *Cyber security/interconnectedness of infrastructure*
  10. 11 responses
    - *Oil price shock*
    - *Fall in value of US \$*
  10. 11 responses
    - *Fall in value of US \$*
    - *Blow up in asset prices*

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 regional food 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 risks such as *Demographic shift* when it so clearly exacerbates other risk combinations potentially tied to food and other resource shortages.

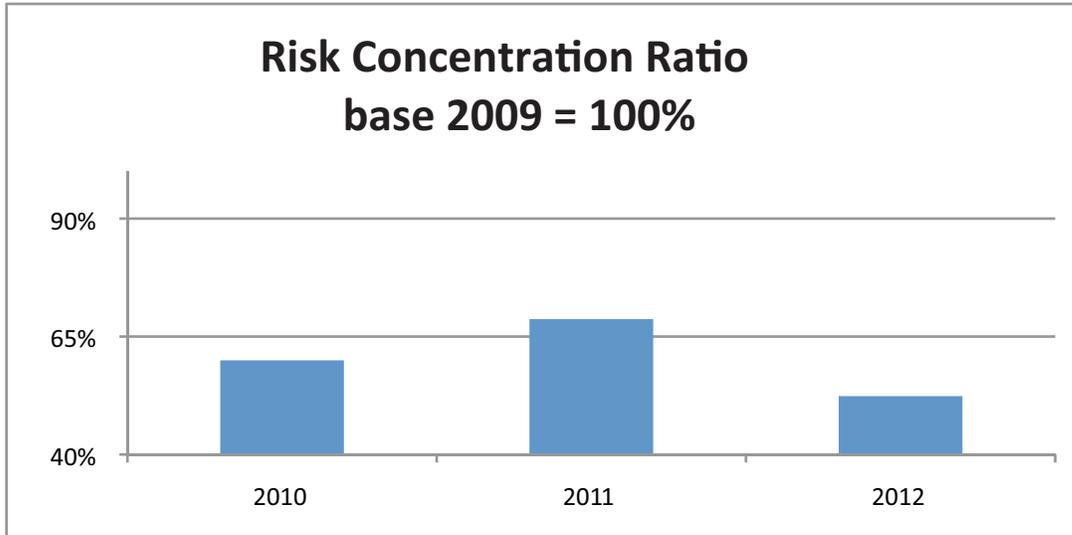
Responses were much less concentrated than in recent surveys. This year provided the broadest range seen for this question, with more risk combinations chosen (116 versus 95/104/101/75 in previous surveys).



There are 253 possible risk combinations. Except for 2011, the trend has been toward a reduced concentration. The outlier last year seems to be a result of the major events occurring in 2011; sovereign debt crisis, Japanese earthquake/tsunami, and Arab Spring. By quartile, with data listed cumulatively and first quartile representing the most frequent responses, results were presented in the following graph. This presents a trend that will continue to be monitored and analyzed.



This may be an indicator of the current risk environment, with each quartile being considered against the extreme example of 2009. This year's Risk Concentration Ratio of 52% is much less worrisome than last year's 69%. Risk managers were not nearly as stressed during this year's survey.

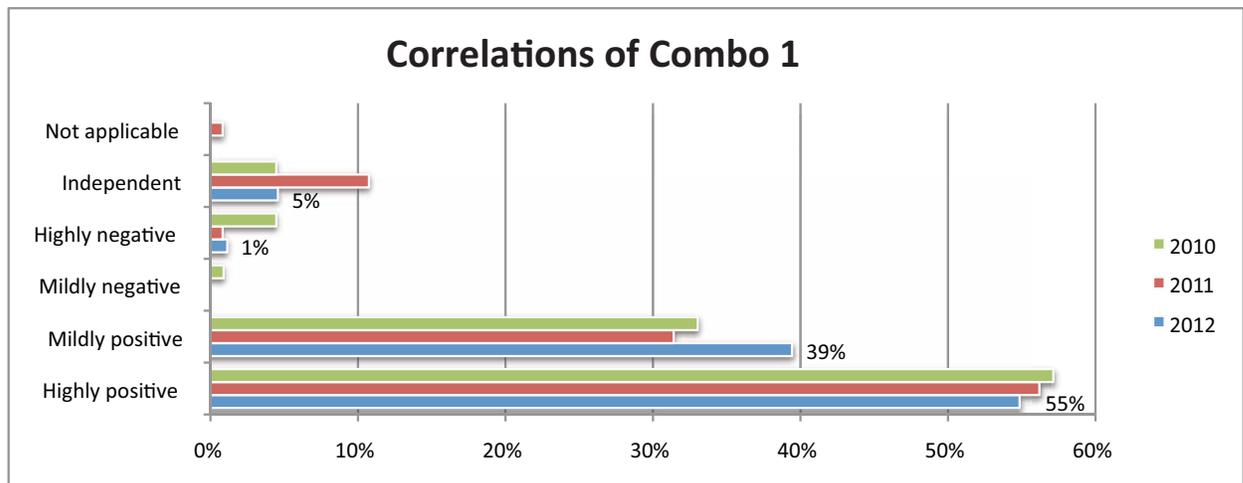


The next chart shows the responses in the order they were chosen. A follow up question referred to Combination 1 so it is reasonable to assume that it is the risk manager's first choice. We generally observe that the Economics category is more commonly included in the first option while the other categories become relatively more prevalent in later choices. It may be that risk managers are anchored in current events for the first choice and Combos 2 and 3 might provide more forecasting credibility.

		Combo 1	Combo 2/3
Economics	Economics	36%	29%
Economics	Environmental	4%	3%
Economics	Geopolitical	25%	21%
Economics	Societal	5%	6%
Economics	Technological	2%	3%
Environmental	Environmental	3%	6%
Environmental	Geopolitical	2%	2%
Environmental	Societal	1%	1%
Environmental	Technological	0%	0%
Geopolitical	Geopolitical	16%	18%
Geopolitical	Societal	2%	2%
Geopolitical	Technological	2%	4%
Societal	Societal	1%	2%
Societal	Technological	1%	1%
Technological	Technological	0%	1%

Respondents were asked the level of correlation for the two risks in Combo 1. Along with 94% of responses that reported either highly or mildly positively correlated (up from 87% in 2011), the independent response decreased from 11% to 5%. Respondents are considering the potential interactions between risks and how that impacts events. Last year's results appear to be the outlier, as 2010 reported 90% correlated and 4%

independent. Only 1% felt the combinations of risks were highly negatively correlated. It does appear that the results are trending away from the highly positively correlated response to one of mildly positively correlated.



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.

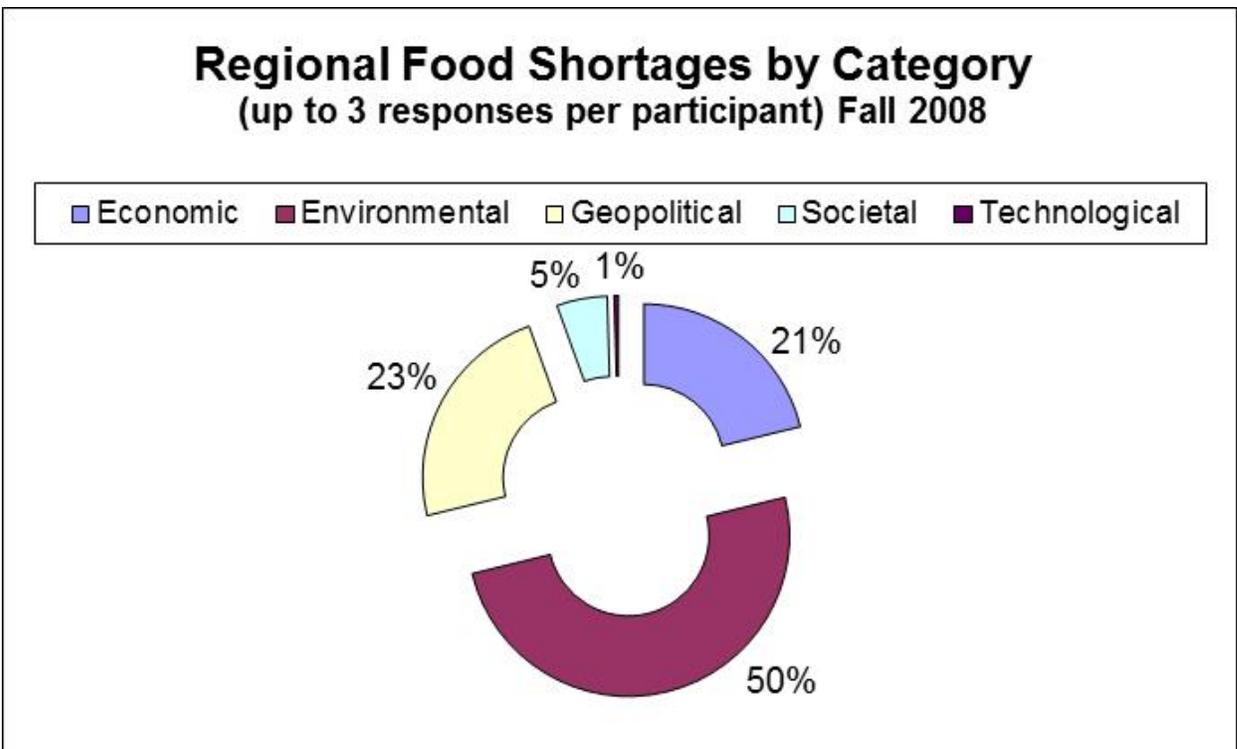
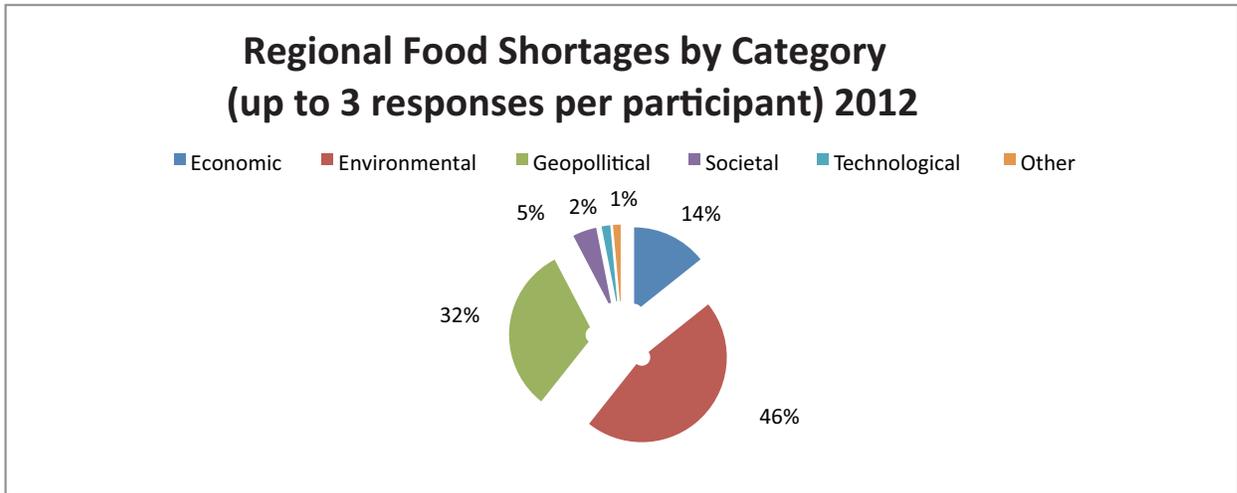
Sometimes it is not clear if there is causality or not. In 1923 the Kanto earthquake in Japan was accompanied by a simultaneous typhoon that fanned flames and created one of the most deadly events of all time. Some have even theorized that the typhoon’s low pressure created conditions favorable to setting off an earthquake.

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, political instability, and resource shortages (food, commodities, water and energy). In this survey we circled back to regional food shortages to see if the topic’s perceptions had changed. Respondents included up to three risks, and 174 respondents chose 483 responses (2.8 per). Results focused on the Environmental and Geopolitical categories, with the leading response 46% from Environmental.

1. 46% Environmental
2. 32% Geopolitical
3. 14% Economic
4. 5% Societal
5. 2% Technological

The top two specific risks chosen were *Climate change* (18% vs. 18% in Fall 2008) and *Loss of freshwater services* (13% vs. 14%). Rounding out the top 5 were *Regional instability* (11% vs. 1%), *Natural catastrophe: Inland flooding* (9% vs. 11%), and *Oil price shock* (9% vs. 13%). The primary difference from the Fall 2008 survey when the question was first posed is the increase in the *Regional instability* response. This caused the overall survey to shift to the Geopolitical category from Environmental and especially

from the Economic category. In the Economic category drop-offs occurred in the *Oil price shock* and *Chinese economic hard landing* risks. This could be a result of the role food shortages played in the Arab Spring.



There were seven write-in responses: government spending, continued quantitative easing, animal food production, population increase, droughts, unsustainable agricultural practices (monoculture), and financial speculation. While one could argue that many of these responses could have been represented by the 23 options, these comments provide a good cross-section of the issues that risk managers are worried about when considering regional food shortages.

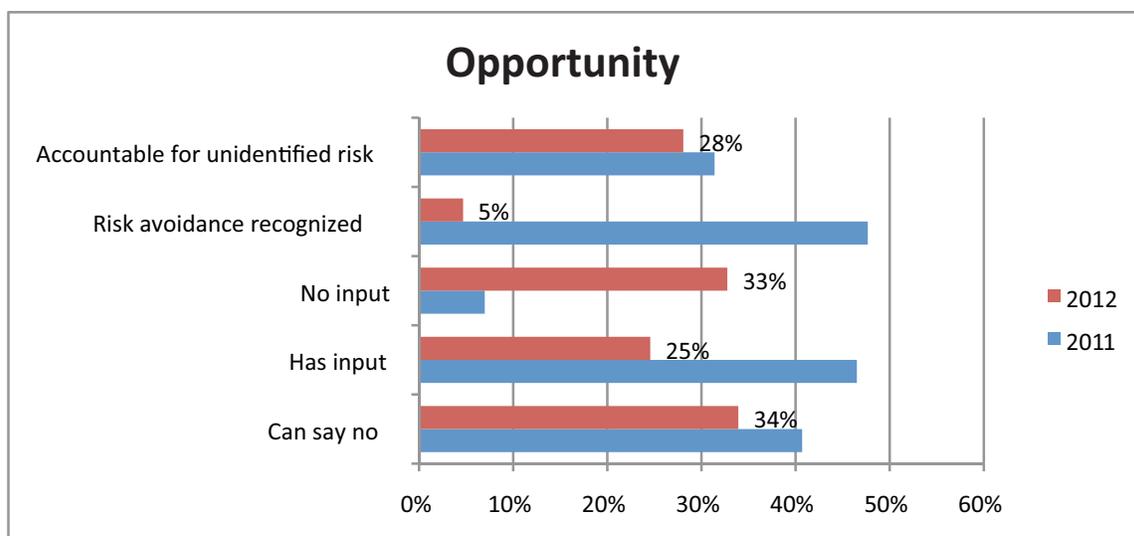
## Risk as Opportunity

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 representative responses included

- Business instability, products not on anyone's radar or have scared everyone away.
- Inconsistencies in regulation of securities, insurance products, and other financial goods & services across national boundaries.
- The current environment of low interest rates will lead companies to buy longer assets, which when interest rates rise will hurt them worse. Finding sufficient yield without extending duration will be the luxury of few companies but they will tend to emerge stronger in the longer term.
- Telematics and other advanced technology in automobiles
- We tend to evolve product designs rather than create something entirely new to leverage opportunities
- Fall in USD, could lead to imbalance of export/import, trigger unwanted inflation, narrow the interest spread.
- Climate change will be a negative for some but a positive for others - e.g., northern countries like Canada will be able to grow more variety and ship from the north
- I monitor the emerging demographic shift to an older population in an attempt to anticipate the impact on pricing of financial instruments
- None, emerging risks are viewed primarily in the context of risk avoidance.

This is a developing area in risk management, and some firms are starting to take advantage of it. If a risk manager can identify trends or information leading to opportunities or mispriced products, this moves into the strategic aspects of risk management. Highlighting a few of the comments made, it seems that places to look include product pricing, technology, interest rate specifics, demographics, climate change, and seeking out opportunities to optimize the risk profile. These could be early indicators of success that risk managers are especially qualified to identify.

The survey asked how the ERM team is utilized when a strategic opportunity is presented to a firm. The results are quite different between surveys, even though the question was unchanged. Over half (59% vs. 84% in 2011) can say “no” to a strategic opportunity and/or have input but no vote. Only 5% (48% in previous survey) expect to be recognized for avoiding a risk while almost a third (28% vs. 31%) say they would be held accountable if they failed to identify a risk. The number of surveys submitted materially increased in 2012, but this is the first question where the results have markedly differed. Perhaps risk managers are being treated differently this year, moving back to the cost center model for risk. As Nassim Taleb has said about Black Swans, everyone knew about them in hindsight. Perhaps risk manager’s warnings that came true are treated as “obvious”. This question will be interesting to follow in the future as new unknown-unknown events occur.



A final question for this section asked for suggestions of risks that could be added to our current 23, described in detail in Appendix I. Each respondent could suggest up to three additional risks. Here are some of the suggestions (unedited).

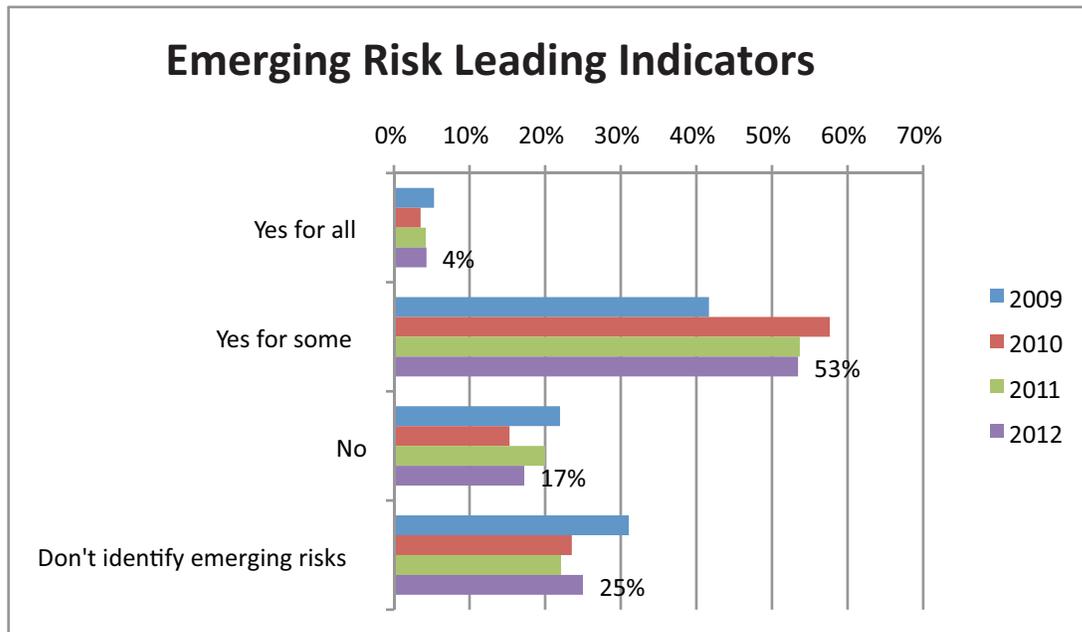
- Changes in regulatory and legal regimes
- impact of unfunded entitlement programs
- Government spending
- Politicians with no long term scope
- Disenfranchisement of the American Investor
- regime change
- class shift
- US Loses World Dominance
- Consumer personal DNA/genome access
- Education gap (emerging)
- Natural Catastrophe: Drought
- Eurozone failure
- animal food production's impact on freshwater and general food supply
- Rapidly rising interest rates and/or inflation
- prolonged very low interest rates
- Natural Catastrophe: ALL Storms, not just tropical
- Market complexity
- Cyber hactivism - the use of cyber terrorism as an instrument of political influence and/or control
- Loss of trust in government/institutions ("occupy movement")
- food security
- Population increase
- Medical progress leading to increased longevity
- Jobs Warfare
- US severe loss of credit standing

- Loss of freedom
- Deleveraging and asset deflation
- Food additives (growth hormones)
- Political climate/changes
- unemployment
- Shifting world economic power to China
- Soil degradation/permanent loss of food growing capacity
- natural resource depletion
- Increased moral hazard (following contracts, etc.)
- Implementation of carbon tariffs, taxes, or similar
- Civil Unrest Domestically

## Section 2: Leading Indicators

Leading indicators of emerging risks are metrics, or events, that indicate higher likelihood that an emerging risk may be materializing. This also provides information used to make better decisions earlier than might be the case otherwise. Key risk indicators (KRIs) provide information about a specific risk. They do not replace metrics that measure value in hindsight, but attempt to identify drivers of future performance. Trending GDP or CPI can provide macroeconomic KRIs, as can revenue and liabilities for a firm. These are examples of lagging indicators and 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 the occurrence of an event that becomes a Boolean indicator. An example might be the signing of a star athlete who would drive higher attendance at games and revenues for the athletic department. The survey asked about the use of leading indicators that would provide a firm with actionable information about a risk.

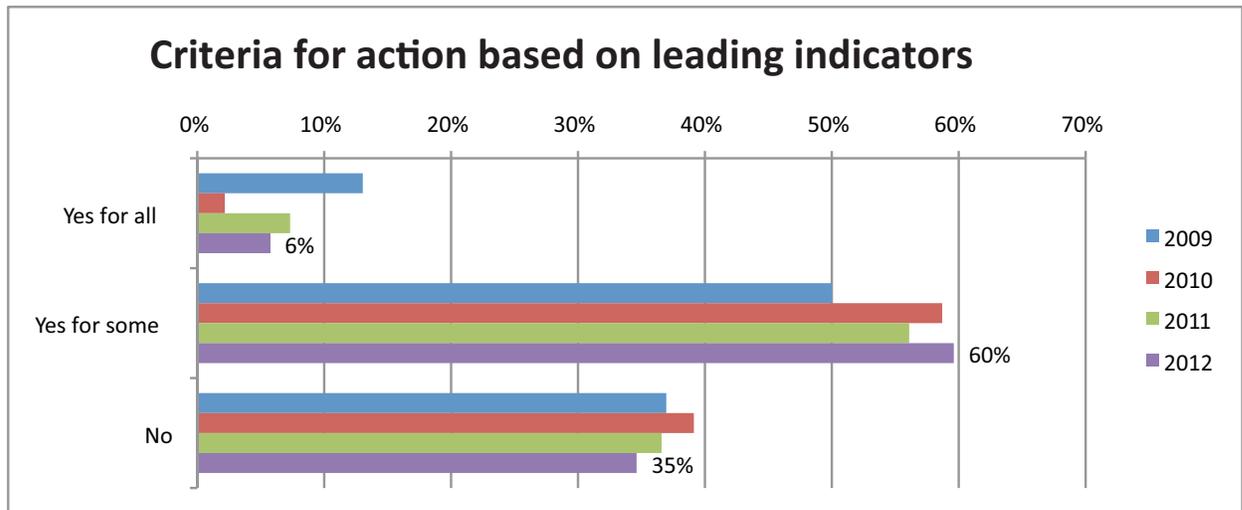
The first question asks *Once an emerging risk is identified, do you select leading indicators to measure changing likelihoods?* Four percent of the respondents noted that they had leading indicators for all identified emerging risks and 53% had them for some. Twenty-five percent did not formally identify emerging risks.



More interesting are the examples shared about specific leading indicators collected and monitored (found in their entirety in Appendix II). Many are standard byproducts of the financial reporting process or economic metrics. These include stock indices, commodities, the WHO indicator (pandemic), credit spreads, volatility, and weather markers. Some are specific to an industry, like monitoring mortality improvements. Some risk managers have the ability to monitor web traffic on specific issues like judicial and

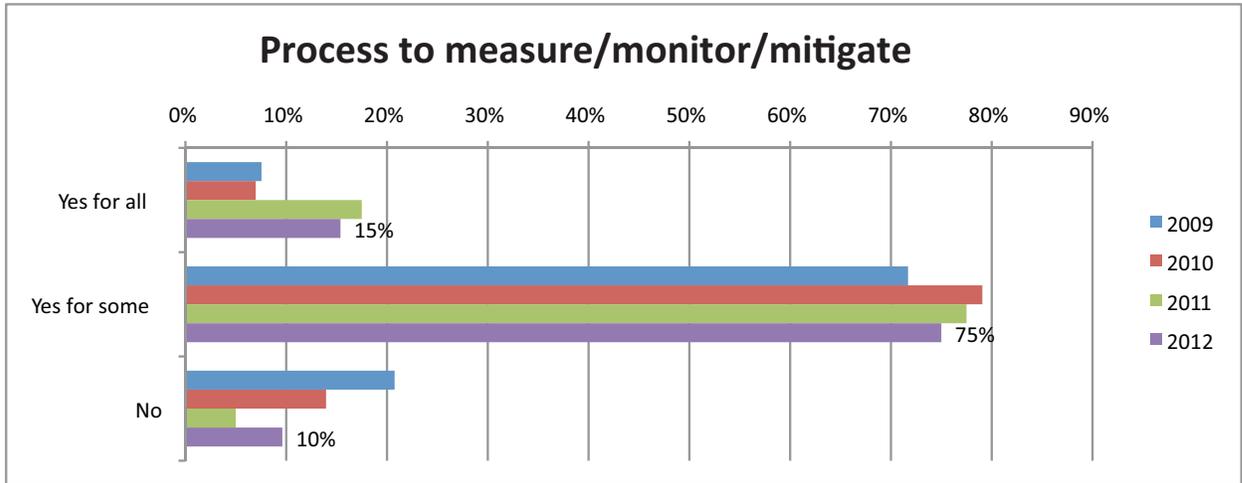
political activity. The most common response continues to be that risk managers are monitoring regulatory developments, which makes sense given the large amount of activity surrounding Dodd-Frank, Solvency II, Basel, health care reform and other regulatory regime changes in the works.

The survey asked whether these leading indicators included criteria that would lead to an action to mitigate or accept the risk. There were 62 responses of the 67 who stated that they use leading indicators for emerging risks. Of those, over half (66%) stated that criteria exist for at least some of their emerging risks, which is slightly higher than prior surveys.



When asked for examples, respondents talked about triggers and thresholds. Based on the examples provided, and comparing them to last year’s survey results, it appears that some risk managers have moved beyond general statements about risk appetite and into specific outcomes. Some comments shared include a threat rating scheme to trigger hedging actions, monitoring exposures to specific risks (e.g., terrorism), and spreads. Several had plans to address a liquidity crisis as it intensified. Quantification varied, with some sharing use of standard deviations and regulatory capital ratios as drivers.

Fifty-nine respondents answered Question 5 about measuring, monitoring, and mitigating an emerging risk once it has been identified, with 90% responding that they did this for some or all of their identified emerging risks (down from 95% in 2011). The trend backtracked a bit in this survey, with 10% reporting no process in place, up from 5% in 2011.

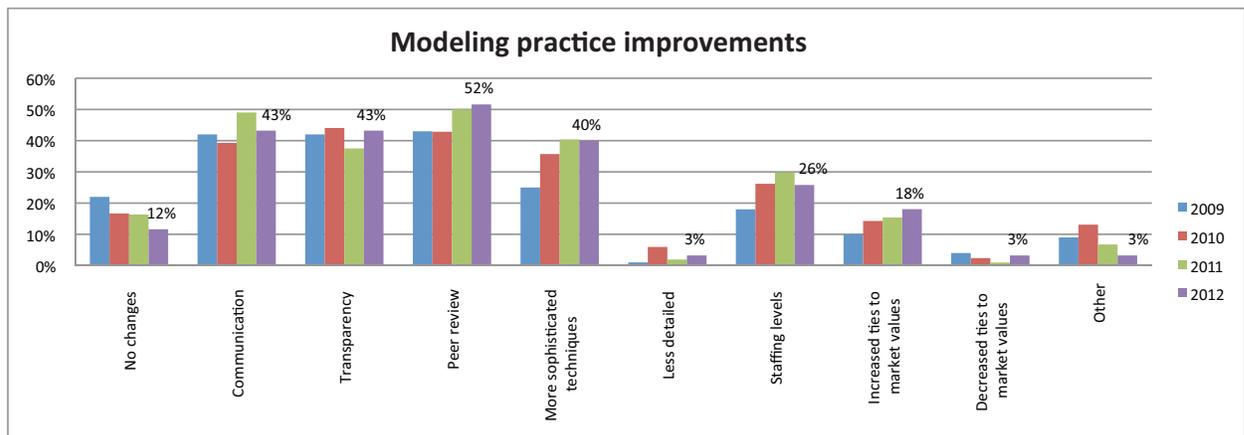


Most of the examples continue to be non-specific, talking in generalities. The focus seems to be on studying potential actions rather than developing specific actions based on specific thresholds. Topics include use of regular reports and monitoring. Some of the best responses described stress test scenarios that are being developed to determine the specific impact of an event on capital over a specific time horizon. Others described exit strategies based on macroeconomic factors like currency relationships and adjusting product offerings based on climate change.

### 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 all continue to evolve. Trends are noticeable among some of the other options as well, with fewer reporting No changes (12%) than ever before and more (18%) citing Increased ties to market values.

One respondent commented that they solicit input from a wider array of experts, while another stated that models were being more heavily reviewed but by less qualified experts (both internal and external). This latter comment is concerning as it could lead to under-qualified reviewers overriding accurate models developed by those who understand the risk profile of a firm best.



In a new question added to the survey in 2012, respondents were asked to share methods for developing assumptions applicable to emerging risks and used in models. These should be viewed as best practice responses. There was consensus around some ideas, as well as some that were unique. Many of the comments discussed finding similar data and applying experienced judgment. Others used variations of Delphi testing, asking experts to build consensus through surveys or workshops. Many commented that it was important to sensitivity test these assumptions for materiality and look in the tails of distributions for potential outliers with adverse consequences. Due to the uncertainty, specific margins should be added.

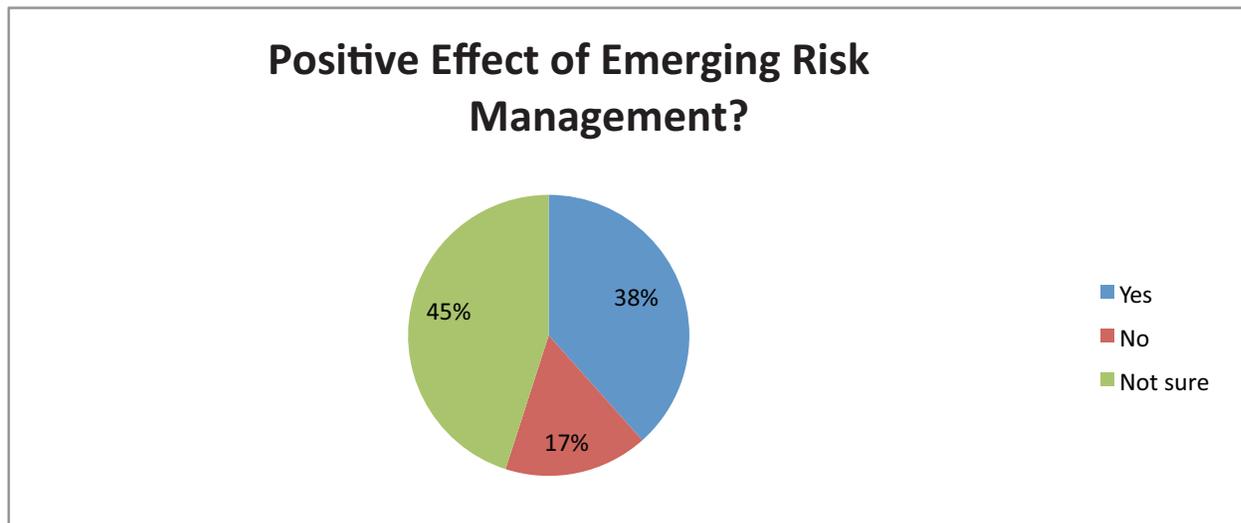
One comment in particular seemed to summarize the responses. *We have come to the conclusion that for emerging risks it is far more informative and worthwhile to do stress tests based on scenarios developed specifically for the risk. Trying to use stochastic processes on a risk that is not well understood can lead to a false sense of security and can be misleading.*

One comment discussed the need for general knowledge about as many things as possible, and a deep understanding of how simple models work. This is consistent with

the latticework style of investing, where the analyst tries to look at a potential investment from multiple perspectives for insights about interactions and value.

One respondent expressed a concern that current reporting requirements were so burdensome that they had no time to do anything else. This is always a concern and opportunity in that an investment that improves efficiency frees up time to focus on projects that add value.

A new question in 2012 asked if the management of emerging risks was having a positive effect. A majority of 70% who responded said yes, but the most popular answer was Not sure.



When asked to explain their answer, many respondents said that considering emerging risks encouraged their risk team to think broader, with a longer time horizon and more strategically. It has helped some firms to proactively give the ERM team strategic input in decisions. The strong interest from regulators and rating organizations is viewed as a positive effect.

One comment expressed concern about being known as “Chicken Little”, a reference to the analyst who only sees the risky side of an issue and predicts many negative outcomes that never occur.

In possibly the most interesting part of the survey to analyze, respondents were asked to share instances where quantitative, qualitative, and combination efforts have enabled better decision making.

The 48 quantitative responses included some common themes. Many used stress scenarios to develop strategic plans around investment strategies and product design. This can establish true tolerances and better understand liquidity and credit quality. Concentration risk can be illuminated using modeling techniques, and some firms use their economic capital models for this purpose. Quantification...*helps management get*

*their arms around the magnitude of the risk.* Not all examples related to financial firms. Building codes designed to withstand earthquakes and hurricanes, with law enforcement backing them up, have made many regions safer places to live. Others are starting to model cyber risk and its implications.

Not all risk managers can effectively utilize these techniques. Some feel their models are not sophisticated enough, especially to consider emerging risks. Another comment noted that *unfortunately, we tend to torture the numbers until they give us the answer we want...maybe they help reach conclusions sooner??* This may be an example of management using models incorrectly or could be a way to incorporate experience in the process. This is the hard part of utilizing models to make decisions. Accuracy is only known in hindsight.

There were 30 qualitative examples of improved decision making. Risks described included liquidity, operations, supplies, cyber liability and reputation. Respondents used qualitative techniques to increase management's awareness of specific risks. One comment suggested that including people from different technical backgrounds and geographic locations on their risk team generated better ideas. Some referred to ORSA (Own Risk and Solvency Assessment) tools or shared specific product lines or investments they avoided.

A good summary for this section was *Qualitative has been used much more frequently than quantification. Business area experts assess things beyond just numerical risks. Reputation risk would be an example.*

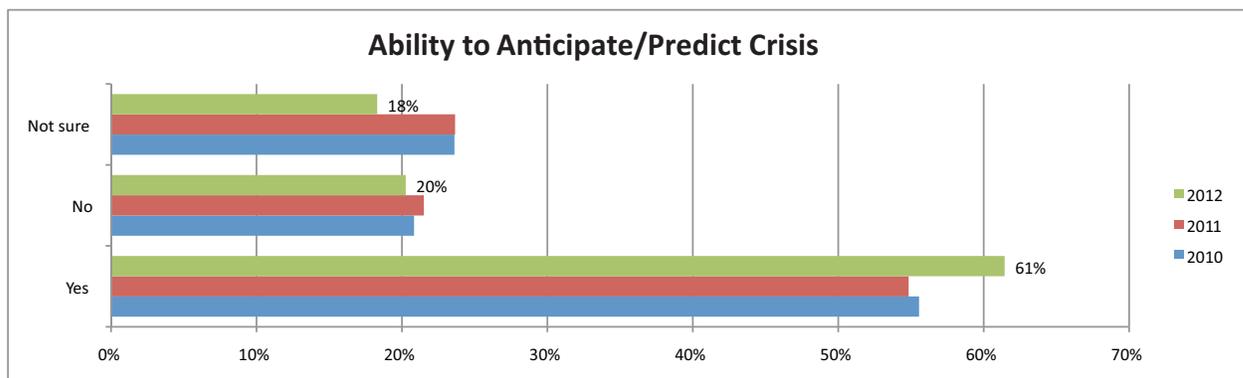
In the final question for this section, 23 respondents shared instances where a combination of qualitative and quantitative analysis has enabled better decision making. There is a clear strategic thought process here, with comments talking about acquisitions, business line exits and new products. A good example of the balance used described an inland flooding insurance product line, with historical data integrated with evolving weather patterns and possibly discontinuous climate change.

There has been great improvement in best practice using qualitative and quantitative techniques together to make better decisions in the recent past. This is an area to expect a spread of use to all types and sizes of firms in the next few years.

## Section 4: Predictions

The capabilities of the risk manager, at least as they characterize them, could be defined as limited but useful. While they can't predict every crisis, at least some bubbles driven by emotional exuberance can be identified in advance. What remains to be seen is if risk managers at firms will consistently be blamed for management decisions, as was seen at MF Global Holdings and other financial firms during the 2008 crisis. When asked if it is possible to anticipate/predict a crisis, over half (61%) stated that it was possible, up from prior surveys. Based on the 79 comments received, there are some consistencies built into the risk profession. Generally it is thought that some crises can be predicted, but timing and severity is very hard to accurately forecast. There is also a concern about false positives (false alarms where your predictions don't come true), predicting so many crises that you lose credibility. Rather than issuing specific predictions, many risk managers develop potential scenarios so they can be better prepared with flexible game plans. Higher order interactions with other risks and events make unintended consequences inevitable. Those who study pattern recognition and human actions may have an advantage determining materiality, especially if they develop leading indicators for poor outcomes. Resiliency can reduce the level of vulnerability or even exploit an opportunity.

The risk manager's job is important. As one respondent shared, *Business as usual will almost always fail to anticipate risks*. Having a process in place to identify events that could create outlier situations is a competitive advantage. In another comment that will generate nodding heads of recognition, *But that doesn't mean you are right or anyone will listen*. Another comment stated why contrarians are in short supply at many companies; *outside the box thinking is widely discouraged in Corporate America*.

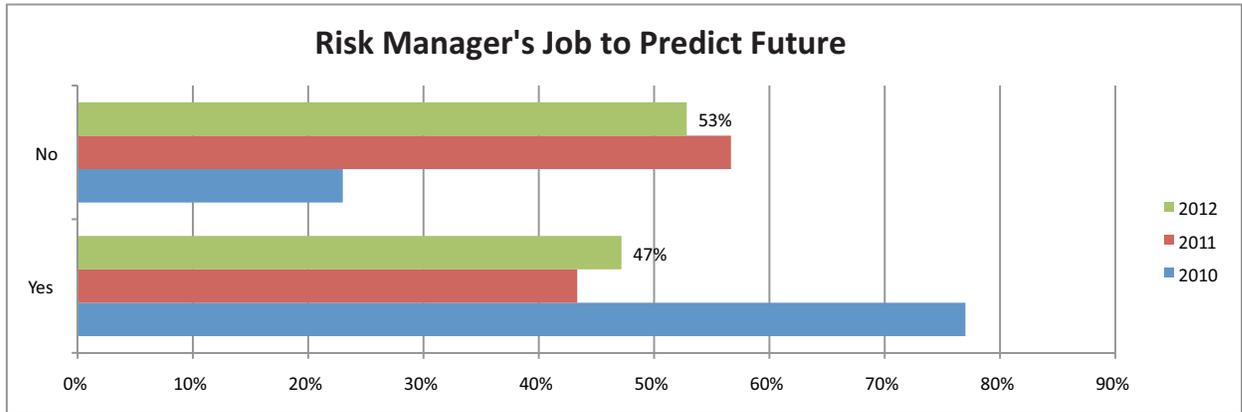


One way to help risk managers train themselves to anticipate emerging risks is to develop a recurring list of potential scenarios that could happen over the next few years and track it over time. This can be a private list or something shared publicly while making it clear that these are not predictions. This makes it much harder for those who say they “predicted” Black Swan events but really did so only in hindsight to make these claims.

Fewer than half (47%) of the risk managers felt it was their job to predict the future, up from the prior survey (43%). Risk managers seem to be interpreting this question

differently than they did when it was first added in 2010 and 77% answered yes. Based on the comments received, most define this as predicting potential outcomes and the underlying causes rather than actual future events. One suggested that *The job is managing the uncertainty of the future*. Another said *We prepare, we don't predict*.

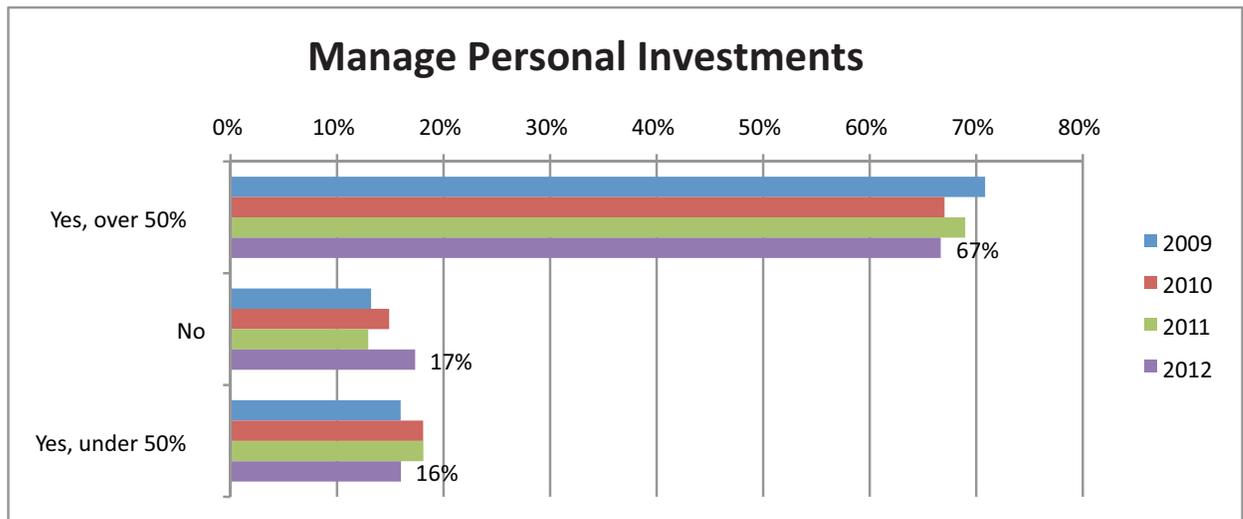
The recent series of events in Italy, where seismologists failed to “predict” a major earthquake and were jailed for their inaccuracy, will lead risk managers toward wording that tends to be conservative.



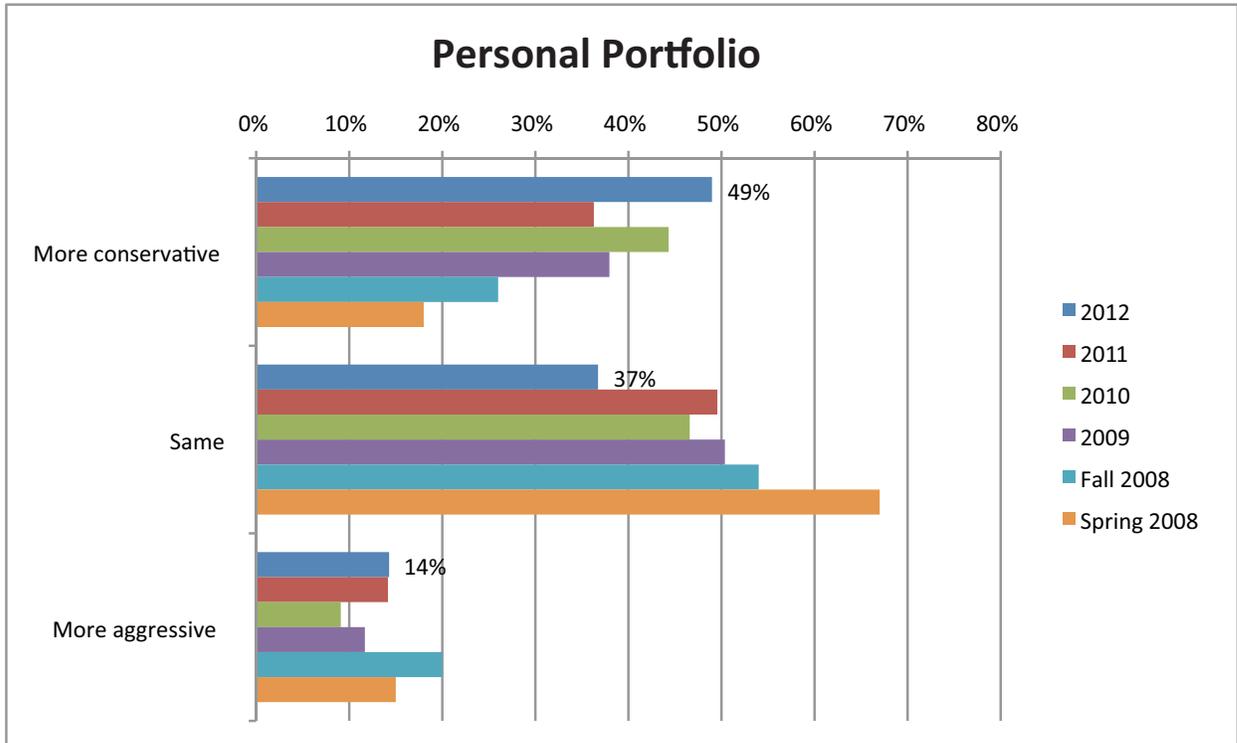
## Section 5: Current topics

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.

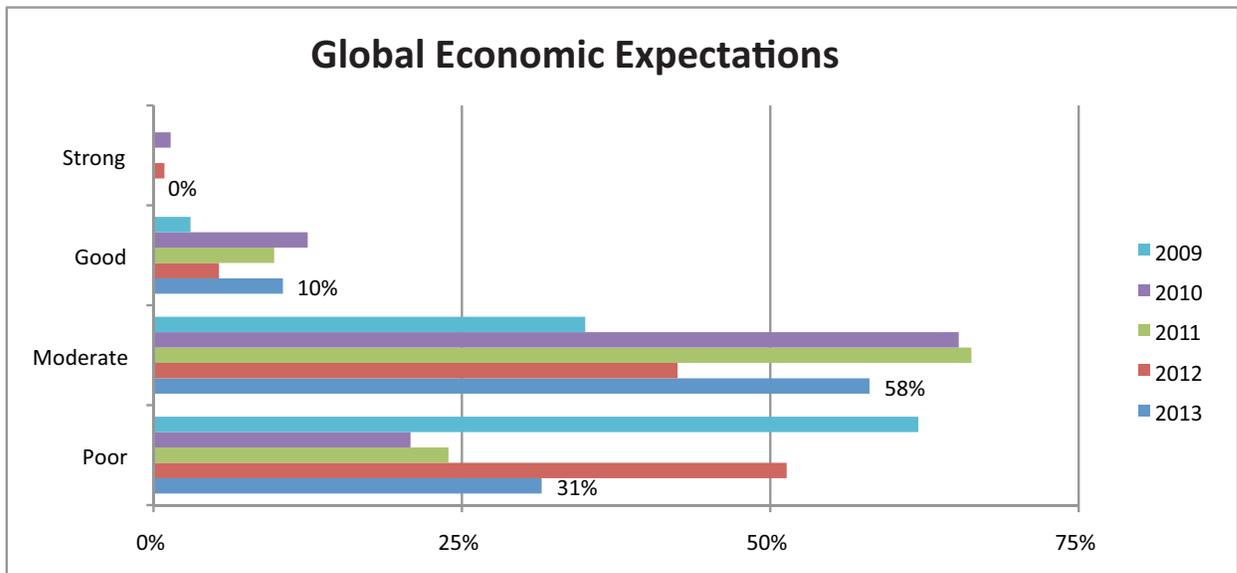
Respondents were asked if they manage their personal investments. A large majority of the risk managers, 84%, manage some portion of their portfolio with over half managing the entire amount. These percentages have been stable across surveys, so it does not appear that recent events have impacted the willingness to manage personal assets.



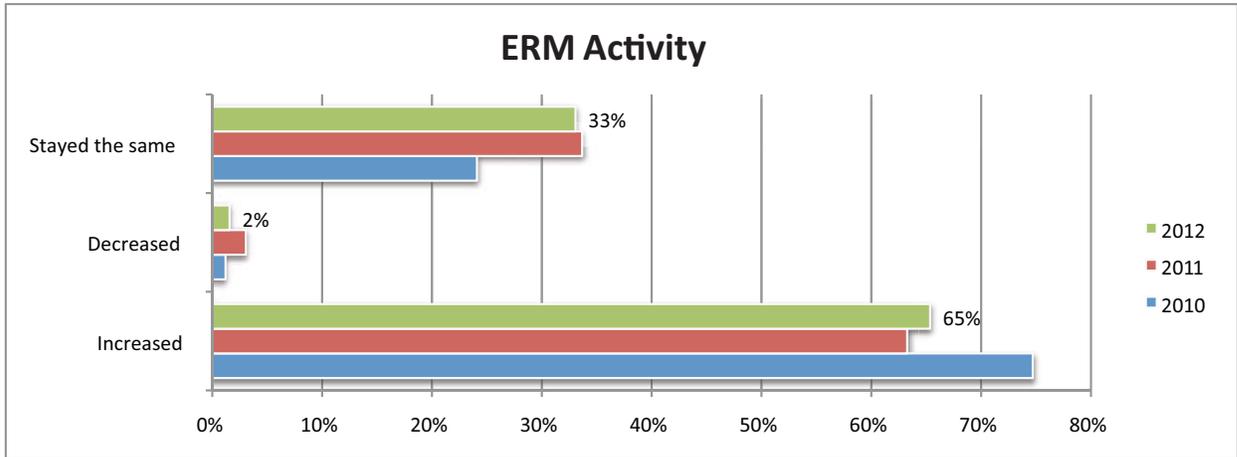
Personal investment strategies returned to the longer term trend toward conservatism. This year saw an increase in those stating their personal investment strategy was more conservative (49% up from 36%) while those investing More aggressive than usual maintained a level of 14%.



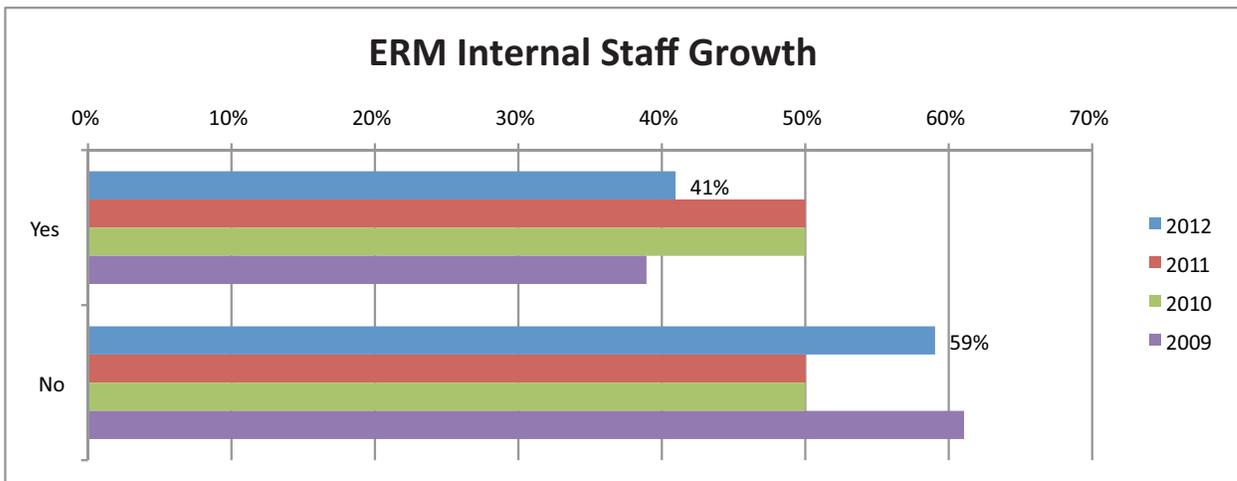
Starting with the second survey, in late 2008, Global Economic Expectations were asked about the following year. The responses for 2009 were, not surprisingly, very negative with 62% expecting a poor economy. Respondents were more optimistic for 2010 and 2011, with 65% and 66% expecting a moderate economy. The 2011 survey showed strong concerns for 2012 with 51% expecting a poor global economy, but the current survey favors a moderate economy with 58% making that choice.



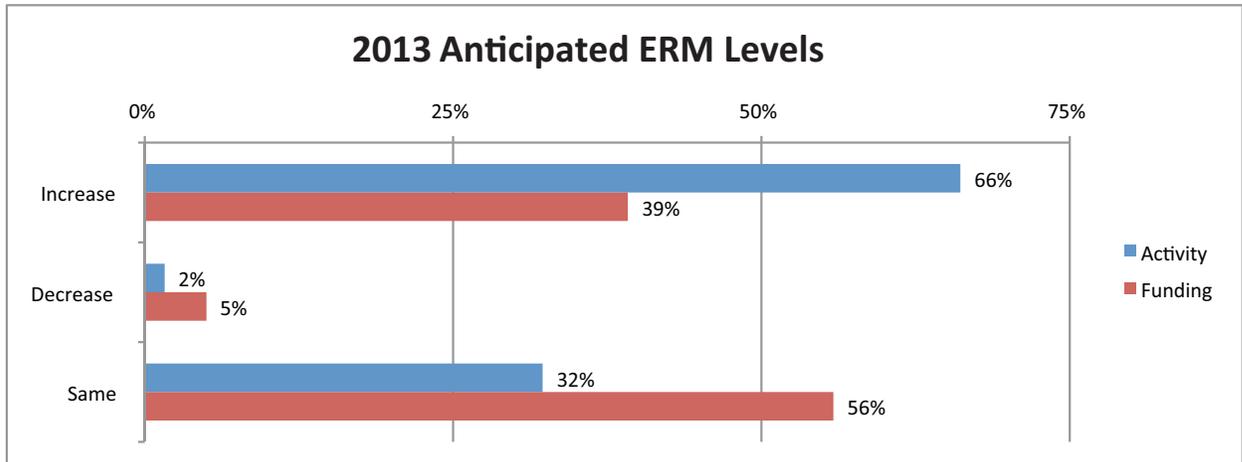
The recent crisis continues to lead to increased ERM activity, and 65% saw more in 2012. Some (2%) decreased their ERM activity, which is interesting in the current environment.



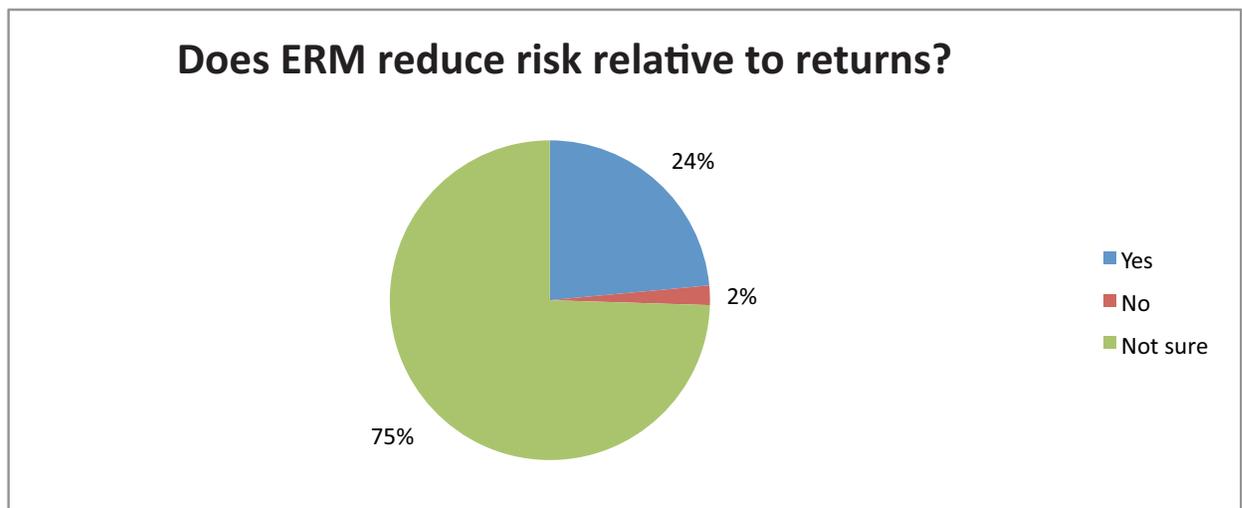
Despite the higher ERM activity, 59% of respondent's internal staff did not grow in 2012, the highest since 2009.



For 2013, survey respondents anticipate continued growth in their activities (66% - highest recorded), 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 or smaller (5%) staffs. A challenge is to have management teams perceive ERM as value added rather than a cost center. Unfortunately, recent history has shown that only severe crises will maintain that status.



A firm's risk profile evolves over time. As ERM matures, a question was asked this year for the first time if internal and external efforts at ERM have/will reduce risk relative to returns (external efforts were meant to reflect regulatory items like Basel and ORSA). Most of the responses said they were not sure (75%) and it will be interesting to trend this question over time.



When asked to defend their response it becomes clear that a firm's culture drives the success or failure of the ERM process. When it works, senior management is engaged and more aware of potential risks. The relative risk and return profile improves, either by reducing risk or improving returns while holding the counterpart steady. *Higher focus and awareness, along with more accountability* was shared by another respondent.

When it doesn't work, *ERM gives a false sense of security*. It may reduce the frequency of minor events while ignoring the possibility of major events. Others see ERM being used to avoid high risk opportunities even if the potential returns are high, being used for new ventures but ignored in legacy products. Silos abound. Symptoms include over-reliance on compliance, form and governance. Some of the respondents have experienced this firsthand. *Rarely does anything actionable emanate from ERM. ERM is currently*

*largely a way for a company to “feel good” about how they are managing risk. It gives an illusion of activity without much substance.*

Based on the researcher’s experience, there is a continuum of ERM best practice. Some early “adopters” developed press releases and focused on communicating to rating agencies the need to lower capital requirements. Some were asked to implement an ERM program by their board with little guidance, often leading to regular reports but little change in the decision making process. Others very quietly continued practices that were not called ERM but effectively managed the risk profile of a firm. These firms continue to improve communication efforts with third party stakeholders. Best practice firms are moving toward incorporating ERM in their strategic planning process, considering the evolving risk profile.

In a paper titled *Enterprise Risk Management: Strategic Antecedents, Risk Integration and Performance*<sup>1</sup>, the authors comment that ERM has a “strong negative correlation with firm value”. This may be a result of public firms more interested in press releases about their ERM accomplishments than actual substance to their efforts and the market recognizing this.

Improved industry ERM practices can reduce systemic risk. There is a balance between internal and external efforts, and firms may find their internal efforts will leapfrog with those of external stakeholders based on changing management priorities. Sometimes a regulator or rating agency “forces” you and everyone else in the industry to do the right thing. Several comments were very insightful. *Reduction of risk will happen because of better risk identification; external efforts will provide controls for risk mitigation. Also Internal ERM efforts are frequently trumped by organizational agendas and managements’ willingness to “run the risk” (naked positions). External ERM efforts (regulators, activist investors) are more likely to improve risk-taking practice.*

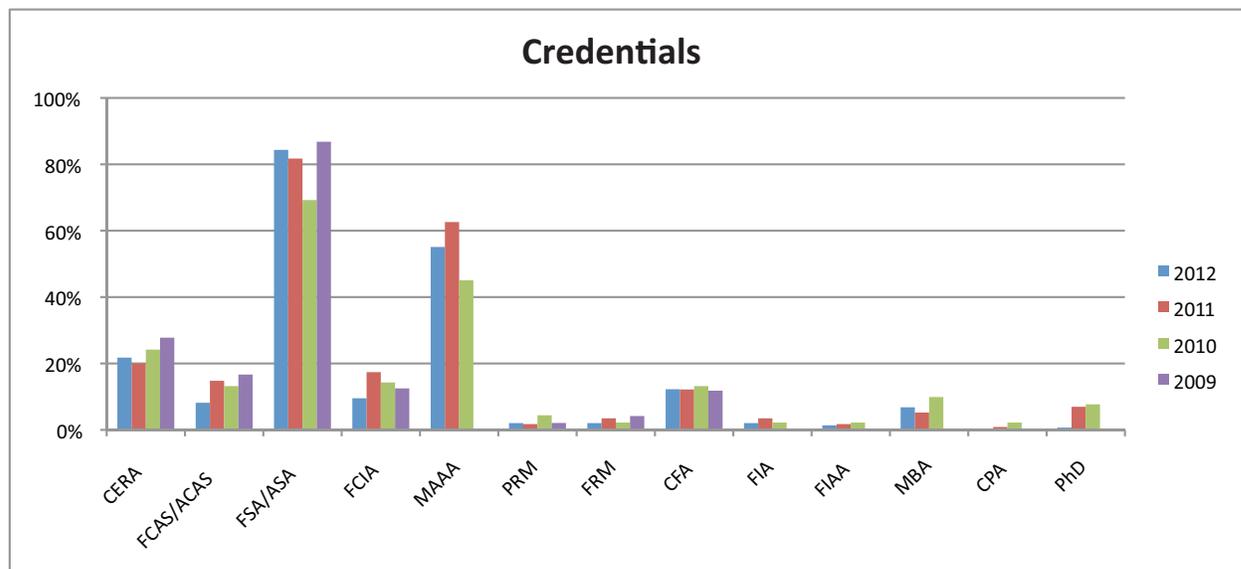
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<sup>1</sup> Lin, Yijia, Wen, Min-Ming and Yu, Jifeng. Enterprise Risk Management: Strategic Antecedents, Risk Integration and Performance. North American Actuarial Journal, Volume 16 #1 pages 1-28. 2012.

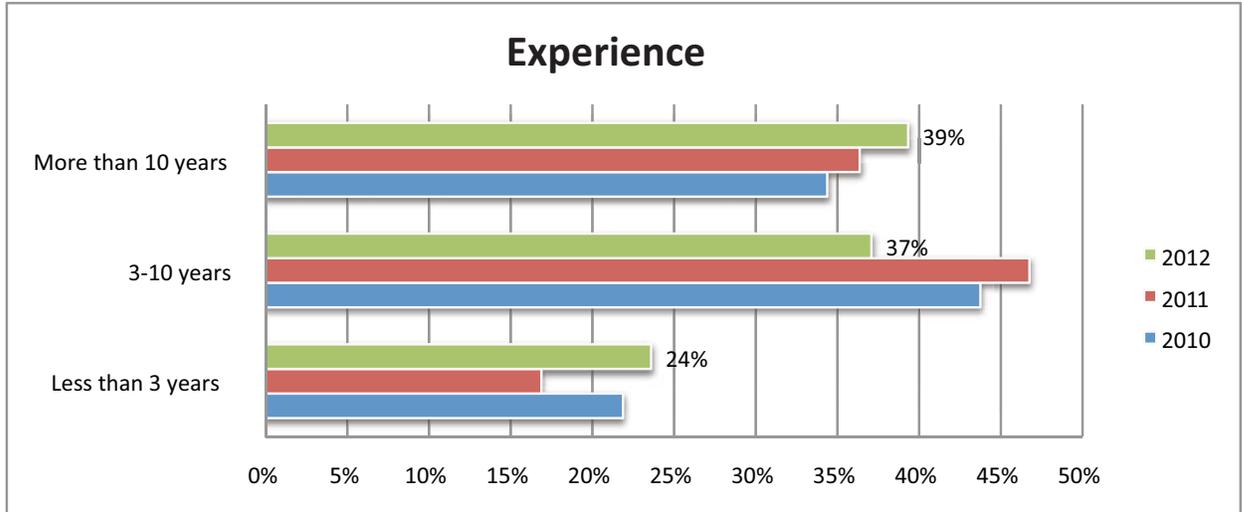
## Section 6: Demographics

Each year the Emerging Risks survey is distributed in several ways, primarily via targeted emails and social media. Each year attempts are made to expand participation. This year the recently formed CRO Council members were asked to participate. For this survey, with a record number of respondents, 36% reported filling out the survey in the past. In another question, 84% responded that the survey respondent held a credential from the Society of Actuaries (ASA/FSA). Other groups representing the research sponsor, the Joint Risk Management Section, were also represented with 10% FCIA's (Canadian Institute of Actuaries) and 8% ACAS/FCAS (Casualty Actuarial Society). Another group strongly represented is CFA charter holders with 12% of the respondents.

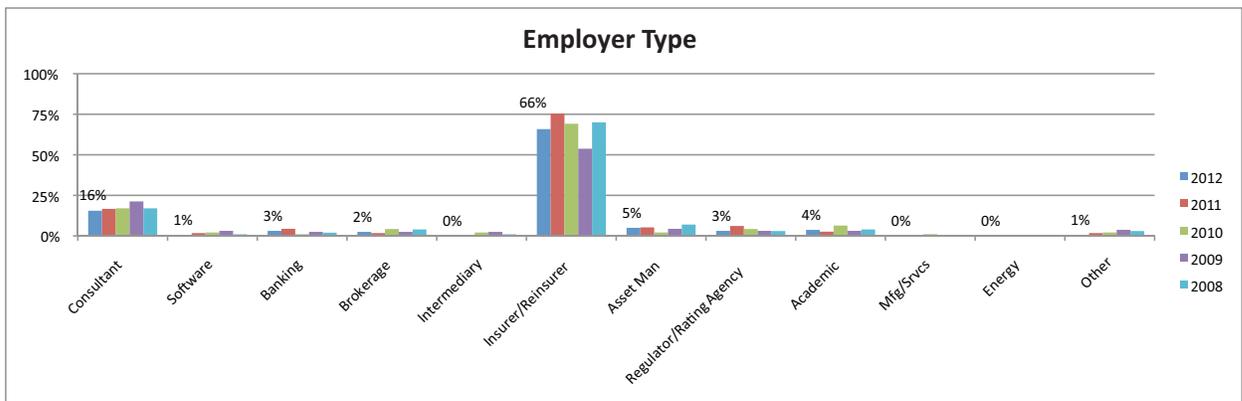
The survey distribution was a bit unsettled this year as there are issues between the North American actuarial organizations that may have contributed to lower participation by some groups. Membership in the American Academy of Actuaries was 55%. Actuarial credentials from outside North America came from the United Kingdom, France, India, Australia, and Israel. Credentialed US based pension actuaries (EA – Enrolled Actuary) have a growing response level, adding diversity.



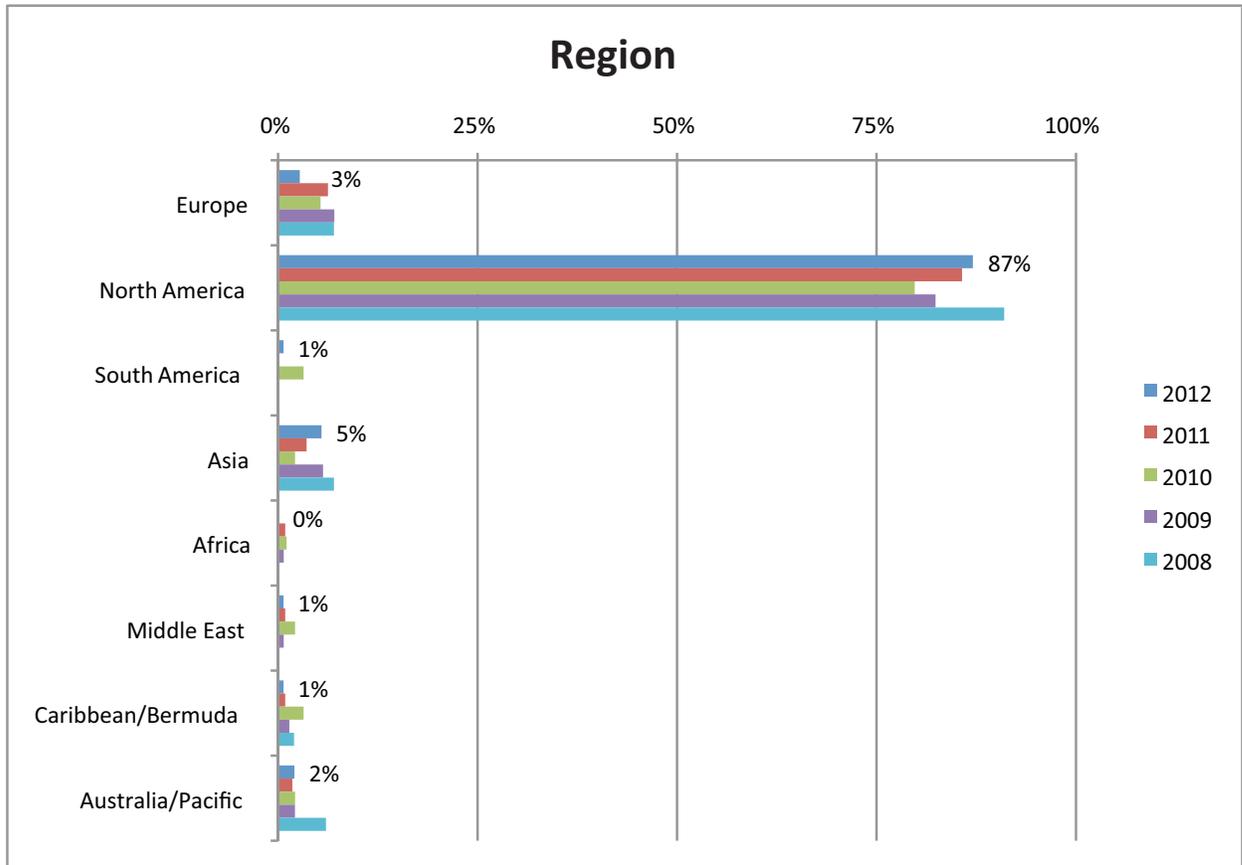
The survey asked respondents how long they have been a risk manager, and over one-third (39%) said they have over 10 years of experience in the role. This group is much more experienced than the norm and responses have revealed many best practices.



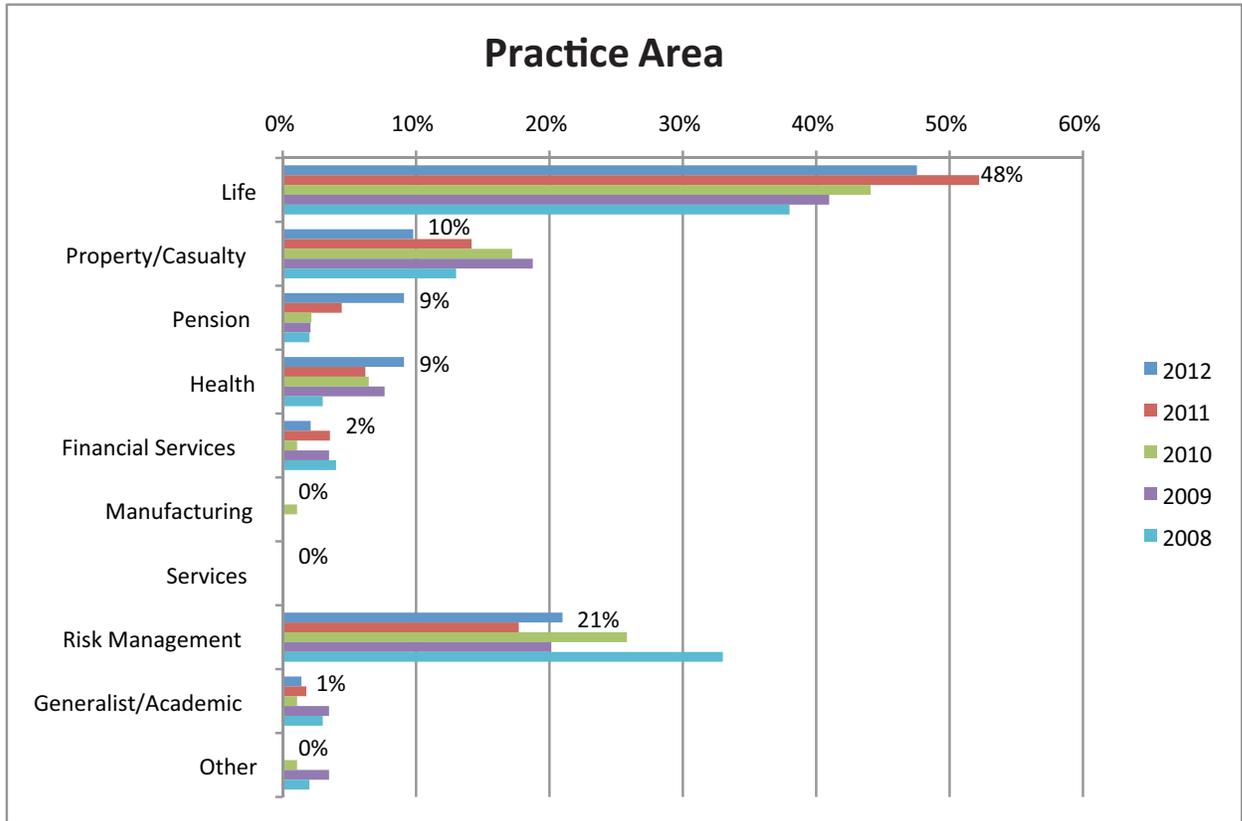
Most survey respondents are employed by either an insurance company/reinsurer (66%) or as a consultant (16%).



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



The primary areas of practice continue to be life insurance (48%) and risk management (21%). Property/casualty insurance dropped (10%), but pension (9%) and health insurance (9%) practitioners both increased.



The survey found that 54% 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 decision making was improved through an emerging risk process. The survey should continue to use open-ended questions to learn from top practitioners. 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. Partnerships with UK and Australian actuarial risk managers, along with the CRO Forum, should be sought out. 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

- Review the natural catastrophe risks and incorporate inland storms and drought

Suggestions from the researcher. Add questions probing

- Does an emerging risk leading indicator ever get dropped? Why?
- What blogs and other sources do you follow?

On the Greatest Impact graph, drop 2010 data as the question was reworded after that.

Review risks covering infrastructure and changes to governmental regulations.

Following the Introductory Section question about top current risk, ask which regions they are concerned with (looking for regional instability and also if Eurozone problems are being picked up here).

Review wording of the question if ERM reduces risk relative to returns to clarify.

Investigate ways that rating agencies and the SEC are incorporating emerging risks in their analysis.

## 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](http://www.weforum.org/pdf/CSI/Long_Global_Risk_Report_2007.pdf). What follows is an updated version for the 2012 survey with a description of the risks.

23 risks

### ***Economic Risks***

- Oil price shock – 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 (WMD) –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.

### **Evolution of risks**

The survey has attempted to maintain consistent risks as much as possible.

Spring 2008 – 23 risks generated by World Economic Forum’s Global Risks 2007

Fall 2008 – no change to risks, minor changes to definition wording

2009 – no changes

2010 – some definitional changes

- *Changed Oil price shock/energy supply interruptions to Oil price shock*
- *Changed US current account deficit/fall in US dollar to Fall in value of US \$*
- *Changed Blow up in asset prices/excessive indebtedness to Blow up in asset prices*
- *Changed Middle East instability – The Israel-Palestine conflict and Iraqi civil war continue to Regional instability – A variety of hot spots are prevalent around the world. These include the Middle East and the Korean Peninsula.*
- *Changed Infectious diseases in the developing world to Infectious diseases*

- *Changed Chronic disease in the developed world to Chronic disease*
- *Changed Emergence of risks associated with nanotechnology to Nanotechnology*

2011 – more substantive changes but attempt made to maintain trends and simplify

- *Moved Fiscal crises caused by demographic shift from Economic to Societal category and renamed Demographic shift. Updated trend data to make consistent going forward.*
- *Added Financial volatility – price instability of core products such as commodities, energy or currency to Economic category*
- *Combined Pandemic and Infectious diseases to Pandemics/infectious disease – A pandemic emerges with high mortality/Incidence of diseases such as HIV/AIDS spreads geographically.*
- *Changed Breakdown of critical information infrastructure (CII) to Cyber security/Interconnectedness of infrastructure*
- *Changed Nanotechnology Studies indicate health impairment due to unregulated exposure to a class of commonly-used nanoparticles (used in paint, nano-coated clothing, cosmetics or healthcare) exhibiting unexpected, novel properties and easily entering the human body. To 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.*
- *Changed definition of International terrorism from Attacks disrupt economic activity, causing major human and economic losses. Indirectly, attacks aid retrenchment from globalization. To Attacks disrupt economic activity, causing major human and economic losses.*
- *Changed the definition of Regional instability from A variety of hot spots are prevalent around the world. These include the Middle East and the Korean peninsula. To Certain unstable areas may cause widespread political and other crises. These include, but are not limited to, the Middle East and the Korean peninsula.*
- *Changed definition of Liability regimes from US liability costs rise by multiples of GDP growth, with litigiousness spreading to Europe and Asia. To Liability costs rise by multiples of GDP growth, with spread of litigiousness.*

2012 – no changes

## Appendix II - Survey Results 2012

The following includes both the survey as well as the responses. There were 228 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. Note that open ended questions are unedited except for obvious spelling corrections.

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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](http://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 26, 2012.

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!

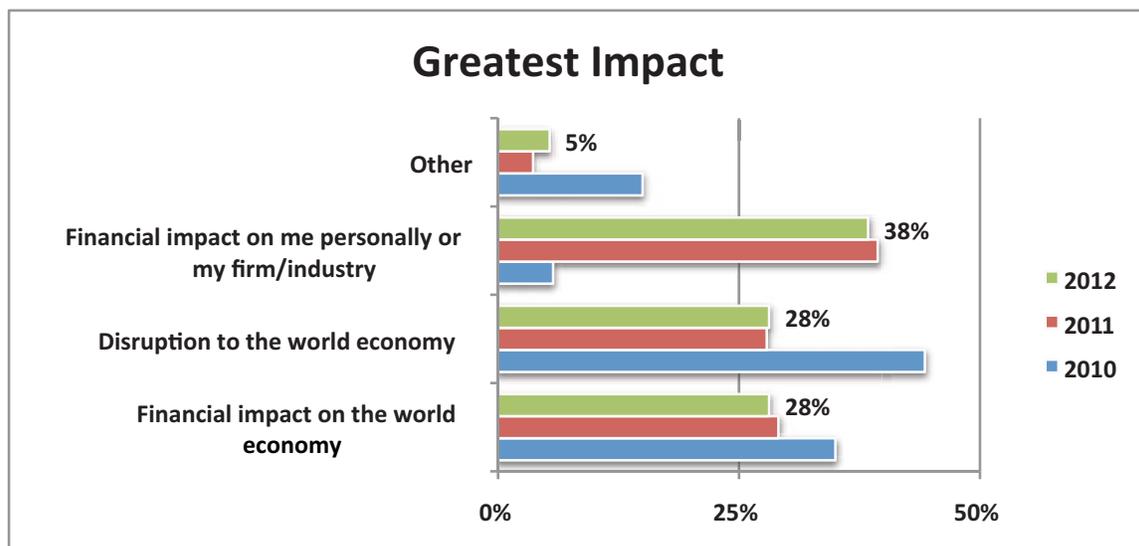
Note: Occasionally a comment is **highlighted** as the researcher found it thought provoking.

### ***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?

- 63 responses 28% (29%/35% in 2011/2010 survey) Financial impact on the world economy
- 63 responses 28% (28%/44%) Disruption to the world economy
- 86 responses 38% (39%/6%) Financial impact on me personally or my firm/industry
- 12 responses 5% (4%/15%) Other
  - narrower than #1 - impact on the US economy
  - Government
  - Deviation from expected
  - We plan based on "my firm/industry" but the triggers are often "disruptions in the nation/world economy"
  - financial impact on the world is the most impactful -- but there is necessarily a strong tendency to consider those that have the greatest impact on the evaluator
  - Deterioration in overall societal well-being
  - financial impact on insurance industry as measured by insolvencies in that industry
  - The sustainability of our way of life both in quantitative (\$) and qualitative (non-\$) terms.
  - Disruption in my grandchildren's wellbeing
  - My company
  - severe disruption in the world IT system or network
  - above should be considered separately



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. Ed. Note: more detailed definitions of these risks can be found in Appendix I.

**224 total responses (bold corresponds with a 5% increase or doubling, italics a 5% decrease or halving)**

**Economic – 114 responses 50% (51%/39%)**

- 12 responses 5% (3%/5%) 5T Oil price shock
- **8 responses 4% (2%/11%)** **Fall in value of US \$**
- 9 responses 4% (7%/8%) Chinese economic hard landing
- **27 responses 12% (7%/14%)** **2 Blow up in asset prices**
- *58 responses 26% (32%)* *1 Financial volatility (new category in 2011)*

**Environmental – 16 responses 7% (2%/10%)**

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

**Geopolitical – 57 responses 25% (23%/24%)**

- 6 responses 3% (2%/4%) International terrorism
- **7 responses 3% (1%/4%)** **Proliferation of weapons of mass destruction (WMD)**
- 7 responses 3% (2%/5%) Interstate and civil wars
- 19 responses 8% (11%/4%) 3 Failed and failing states
- 1 response 0% (0%/1%) Transnational crime and corruption
- *2 responses 1% (2%/4%)* *Retrenchment from globalization*
- 15 responses 7% (4%/1%) 4 Regional instability

**Societal – 11 responses 5% (8%/12%)**

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

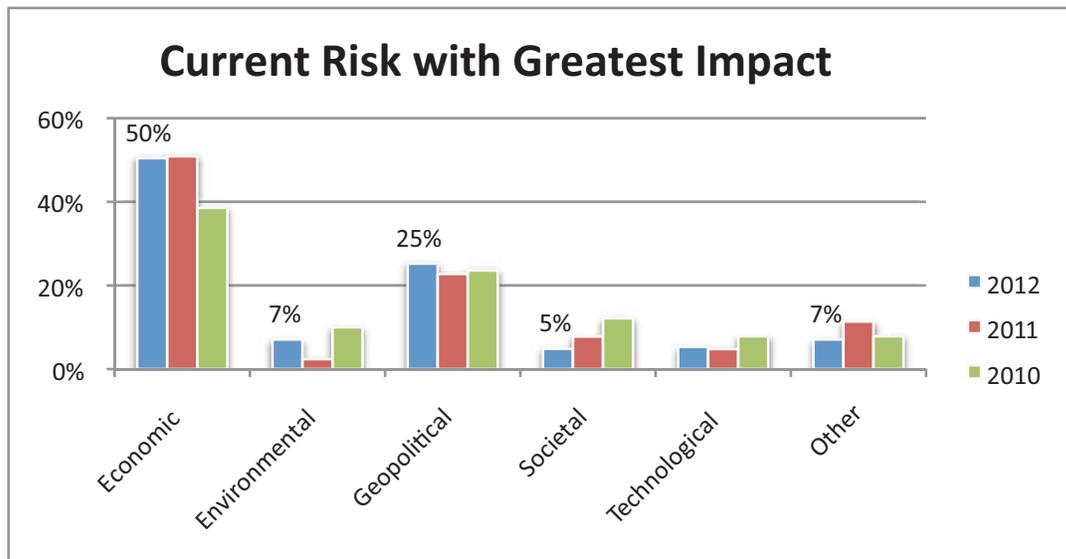
**Technological – 12 responses 5% (5%/8%)**

- 12 responses 5% (4%/8%) 5T Cyber security/Interconnectedness of infrastructure
- 0 responses 0% (1%/0%) Technology/Space weather

**Other – 16 responses 7% (11%/8%)**

- Unintended consequences of significant regulatory change
- sovereign debt and deficits
- Government spending
- Capital Shortfalls/lack of financing
- Natural Catastrophe: ALL Storms, not just tropical
- Low interest rates
- Euro zone collapse
- Prolonged low interest rates.
- regulatory/legislative

- Movement away from Free Enterprise economies
- Government and personal indebtedness
- Sovereign Debt Unwind
- uncertainty
- Excessive Debt
- Dishonesty/Selfish
- widening wealth gap



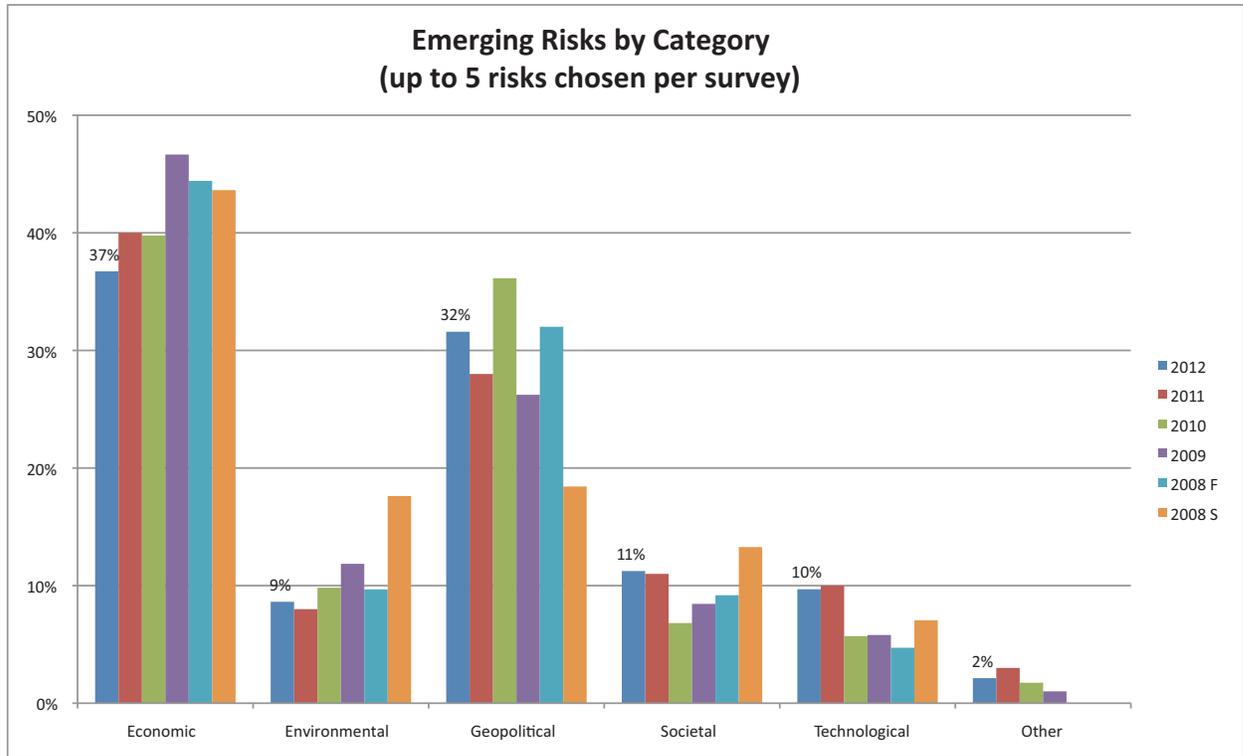
## **Section 1: Emerging Risks**

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

**1,032 total responses from 228 surveys (average 4.53)**

**Divisor in percentages for major categories is 1,032 – for individual categories it is 219 (228 surveys with 9 who did not respond to this question).**

- 0 9 surveys 4% (5%)
- 1 3 surveys 1% (4%)
- 2 1 survey 0% (1%)
- 3 11 surveys 5% (7%)
- 4 26 surveys 11% (15%)
- 5 178 surveys 78% (68%)



**Economic – 379 responses 37% (previous surveys F2011/F2010/F2009/F2008/S2008 40%/40%/47%/44%/44%)**

- 67 responses 31% (32%/40%/45%) Oil price shock
- 56 responses 26% (25%/49%/66%) Fall in value of US \$
- 68 responses 31% (32%/41%/33%) 5 Chinese economic hard landing
- 53 responses 24% (22%/31%/49%) Blow up in asset prices
- 135 responses 62% (68%) 1 Financial volatility

**Environmental – 89 responses 9% (8%/10%/12%/10%/18%)**

- 44 responses 20% (14%/25%/27%) Climate change
- 23 responses 11% (6%/9%/10%) Loss of freshwater services
- 14 responses 6% (5%/4%/8%) Natural catastrophe: Tropical storms
- 5 responses 2% (6%/5%/7%) Natural catastrophe: Earthquakes
- 3 responses 1% (4%/2%/5%) Natural catastrophe: Inland flooding

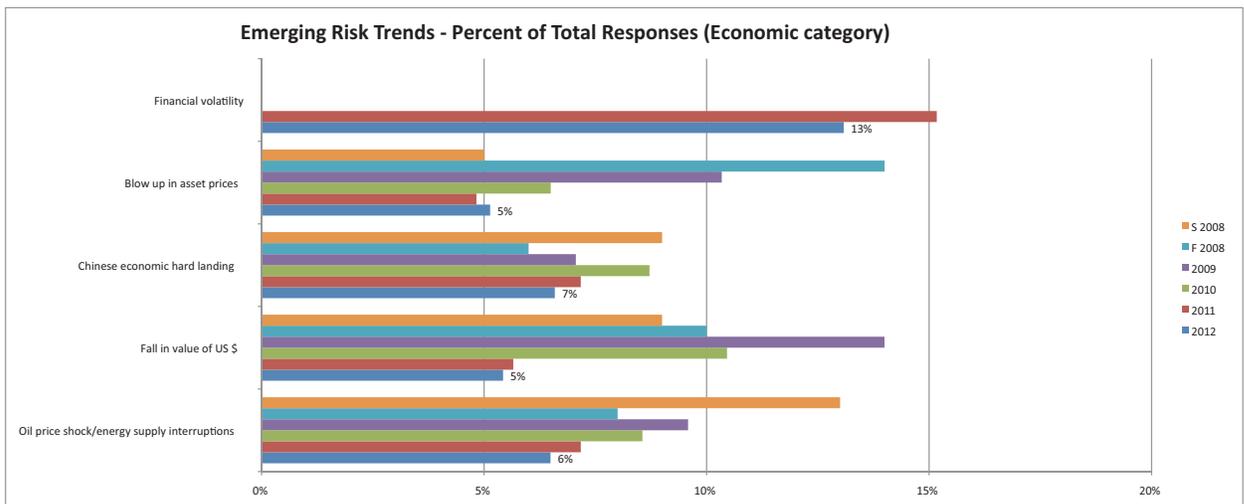
**Geopolitical – 326 responses 32% (28%/36%/26%/32%/18%)**

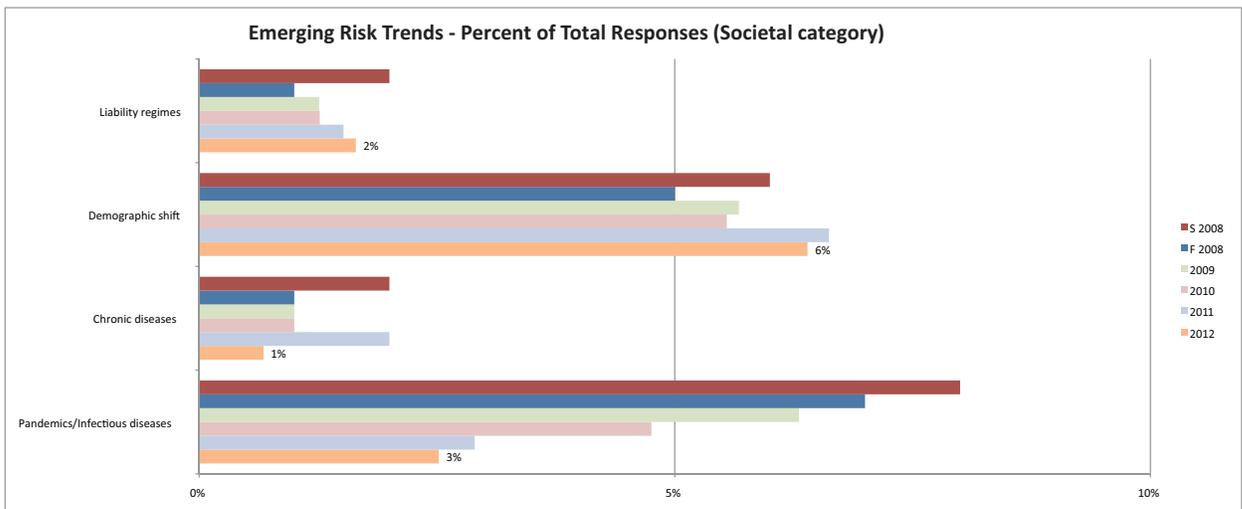
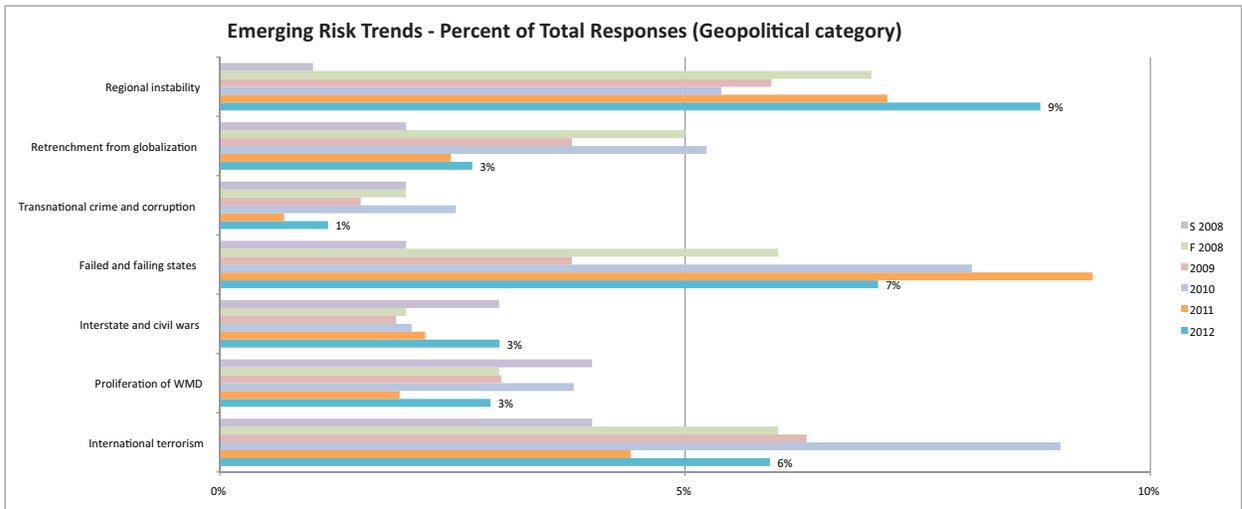
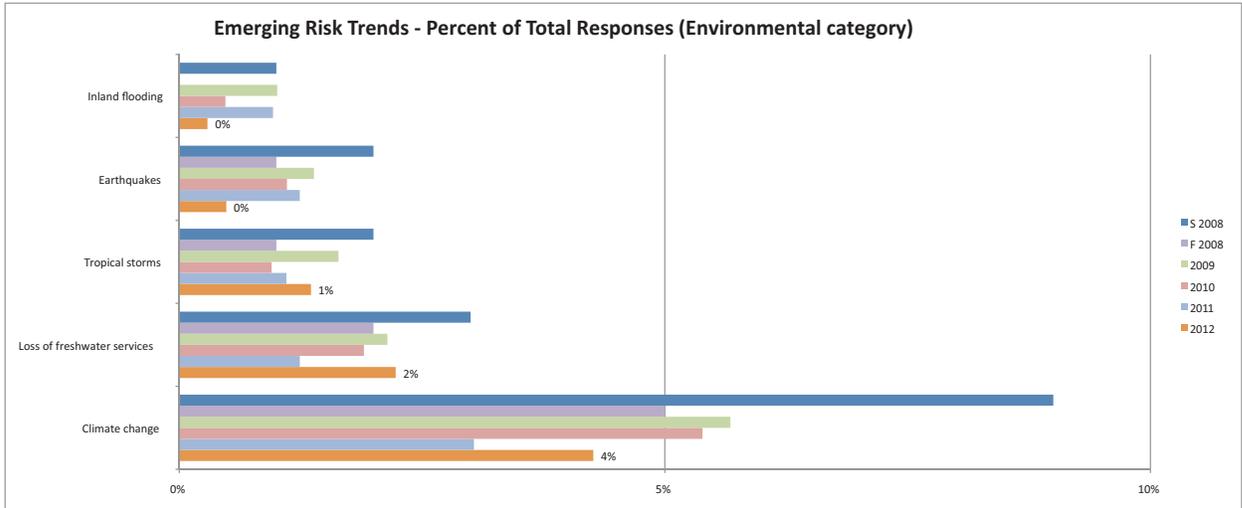
- 61 responses 28% (20%/43%/30%) International terrorism
- 30 responses 14% (9%/18%/14%) Proliferation of weapons of mass destruction (WMD)
- 31 responses 14% (10%/10%/9%) Interstate and civil wars
- 73 responses 33% (42%/38%/18%) 4 Failed and failing states
- 12 responses 5% (3%/12%/7%) Transnational crime and corruption
- 28 responses 13% (11%/25%/18%) Retrenchment from globalization
- 91 responses 42% (32%/25%/28%) 2 Regional instability

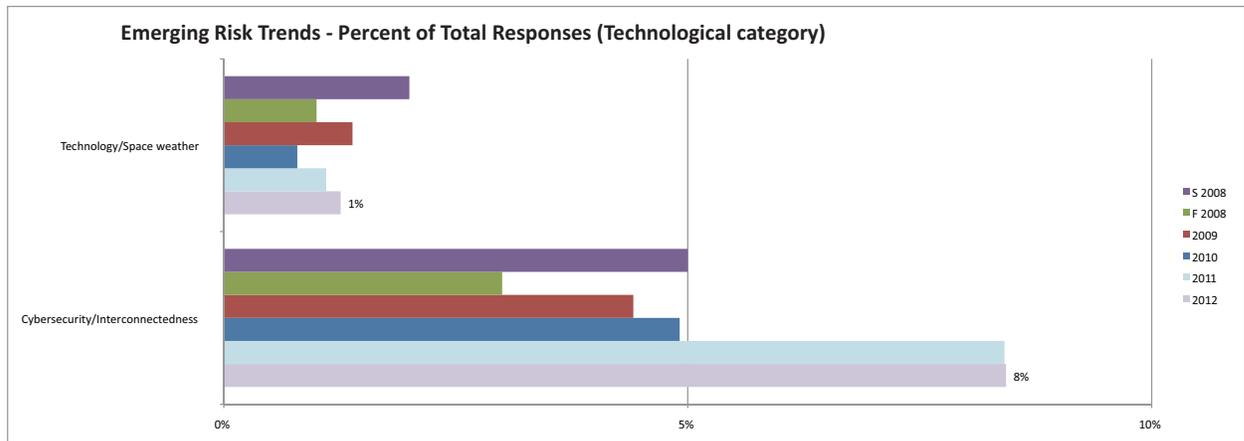
**Societal – 116 responses 11% (11%/7%/8%/9%/13%)**

- 26 responses 12% (13%/22%/30%) Pandemics/Infectious diseases
- 7 responses 3% (2%/4%/4%) Chronic diseases

- 66 responses 30% (30%/26%/27%) Demographic shift
- 17 responses 8% (7%/6%/6%) Liability regimes
- Technological – 100 responses 10% (10%/6%/6%/5%/7%)**
- 87 responses 40% (38%/23%/21%) 3 Cyber security/interconnectedness of infrastructure
- 13 responses 6% (5%/4%/7%) Technology/space weather
- Other – 22 responses 2% (3%/2%/1%/0%/0%)**
  - sounds perhaps vague: poor quality of service in the US
  - regulatory change
  - Fragility of electrical grid
  - sovereign debt and deficits; unfunded entitlement programs
  - Taxation/Inflation
  - Financial/Regulatory Reform
  - Euro collapse
  - Food shortages/cost
  - European Debt Crisis
  - bankrupt developed countries
  - Natural Catastrophe: ALL storms, not just tropical
  - food security
  - Iran
  - regulatory/legislative
  - Crony Capitalism
  - Movement away from free enterprise economies
  - soil degradation/reduced carrying capacity
  - EU collapse
  - Threats to secure food supply
  - Excessive Debt
  - extreme inflation or deflation
  - complexity of regulation







Another way to review this data is as a percent of the total responses. For example, Climate change had 44 responses in this survey. In the previous analysis just shared,  $44/219 = 20\%$ . In this next section we will look at  $44/1032 = 4\%$  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 (42% average – 37%/40%/40%/47%/43%/42% October 2012, October 2011, November 2010, December 2009, November 2008, April 2008)**

- 9% - 6%/7%/9%/10%/8%/13% *Oil price shock*
- 9% - 5%/6%/10%/14%/10%/9% *Fall in value of US \$*
- 7% - 7%/7%/9%/7%/6%/9% *Chinese economic hard landing*
- 8% - 5%/5%/6%/10%/14%/5% *Blow up in asset prices*
- 14% - 13%/15% *Financial volatility*
- Environmental (11% - 9%/8%/10%/12%/9%/17%)**
- 5% - 4%/3%/5%/6%/5%/9% *Climate change*
- 2% - 2%/1%/2%/2%/2%/3% *Loss of freshwater services*
- 1% - 1%/1%/1%/2%/1%/2% *Natural catastrophe: Tropical storms*
- 1% - 0%/1%/1%/1%/1%/2% *Natural catastrophe: Earthquakes*
- 1% - 0%/1%/0%/1%/0%/1% *Natural catastrophe: Inland flooding*
- Geopolitical (29% - 32%/28%/36%/26%/31%/18%)**
- 6% - 6%/4%/9%/6%/6%/4% *International terrorism*
- 3% - 3%/2%/4%/3%/3%/4% *Proliferation of weapons of mass destruction (WMD)*
- 2% - 3%/2%/2%/2%/2%/3% **Interstate and civil wars**
- 6% - 7%/9%/8%/4%/6%/2% **Failed and failing states**
- 2% - 1%/1%/3%/2%/2%/2% *Transnational crime and corruption*
- 4% - 3%/2%/5%/4%/5%/2% *Retrenchment from globalization*
- 6% - 9%/7%/5%/6%/7%/1% **Regional instability**
- Societal (10% - 11%/11%/7%/8%/9%/12%)**
- 5% - 3%/3%/5%/6%/7%/8% *Pandemics/Infectious diseases*
- 1% - 1%/2%/1%/1%/1%/2% *Chronic diseases*
- 6% - 6%/7%/6%/6%/5%/6% *Demographic shift*
- 1% - 2%/2%/1%/1%/1%/2% **Liability regimes**

**Technological (7% - 10%/10%/6%/5%/4%/7%)**

• 6% - 8%/8%/5%/4%/3%/5%

**Cyber security/Interconnectedness of**

**infrastructure**

• 1% - 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 – 105 responses 54% (56%/48%/63%/65% Fall 2010/Fall 2009/Fall 2008)**

• 9 responses 5% (3%/9%/6%/12%)

**Oil price shock**

• 13 responses 7% (2%/11%/26%/18%)

**Fall in value of US \$**

• 10 responses 5% (5%/14%/4%/3%)

**Chinese economic hard landing**

• 18 responses 9% (6%/10%/22%/25%) 2

**Blow up in asset prices**

• 55 responses 28% (40%)

1 **Financial volatility**

**Environmental – 11 responses 6% (4%/7%/12%/4%)**

• 10 responses 5% (2%/4%/6%/3%)

**Climate change**

• 0 responses 0% (0%/2%/3%/1%)

**Loss of freshwater services**

• 1 response 1% (1%/1%/2%/0%)

**Natural catastrophe: Tropical storms**

• 0 responses 0% (1%/0%/1%/0%)

**Natural catastrophe: Earthquakes**

• 0 responses 0% (0%/0%/0%/0%)

**Natural catastrophe: Inland flooding**

**Geopolitical – 44 responses 23% (22%/28%/14%/18%)**

• 2 responses 1% (2%/4%/2%/3%)

**International terrorism**

• 2 responses 1% (2%/7%/4%/3%)

**Proliferation of weapons of mass destruction**

(WMD)

• 6 responses 3% (1%/5%/1%/1%)

**Interstate and civil wars**

• 15 responses 8% (12%/8%/2%/2%) 3

**Failed and failing states**

• 0 responses 0% (0%/0%/1%/1%)

**Transnational crime and corruption**

• 5 responses 3% (2%/3%/1%/2%)

**Retrenchment from globalization**

• 14 responses 7% (4%/1%/3%/4%) 4T

**Regional instability**

**Societal – 11 responses 6% (5%/4%/2%/2%)**

• 2 responses 1% (2%/3%/2%/2%)

**Pandemics/Infectious diseases**

• 1 response 1% (0%/1%/0%/0%)

**Chronic diseases**

• 4 responses 2% (3%/3%/5%/7%)

**Demographic shift**

• 4 responses 2% (1%/0%/0%/0%)

**Liability regimes**

**Technological – 15 responses 8% (8%/9%/6%/6%)**

• 14 responses 7% (7%/9%/4%/6%) 4T

**Cyber security/interconnectedness of**

**infrastructure**

• 1 response 1% (1% (0%/1%/0%))

**Technology/Space weather**

**Other – 8 responses 4% (5%/3%/3%/3%)**

• Taxation/Inflation

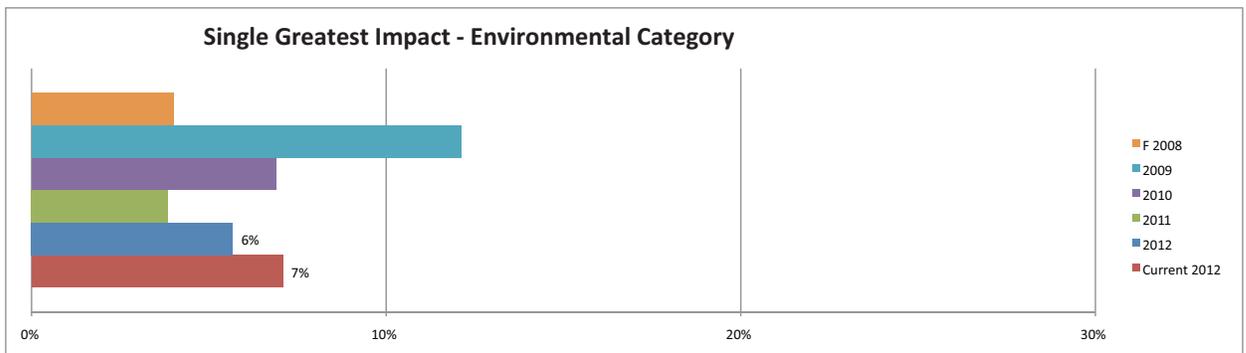
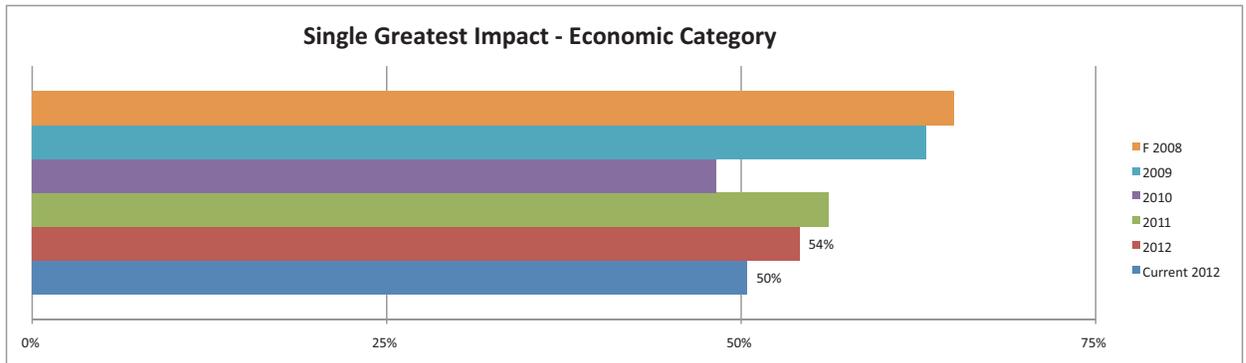
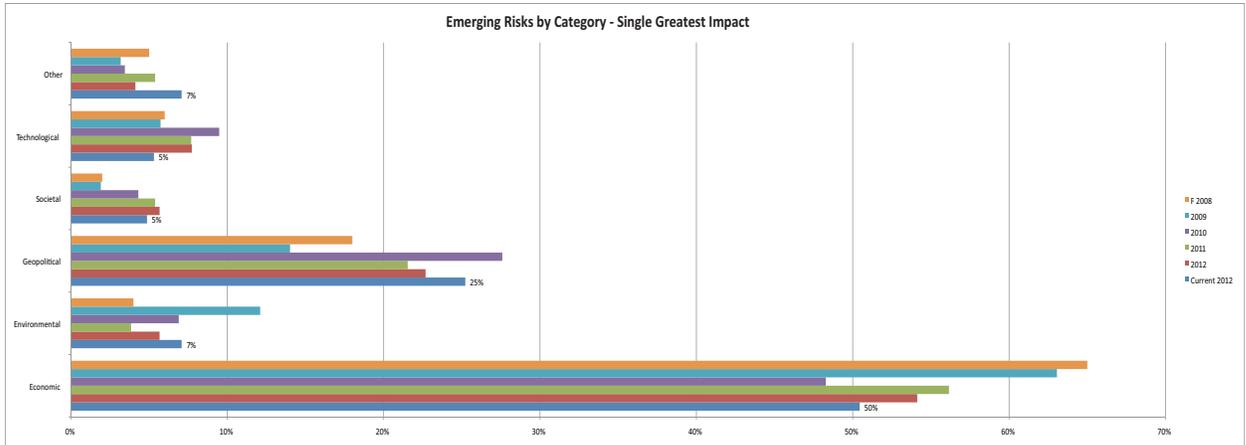
• European Debt Crisis

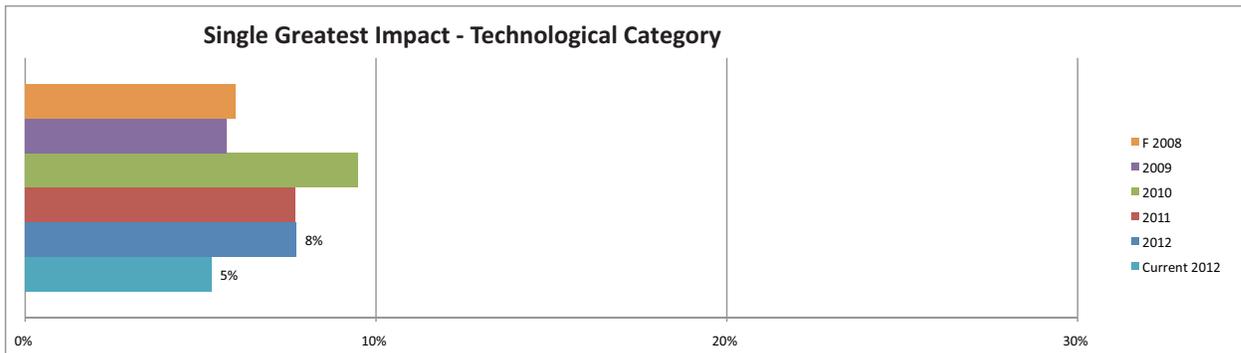
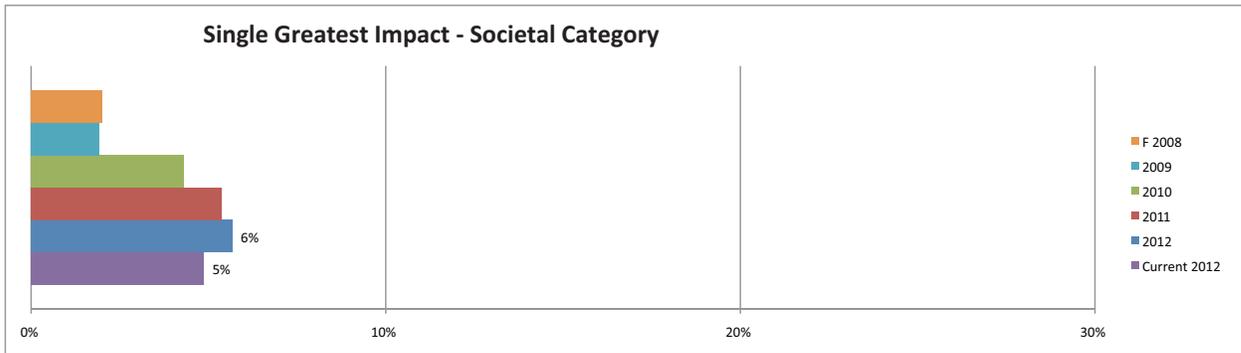
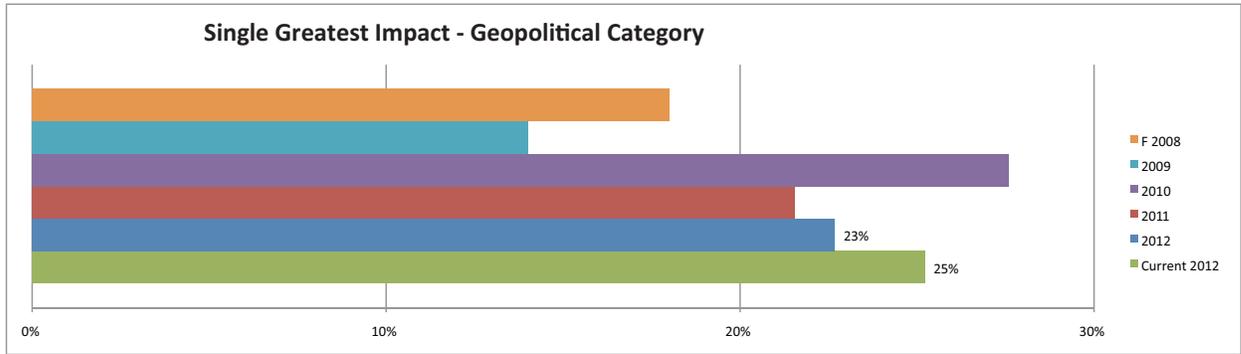
• Natural Catastrophe: ALL Storms, not just tropical

• food security

• regulatory/legislative

- movement away from free enterprise economies
- Excessive Debt
- extreme inflation or deflation





**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 – 46% (48%/45%/53%/49% in previous surveys)**

- 9% (9%/10%/13%/12%)      1 2 Oil price shock
- 6% (6%/13%/18%/12%)      2     Fall in value of US \$
- 7% (8%/10%/8%/6%)        3 5T Chinese economic hard landing
- 8% (6%/7%/11%/14%)       4 3T Blow up in asset prices
- 15% (19%)                        5 1 Financial volatility

**Environmental – 9% (7%/11%/13%/9%)**

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

**Geopolitical – 32% (32%/35%/25%/32%)**

- 6% (6%/9%/6%/8%) 11 International terrorism
- 4% (2%/4%/4%/3%) 12 Proliferation of weapons of mass destruction (WMD)
- 4% (3%/4%/1%/3%) 13 Interstate and civil wars
- 8% (9%/8%/3%/5%) 14 3T Failed and failing states
- 1% (2%/2%/1%/1%) 15 Transnational crime and corruption
- 3% (3%/4%/3%/4%) 16 Retrenchment from globalization
- 7% (7%/5%/6%/8%) 17 5T Regional instability

**Societal – 7% (6%/5%/5%/8%)**

- 2% (1%/4%/4%/7%) 18 Pandemics/Infectious diseases
- 1% (1%/0%/1%/1%) 19 Chronic disease
- 3% (3%/5%/4%/6%) 20 Demographic shift
- 1% (1%/0%/1%/0%) 21 Liability regimes

**Technological – 5% (7%/4%/3%/2%)**

- 5% (6%/3%/2%/1%) 22 Cyber security/Interconnectedness of infrastructure
- 1% (1%/0%/1%/0%) 23 Technology/Space weather

**Two risk combinations – 491 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	0	11	7	9	24	2	2	3	1	0	10	2	5	2	1	2	7	0	0	0	0	4	0
2	0	0	15	11	16	1	0	0	0	0	0	0	0	3	0	1	2	0	1	1	0	1	0
3	0	0	0	8	18	0	0	0	0	0	0	0	2	6	0	5	6	0	0	2	0	2	0
4	0	0	0	0	23	1	0	0	0	0	0	0	1	5	0	1	3	2	0	7	1	3	0
5	0	0	0	0	0	3	2	1	1	0	4	1	2	17	0	6	10	4	1	7	5	7	0
6						0	6	7	2	8	0	0	1	0	0	1	1	3	0	0	0	1	0
7						0	0	0	1	2	0	0	3	1	0	0	0	4	0	0	0	0	0
8						0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0
9						0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
10						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11											0	19	6	3	0	1	4	0	0	0	0	0	12
12											0	0	3	6	2	1	5	0	0	0	0	0	1
13											0	0	0	7	0	1	3	0	0	0	0	0	1
14											0	0	0	0	3	4	13	0	0	4	1	1	0
15											0	0	0	0	0	1	1	0	0	0	0	2	0
16											0	0	0	0	0	0	5	0	0	0	0	1	0
17											0	0	0	0	0	0	0	1	0	2	0	3	0
18																		0	1	2	0	1	0
19																		0	0	6	1	0	0
20																		0	0	0	1	1	1
21																		0	0	0	0	0	0
22																						0	4
23																						0	0

Leading combinations were

24 responses (5%)

*Oil price shock*

*Financial volatility*

23 responses (5%)

*Blow up in asset prices*

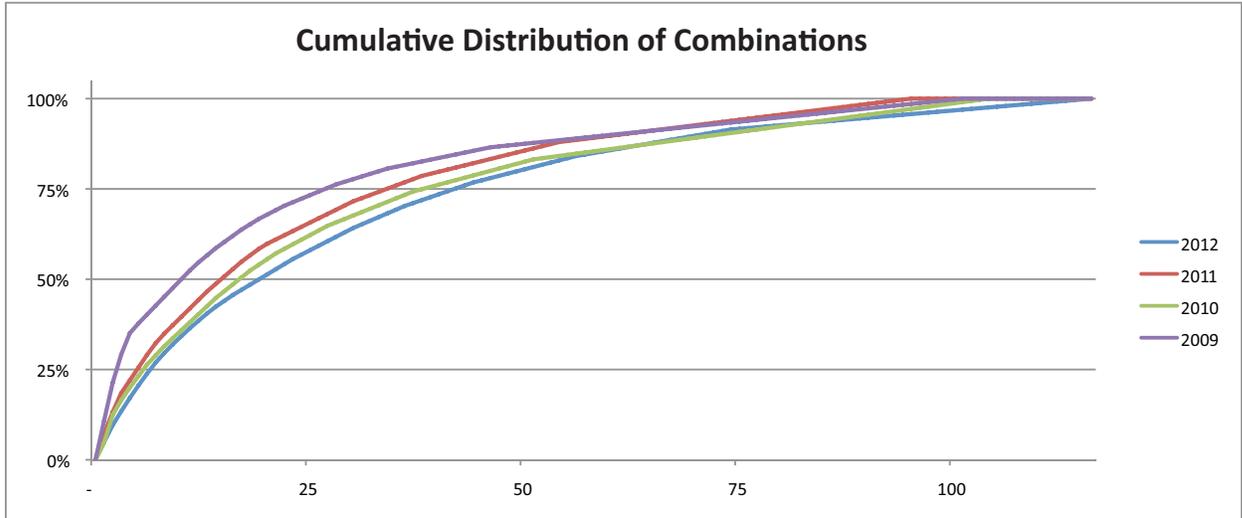
- 19 responses (4%)
  - Financial volatility*
  - International terrorism*
  - Proliferation of weapons of mass destruction (WMD)*
- 18 responses (4%)
  - Chinese economic hard landing*
  - Financial volatility*
- 17 responses (3%)
  - Financial volatility*
  - Failed and failing states*
- 16 responses (3%)
  - Fall in value of US \$*
  - Financial volatility*
- 15 responses (3%)
  - Fall in value of US \$*
  - Chinese economic hard landing*
- 13 responses (3%)
  - Failed and failing states*
  - Regional instability*
- 12 responses (2%)
  - International terrorism*
  - Cyber security/interconnectedness of infrastructure*
- 11 responses (2%)
  - Oil price shock*
  - Fall in value of US \$*
- 11 responses (2%)
  - Fall in value of US \$*
  - Blow up in asset prices*
- 10 responses (2%)
  - Oil price shock*
  - International terrorism*
- 10 responses (2%)
  - Financial volatility*
  - Regional instability*

### Combinations by category

		2008	2009	2010	2011	2012
Economics	Economics	34%	42%	29%	29%	29%
Economics	Environmenta	2%	3%	5%	3%	3%
Economics	Geopolitical	22%	16%	21%	24%	21%
Economics	Societal	2%	3%	2%	6%	6%
Economics	Technological	1%	1%	3%	4%	3%
Environmenta	Environmenta	7%	9%	7%	4%	6%
Environmenta	Geopolitical	2%	2%	3%	2%	2%
Environmenta	Societal	5%	3%	2%	2%	1%
Environmenta	Technological	0%	0%	0%	0%	0%
Geopolitical	Geopolitical	16%	14%	20%	14%	18%
Geopolitical	Societal	4%	2%	2%	1%	2%
Geopolitical	Technological	1%	2%	3%	7%	4%
Societal	Societal	2%	1%	2%	1%	2%
Societal	Technological	1%	0%	1%	0%	1%
Technological	Technological	0%	1%	0%	1%	1%

### Combinations by choice 1, 2, 3

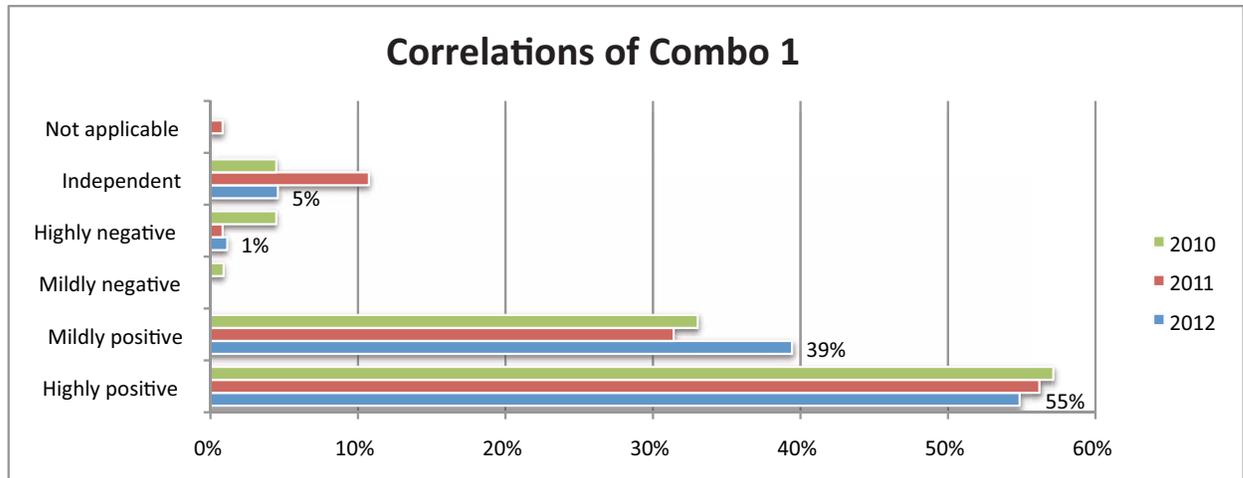
		Combo 1	Combo 2	Combo 3	Total	Combo 1	Combo 2/3
Economics	Economics	65	48	29	142	36%	29%
Economics	Environmenta	7	4	6	17	4%	3%
Economics	Geopolitical	45	28	31	104	25%	21%
Economics	Societal	9	9	13	31	5%	6%
Economics	Technological	3	9	5	17	2%	3%
Environmenta	Environmenta	6	14	9	29	3%	6%
Environmenta	Geopolitical	3	2	3	8	2%	2%
Environmenta	Societal	2	3	2	7	1%	1%
Environmenta	Technological	0	0	1	1	0%	0%
Geopolitical	Geopolitical	28	34	26	88	16%	18%
Geopolitical	Societal	4	1	3	8	2%	2%
Geopolitical	Technological	4	9	8	21	2%	4%
Societal	Societal	2	6	3	11	1%	2%
Societal	Technological	1	0	2	3	1%	1%
Technological	Technological	0	2	2	4	0%	1%
		179	169	143	491	100%	100%



Risk Concentration Ratio						
					Avg prior to	
	2009	2010	2011	2012	Current Yr	Avg/Curr Yr
First quartile	3	6	5	7	4.7	0.67
Second quartile	10	17	15	20	14.0	0.70
Third quartile	27	38	34	42	33.0	0.79
Total	101	104	95	116	100.0	0.86
Remaining	152	149	158	137		
						75

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

- 96 responses 55% (56%/57%) Highly positively correlated
- 69 responses 39% (31%/33%) Mildly positively correlated
- 0 responses 0% (0%/1%) Mildly negatively correlated
- 2 responses 1% (1%/4%) Highly negatively correlated
- 8 responses 5% (11%/4%) Independent
- 0 responses 0% (1%/0%) Not applicable



**Question 5.** Many of the emerging risks could lead to regional food shortages. Which risks, in your opinion, would be most likely to lead to this potential event? (please select no more than three)

**174 respondents chose at least one for a total of 483 responses (2.8 average)**

**Economic – 69 responses (14%)**

- 43 responses 9% 5 Oil price shock
- 7 responses 1% 1 Fall in value of US \$
- 1 response 0% 0 Chinese economic hard landing
- 7 responses 1% 1 Blow up in asset prices
- 11 responses 2% 2 Financial volatility

**Environmental – 224 responses (46%)**

- 85 responses 18% 1 Climate change
- 62 responses 13% 2 Loss of freshwater services
- 22 responses 5% 2 Natural catastrophe: Tropical storms
- 11 responses 2% 1 Natural catastrophe: Earthquakes
- 44 response 9% 4 Natural catastrophe: Inland flooding

**Geopolitical – 153 responses (32%)**

- 6 responses 1% 1 International terrorism
- 3 responses 1% 1 Proliferation of weapons of mass destruction (WMD)
- 37 responses 8% 8 Interstate and civil wars
- 39 responses 8% 8 Failed and failing states
- 4 responses 1% 1 Transnational crime and corruption
- 9 responses 2% 2 Retrenchment from globalization
- 55 responses 11% 3 Regional instability

**Societal – 22 responses (5%)**

- 15 responses 3% 3 Pandemics/Infectious diseases
- 0 responses 0% 0 Chronic diseases
- 7 responses 1% 1 Demographic shifts
- 0 responses 0% 0 Liability regimes

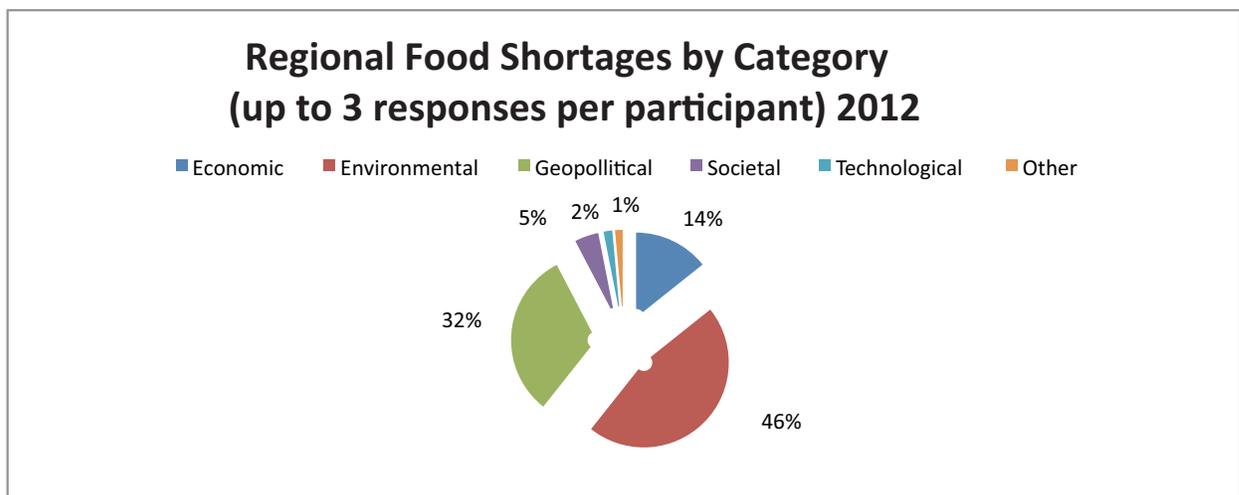
**Technological – 8 responses (2%)**

- 5 responses 1% Cyber security/Interconnectedness of infrastructure
- 3 responses 1% Technology/Space weather

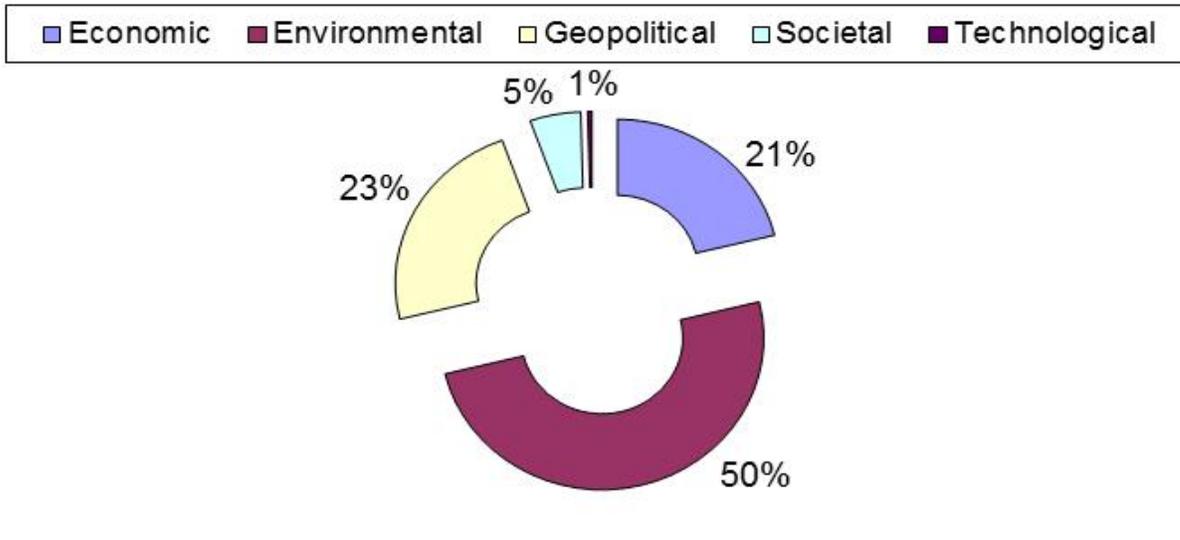
**Not Sure – 2 responses (0%)**

**Other – 7 responses (1%)**

- Government spending
- Continued quantitative easing
- animal food production
- population increase
- Droughts
- Unsustainable agricultural practices (monoculture)
- financial speculation



## Regional Food Shortages by Category (up to 3 responses per participant) Fall 2008



**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, and why?

- None, emerging risks are viewed primarily in the context of risk avoidance.
- precious metals
- None
- Diversify the business by growing product lines that were not considered core in the past.
- Short USD+Long GOLD if Obama elected
- Business instability, products not on anyone's radar or have scared everyone away. Demographic shifts are also important.
- none
- Inconsistencies in regulation of securities, insurance products, and other financial goods & services across national boundaries.
- None.
- Interest rates, demographic changes, technology changes, medical advancements
- none
- The challenge with possible mis-pricing is timing...both entering into and awaiting the possible pay-back. In other words, aspects that may be monitored as mis-priced may not be items that can be deemed comfortable from an enterprise perspective as the return profile is "emerging" as well.
- None
- Alternative energy initiatives
- Financial markets - interest rates and equity behavior. Both have a large impact on my industry.

- Climate change provides diversification from demographic shift.
- The current environment of low interest rates will lead companies to buy longer assets, which when interest rates rise will hurt them worse. Finding sufficient yield without extending duration will be the luxury of few companies but they will tend to emerge stronger in the longer term.
- none
- Telematics and other advanced technology in automobiles
- we tend to evolve product designs rather than create something entirely new to leverage opportunities
- None
- Mortgage insurance
- Diversification of service offerings to spread risk associated with limited lines of income.
- Demographic change.
- none
- Fall in USD, could lead to imbalance of export/import, trigger unwanted inflation, narrow the interest spread.
- None
- risk off / US Treasury rally - signals that risk assets are on sale at WalMart.
- Steepness of yield curve
- Offsets between mortality & longevity risk
- New complicated investment product that is short of a widely accepted valuation method. There could be mispricing there due to lack of knowledge.
- The use of self-retention models, manuscript policy wordings as well as the elimination of exclusions and/or rewrites of wordings both in London and domestic markets.
- Financial risk - easier to price and transact ; other risks are not easy to transact
- I personally don't monitor these risks.
- flood risk; climate change
- Blow up in asset prices
- None, we are currently reactive in this area.
- none
- I have not been doing that.
- falling \$, it's the international currency reserve. It will effect commodity prices.
- Emerging market equities and bonds as a way to avoid the overspending and huge debt of developed countries.
- I just shudder
- None.
- Asset/investment mispricing
- regulatory changes - potential to exploit change / climate change - better understand risks/rewards by area
- Interest rate movement
- Energy - All economies need energy.

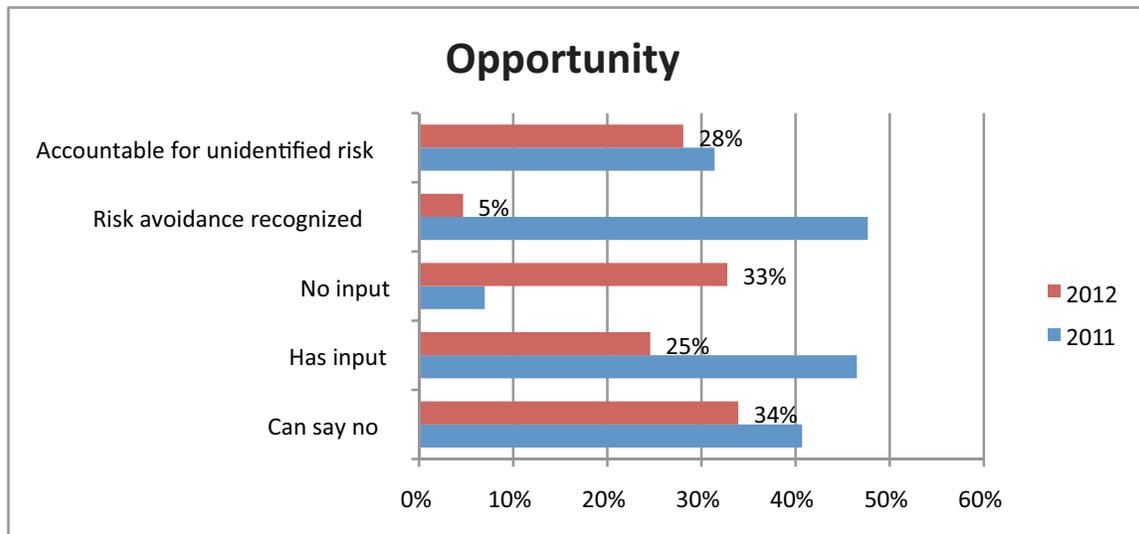
- Return on personal investment in non-financial assets (family, home, travel, education).
- All natural catastrophes and climate change to adequately price for property risk
- climate change will be a negative for some but a positive for others - e.g., northern countries like Canada will be able to grow more variety and ship from the north
- I monitor 'financial volatility' closely, because temporary mispricing will revert to its fundamental value.
- Financial volatility - customers want protection against this
- Credit spreads and equity volatility - correlate with stressed environments
- Insurance companies will invest inappropriately which will lead to opportunities for acquisition by other companies.
- None.
- I track emerging risks that I can develop risk management consulting solutions or for which I can design limited risk transfer/insurance mechanisms for. For example, monitoring cyber risk but looking for ways to develop a more holistic solution involving ongoing outside assessment/monitoring, then getting insurance underwriters to allow for better terms and conditions for those risks the client ultimately wants to transfer.
- I monitor the emerging demographic shift to an older population in an attempt to anticipate the impact on pricing of financial instruments
- Volatility adds to the amount of risk capital we must hold. We monitor this.
- None
- I don't specifically monitor emerging "opportunities". What monitoring I do is more related to whether the economic environment is becoming more stable or less stable.
- We monitor using social media as a distribution channel for insurance products as they are cost efficient and can bring better value to the customers.
- catastrophe reinsurance mechanisms - interest

**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)

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

- 42 responses 34% Our ERM function can say no to a strategic opportunity
- 56 responses 25% Our ERM function has input but not a vote when a strategic opportunity is being considered
- 8 responses 33% Our ERM function has no input when a strategic opportunity is being considered
- 48 responses 5% If the firm avoided a risk identified by the ERM department, the value of the department is recognized
- 30 responses 28% If the firm was subjected to a risk not identified, the ERM department would be held accountable
- 58 responses Not applicable

Note that for the first 2 responses there were 4 who chose both so 94 (55% down from 84% in 2011) could say no to a strategic opportunity and/or have input



### Comments

- This question points out the need to have all areas of the company responsible and accountable for identifying and measuring risk - a central area may not be the optimal solution for dealing with ERM
- Our ERM function consists of the key senior officers as well as the Chief Risk Officer
- I don't know.
- Our ERM function has significant input, but can be disregarded by senior management who know the business better.
- Can be overridden

**Question 8.** No list of risks is ever complete. Are there other emerging risks that you feel are significant that should be considered for future surveys?

### Option 1

- Changes in regulatory and legal regimes
- impact of unfunded entitlement programs
- Government spending
- Politicians with no long term scope
- Disenfranchisement of the American Investor
- regime change
- class shift
- US Loses World Dominance
- Consumer personal DNA/genome access
- collapse of Euro
- Education gap (emerging)

- politicians
- Natural Catastrophe: Drought
- Accelerating Governmental Costs from Social Insurance Plans
- Government Debts/Overspending
- Eurozone failure
- Excessive government regulation
- animal food production's impact on freshwater and general food supply.
- Rapidly rising interest rates and/or inflation
- prolonged very low interest rates
- Natural Catastrophe: ALL Storms, not just tropical
- Market complexity
- Cyber hactivism - the use of cyber terrorism as an instrument of political influence and/or control
- Loss of trust in government/institutions ("occupy movement")
- Low interest rates
- Regulatory regimes
- Natural catastrophe: Drought
- Ineffective governmental response to crises
- Systemic Risk of Collapse
- Political failure
- food security
- Collapse of Eurozone
- Population increase
- legislative/regulatory
- Medical progress leading to increased longevity
- Jobs Warfare
- Euro break-up
- Droughts
- Europe dismantlement
- Business Model Change
- nanotechnology
- Low growth
- US severe loss of credit standing
- Loss of freedom
- Deleveraging and asset deflation
- overpopulation
- Low interest rates
- US entering war like in Iraq
- Loss of confidence/motivation in the 1st world countries
- Management culture
- world overpopulation
- US Debt Crisis
- Food additives (growth hormones)
- Political climate/changes

- Rapid inflation
- Tax Policy Changes
- Global depression
- employee engagement
- Affordability and access to basic and higher education
- Excessive Debt
- operational risk
- Eurozone crisis
- US Financial Regulation Reform
- Restructure/default of U.S. National Debt
- Market Crash
- Increasing government debt
- US Fiscal and Monetary Policy
- Threat of widespread adoption of socialism/communism
- US Gov. Default
- risk of radical changes in workplace expectations/norms for either employers or employees
- Financial security system breakdown

#### **Option 2**

- Currency retrenchment (e.g. Euro)
- currency wars
- Taxation
- Regulatory/Financial Reform
- Fiat currency failure/success
- No-growth (or negative growth) economic scenario
- Unfunded Social Programs
- unemployment
- Continued growth in government power
- Shifting world economic power to China
- meltdown of reinsurance markets with counterparty failures
- Natural Catastrophe: Drought
- Regulatory Complexity
- Adequate Training to meet technological needs
- Longevity improvement
- Freeze of political process hijacked by extreme
- High Unemployment/Underemployment
- stress-related diseases
- Consistently low investment returns
- Soil degradation/permanent loss of food growing capacity
- have nots demanding more from the haves - triggers haves not working
- natural resource depletion
- Debt crisis
- Regulatory strangleholds
- Unsustainable Social Security Benefits

- Fragility of electrical power grid (US and Canada)
- Corruption & Frauds
- Government Regulations
- Massive international bond defaults
- U.S. Business Regulations
- Derivative limitations
- U.S. tax law changes
- zero-bound interest rate risk
- Social security breakdown

### **Option 3**

- Increased moral hazard (following contracts, etc.)
- Inflation
- Trade Wars (imbalancing trade)
- Implementation of carbon tariffs, taxes, or similar
- meltdown of derivatives markets with counterparty failures
- Impacts of Government Regulation (ex: Health Care Reform)
- Population Increase
- Economic Diversity & Balance
- Education gap-more \$ doesn't = better education
- Free market obstructions
- Unsustainable Medicare Benefits
- Regulatory regimes
- Civil Unrest Domestically
- Housing Bubble
- extreme inflation or deflation risk
- World war III

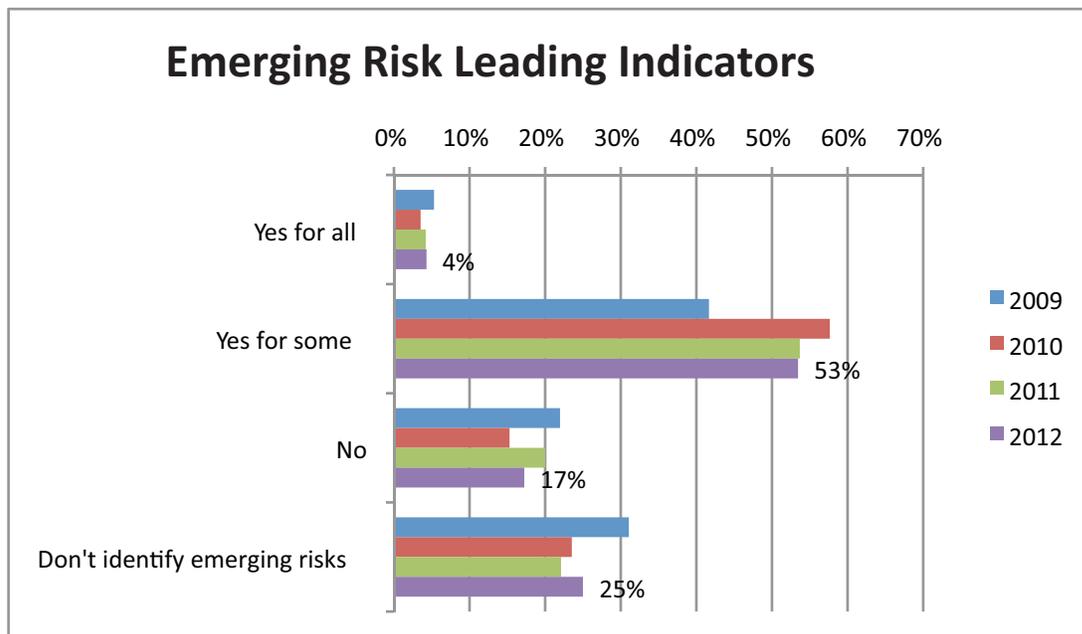
## Section 2: Leading Indicators

Some questions require an industry perspective. Please choose an industry where you are a risk expert and answer questions consistently throughout.

**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 the threat's credibility.)

**172 responses (Fall 2011/Fall 2010/Fall 2009 for comparison)** percentages back out those stating question is not applicable to them

- 5 responses 4% (4%/4%/5%) Yes for all
- 62 responses 53% (54%/58%/42%) Yes for some
- 20 responses 17% (20%/15%/22%) No
- 29 responses 25% (22%/24%/31%) We do not formally identify emerging risks
- 29 responses Not sure
- 27 responses Not applicable



**Question 2.** If yes, please provide examples of these methods, including the specific emerging risk and leading indicators.

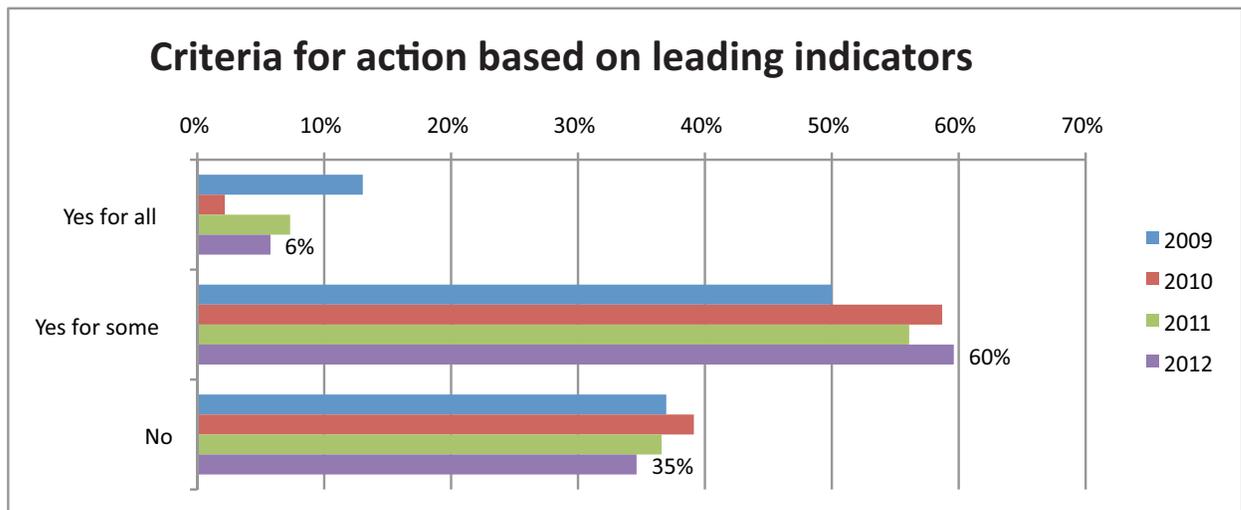
- A liquidity stress event. Leading indicators are trends/swings in the market values of investment assets.
- I can not. (company policy prohibits the dissemination of this information.)
- No, that is proprietary information.
- Regulatory risk .... amount of new regs with degree of regulation

- Morbidity/mortality improvement - effectiveness of Alzheimer drugs in test.
- Financial volatility - FOMC, equity market trends.
- Telematics: progress of patents (and related lawsuits) on pay-as-you-go monitoring devices
- adverse policyholder behavior is tracked via data on lapse, surrender, take rates, etc.
- For the current Euro crisis - and its possible dissolution, we monitor several financial metrics including sovereign interest rates and debt maturities by period.
- Regulatory risks - changes in political environment
- We try to identify a constant such as size, asset base, distribution or concentration of resources with which to project impact of what we see coming. Example would be the collapse of the mortgage market was predicted as we saw the number of days in delayed payments and measured those days with outcomes.
- Free form media scanning, judicial activity and political activity
- climate change indicators as identified by climate scientists
- Low (lower) interest rates: economist forecasts
- Not sure
- spike in interest rates -- Fed and Wall St discussions
- inland flooding and tropical storms - monitor climate change markers
- Focused Group, Economic Indicators
- Surveying SME within organization.
- For example, I am concerned with the volatility in Hong Kong stock market. I watch the exchange rate of Hong Kong dollar against US dollar closely, because it is a rough indicator of money flow into and out of Hong Kong.
- Review market forecasts and indicators for key macroeconomic factors impacting business
- Weather would have an impact on food prices.
- Eurozone crisis - monitor credit spreads / Climate change - monitor loss frequency and severity trends
- Housing bubble indicators - HPA, price to income, price to rent, affordability, supply vs. demand
- CDS on companies being monitored
- Follow, and try to predict, prices of commodities such as oil and gold, as well as equities, bond rates, employment levels (i.e. economic indicators). Identify a best estimate economic scenario, as well as optimistic and pessimistic ones; describe and respond to actions needed to take under these scenarios and vulnerabilities of the firm under these scenarios. Reflect after the period has occurred as to why predictions were correct or incorrect, for the purpose of improving predictions going forward.
- Pandemic - CDC and WHO data
- News/financial reports.
- We are a bank so we monitor all sorts of financial indicators as a measure of economic strength

**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?

**62 responses**

- 3 responses 6% (7%/2%/13%) Yes for all
- 31 responses 60% (56%/59%/50%) Yes for some
- 18 responses 35% (37%/39%/37%) No
- 10 responses Not sure
- 0 responses Not applicable



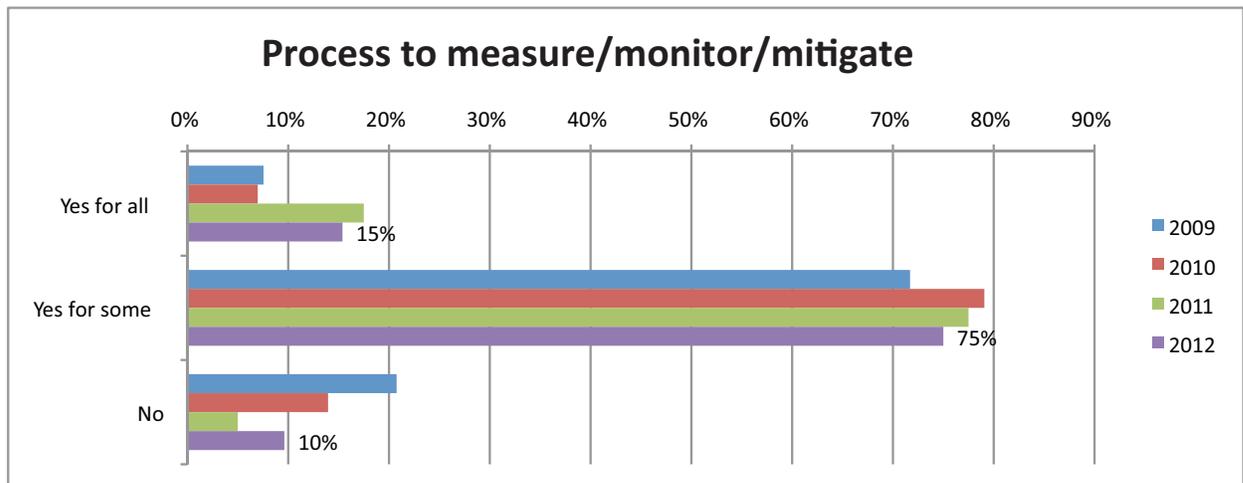
**Question 4.** If yes, please provide examples.

- I can not. (company policy prohibits the dissemination of this information.)
- Again, that is proprietary information.
- typically set threshold levels where an action or discussion is required - outcome may be to risk accept, alter threshold levels, or mitigate
- Raising suggestions to management of consulting opportunity
- If risk increases to extent it endangers solvency, pay the cost to hedge
- Not sure
- impact on capital sufficiency
- monitor terrorism risk by region and adjust risk tolerances/limits accordingly
- Greek collapse - watching spreads
- Contingency planning for liquidity risk event outlines stages tied to market and company-specific events
- monitor risk level and manage within tolerance and limits
- If the housing bubble indicators exceed 2 standard deviations of the historical data, then mitigating plans are triggered.
- Typically use the regulatory capital ratio as a measure to determine if mitigating actions are necessary.

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

**59 responses**

- 8 responses 15% (18%/7%/7%) Yes for all
- 39 responses 75% (78%/79%/72%) Yes for some
- 5 responses 10% (5%/14%/21%) No
- 7 responses Not sure
- 0 responses Not applicable



**Question 6.** If yes, please provide examples.

- We model the risk in a stress test, focusing on what it would do to our capital position over the planning horizon. We also in some cases model the entire cash flow stream over a 30-year horizon in the stress scenario. Mitigation of the risk depends on the risk and the circumstances.
- I can not....
- Proprietary information
- Exit strategies for certain products based on deflation and currency relationships
- Analyzing equity hedge prices to reduce surplus volatility.
- Data Breach and Cyber Liability exposures: assigned owner(s), regular reporting on mitigation activities, regular assessment of changes in the nature of technology developments
- this really depends on the proximity of the risk; if a threshold is breached or further analysis indicates action is needed then specific mitigations are considered by management; for example, if the risk in the investment portfolio is deemed excessive then a full analysis is done of alternative actions and trade-offs to determine the mitigation chosen

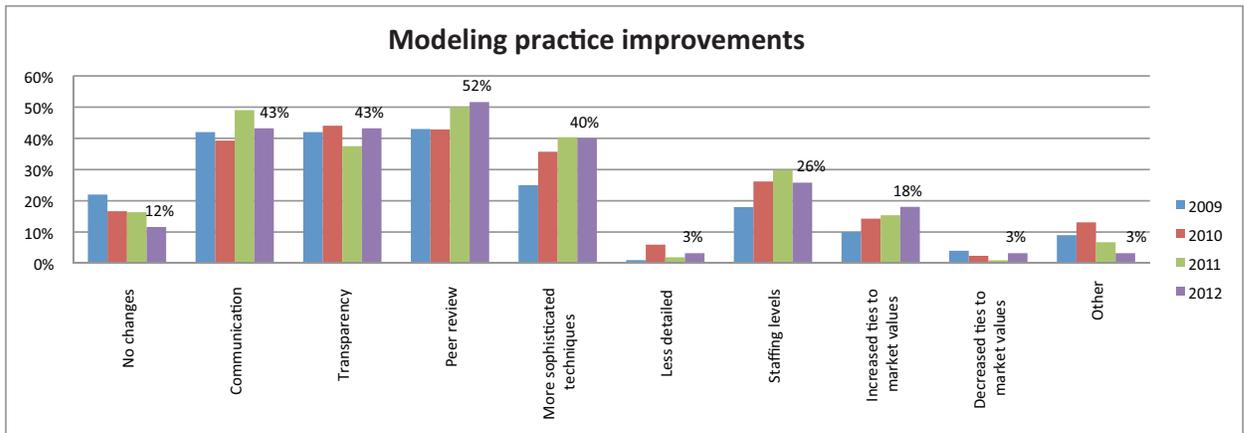
- Risks are identified and committees are formed to monitor. Reporting on risks is reviewed by committee of the Board of Directors each quarter.
- The determination as to the number and quality of credit card customers by credit score
- Use Economic Capital
- determine monitoring based on the issue
- Not sure
- capital sufficiency
- climate change: monitor risks factors and adjust product offerings and prices
- Deterministic Stress Testing
- ERM Team discusses emerging risks and assigns responsibility to analyze and bring back options to consider to manage the risk.
- Emerging risks are prioritized and formal studies are conducted, with mitigation as appropriate
- Housing bubble process as described in response to previous questions.
- Have a risk appetite statement with tolerances and specific metrics. These are measured and reported upon at least quarterly to Management and the Board.
- Plans to monitor, quantify, and mitigating actions.

### 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)

**395 responses from 155 (2.5 average)**

- 18 responses 12% (16%/17%/22%) No changes
- 67 responses 43% (49%/39%/42%) Communication
- 67 responses 43% (38%/44%/42%) Transparency
- 80 responses 52% (50%/43%/43%) Peer review
- 62 responses 40% (40%/36%/25%) More sophisticated techniques
- 5 responses 3% (2%/6%/1%) Less detailed
- 40 responses 26% (30%/26%/18%) Staffing levels
- 28 responses 18% (15%/14%/10%) Increased ties to market value
- 5 responses 3% (1%/2%/4%) Decreased ties to market value
- 18 responses Not applicable
- 5 responses 3% (7%/13%/9%) Other
  - economic value
  - More review by less qualified individuals--too many high level morons both internal and external opining in ignorance
  - have added some independent models for selected processes
  - Increased focus on back-testing and looking at risk in multiple ways
  - Input from a wider array of experts



**Question 2.** Historical data is rarely available for emerging risks. How do you develop assumptions for the quantification performed by models?

- Identify analogous risks, look at behavior when similar events occurred, Identify possible outcomes and behaviors and qualitatively assess before quantifying.
- Ask senior management what would a plausible range of assumptions be.

- Analysis of related emerged risks.
- Look for qualitative bases and/or probable correlated data that may have some historical record.
- Judgment.
- Internal studies of corporate experience
- group discussion/consensus, w/ sensitivity testing
- Subjective assessment. Correlations of risks would be an example of something for which we have had challenges in assessing anticipated relationships.
- review any available data, use surveys
- Subject matter experts and good inference; sensitivity testing
- look at tails to see the potential problems
- Stochastic generation of economic variables, specifically interest rates and equity returns.
- Develop parameters from underlying risks that we feel would be similar to emerging risks.
- We have come to the conclusion that for emerging risks it is far more informative and worthwhile to do stress tests based on scenarios developed specifically for the risk. Trying to use stochastic processes on a risk that is not well understood can lead to a false sense of security and can be misleading.
- survey line of business leaders - for example developing a policyholder behavior model for lapses in times of rapidly rising interest rates.
- informed judgment plus stress testing.
- models are just tool and we recognize this; we try to better understand the range of potential outcomes given a wide range of potential assumptions
- NA
- scenario testing
- Stress testing
- Stress testing
- Surveys of senior leadership, and facilitation of discussions with top leaders.
- Conservative view on historical data (financial risks) /
- Simulate "what if" scenarios.
- Based on similar risks
- Survey's to obtain estimated levels of impact under various scenarios.
- Discussions with internal and external experts. What if discussion groups
- n/a
- Not applicable
- We use "shock" scenarios that we believe would create material risk for our company. We also try to back into (solve for) scenarios where we would experience major negative impacts.
- General knowledge about as many things as possible. A deep understanding of how simple models work. You usually don't need many assumptions to get the right order of magnitude.
- We don't - too buried with standard reporting.
- Study Exp. with SST

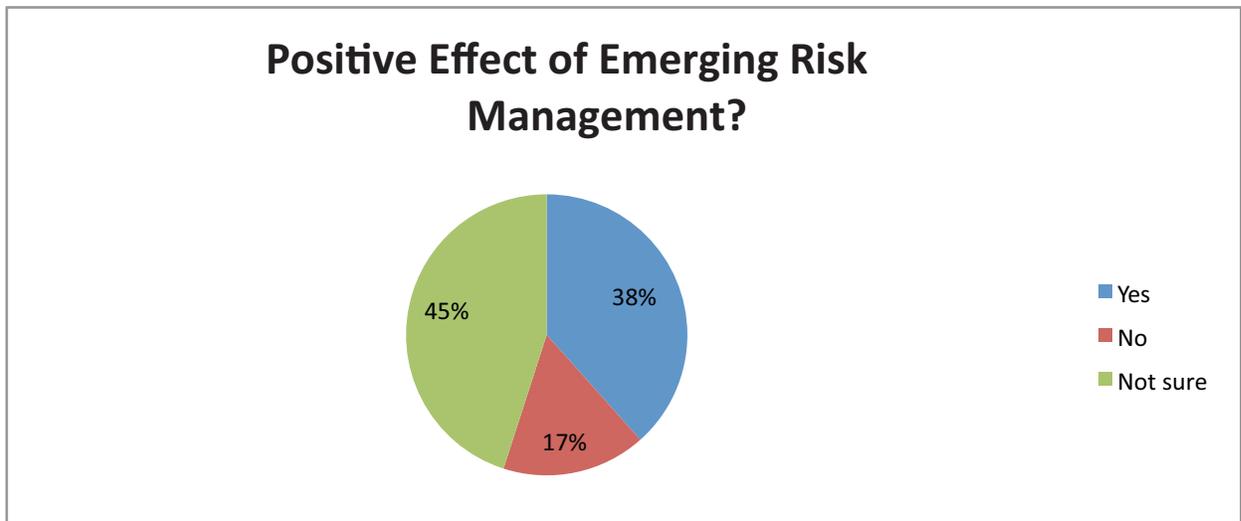
- Expert opinion
- n/a
- extrapolate related data; professional judgment; scenario/sensitivity analysis
- Someone develops a proposal, and other staff independently critique it.
- Artificial intelligence model that is capable of scientific modeling
- past experience along with industry trends and adjusted more dynamic modeling techniques
- Internal debate
- Intelligence guessing and scenarios
- Models are not necessarily the solution
- Via discussions with stakeholders
- rely on historical events with similar characteristics; expert opinion
- Using data from other events; modeling
- Our ERM process has interviewing of senior (not executive) leaders as a key input in risk scenario development. This allows the ERM department to have more of the risk scenarios that the front line business areas see on our radar.
- Review economic social and regional data, trends, and attempt to develop model parameters accordingly. Then need to follow up and test for sensitivity.
- Stochastic modeling of possible scenarios; best estimate / judgment
- sensitivity and stress test
- Workshops to elicit expert views
- A combination of judgment and application, and sometimes translation, of the historical data that is available.
- Assemble think tank to come up with assumptions and scenarios
- intuition, analogy
- Hopefully identify proxy using existing metric that will correlate to the risk
- Consensus from discussion
- test historical interest rate shocks and test beyond that
- Surrogate pricing
- Exposure calculations are as precise as possible - then run "what if" scenarios
- Corporate Risk Management group
- Subjective estimation/description of an adverse scenario.
- Use historical data where available, otherwise rely on models and assumptions created by experts/consultants
- Various sources
- fuzzy logic, Delphi methods
- Stress Testing / Scenarios
- Peer discussions and research
- Consensus.
- Brainstorming with internal staff and outside experts when practical. No formal method but at least trying to use those that can develop an educated guess and have a basic understanding of risk management.
- Reach out to others, internet, experts for data assumption setting.
- Extrapolation of what little data does exist

- Add in specific margin for emerging risk.
- Use a range of scenarios
- Research externally and estimate range of impacts
- If historical data is unavailable, try to find a market measure to tie to (index, ETF, etc.).
- Scenario Analysis
- Acquire perspectives from experts from different, but related, fields.
- intuition, find boundaries
- Models are generally tied to identified variables that do not include the macro environment.
- Best guess/informed judgment.
- Judgment,
- Industry expertise that's communicated, discussion and adjusting assumptions with internal expertise of subject matter experts and management judgment.

**Question 3.** Has the management of emerging risks had a positive effect in your company/industry?

**151 responses**

- 58 responses 38% Yes
- 25 responses 17% No
- 68 responses 45% Not sure



**Question 4.** Why or why not?

- It has contributed to forward thinking on risk capacity, which has led to changes in the strategic priorities of our organization.
- The need to be neither overly plausible nor overly implausible restricts the boundaries of what will be considered in decision making.

- It has at least forced sr. management and the Board to acknowledge the limitations of our ERM function and to recognize the need for more focus in that arena.
- It prompts additional thought and analysis that enhances the understanding of the business.
- ERM process is not developed enough to have any effect on management of the organization
- Regulators and rating organizations love it. Plus its value as a high risk avoidance tool.
- In some cases, it seems that the "process" of managing the emerging risk has dominated practical interpretation. For example, terrorism models often focus on high profile targets. This may lead an organization to steer resources away from specific modeling parameters only to engage other concentration risk -- when, in the end, one might argue the core risk is concentration risk, not terrorism risk.
- Changing retirement asset mix with changing conditions.
- I do not think it affects decision making in most cases.
- Unanticipated fallout from financial crisis affecting new ventures.
- Over the last 15 years we have continually modeled lower interest rates and have been out front in the guarantees we provide. We believe we are well positioned even if 10 year treasuries go to 1% and stay there. We are now looking at the potential for interest rates to stay low for a long time (the Japan scenario) or stay low for a while but then quickly rise a la the early 1980's. Companies need to be looking at these types scenarios combined with sluggish or recessionary economies.
- ERM has a seat at the table now on major directional decisions
- this is a good way to advance the risk discussion and embed a strong risk culture even if the outcome is not entirely quantifiable
- too early
- There are always cases where you get it wrong and cases where you get it right, so some wins and some losses and it's difficult to tell the net position.
- Just getting started in identifying and tracking emerging risks
- Unable to successfully manage and foresee the long term drop in interest rates. Also, competitive situation did not allow for quick repricing.
- I am not our Enterprise Risk Manager, so I do not know how we treat emerging risks.
- More awareness of future impacts to current decisions.
- Yes - we are much more aware of risk and factor it into our decision-making.
- We are ready for a broader array of risks.
- Staff cutbacks have left the remaining staff too buried with standard reporting.
- Better Pricing, and finding sources of profits and losses. / Better education for the board regarding risks and rewards
- Company awareness of risks
- Led to deliberate strategies for M&A and investment policy
- It brings us closer to real time evaluation of risks, identifying trends and we are able to make adjustments much sooner resulting in minimizing costs and losses.

- Current (today's) risks are more "urgent"
- my company's services focus on risk management so increased attention means opportunity for the company
- I believe a focus on emerging risk has raised the level of discussion across the industry and given us an increased likelihood of avoiding industry wide stresses that are foreseeable.
- Few major emerging risks have fully emerged into a crisis.
- Too new in the thinking
- minimal impact to date
- Useful tools have been developed to monitor and manage the risk.
- Improved awareness and clarified risk appetite
- people tend to view levels of emerging risks in terms of what has been seen in the past and tend to not believe worse could occur (if the clock were rolled back to 2006, how many people today would predict or test the reality of the financial crises that occurred in 2007-2008)
- Save net income.
- Identification and prevention of potential problems
- achieved significant recognition for leading-edge research and best practices, share this with our clients (for business advantage)
- Still in early stages.
- Management is more aware of risks.
- Specific emerging risks are often not taken seriously until they overtake the organization. Discerning which emerging risks pose legitimate threats is subject to much internal debate. No-one wants to be known as a "Chicken Little".
- Not close enough to the process
- Risk was not as discussed as earnings. Now risk has a more level platform with earnings pressures.
- More aware of thinking about how factors outside our business can have major impact than five years ago. Lead to greater diversification efforts.
- I don't think we are far enough along as an industry to tell if there is an impact much less a positive one.
- Was thought to be excessive. / Now thought to be too little attention.
- Able to be proactive in risk management, rather than reactive
- Small company with limited line of business
- I am not sure how prevalent it is or how much of a difference it has made to managing risk in the industry. I believe it is valuable to do so, but am not sure industry management feels the same way.
- Allows some companies to mitigate the risk to some extent
- Increased internal communication within management and at the Board levels. Increased discussion at industry meetings.
- Rarely does anything actionable emanate from ERM. ERM is currently largely a way for a company to "feel good" about how they are managing risk. It gives an illusion of activity without much substance. In our current environment, generating a "thought experiment" or thinking through very clearly how various

- people will behave in various roles is much more effective. There are plenty of product holes that can be filled before true ERM is of any use here.
- Emerging risk process is still being formalized.
  - More awareness.
  - Taking Japan Scenario seriously. And also rate spikes.
  - Helps prepare responses for incidents proactively, which is good general practice and process. These planned actions can also at times be leveraged to deal with other risks or events as they occur.

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

- Scenario analysis of differing product risks has led to derisking of variable products and reduction in efforts to sell them while expanding investment in other less risky areas.
- the opposite is true wrt economic variables
- Significant stress scenarios help encourage conversations about limiting the amount of certain types of business we want to accept.
- Worst case scenarios can help flush out true tolerances
- Investment strategy studies have eliminated certain investment proposals
- analysis of the need to invest to cover interest rate guarantees has led to improvements in investment strategy
- Risk (from any cause) resulting in "run on the bank" - analysis demonstrated financial exposure vs. the risk of maintaining more liquidity at the cost of lost yield and asset/liability mismatch (reinvestment risk)
- Enhanced concentration risk models, particularly for examining multi-LOB exposure to natural events, has led to better decision-marking relative to risk assumption choices.
- Measurement of the impact on surplus of equity gains / losses lead to hedging program.
- see 4
- quantification of the impact of prolonged low interest rates led to product design changes. Quantification of the risk of interest rate spikes led to implementation of a hedging program and product design changes.
- Using Economic Capital modeling to calculate likelihood of violating our Risk Tolerance statements
- presentation of range of potential outcomes builds better understanding of upside and downside risk in products
- Quantification - even on an approximate level - of the risk associated with new ventures that could impair or reduce existing revenue helps management get their arms around the magnitude of the risk.
- Often causes reducing risks. Time will tell if this will pay-off.
- Law enforcement of the use of better building engineering/design techniques have greatly reduced losses in countries prone to earthquakes (New Zealand/Mexico) or typhoons/hurricanes (Hong Kong).

- n/a
- Our decisions around how much capital to hold are very much based on our ERM process.
- Insurance pricing.
- We've changed pricing of products and remuneration (agents and staff). / Negotiations with agents are based upon the results
- n/a
- Realized that our initial assumptions on the combination of events which could theoretically bring down the company were actually wrong, and that we should focus on a considerably different combination.
- selection of partners
- None
- Understand if action is needed
- clients have used quantification to adjust / balance their portfolio of risk
- Our models are not sophisticated enough to demonstrate many of the informally identified emerging risks as many of these are not simple shocks to modeled assumptions.
- Calculate EC - facilitates communication of impact of risk
- Stochastic modeling of guarantee risk in variable annuities.
- unfortunately, we tend to torture the numbers until they give us the answer we want...maybe they help reach conclusions sooner??
- Hedging equity product risk
- evaluating whether to buy protection against interest rate spikes -- balancing the cost of the protection against the benefit gained and the cost of doing nothing
- Projection of future financial results
- models are subject to validation and recalibration/reparameterization regularly for known risk factors subject to unknown changes
- N/A
- Stress tests for credit quality and asset liquidity.
- ALM techniques allowed my firm to back off of deferred annuities and RMBS in 2006 based on modeling
- Assessment of equity hedging
- Economic and other stress testing led to strategic hedging decisions
- Products have been changed or not pursued.
- Understand value impacts of risk events better.
- Making sure to not start a new practice area where a factor outside our control (interest rates) can devastate the opportunity for the products being offered.
- Recently, did a study on cyber privacy risk and probability of occurrence and costs. Rough model built around potential loss distribution to link to risk appetite. First time such an approach was used.
- Quantification of Eurozone exposure and risk allowed enables timely decisions around hedging options
- With sufficient data, parameterization of risks is accurate and sufficient capital is being held.

- Specific "what-if" scenarios allowed mitigation policy to be put in place in case a specific action occurred. This created an automatic approach, rather than a reactive approach.
- None.
- Rate scenario planning - resulted in not making rash decisions to risk up the asset portfolio chasing yield

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

- None that I'm aware of
- A sense that market volatility and sources of disruption still abound has encouraged us to maintain a very strong liquidity position and significant financial flexibility.
- Included reputation risk in evaluating marketing opportunity with outside entities
- In some cases, more awareness of pandemic risk (or similar) has led to more thinking about operational impacts, not just financial risk implications.
- Reviewing the abilities of outside vendors to help mitigate exposure to cyber liability and data breach; making a better selection based on both current value proposition and future view of the issue's emergence
- broad discussion of issues has surfaced potential mitigations and areas for further analysis
- Made decision makers aware of situations they may not have thought about.
- Reinsurance
- We've changed pricing of products and remuneration (agents and staff). / Negotiations with agents are based upon the results
- n/a
- Inclusion of people from different technical backgrounds and geographical locations in critique teams.
- credit card portfolio acquisitions
- None
- When you realize you don't understand a business, you may want to move away from it. For example, rising stocks in the US are not linked to the job market and to the flat stock market in EU make me stay on the sideline from investing.
- clients have used qualitative benchmarks to balance their portfolio of risk
- what if scenarios useful in planning entries to new markets
- Planning and reserve management
- Provided a better framework for risk control and monitoring
- novel risks such as potential impact of more active solar cycle are analyzed largely qualitatively since incidence rates and severities are unknown
- N/A
- I did not invest in FNM and FRE after Buffett sold his FRE position
- Analysis of business into grow / nurture / exit uses qualitative as well as. Quant
- Qualitative has been used much more frequently than quantification. Business area experts assess things beyond just numerical risks. Reputation risk would be an example.

- Enhanced risk culture.
- Used the fact that past consulting businesses that are hard to differentiate or are too complex to have a longer road to profitability. We now try to choose endeavors that are shorter-term in maturity.
- Qualitative analysis around emerging operational risks allowed us to prioritize our mitigation efforts
- We now conduct an ORSA (Own Risk and Solvency Assessment), which is both quantitative and qualitative. This process has been good for considering risks not currently modeled and feeding into new modeling priorities. This has forced us to consider risk management in the planning and operations functions as well.
- Given directive from the Board to investigate a specific issue more fully, and come with recommendations for mitigation.
- Qualitatively, we were observing agents selling a high minimum guarantee as the sole reason for selling that particular product and we finally closed the problem off by refiling the product with a lower minimum guarantee. They had been trying to drop the minimum guarantee for many years and just now finally made it happen. In an ERM sense, the decision was 6-8 years late.
- Backed away from fixed annuities

**Question 7.** Please share instances where a combination of qualitative and quantitative analysis has enabled better decision making.

- Frequent "what if" analysis has impacted product design.
- Cost benefit analysis of catastrophe insurance led to decision to buy or not buy.
- Managing to Strategic Plan growth targets while simultaneously managing down cost of overall CAT risk.
- broad discussion can benefit from available information and lead to discussion and direction for further analysis and understanding of information important to management
- We've changed pricing of products and remuneration (agents and staff). / Negotiations with agents are based upon the results
- bank and credit card acquisitions
- None
- See above
- always best to balance quantitative with qualitative
- Analysis of this type convinced leadership to pull back (but not fully exit) a strategic line of business.
- new products usually have both kinds of analysis and neither one alone is sufficient.
- Planning and risk appetite
- No instance comes into mind.
- inland flooding - mechanism is understood but impact of climate change is unknown
- stock filters combine simple models with qualitative analysis of company strategy
- See above

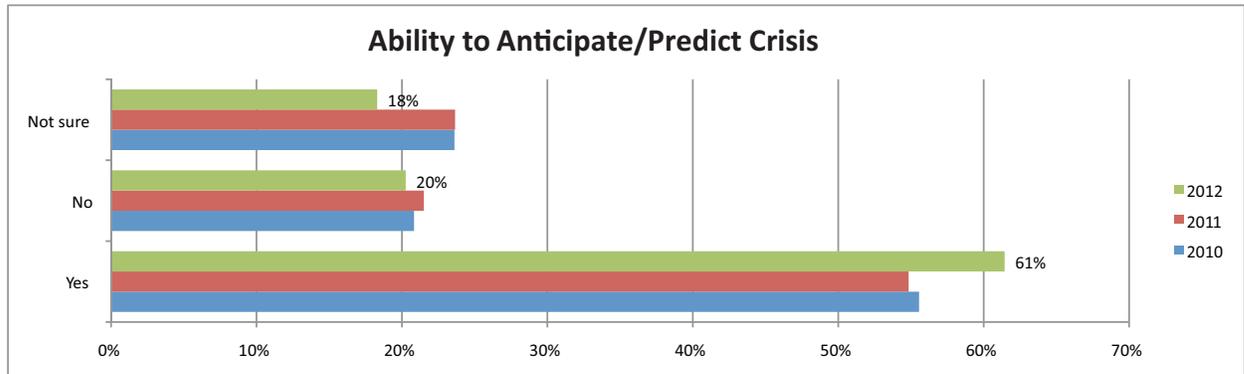
- Once again, products have not been pursued when benefits did not exceed perceived qualitative risk.
- Deciding to make an acquisition or not.
- Perform quantitative and qualitative scenario analysis to look for correlations across all risks
- The ORSA is both of these and forces us to plan ahead for future risk management needs (budgeting, operations, IT, etc.).
- None.
- Reworking reinsurance with mortality catastrophe scenarios in mind.
- Helped us exit businesses before the financial crisis.

## Section 4: Predictions

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

**153 responses**

- 94 responses 61% (55%/56%) Yes
- 31 responses 20% (22%/21%) No
- 28 responses 18% (24%/24%) Not sure



**Question 2.** Comments

- It is hard for an organization to anticipate or predict a crisis, even if individuals within the organization are doing so. Crisis are sometimes driven by random events, but quite often they are driven by herd behavior, moral hazard, and agency concerns which are always present to some degree and part of the culture of organizations.
- Many crises follow lots of writing on the wall, but the timing, magnitude and other variables make their management much harder than their prediction.
- anticipate but not predict
- Possible? yes. But even a broken clock is right twice a day. It is unreasonable to expect that some one or some group can consistently predict a crisis.
- It's not easy.
- In some cases, yes. The housing bubble was predicted by a variety of experts and even Dr. Wang had spoken out against the repeated misapplication of his modeling approach,
- Not really possible to predict a crisis, but a culture that is flexible and open to change is in a better position to cope with crises as they arise.
- Not always. Some crises are man-made and much thumping can be monitored. Disease models can come on quickly. One might imagine such a risk but not predict the where, how and how much of it, until the crisis is well started.
- devoting time/thought to potential risks leads to this
- Yes and No. No in the sense some may be unprecedented (Black Swan); Yes - in a general sense (couldn't anticipate specific epidemic (a la "Contagion"), but can

- in the general sense) and sometimes in specifics (some crisis develop over time like our debt crisis)
- However, anticipating the timing is challenging...not all crises are "predictable"; building consensus on such predictions in an enterprise generally is impossible.
  - We can anticipate many crises, but not predict them
  - but predicting the timing of the crisis is harder
  - There are many examples where this has been done. The difficulty is in estimating interactions with other factors and responses. The increase in foreclosures as a result of FED actions was widely predicted. A multi-year recession and collapse in lending was not.
  - Anticipate potential crisis...
  - I don't believe it is possible to predict a true crisis with enough time for meaningful action.
  - This question is constructed inane; some crises can be predicted, most not
  - It is possible to anticipate. Recognize those that made money off the housing crisis. But not everyone predicted or agreed that it was likely.
  - by involving enough people, most risks can be foreseen and contingencies planned should the risk occur. not all of the people involved will be in management or senior management as volume of people is more important than position.
  - You can't predict, but you can say that at some point bad things will happen (Murphy's Law) and be prepared.
  - but, it is possible to quantify the results of a crisis and determine whether the results are within the company's risk tolerance
  - Ron Paul 30 years ago predicted that government managing of markets would result in bubbles that would eventually burst.
  - Not always, yes but if a big picture risk based view is the norm there are plenty of clues. Business as usual will almost always fail to anticipate risks
  - depends on time frame
  - There are usually signs, although these are usually better recognized in hindsight
  - Sometimes. James Dale Davidson and Lord Rees-Mogg accurately predicted a number of historical events (e.g., the fall of the Berlin Wall) by analyzing historical events from the standpoint of the ability of a group to project violence onto another. This was not soothsaying, but the recognition of patterns and human actions. The same can likely be done today in some circumstances. For example, it should have been relatively easy for someone to have foreseen that an airliner would eventually be used as a weapon (as in, 9/11).
  - But that doesn't mean you are right or anyone will listen.
  - Sometimes it is (for example a real estate bubble) others it is impossible (Arab Spring).
  - For some risks there are leading indicators.
  - The problem is that you won't always be correct in your prediction.
  - It depends. It's possible to think about potential scenarios and be better prepared should something similar occur

- You can anticipate a crisis, but it is likely difficult to predict. Developing actions plans in the event of a potential crisis is useful as more clearly identifies the impact of the crisis on the firm, and whether the firm can survive it as is, or if it can identify actions to mitigate the impact.
- Some individuals/firms did predict the MBS crisis (and made a lot of money as a result)
- IN many it is possible to predict but there will always be something that will "come out of the blue"
- It's hard and subject to a high degree of error.
- outside the box thinking is widely discouraged in Corporate America
- We can predict that there is a chance for a crisis, but we can't predict exactly when it will occur nor the severity of the crisis
- but you can still take steps to prepare for potential crises.
- Yes, but the problem is to decide which possible events are inside / outside the useful range of consideration.
- There is the ability to predict however, in many cases the point at which the crisis is predictable it may be too late to totally avoid any and all negative consequences
- Sometimes, but not always
- Political crisis is predictable based on current state
- Chance will play a role, false positive will be likely but you still should be on the watchout
- Suggested reading "The art of the long view"
- depends on the situation; 20/20 hindsight
- Some crisis are foreseeable, others are not. For some that are foreseeable, the risk has few mitigants other than some "playbooking" of responses.
- Not possible to do so on a regular basis; may sometimes get "lucky" and do so.
- Some things are obvious - exact timing hard to predict, but certain crises are inevitable.
- The difficulty is in predicting when it will occur
- a continuation of the failed US fiscal and monetary policies will lead to a crisis.
- Possible, but almost by definition, the one to do so is a contrarian. In my experience, such predictors also come up with lots of false alarms, so not clear whether they really help.
- It is possible to anticipate or predict some crises. It is certainly not possible to anticipate all of them. The key is to develop resiliency - an ability to recognize vulnerabilities and reduce the level of vulnerability or better yet, exploit the opportunity identified.
- Depends on the crisis.
- Yes we can predict an event. We probably can't predict the timing. But if we say it often enough it will hit at the right time then we look like geniuses
- I think you may be able to identify the potential for a crisis, and potentially assign some crude probability such as low, high or neutral, but accurately predicting a crisis would be very difficult.

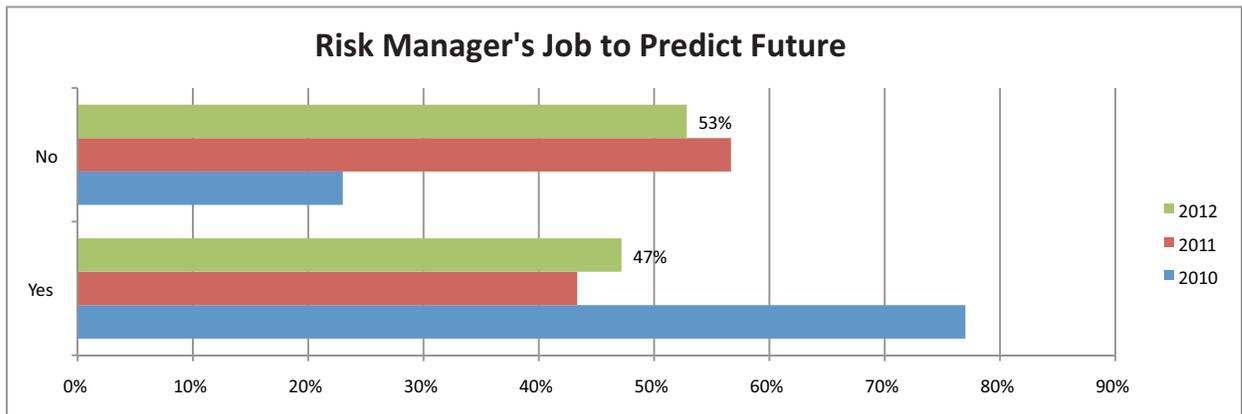
- anticipate, perhaps - predict, no. One can, on the basis of anticipation, prepare for an event of known size/severity. The unknown and unknowable risks are the ones that kill you.
- Seems you also have to be lucky
- deep analysis of the issue combined with common sense. Great examples are given in Michael Lewis' books *The Big Short* and *Boomerang*. Not every crisis can be anticipated, but many can be and mitigation can be created.
- The potential, yes; the fact or timing, no.
- Advances in technology are allowing some acts of nature and the resulting destruction to be predicted in advance. Not sure that man-made business crises are predictable in terms of timing or degree because there are too many players and no one has access to all of the information.
- Financial market dislocations all had various leading indicator measures
- often possible to anticipate a pending problem, but hard to predict severity and almost impossible to predict timing accurately
- Effective predictions require a flexible outlook not grounded in past events.
- But it is possible to plan for certain scenarios playing out and have an action plan in place in case they do happen
- Read *Black Swan* if you answer yes to this question
- anticipate a potential crisis, with potential drivers yes
- It is possible to quantify and monitor the probability of a crisis occurring, although it rarely has a 100% success rate.
- Not exactly. It is unlikely that a crisis will evolve exactly as foreseen. However components of a crisis can be foreseen and planned for, even if the plans need to be adapted to fit the situation.
- Mortgage crisis was predictable
- Most crisis events occur because there is no perception of the timing of the occurrence. This leaves little time to manage and ultimately a domino effect.
- Where lack of funding/budgeting is going to cause a bigger problem down the road, you can plan for those and develop opportunity or defensively plan to not be in a financial position to be negatively affected
- The prediction will in all likelihood not be very precise, but it is better to set up a 'what if' to start to understand and think how to mitigate, then to totally not try at all.
- yes and no -- some crisis could be detected, but harder to do
- The idea is not to predict a crisis, but to be prepared for what cannot be foreseen. For actuaries, this likely means assessing how much economic capital to hold, but for the company it encompasses much more.
- It is possible sometimes, but not always.
- Only occasionally - perhaps by looking at scenarios - identify the possibility
- There is usually an element of chaotic activity just prior to the crisis, but that is really just what happens as an existing crisis is revealed.
- It is possible, but not always. The worst ones come out of no where (but true to Taleb, were "predicted")

- Yes to anticipate. Prediction is difficult, especially the extent and details. Even if wrong, putting protective or responsive measures in place is helpful.

**Question 3.** If you consider yourself a risk manager, is predicting the future part of your job?

**152 responses**

- 50 responses 47% (43%/77%) Yes
- 56 responses 53% (57%/23%) No
- 46 responses Not applicable



**Question 4.** Comments

- My job is to be able to identify potential futures, not THE future and describe the implications of these different futures.
- More like predicting many possible futures.
- Analyzing potential future outcomes? yes. "Predicting"? no.
- Anticipating possible future events and consequences is part of the job. I think that is different than predicting the future.
- No, providing insights about ranges of possible (even probable) futures is, but direct prediction is not.
- The job is managing the uncertainty of the future.
- Although, the focus is not on one single prediction but a range of outcomes and action plans in relation to the various environments.
- Mitigating risks that could happen, but not predicting
- More about predicting what possibly could occur in the future and underlying potential causes.
- can't predict the future but can prepare for several possible outcomes
- Less predicting a specific outcome than a range of possible outcomes with likelihoods.
- Not predicting the future but promoting and understanding of potential future outcomes - if I could predict the future we would never take any risks; the trick is to understand what could happen and position yourself based on your risk appetite

- Risk management needs to allow for all future outcomes, but judgment is needed to (informally) assign a probability to each outcome and determine if we're getting the right return for the risk involved
- Doing my best to ANTICIPATE the future is part of my job.
- Managing potential futures is the key part. Not predicting which will happen.
- I enjoy studying risk management but I cannot consider myself a risk manager.
- Showing possible versions of the future, but NOT predicting.
- You can't predict the future, but you can consider possible alternative scenarios. This is a fundamental component of risk management.
- My job is monitoring events, and working to develop solutions to mitigate the impact of these on the areas I manage.
- The worst thing a risk manager could do is try to predict the future. If we knew (with certainty) the future there wouldn't be any risk.
- Risk is all about the future.
- That is a job for forecasting weather, however we can give insight...
- We prepare, we don't predict
- Managing pension plans
- Predicting the future is too narrow. Engaging in a meaningful discussion about potential futures would be a better statement.
- Strategizing regarding potential futures is part of my job, but predicting the future is not.
- Taking prudent steps to protect business though would be.
- Prediction is not my (our) role, but offering potential futures and plans/strategies around the scenarios is. The board (with ERM input) decides which strategies to pursue which implicitly assumes a future state.
- Need to predict a range of possible futures and make sure business can survive them all.
- There's a difference between a prediction and noting something as being possible, and among what's possible, there are different likelihoods. Understanding that is part of my job, not making predictions.
- Our job is to recognize and acknowledge the range of future outcomes possible, and put in place hedges against certain outcomes where it makes economic and practical sense to do so. Nobody has a crystal ball.
- I'm retired. But anticipating and making reasonable provision for personal risk is important. In my old job, identifying emerging risk was part of my brief.
- Prediction is very difficult to achieve.
- risk identification is all about seeing around corners
- Predicting the future is not part of my job, but evaluating and communicating potential outcomes would be.
- Anticipating the unexpected and striving to gauge its impact is certainly part of a risk manager's responsibility.
- Again, no predictions can be made - just accurate assessment of all possible futures
- I'm not expected to be right but my goal is to make the reader think about alternative futures

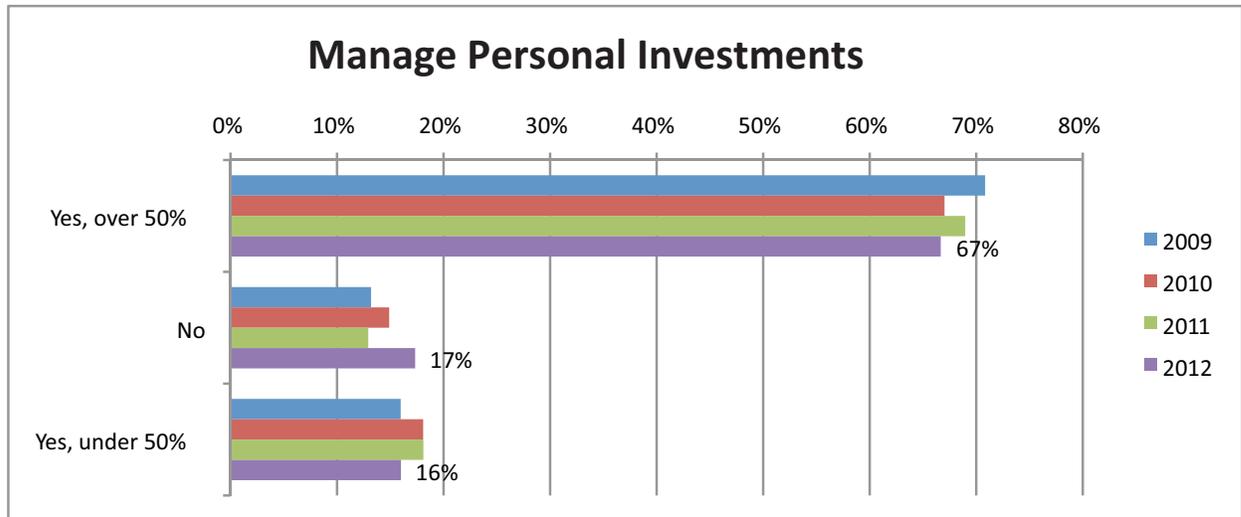
- I am teaching risk management, but do not practice as a risk manager.
- Foreseeing possible futures is closer to the role. Ask the seismologists in Italy whether predicting earthquakes is a good idea!
- Outlining possibilities / expectations more than predicting future
- Prediction would get in to a single path mindset. We are supposed to consider possibilities and understand the ramifications and how these can be managed.
- Correctly understanding value/enterprise impacts is part of a risk manager's job.
- I am in revenue generation, so this is used to not only grow my business, but to develop consulting around so that I can also help my clients
- Risk managers are not accountable to predict the future, but are accountable to understand the range of possibilities for future changes that could negatively impact their firm.
- The idea is not to predict, but to prepare for what cannot be predicted.
- Although creating plausible scenarios and assigning probabilities to these scenarios is part of my job.
- Yes, modestly at best. I need to have a view on interest rates and general market conditions to inform other projects and initiatives.
- Not predicting one scenario but looking at a variety of scenarios that may unfold in the future
- Being prepared is.
- Our responsibility is providing insight into the possible range of outcomes, and possibly their likelihood. Also proactive preparedness.
- The challenge is communicating predictions within the context of "Knightian Uncertainty" and helping decision makers understand both what is known and what is unknowable.

## Section 5: Current topics

**Question 1.** Do you manage your personal investments?

**150 responses**

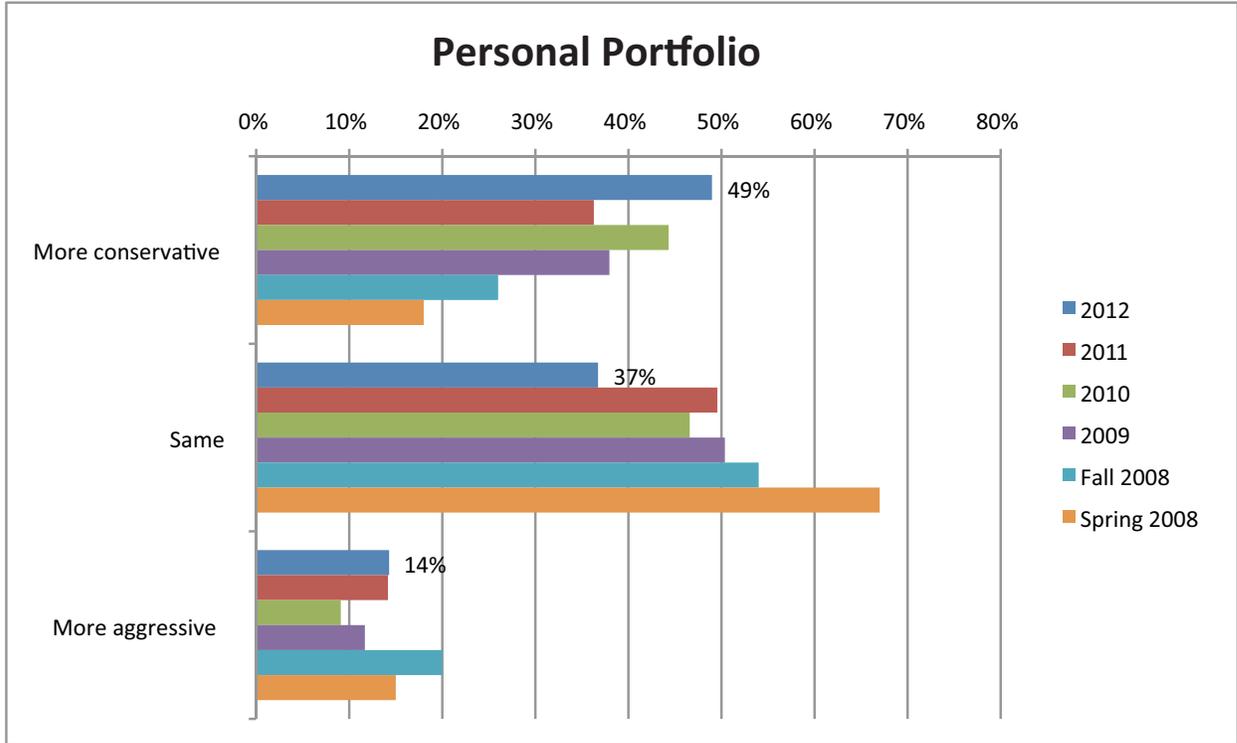
- 100 responses 67% (69%/67%/71%) Yes, for more than 50% of portfolio
- 26 responses 17% (18%/18%/16%) Yes, for less than 50% of portfolio
- 24 responses 16% (13%/15%/13%) No



**Question 2.** Currently, your personal investment portfolio is:

**152 responses**

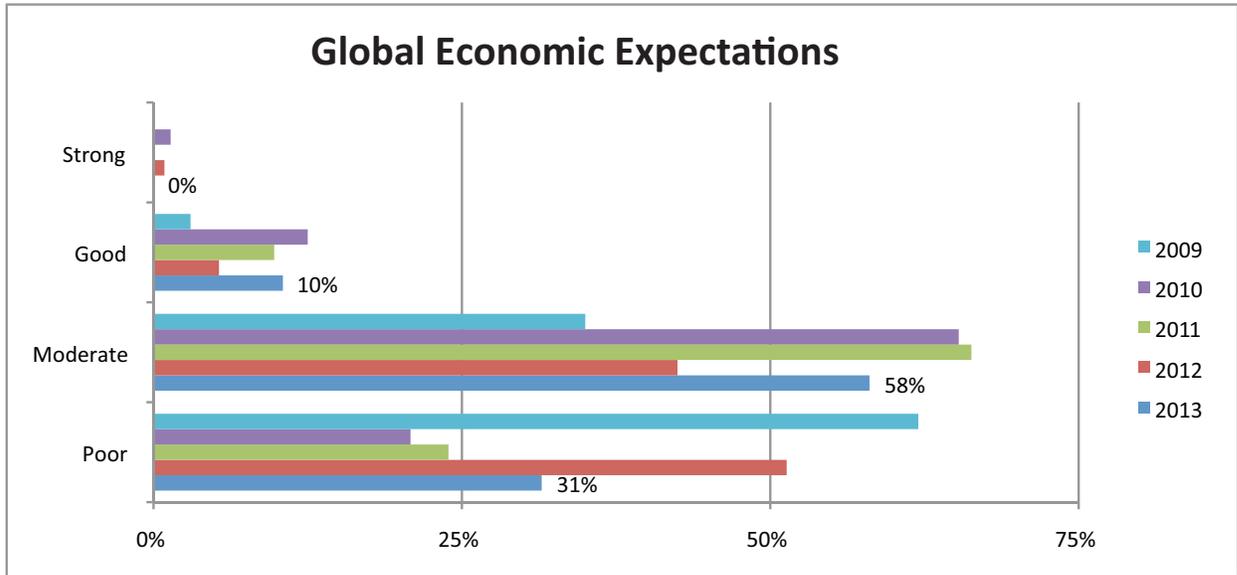
- 72 responses 49% (36%/44%/38%/26%/18%) More conservative than usual
- 54 responses 37% (50%/47%/50%/54%/67%) Same as usual
- 21 responses 14% (14%/9%/12%/20%/15%) More aggressive than usual
- 1 response Not sure
- 4 responses Prefer not to answer



**Question 3.** Your expectations for the 2013 global economy are:

**152 responses** percentages are expectations for 2013 and previous expectations for 2012/2011/2010/2009

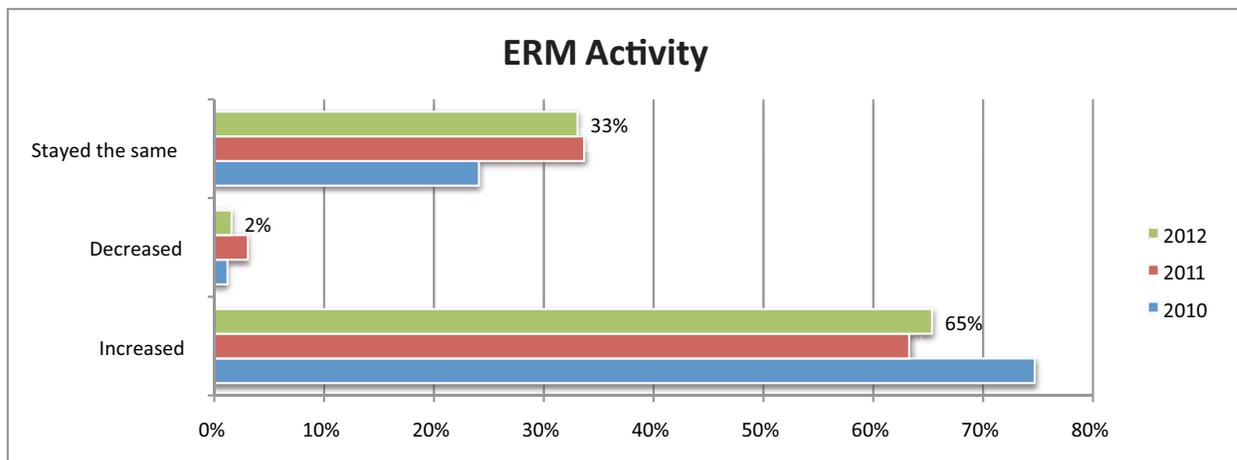
- 45 responses 31% (51%/24%/21%/62%) Poor
- 83 responses 58% (42%/66%/65%/35%) Moderate
- 15 responses 10% (5%/10%/13%/3%) Good
- 0 responses 0% (1%/0%/1%/0%) Strong
- 9 responses Not sure



**Question 4.** Did you experience a change in the level of ERM-focused activities for your organization or clients in 2012?

**151 responses**

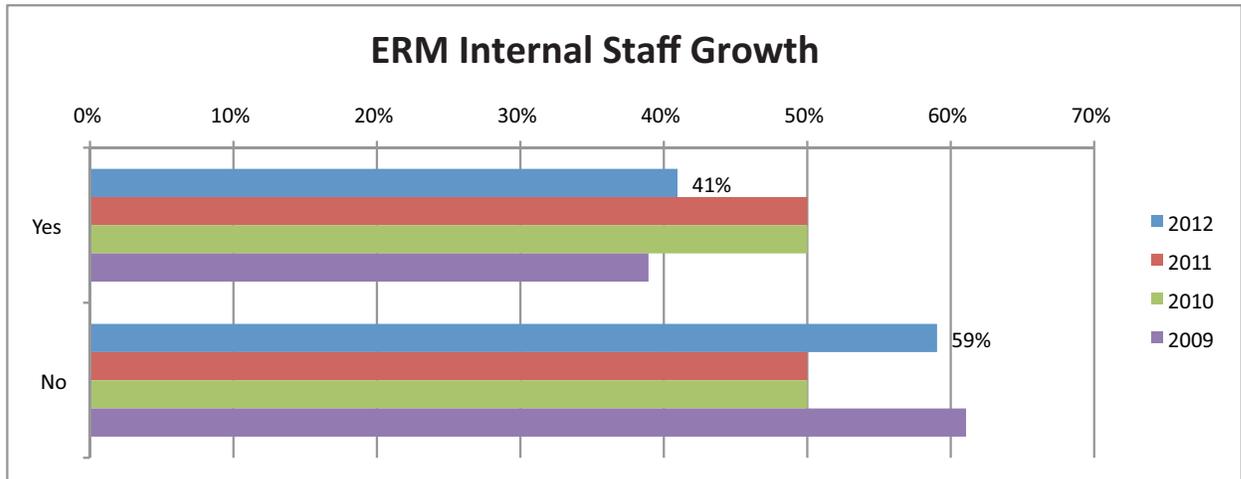
- 83 responses 65% (63%/75%) Increased
- 2 responses 2% (3%/1%) Decreased
- 42 responses 33% (34%/24%) Stayed the same
- 9 responses Not sure
- 15 responses Not applicable



**Question 5.** Did your internal ERM staff increase in 2012?

**86 responses**

- 43 responses 41% (50%/50%/39%) Yes
- 62 responses 59% (50%/50%/61%) No
- 25 responses Not sure
- 19 responses Not applicable

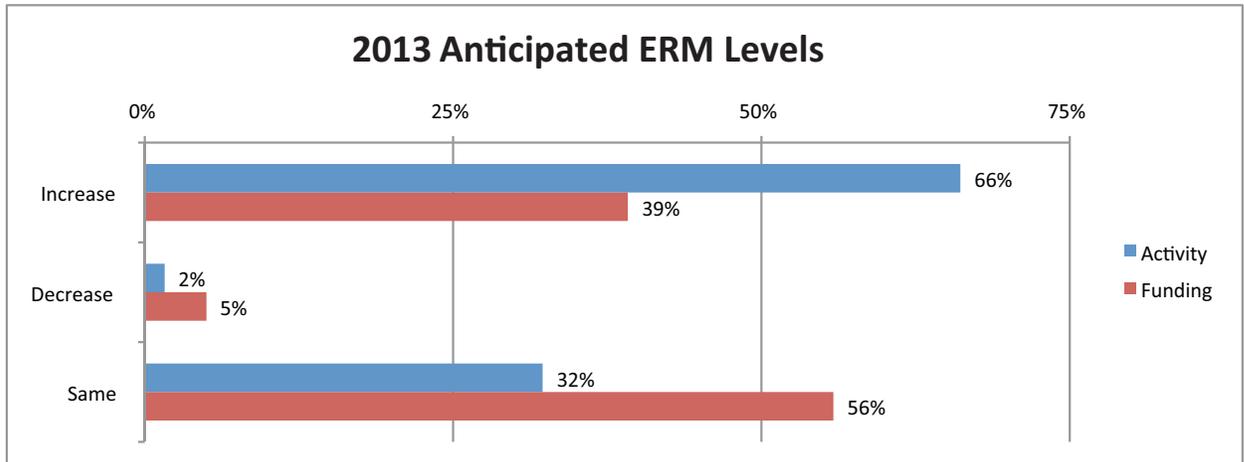


**Question 6.** Do you anticipate a change in the level of ERM-focused activities for your organization or clients in 2013 relative to 2012?

**150 responses**

- 82 responses 66% (59%/69%/67%/73%) Increase
- 2 responses 2% (0%/1%/1%/3%) Decrease
- 40 responses 32% (41%/30%/32%/24%) Stay the same
- 16 responses Not sure
- 10 responses Not applicable

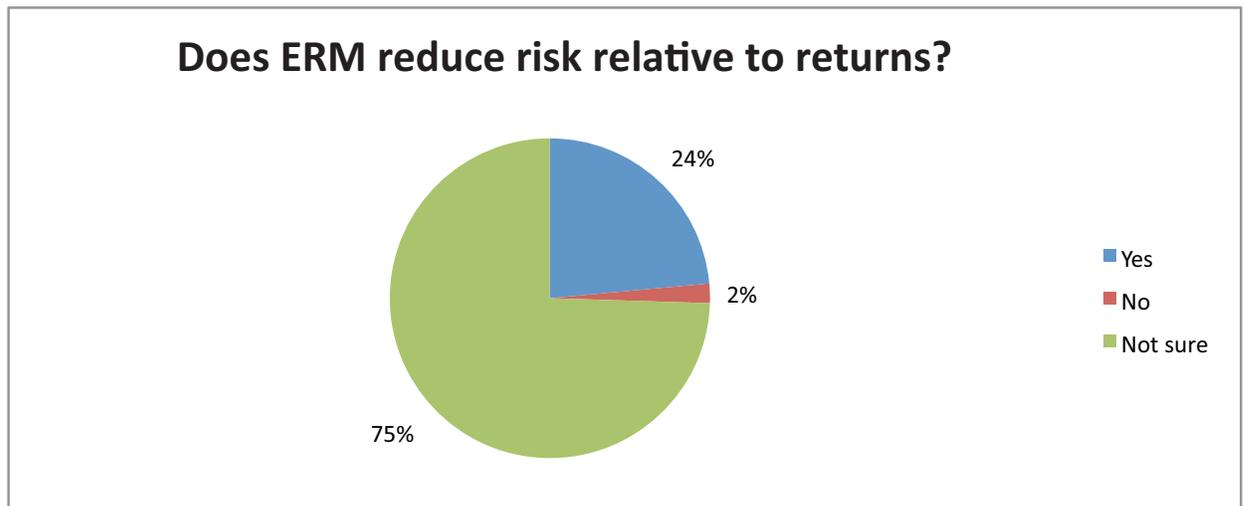




**Question 8.** Do you believe that ERM, considering both internal and external efforts, has/will reduce risk relative to returns? (please select one)

**102 responses**

- 24 responses 24% Yes
- 2 responses 2% No
- 76 responses 75% Not sure



**Question 8.** Why or why not?

- Current senior decision makers for the business (outside ERM, such as CFO) are very knowledgeable about ERM concepts and engaged in the process. If this were not the case I would be much less optimistic.
- ERM gives a false sense of security
- Overall, not necessarily risk-by-risk. More and better information to make holistic risk decisions.
- To use an automobile analogy: it “may” reduce the likelihood of a fender-bender, but I’m not sure it will reduce the likelihood of a serious collision.

- Relative to returns, my employer's ERM processes will simply lop off the high-risk, high-return opportunities.
- Greater awareness of potential risks, both within my organization and with respect to the industry as a whole seems like the best way to improve the proper pricing and allocation of risk opportunities.
- ERM is driving a different way of thinking about product pricing, which is increasing pricing margins. As such, returns will be increased relative to risk.
- Should identify opportunities to take advantage of and quantify the alternatives to make more informed decisions regarding resource allocation
- Our ERM doesn't focus on health risk, more direct financial and cyber risks.
- I believe that time devoted to ERM will lead to anticipation and mitigation of some risks (generally without a reduction in returns)
- budget constraints
- In core business activities, ERM impacts little. In new initiatives, ERM tends to be more obstacle than enabler. In such new initiative cases, the business may benefit from diversification, expanded shelf/distribution, etc., but ERM invokes more procedural constraints than on-the-run quantitative assessment.
- Better enterprise risk management leads to reduced risks relative to returns.
- Risk management has not been pushed down into the organization, nor linked "silozed" functions and decision making.
- Too many risks are global/macro for which there are no or very limited individual company answers
- It has shown itself already in reduction of CAT risk.
- ERM works
- I'm not sure what you mean by "external efforts". I believe we can reduce risk relative to returns within our organization using ERM, and I'm considering that "Internal".
- Reduced both risk and returns. Not sure we have a "purely" better profile as the question suggests.
- ERM activities are on the rise. They will most likely reduce risk, not increase it. By reducing risk, chances are they will also reduce return, on the long run.
- Primarily compliance to begin with.
- More attention to the risks inherent in strategy and business decisions.
- ERM should move us way from taking risks where the return does not justify it.
- I'm assuming that ERM is done properly, in which case risk per unit of return should always decrease.
- If everyone in the industry is improving it's ERM, there will be better risk management in the industry and it will force the whole economy to do so, which will inspire more confidence in the system
- effective risk management practices will result in efficiencies thereby recovering costs
- Companies with ERM programs are still finding themselves in crisis.
- keep on the straight and narrow
- I think it is a worthwhile exercise and is likely to reduce risk relative returns on average. I do not expect it to be the panacea that it is sometimes touted as. We

should be careful with the marketing of "ERM" so that it does not become the type of trite buzzword that the HR industry is notorious for.

- it's very difficult to predict - especially the future (Niels Bohr)
- I believe it will also reduce returns instead of reducing risk only
- While many folks are now interested in studying potential risks and their impacts, it is not clear that many are willing to act to limit the risks.
- Reduction of risk will happen because of better risk identification; external efforts will provide controls for risk mitigation
- Internal ERM efforts are frequently trumped by organizational agendas and managements' willingness to "run the risk" (naked positions). External ERM efforts (regulators, activist investors) are more likely to improve risk-taking practice.
- regulatory efforts do a little but internal efforts do more
- Activities in other companies should reduce overall volatility, but it is not clear whether the cost of this will exceed the benefit as less risk overall will be taken, increasing the risk of lost opportunities.
- I think the risk reduction can be effected, but I'm not sure if it will also be accompanied by return reduction.
- Better awareness/education will cause more to think before they act and consider consequences.
- ERM efforts can help to identify risk and put in place mitigations, ultimately reducing risk relative to returns.
- Higher focus and awareness, along with more accountability
- It will reduce risk, but I'm not sure it will reduce risk relative to returns. Returns are lower as a result of reduced risk. The hope is that we will be sufficiently prepared for whatever does occur (capital and operations).
- ERM has become much more prominent at the management and Board level.
- Too much focus on form/governance, not enough focus on real risk drivers. Might increase risk by promoting a false sense of security
- ERM is not really implemented here. We are relying on people's individual knowledge. I pushed very hard for lowering the minimum guarantee, but other's had been doing so for a long time.
- Mostly internal efforts, but external efforts make it less painful to avoid stupid things (that other companies are doing)

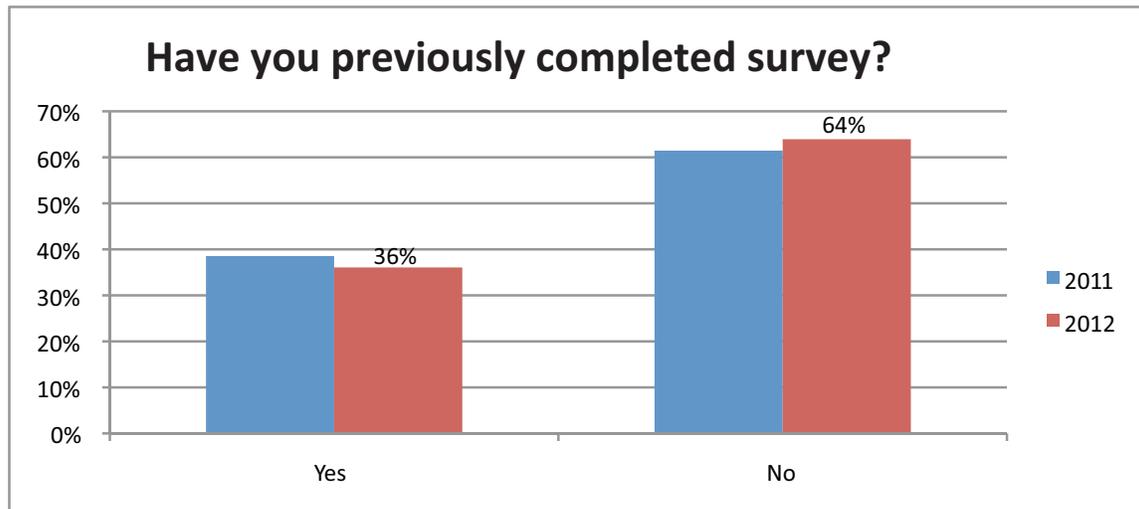
## Section 6: Demographics

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

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

**146 responses**

- 44 responses 36% (39%) Yes
- 78 responses 64% (61%) No
- 24 responses Not sure



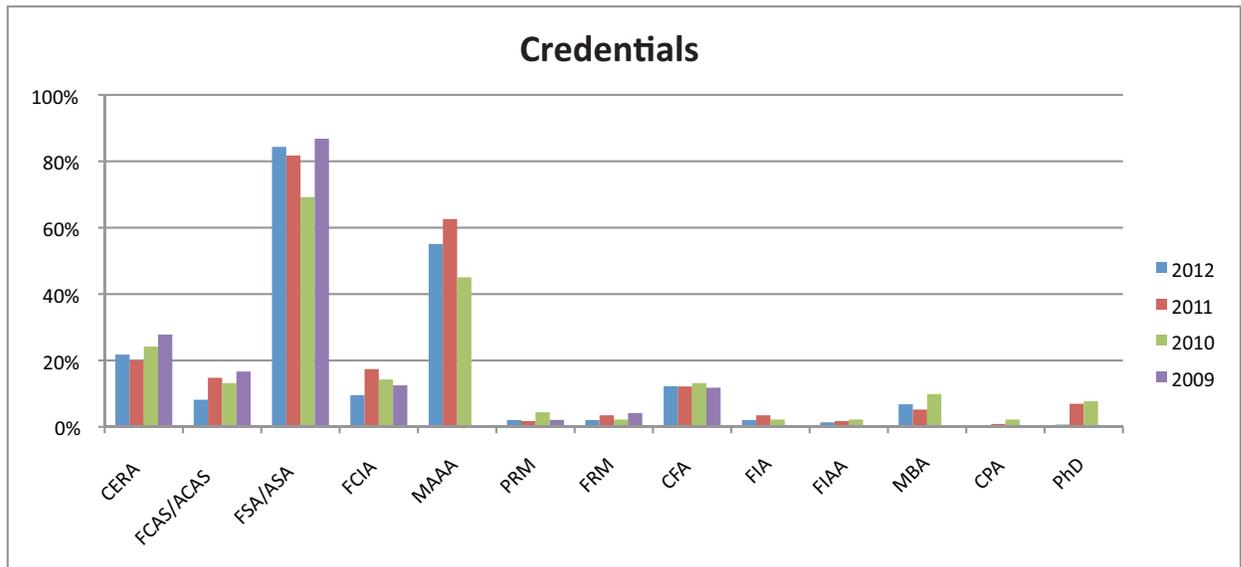
**Question 3:** What credentials do you currently hold? (please select all that apply)

**343 responses from 147 surveys (2.3 average)**

Percentages are based on 147 surveys.

- 32 responses 22% (20%/24%/28%/27% in previous surveys) CERA
- 124 responses 84% (82%/69%/87%) FSA/ASA
- 12 responses 8% (15%/13%/17%) FCAS/ACAS
- 14 responses 10% (17%/14%/13%) FCIA
- 81 responses 55% (63%/45%) MAAA
- 3 responses 2% (2%/4%/2%) PRM
- 3 responses 2% (3%/2%/4%) FRM
- 18 responses 12% (12%/13%/12%) CFA
- 3 responses 2% (3%/2%) FIA
- 2 responses 1% (2%/2%) FIAA
- 10 responses 7% (5%/10%) MBA
- 2 responses 1% CPCU
- 6 responses 4% (7%/8%) PhD
- 9 responses 6% (6%/5%) Other actuarial credential (please specify)

- EA (4)
  - ACIA
  - FILAA
  - French actuary
  - AIAI
- 21 responses 14% (11%/12%) Other non-actuarial credential (please specify)
    - FLMI (10)
    - CLU (3)
    - ChFC (4)
    - ACS
    - FFSI (Loma)
    - MA (Economics)
    - MA
    - ALMI
    - CIA
    - FFin
    - Masters in Economics
    - RHU
    - MIRM
    - Certified Risk Manager
    - CPA
    - MSA

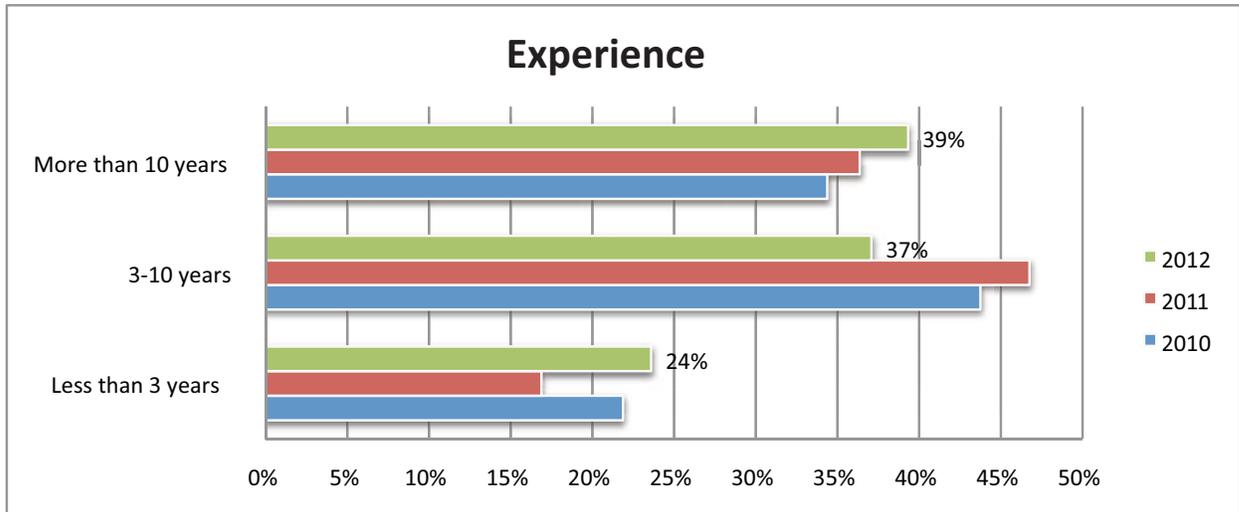


**Question 3:** How long have you been a risk manager?

**89 responses**

- 58 responses Not applicable

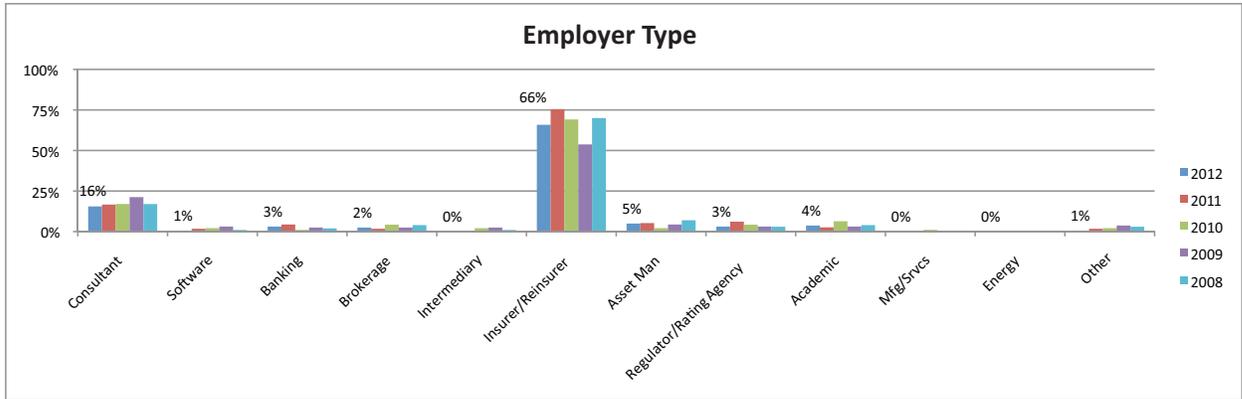
- 21 responses 24% (17%/22%) Less than 3 years
- 33 responses 37% (47%/44%) 3-10 years
- 35 responses 39% (36%/34%) More than 10 years



**Question 4.** Employer type (please select all that apply)

**161 responses with 114 unique (1.1 average)**

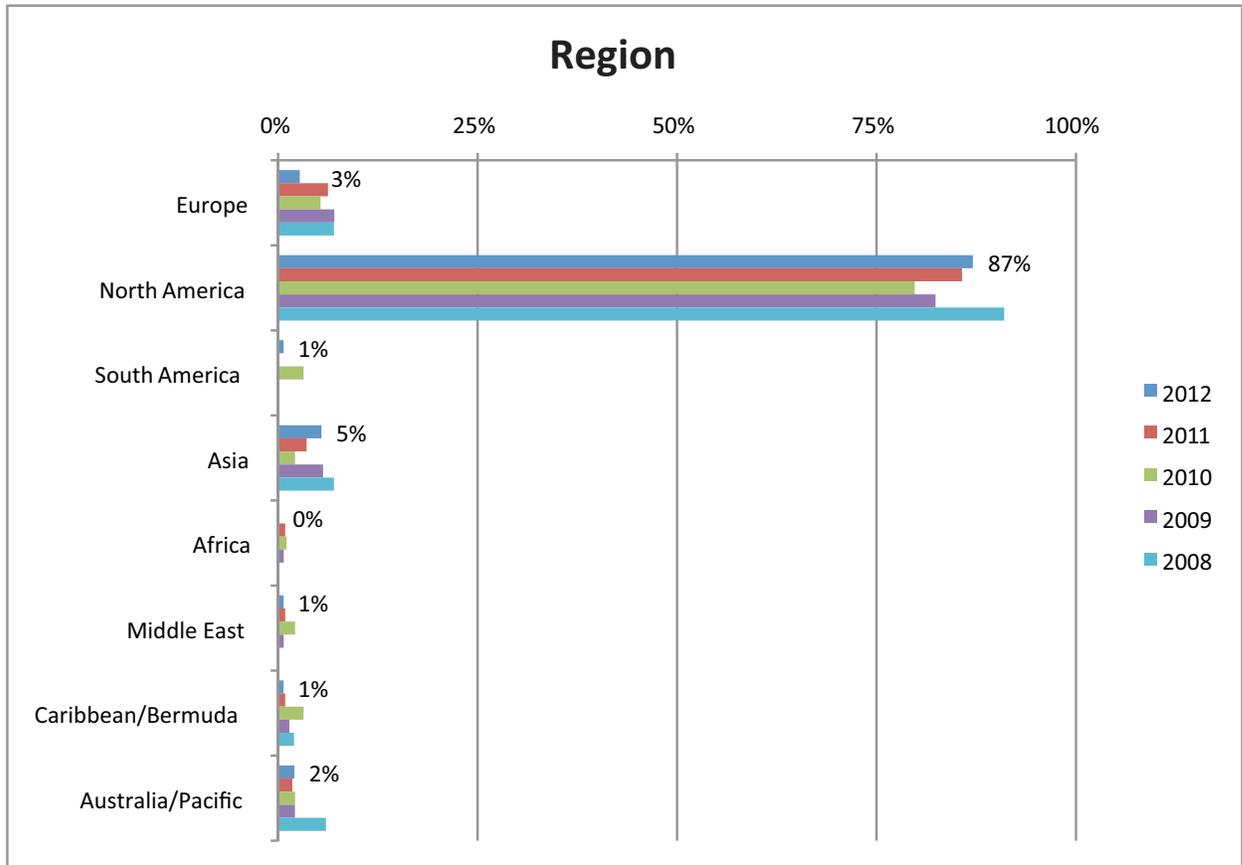
- 25 responses 16% (17%/17%/21%/17%) Consultant
- 1 response 1% (2%/2%/3%/1%) Software
- 5 responses 3% (4%/1%/3%/2%) Banking
- 4 responses 2% (2%/4%/3%/4%) Brokerage
- 0 responses 0% (0%/2%/3%/1%) Intermediary
- 106 responses 66% (75%/69%/54%/70%) Insurance/Reinsurance Company
- 8 responses 5% (5%/2%/4%/7%) Asset Management
- 5 responses 3% (6%/4%/3%/3%) Regulator/Rating Agency
- 6 responses 4% (3%/6%/3%/4%) Academic
- 0 responses 0% (0%/1%/0%/0%) Manufacturing/Services
- 0 responses 0% (0%) Energy
- 1 response 1% (2%/2%/4%/3%) Other
  - U.S. government



**Question 5: Primary Region (please select one)**

**147 responses**

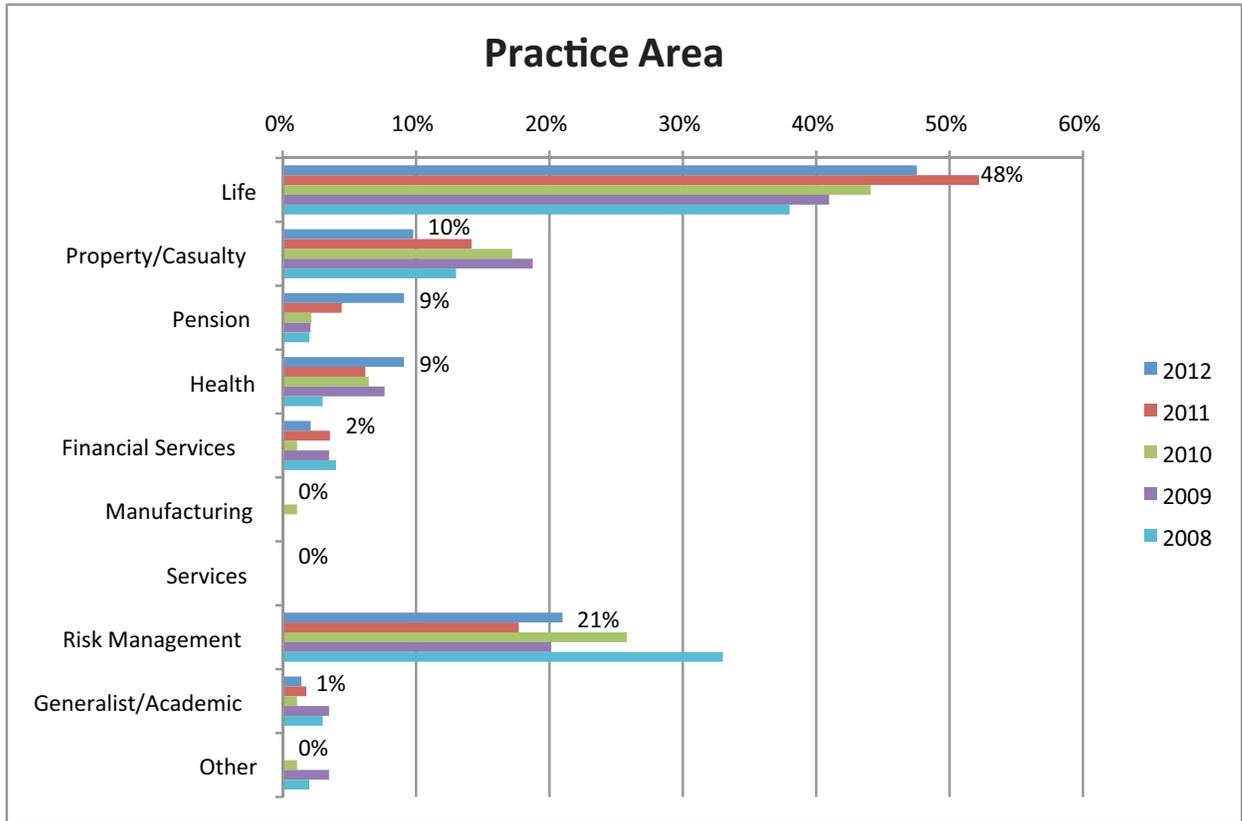
- 4 responses 3% (6%/5%/7%/7%) Europe
- 128 responses 87% (86%/80%/82%/91%) North America
- 1 response 1% (0%/3%/0%/0%) South America
- 8 responses 5% (4%/2%/6%/7%) Asia
- 0 response 0% (1%/1%/1%/0%) Africa
- 1 response 1% (1%/2%/1%/0%) Middle East
- 1 response 1% (1%/3%/1%/2%) Caribbean/Bermuda
- 3 responses 2% (2%/2%/2%/6%) Australia/Pacific
- 1 response
  - Global - North America and Europe are primary



**Question 6: Primary area of practice (please select one)**

**143 responses**

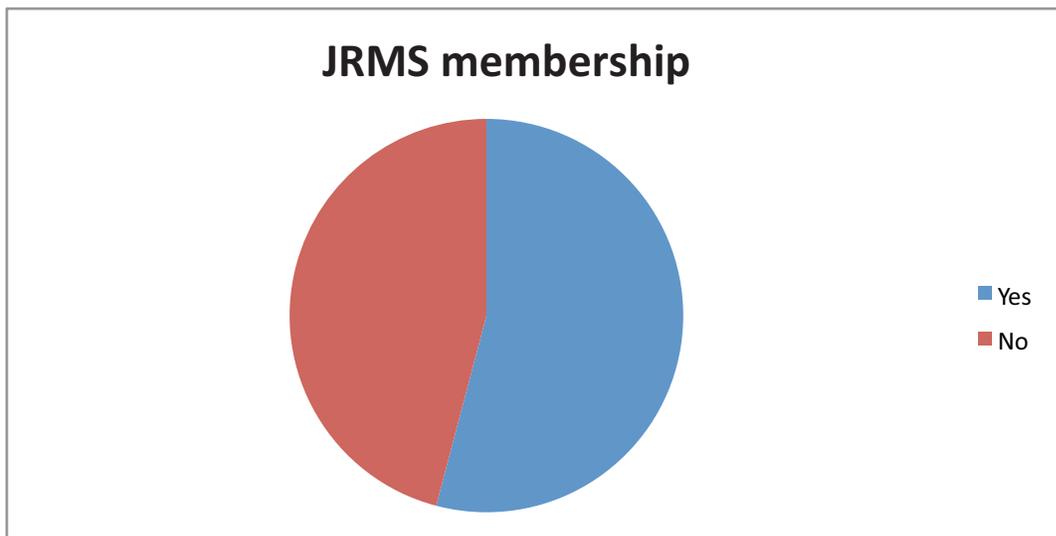
- 68 responses 48% (52%/44%/41%/38%) Life
- 14 responses 10% (14%/17%/19%/13%) Prop/Cas (Gen'l Insurance, Non-Life)
- 13 responses 9% (4%/2%/2%/2%) Pension
- 13 responses 9% (6%/6%/8%/3%) Health
- 3 responses 2% (4%/ (1%) Financial Services (non Insurance)
- 0 responses 0% (0%/1%) Manufacturing
- 0 responses 0% (0%/0%) Services
- 30 responses 21% (18%/26%/20%/33%) Risk Management
- 2 responses 1% (2%/1%/3%/3%) Generalist/Academic
- 3 responses Other
  - social insurance
  - Insurance Data and Systems
  - multi-line insurance



**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?

**146 responses**

- 79 responses 54% (81%/75%/85%/85%) Yes
- 67 responses 46% (19%/25%/15%/15%) No



**Question 8.** Do you have any comments or suggestions for future iterations of this survey?

- None.
- Not at this time.
- no
- Great survey! Keep up the great work!
- This was a well thought out survey.
- Either collapse the Natural Catastrophe categories into one, or create more categories than in this survey.
- It would be helpful to focus in on specifics of how others view risk appetite and how others assess / identify operational risks
- It is a good idea. Keep asking questions if you seek answers!
- No
- Clarify the questions, particularly near the start of the survey where the respondent is not yet comfortable.
- Update list of risks - five years is a long time
- Retain the write-in response options.
- No, but I would like to know more about how other companies are measuring emerging risks.
- Your list of emerging risks is missing the biggest risk of all. That risk is one of a meteor strike where the meteor is large enough to not break up in the atmosphere and hits the planet with such a force that depending on size and where the strike is, there could be devastating effects up to and including human extinction. This may be a "black swan" event beyond the scope of the survey, but even if it is, you might consider a section on issues beyond the regular emerging risks into the extreme risks that no one ever thinks about at all. / / Also, I don't see "Electromagnetic Pulse (EMP)" on the list unless you think it is part of other categories. I believe this one is distinct enough and companies can actually do things to prepare or limit damage from this one by geographically distributing processes.
- Can we make a survey specific to the insurance industry?

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?
- Expand Natural catastrophe: Tropical storms to include inland convective storms

May not need Section 4 Question 4 as Comments have become consistent.

## Appendix III - 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.

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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](http://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.

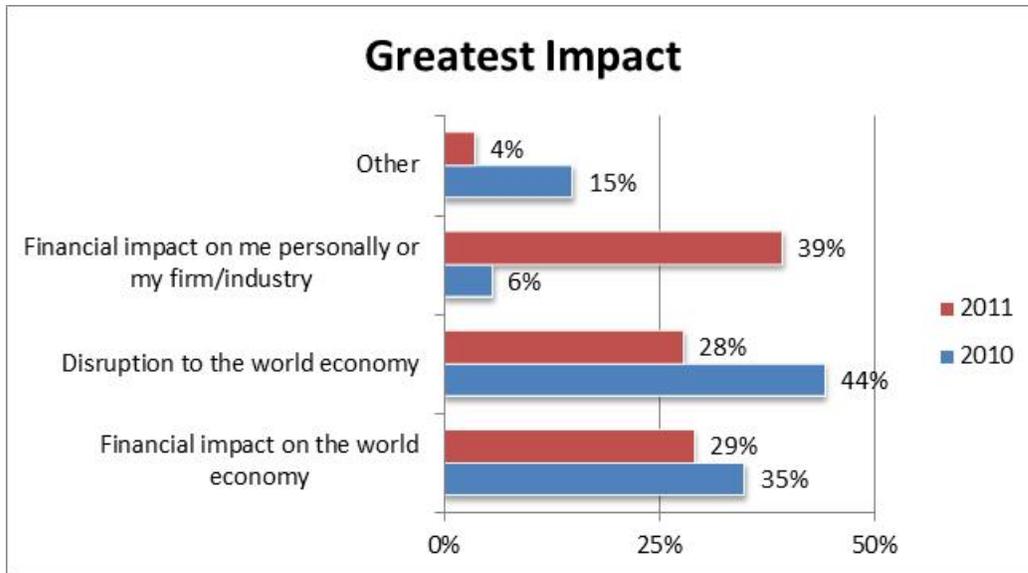
### ***Default Question Block***

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**

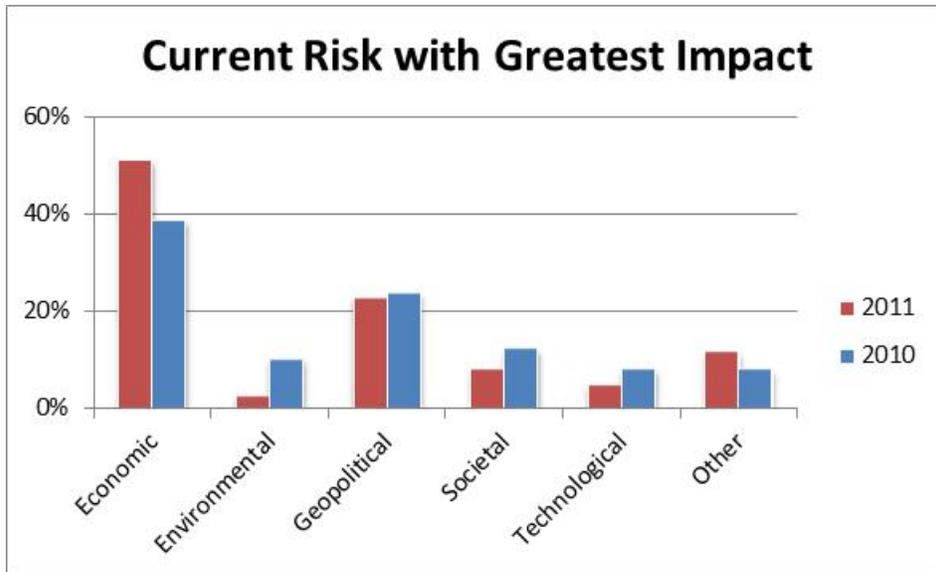
**Economic – 85 responses 51% (39%)**

- 5 responses    3% (5%)    Oil price shock
- 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



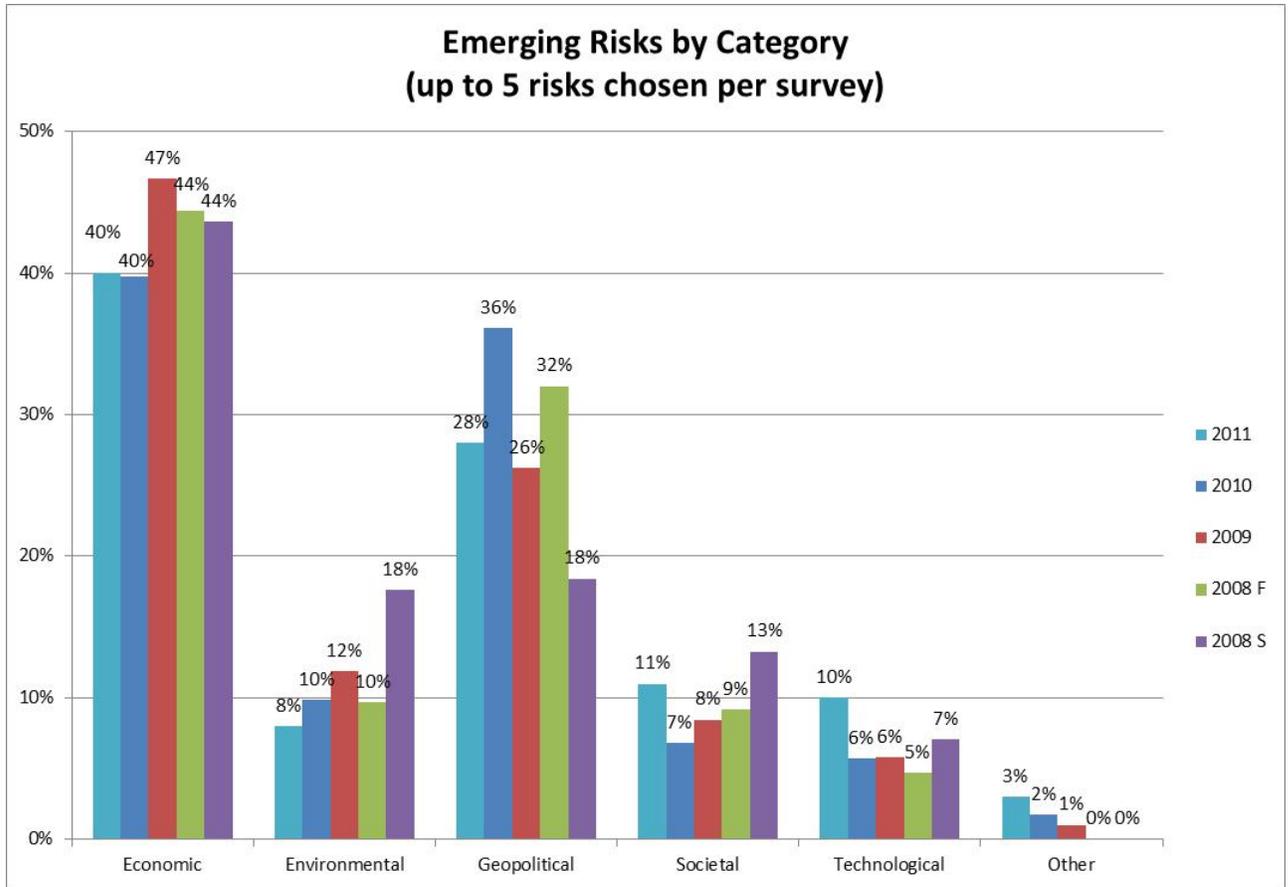
## Section 1: Emerging Risks

**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%)**

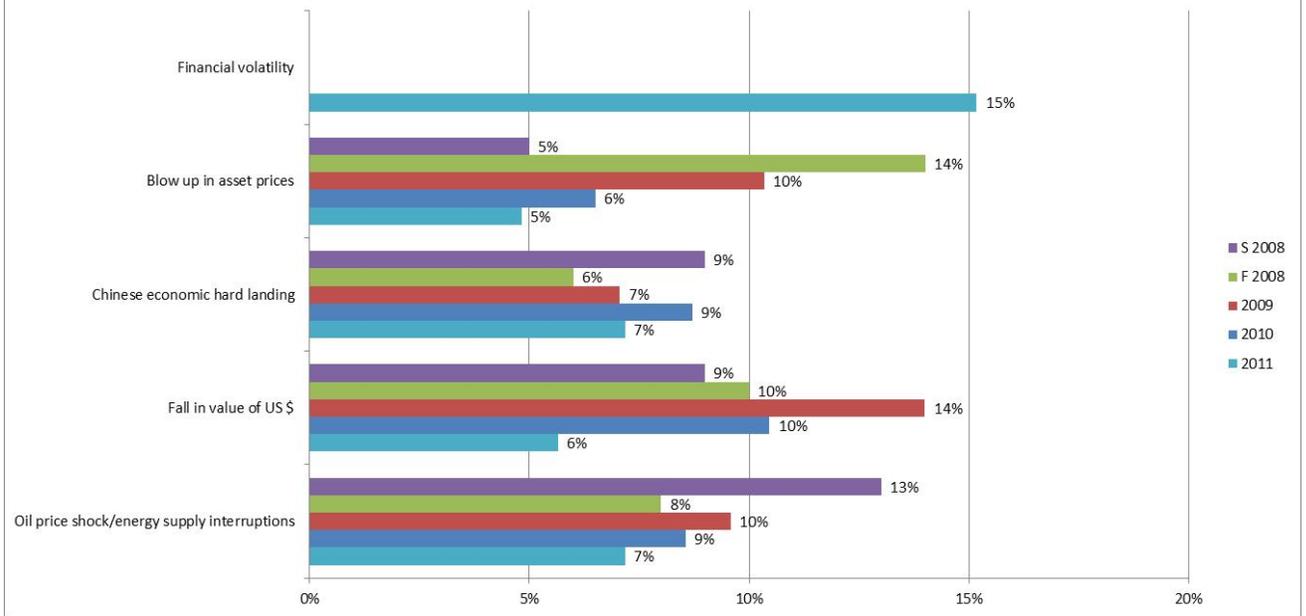
- 22 responses 14% (25%/27%) Climate change
- 9 responses 6% (9%/10%) Loss of freshwater services
- 8 responses 5% (4%/8%) Natural catastrophe: Tropical storms
- 9 responses 6% (5%/7%) Natural catastrophe: Earthquakes
- 7 responses 4% (2%/5%) Natural catastrophe: Inland flooding

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

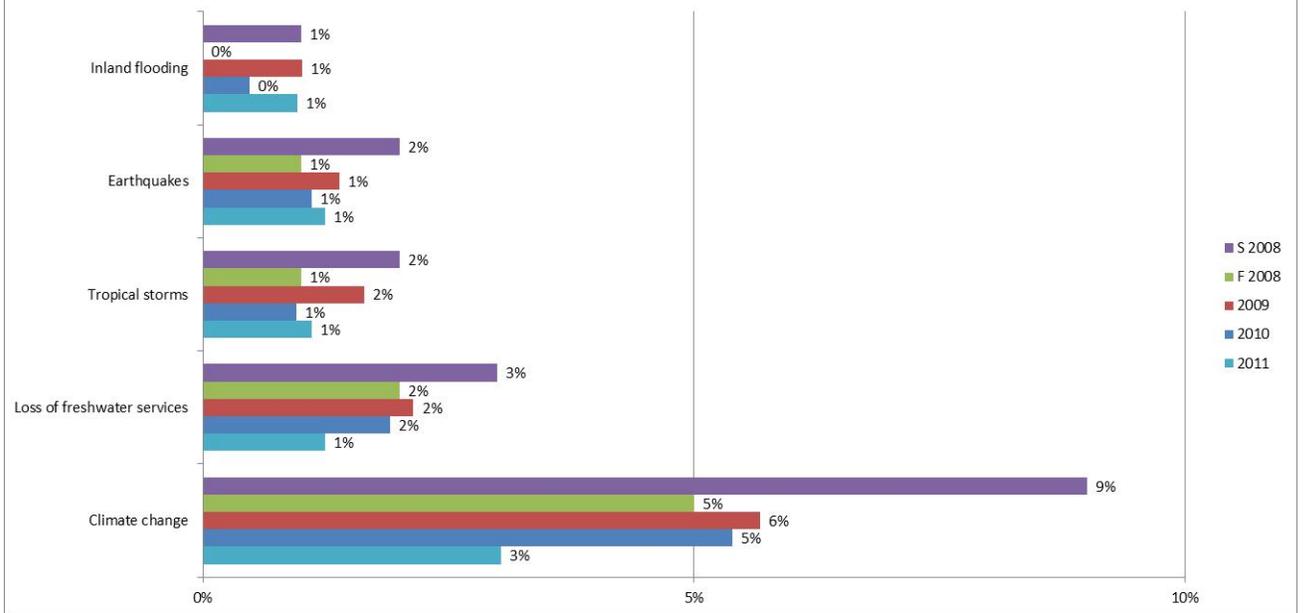
- 32 responses 20% (43%/30%) International terrorism
- 14 responses 9% (18%/14%) Proliferation of weapons of mass destruction (WMD)
- 16 responses 10% (10%/9%) Interstate and civil wars
- 68 responses 42% (38%/18%) 2 Failed and failing states
- 5 responses 3% (12%/7%) Transnational crime and corruption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

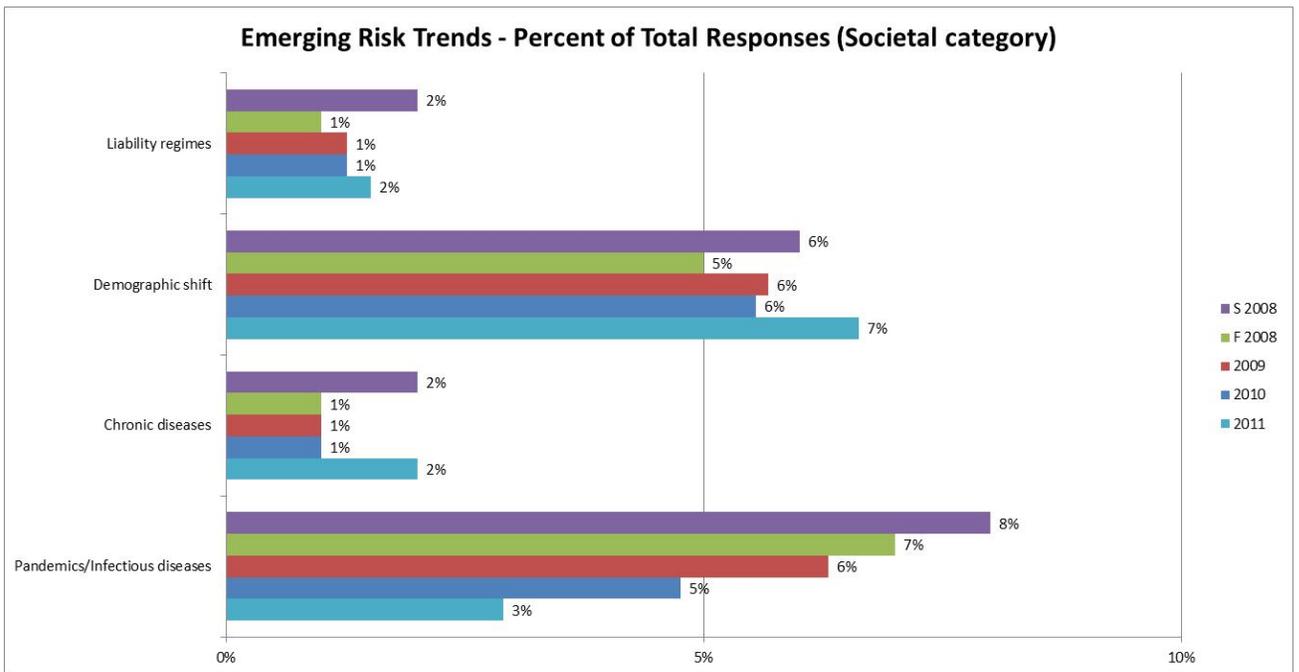
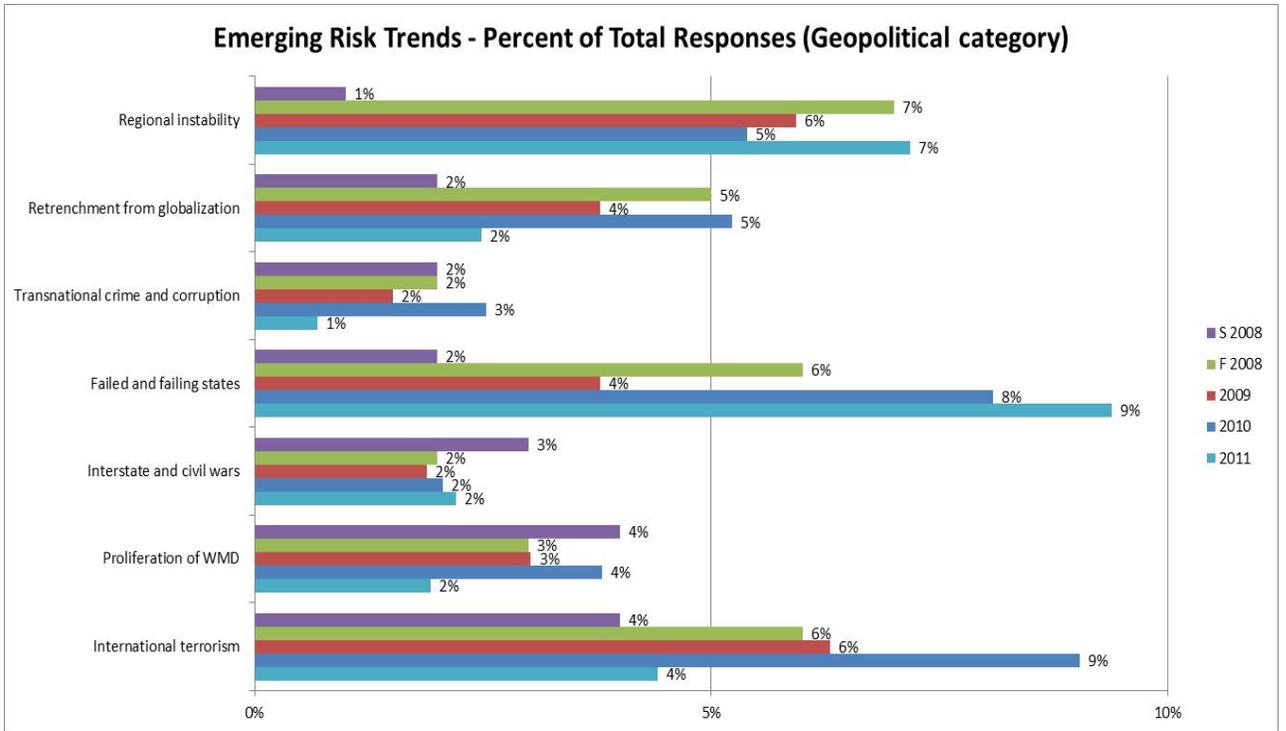
- 52 responses 32% (25%/28%) 4T Regional instability
- Societal – 83 responses 11% (7%/8%/9%/13%)**
- 21 responses 13% (22%/30%) Pandemics/Infectious diseases
- 3 responses 2% (4%/4%) Chronic diseases
- 48 responses 30% (26%/27%) Demographic shift
- 11 responses 7% (6%/6%) Liability regimes
- Technological – 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

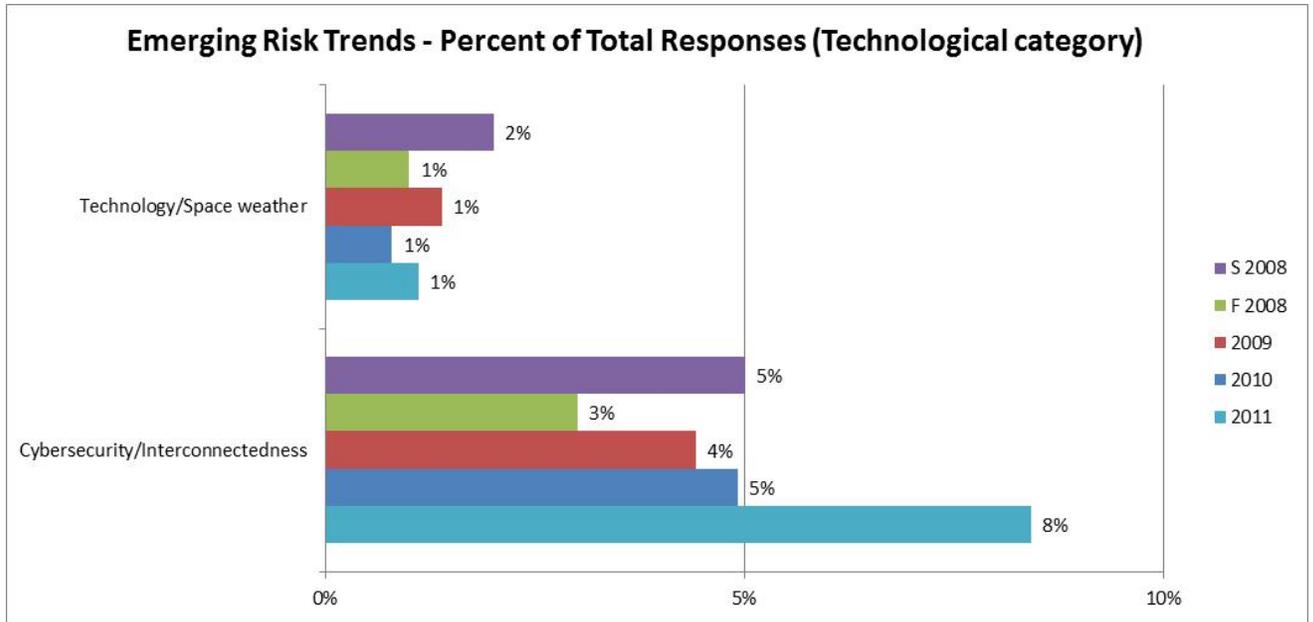
### Emerging Risk Trends - Percent of Total Responses (Economic category)



### Emerging Risk Trends - Percent of Total Responses (Environmental category)







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*
- 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%)**

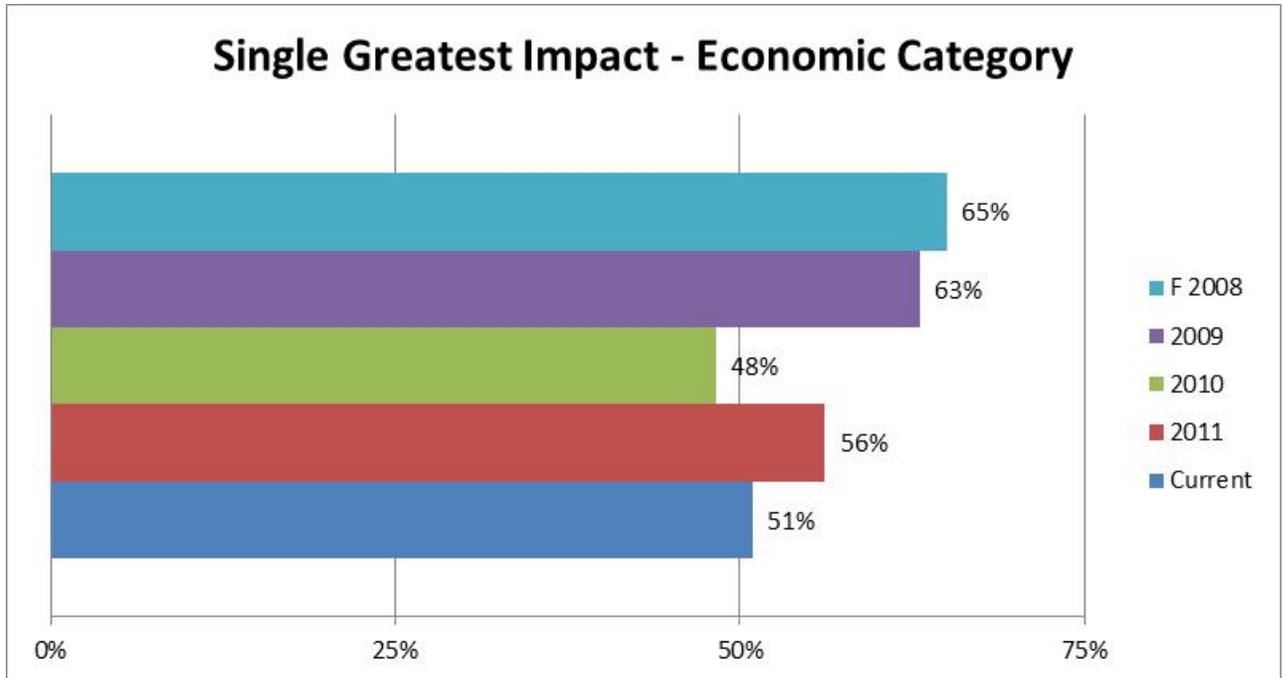
- 2 responses 2% (3%/2%/2%) *Pandemics/Infectious diseases*
- 0 responses 0% (1%/0%/0%) *Chronic diseases*
- 4 responses 3% (3%/5%/7%) *Demographic shift*
- 1 response 1% (0%/0%/0%) *Liability regimes*

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

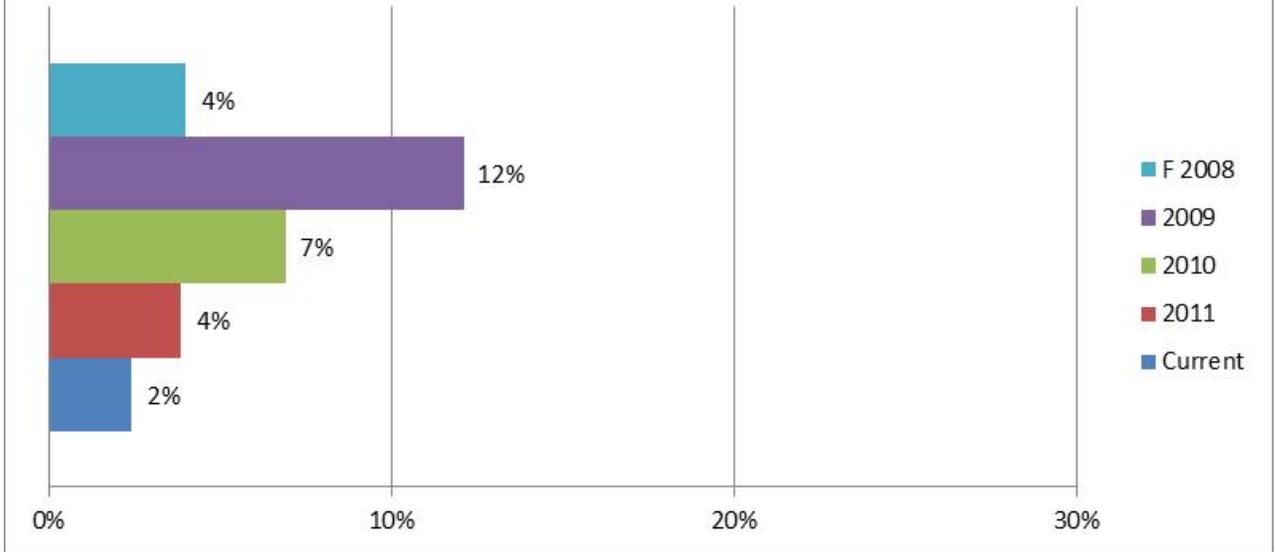
- 9 responses 7% (9%/4%/6%) 3 *Cyber security/interconnectedness of infrastructure*
- 1 response 1% (0%/1%/0%) *Technology/Space weather*

**Other – 7 responses 5% (3%/3%/3%)**

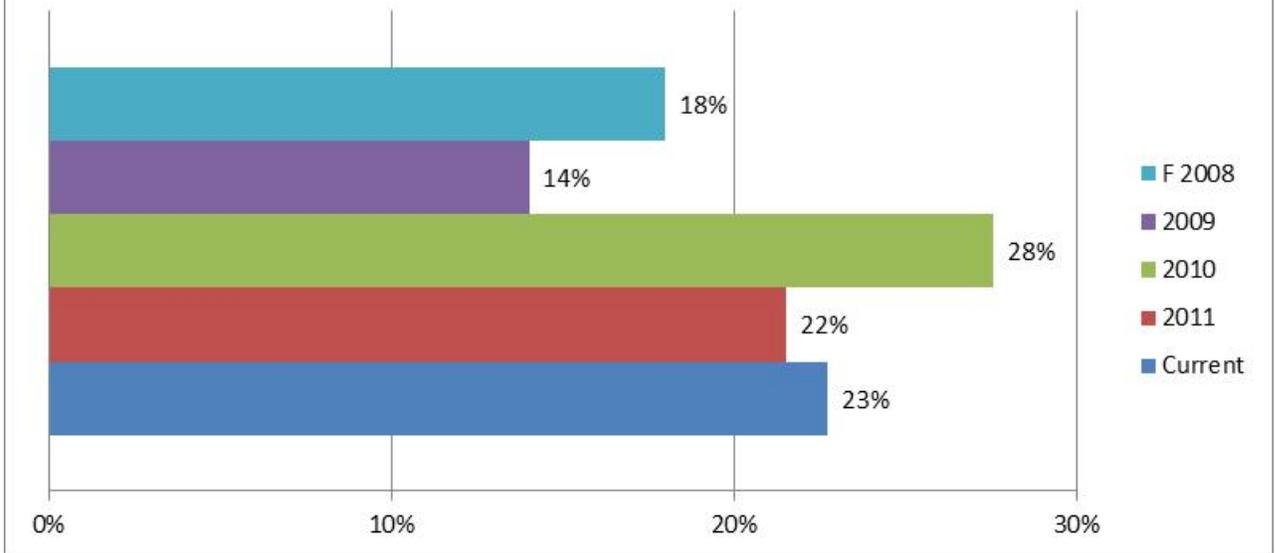
- Rise of Socialism in US
- Sovereign debt
- Ability to repay bailouts
- Natural Catastrophe: CAT models significantly inaccurate
- Volatility
- Civil unrest
- Regulatory intervention

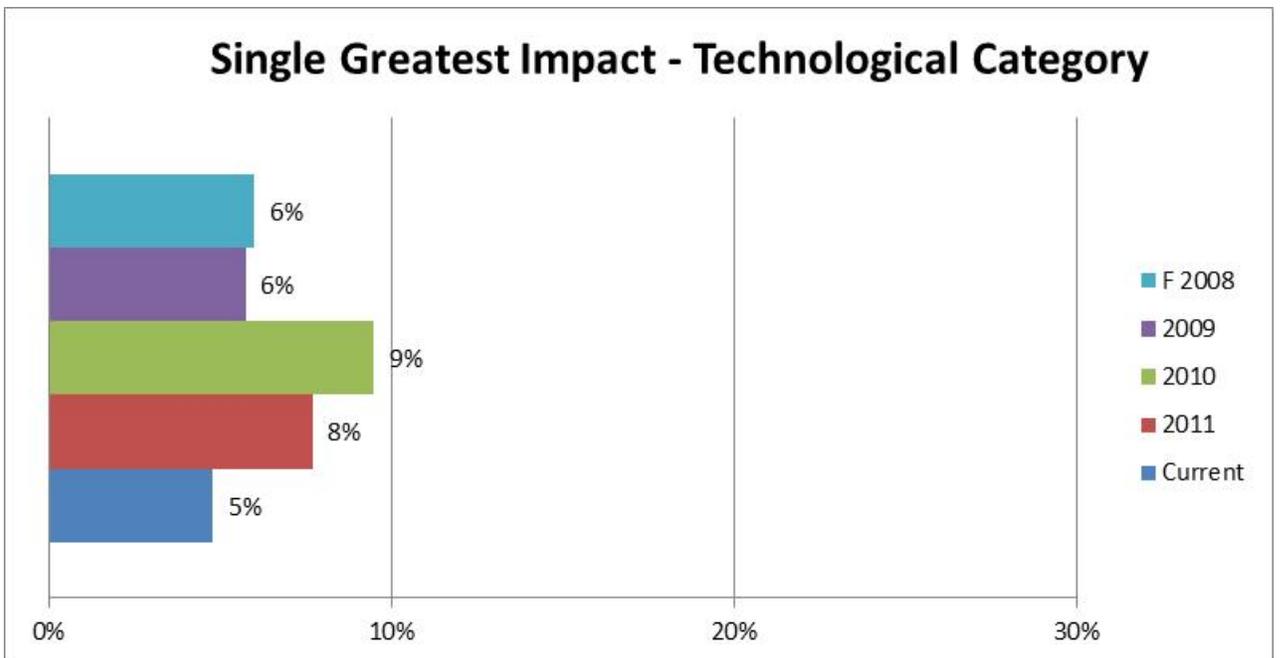
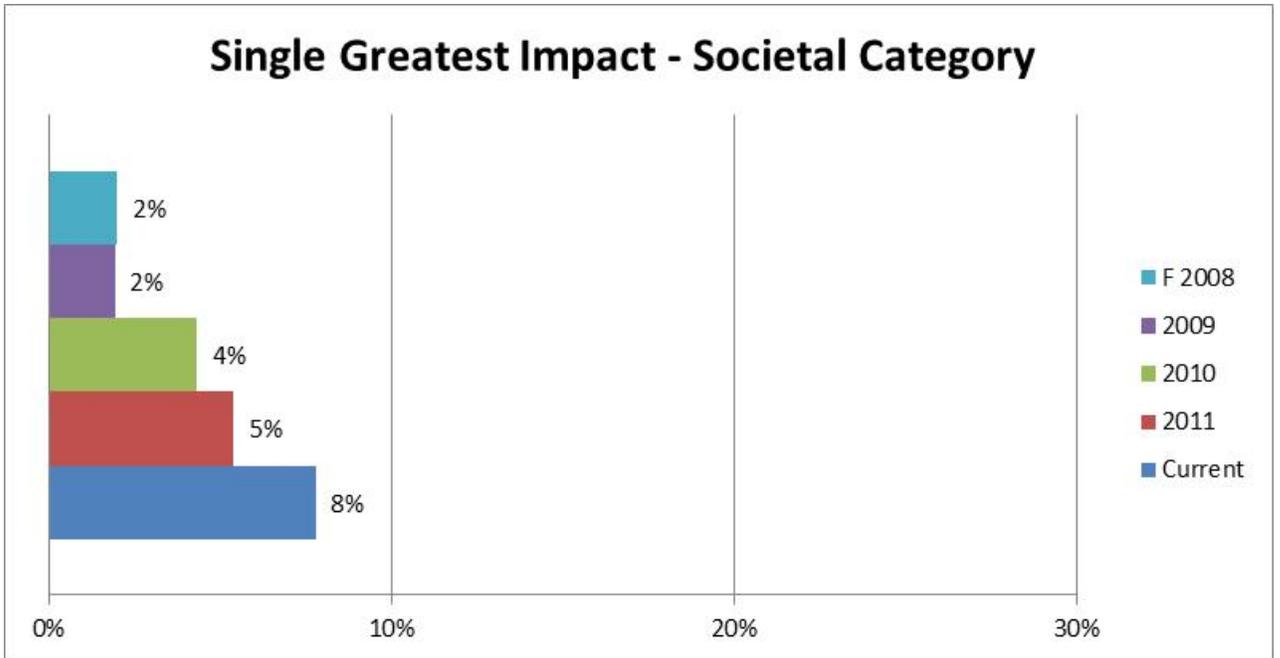


### Single Greatest Impact - Environmental Category



### Single Greatest Impact - Geopolitical Category





**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	0	0	12	0
12									0	0	1	2	0	0	4	0	0	0	0	0	0	0	0
13									0	0	0	5	1	0	3	0	0	0	0	0	0	2	0
14									0	0	0	0	1	3	8	1	0	2	0	0	0	0	0
15									0	0	0	0	1	0	0	0	0	0	0	0	0	8	0
16									0	0	0	0	0	0	2	0	0	1	0	1	0	1	0
17									0	0	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

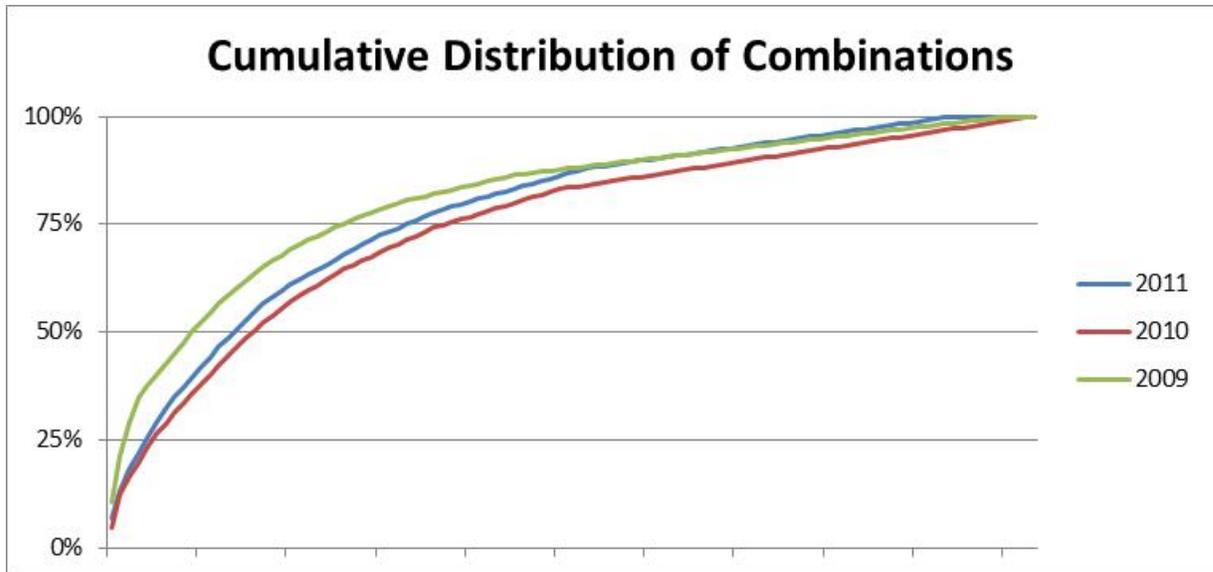
1. 24 responses
  - Financial volatility
  - Failed and failing states
2. 21 responses
  - Oil price shock
  - Financial volatility
3. 18 responses
  - Chinese economic hard landing
  - Financial volatility
4. 12 responses
  - International terrorism
  - Cyber security/interconnectedness of infrastructure
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
  - 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

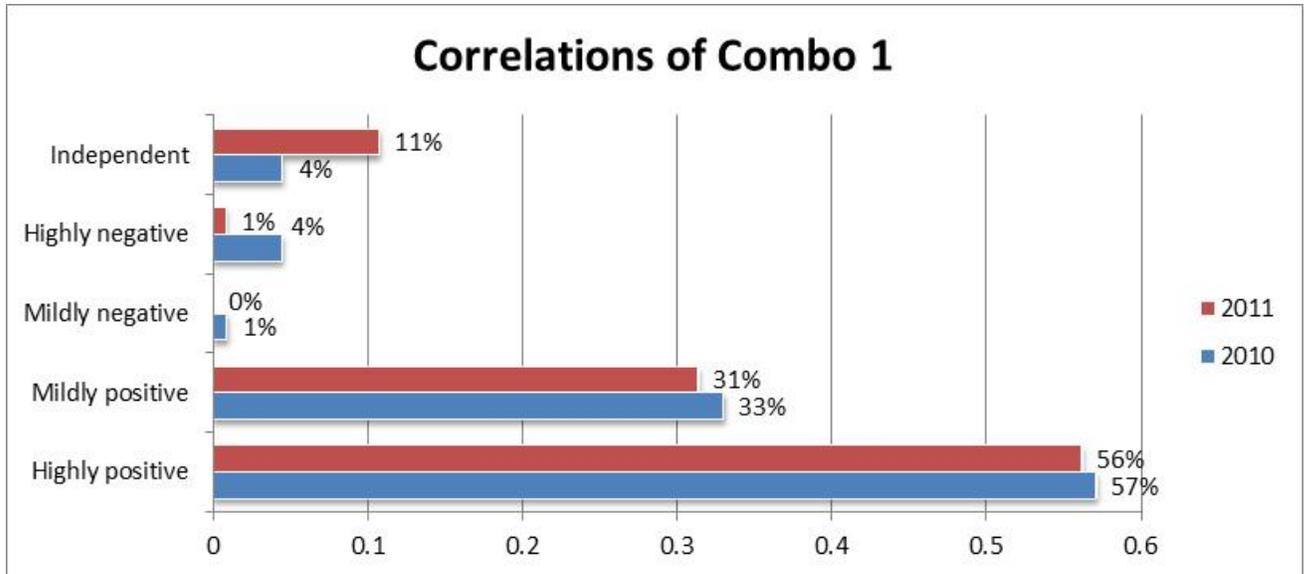
		Combo 1	Combo 2	Combo 3	Total	Combo 1	Combo 2/3
Economics	Economics	50	29	20	99	40%	29%
Economics	Environmental	5	2	3	10	4%	3%
Economics	Geopolitical	36	23	24	83	29%	24%
Economics	Societal	9	7	5	21	7%	6%
Economics	Technological	4	5	5	14	3%	4%
Environmental	Environmental	1	7	4	12	1%	4%
Environmental	Geopolitical	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%



	2009	2010	2011	Avg prior to 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
- 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

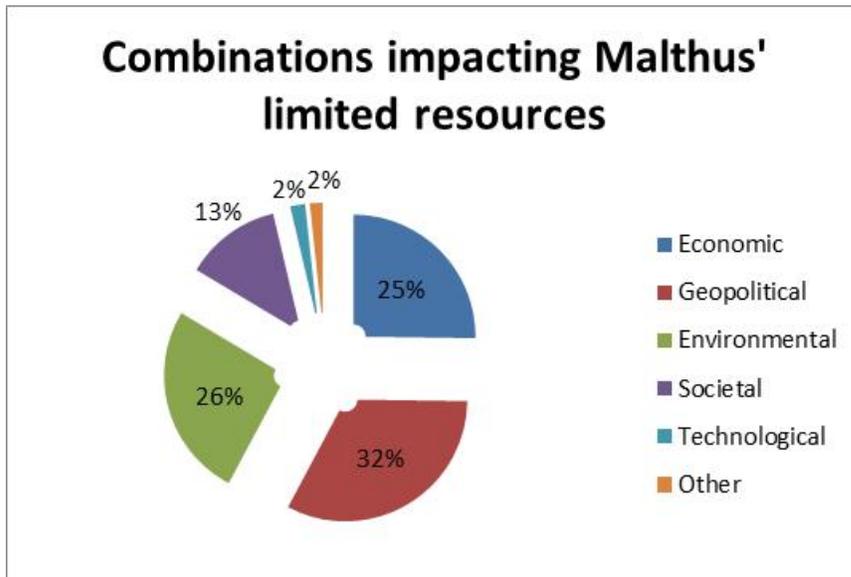
**Technological – 7 responses (2%)**

- 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

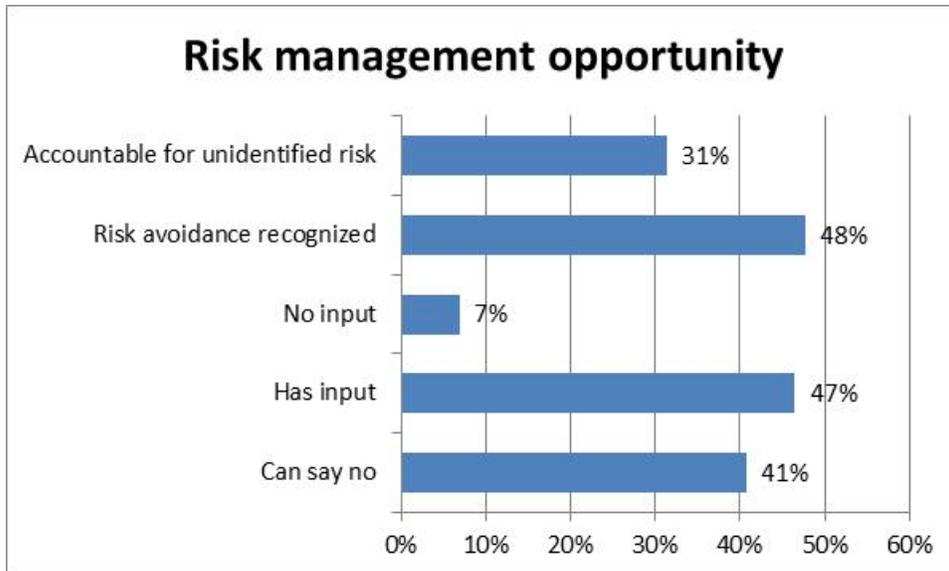
**Question 7.** The true measure of an ERM program is how it is received by the board and senior management. Which of these is true in your situation? (please select all that apply)

**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

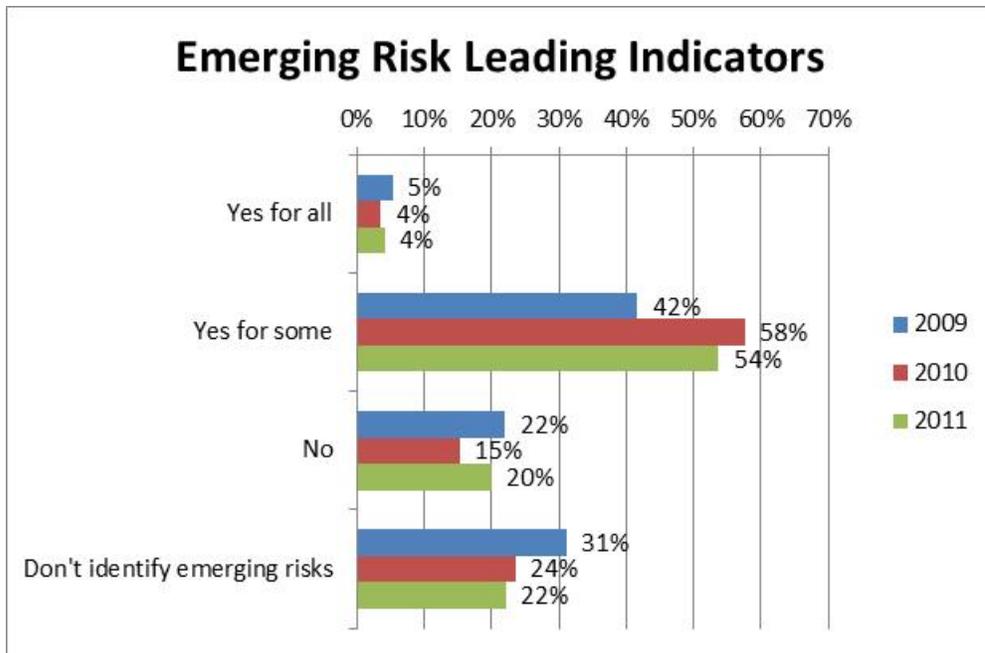


## Section 2: Leading Indicators

**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.

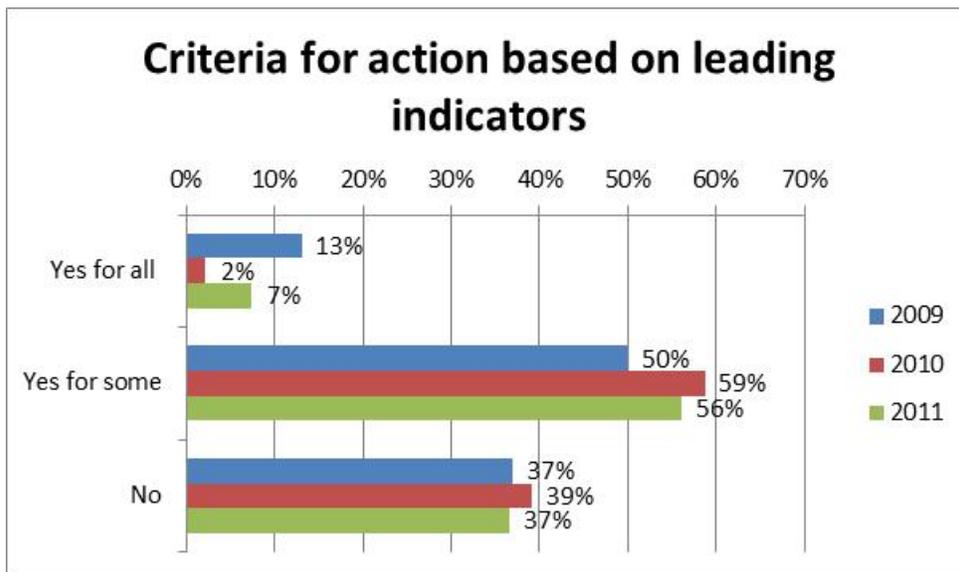
- Monitoring world stock markets, futures
- CRO and research arm monitor various risks
- We read Bloomberg articles
- General credit risk is adjusted by remote geographical and sector performance.
- Mapping the problem
- Actuarial quantifies risk with assumptions. Our actuarial department quantifies 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



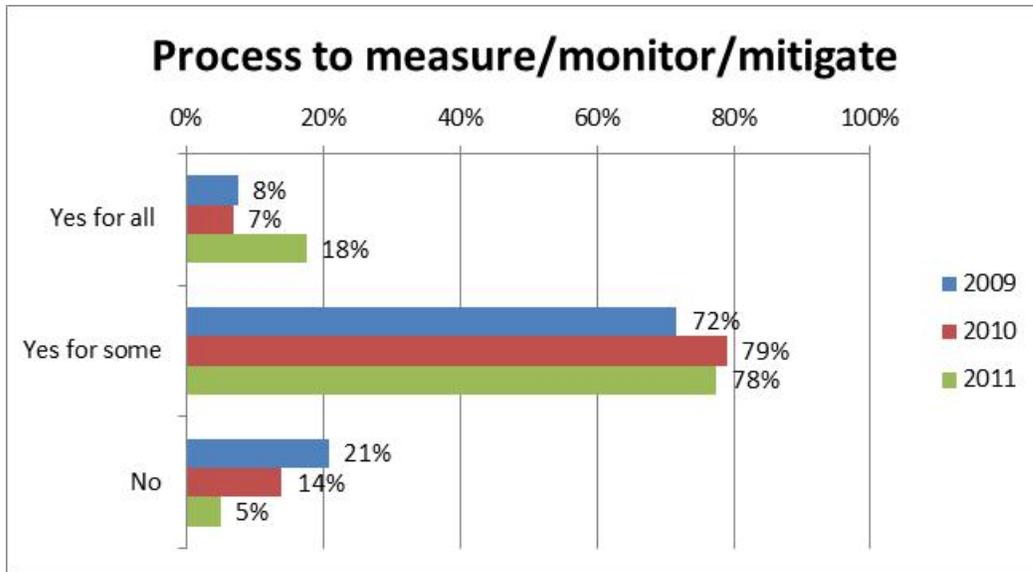
**Question 4.** If yes, please provide examples.

- 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.

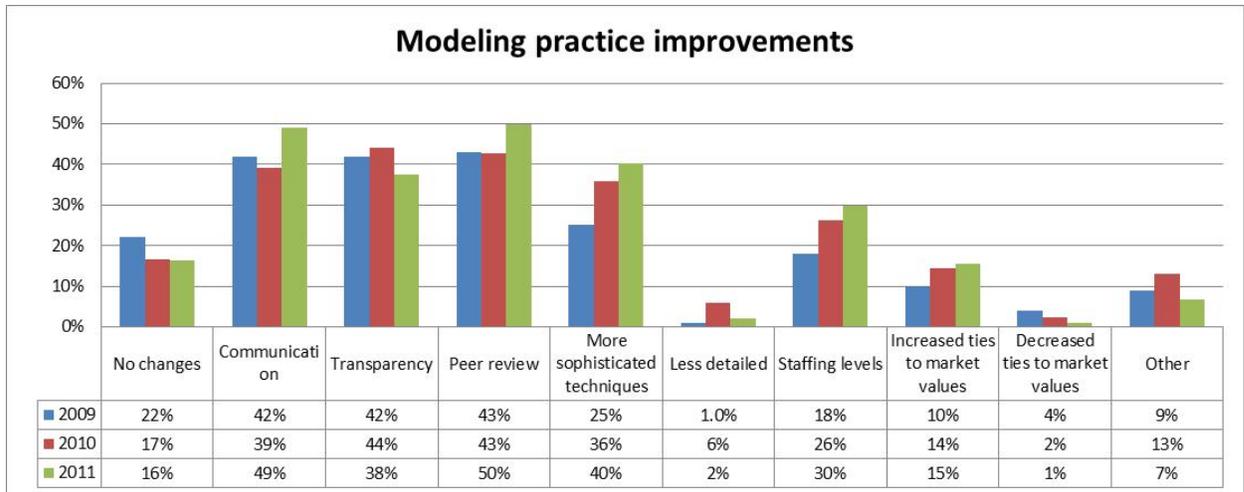
- For regulatory risks, we monitor the regulator activities, and other regulatory development in the region.
- Initial tremors in investment banking and finance sectors led us to divest of all investment banking debt held in our general account prior to Bear collapse.

### **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)**

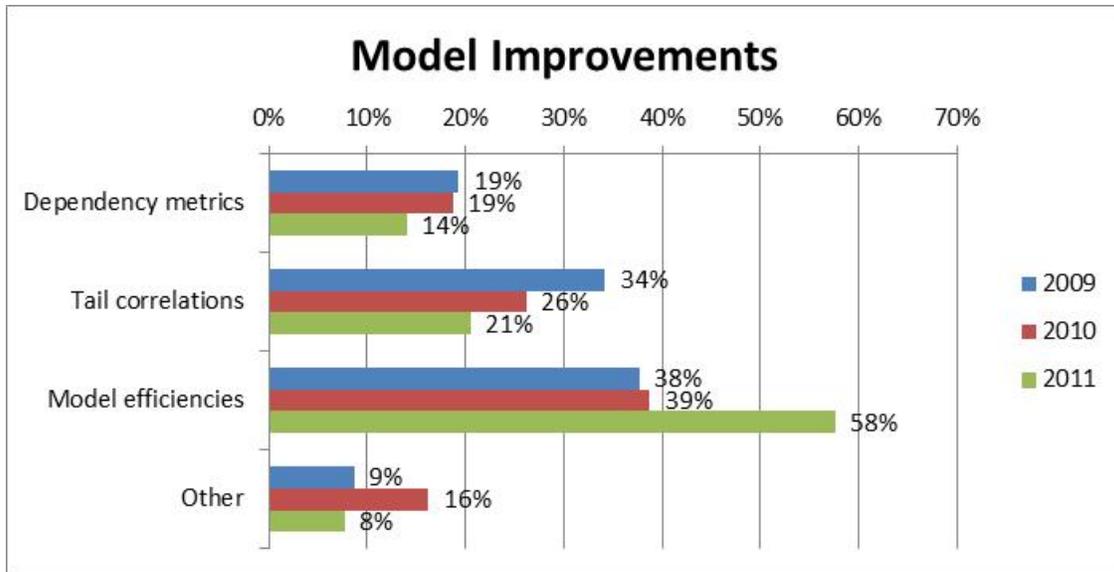
- |                |               |                                |
|----------------|---------------|--------------------------------|
| • 17 responses | 16% (17%/22%) | No changes                     |
| • 51 responses | 49% (39%/42%) | Communication                  |
| • 39 responses | 38% (44%/42%) | 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.



**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.

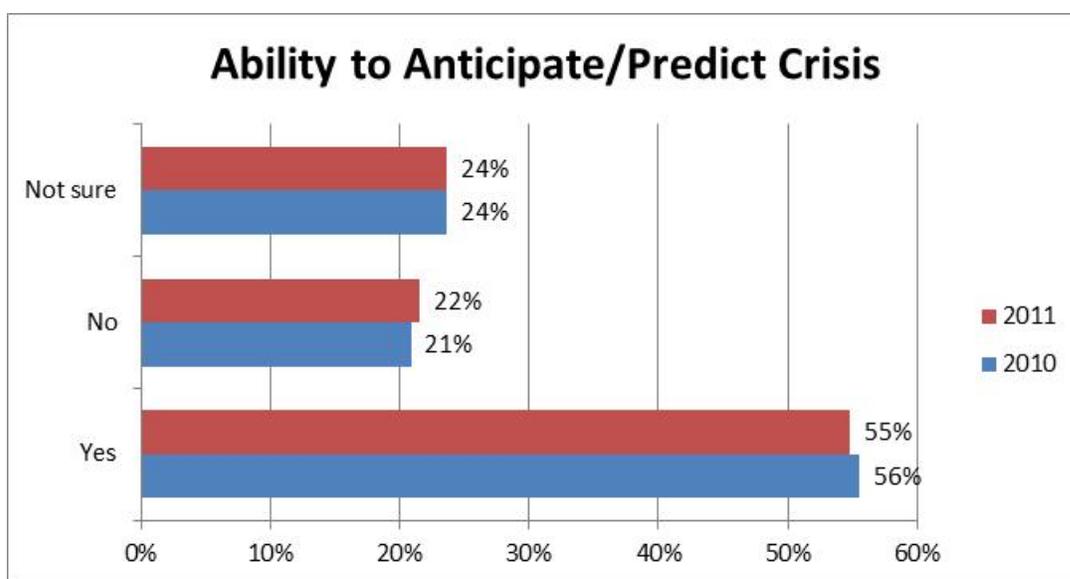
- Not sure

## 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

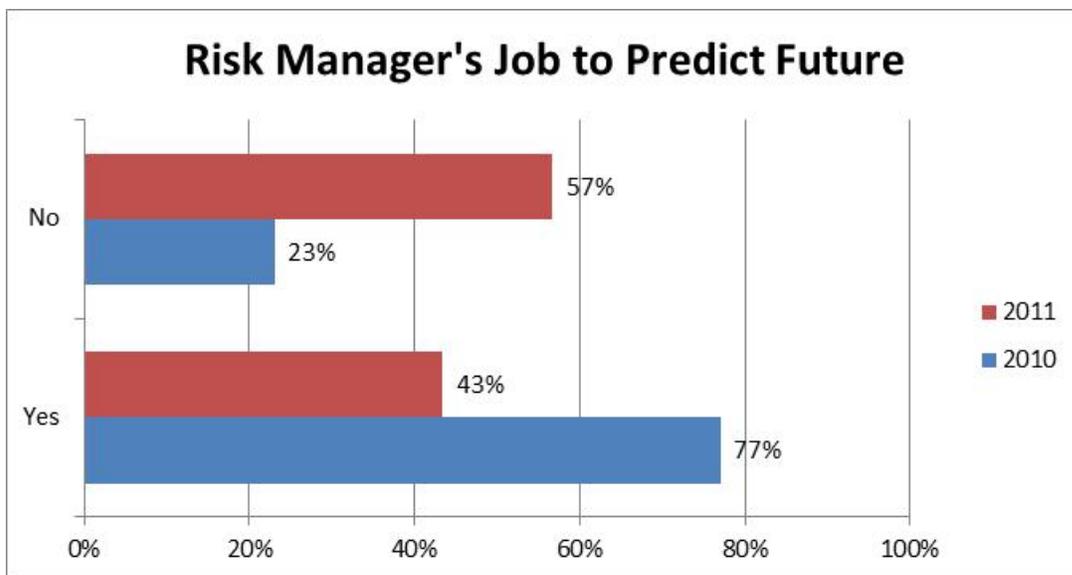
Unfortunately the survey did not allow both a comment and a vote. The researcher has attempted to categorize each comment into the categories Yes/No/Not applicable (considering multiple futures was labeled yes).

- 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

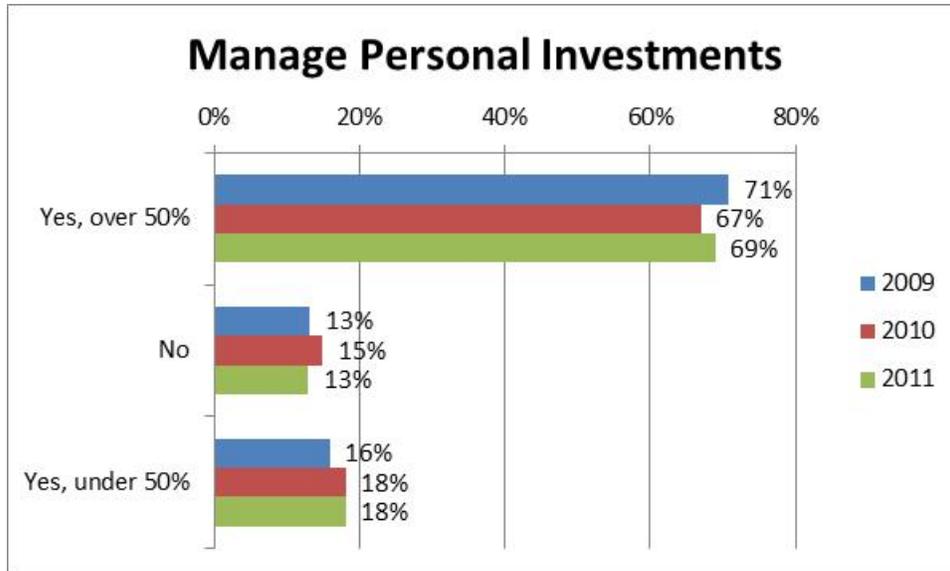


## Section 5: Current topics

**Question 1.** Do you manage your personal investments?

**116 responses**

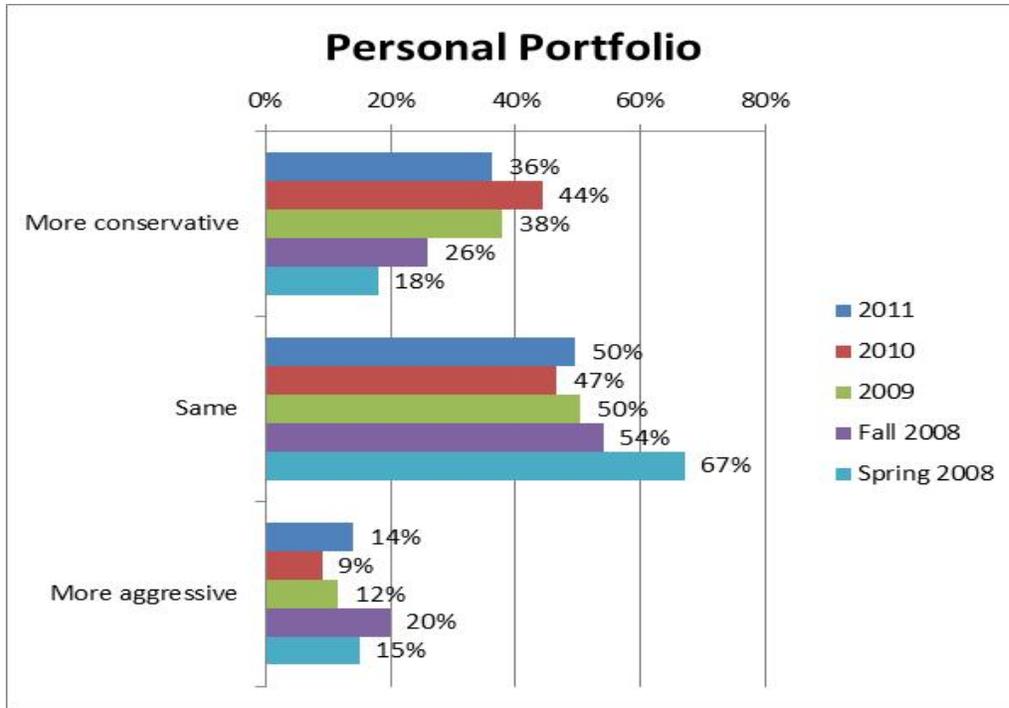
- 80 responses 69% (67%/71%) Yes, for more than 50% of portfolio
- 15 responses 13% (15%/13%) No
- 21 responses 18% (18%/16%) Yes, for less than 50% of portfolio



**Question 2.** Currently, your personal investment portfolio is:

**116 responses**

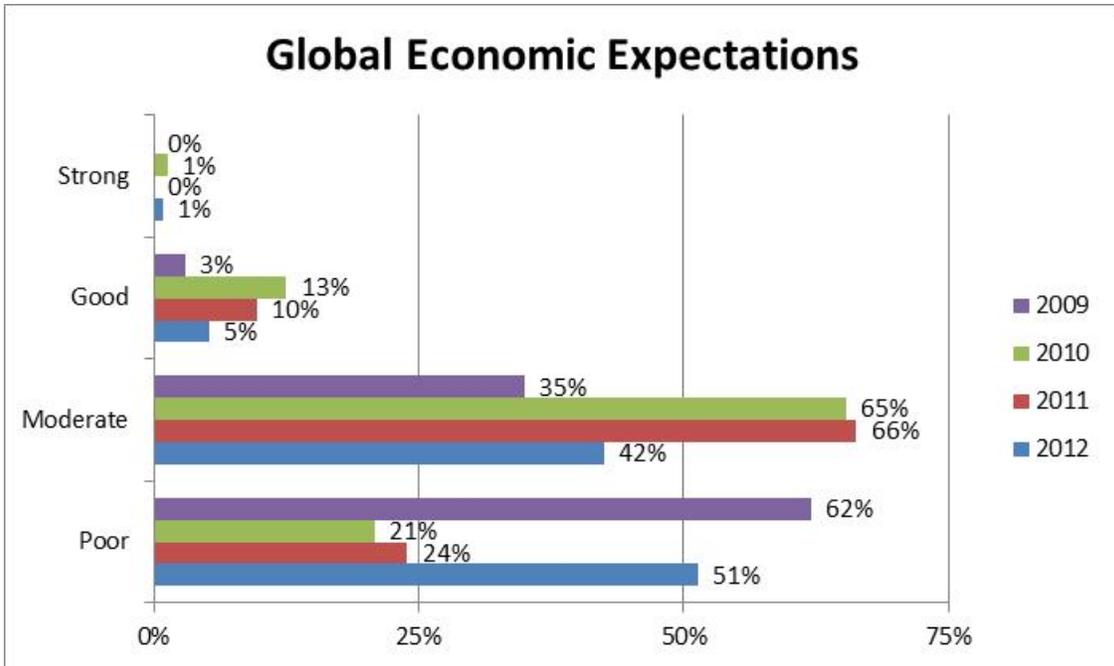
- 58 responses 36% (44%/38%/26%/18%) More conservative than usual
- 48 responses 50% (47%/50%/54%/67%) Same as usual
- 6 responses 14% (9%/12%/20%/15%) More aggressive than usual
- 1 responses Not sure
- 3 responses Prefer not to answer



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

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

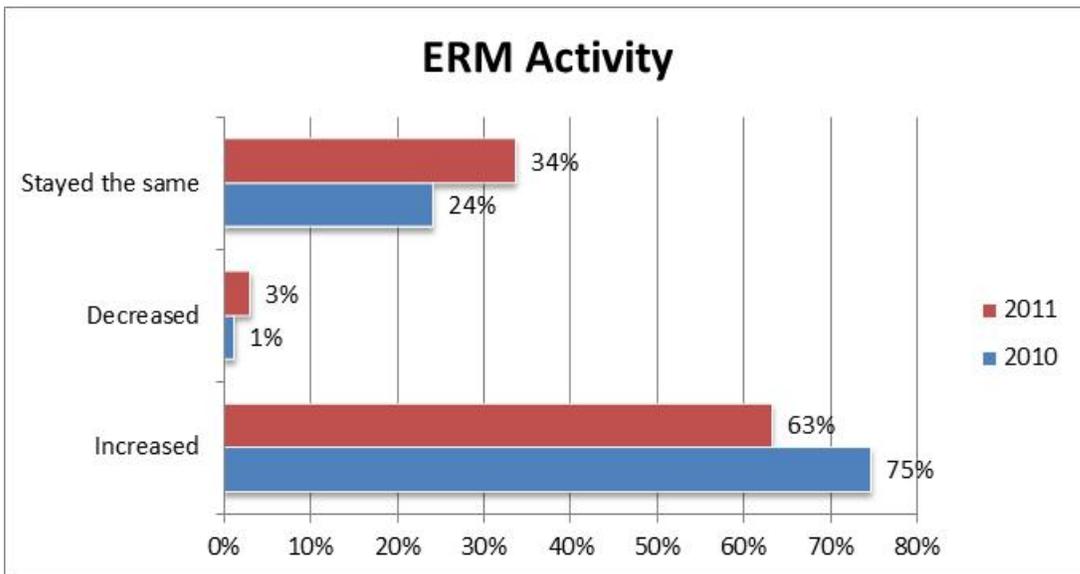
- 58 responses 51% (24%/21%/62%) Poor
- 48 responses 42% (66%/65%/35%) Moderate
- 6 responses 5% (10%/13%/3%) Good
- 1 responses 1% (0%/1%/0%) Strong
- 3 responses Not sure



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

**98 responses**

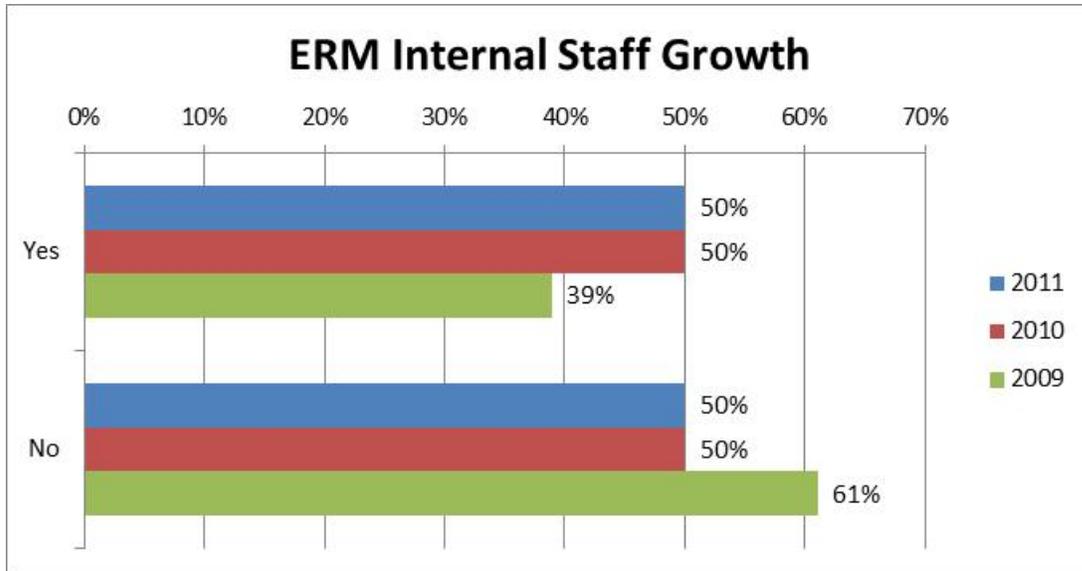
- 62 responses 63% (75%) Increased
- 3 responses 3% (1%) Decreased
- 33 responses 34% (24%) Stayed the same
- 3 responses Not sure
- 15 responses Not applicable



**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?

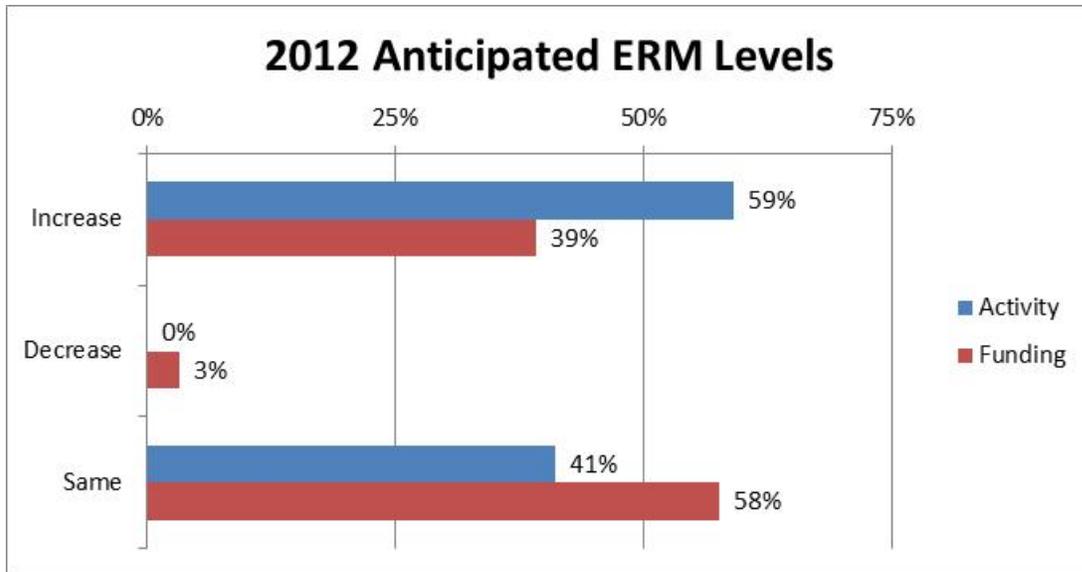
**100 responses**

- 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**

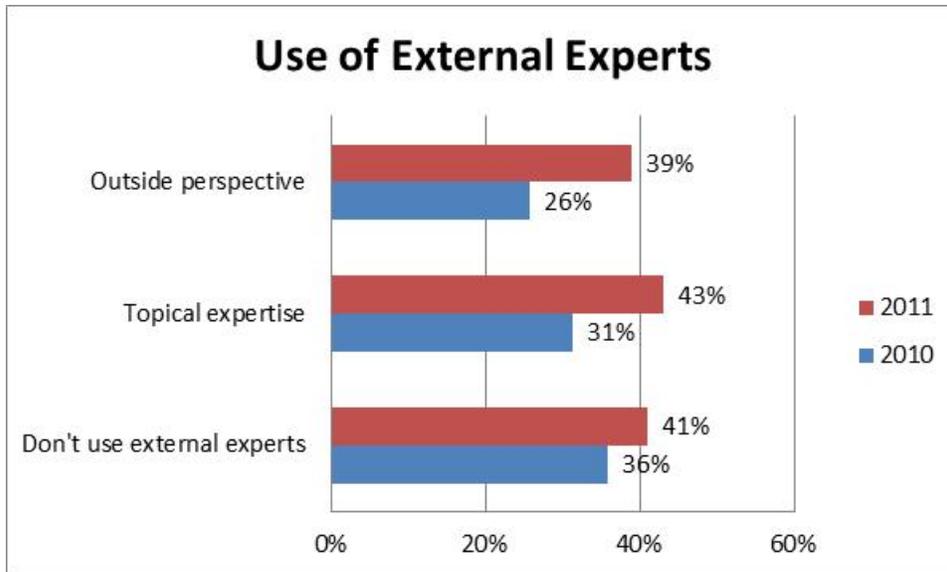
- 36 responses 39% (47%) Increase
- 3 responses 3% (4%) Decrease
- 53 responses 58% (49%) Stay the same
- 12 responses Not sure
- 10 responses Not applicable



**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

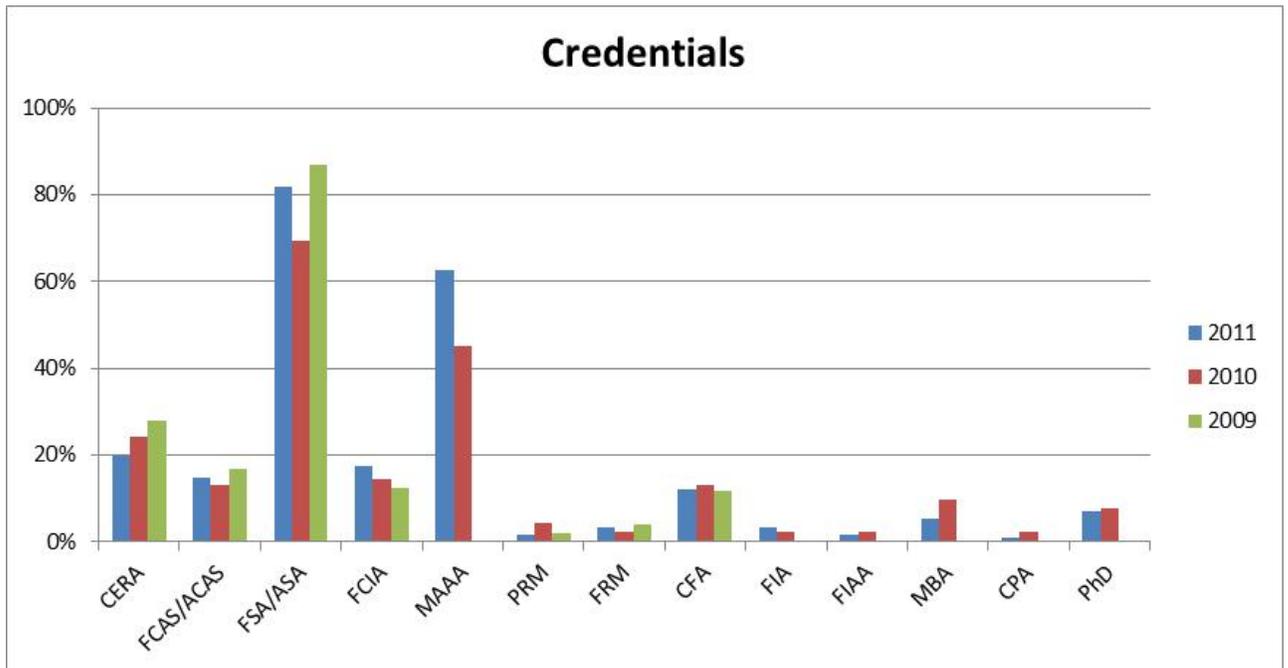
**Question 3:** What credentials do you currently hold? (please select all that apply)

**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

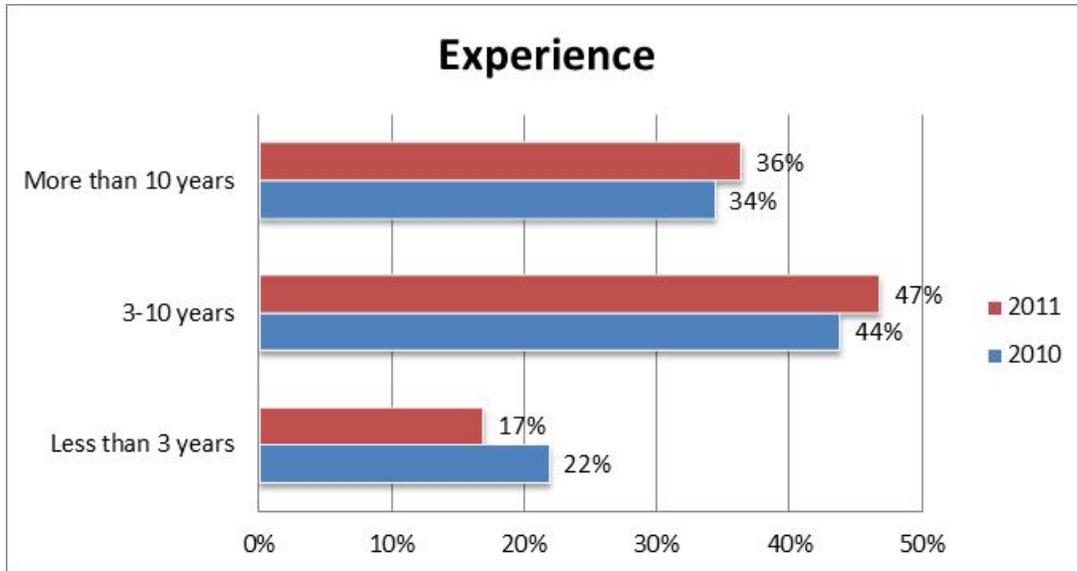
- 4 responses 3% (2%) FIA
- 2 responses 2% (2%) FIAA
- 6 responses 5% (10%) MBA
- 1 response 1% (2%) CPA
- 8 responses 7% (8%) PhD
- 7 responses 6% (5%) Other actuarial credential (please specify)
  - 1 FIA (France)
  - 1 FCA
  - 1 FHAS
  - 1 FASSA
  - 1 CONAC Mexico
  - 1 CQF
  - 1 BSc
- 13 responses 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**

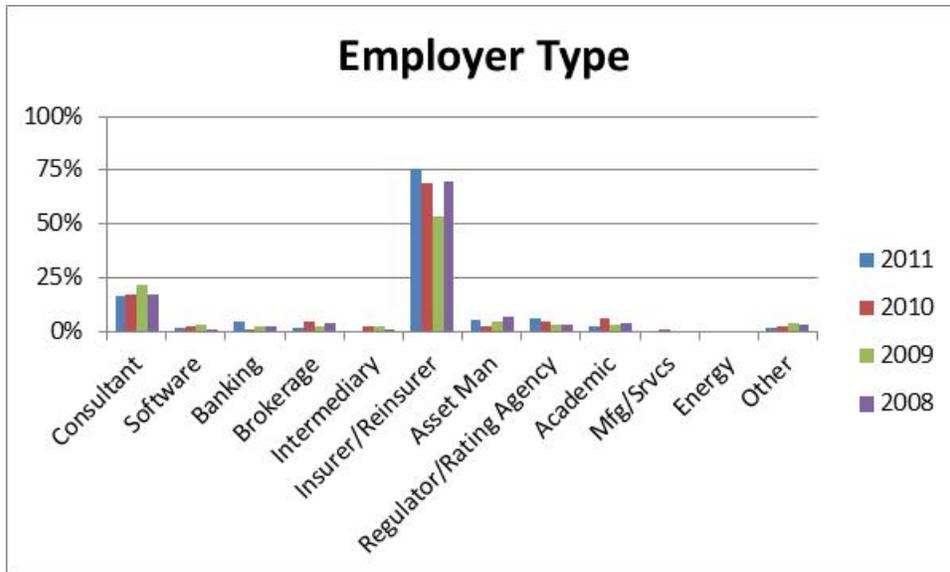
- 37 responses                      Not applicable
- 13 responses    17% (22%)    Less than 3 years
- 36 responses    47% (44%)    3-10 years
- 28 responses    36% (34%)    More than 10 years



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

**132 responses with 114 unique (1.1 average)**

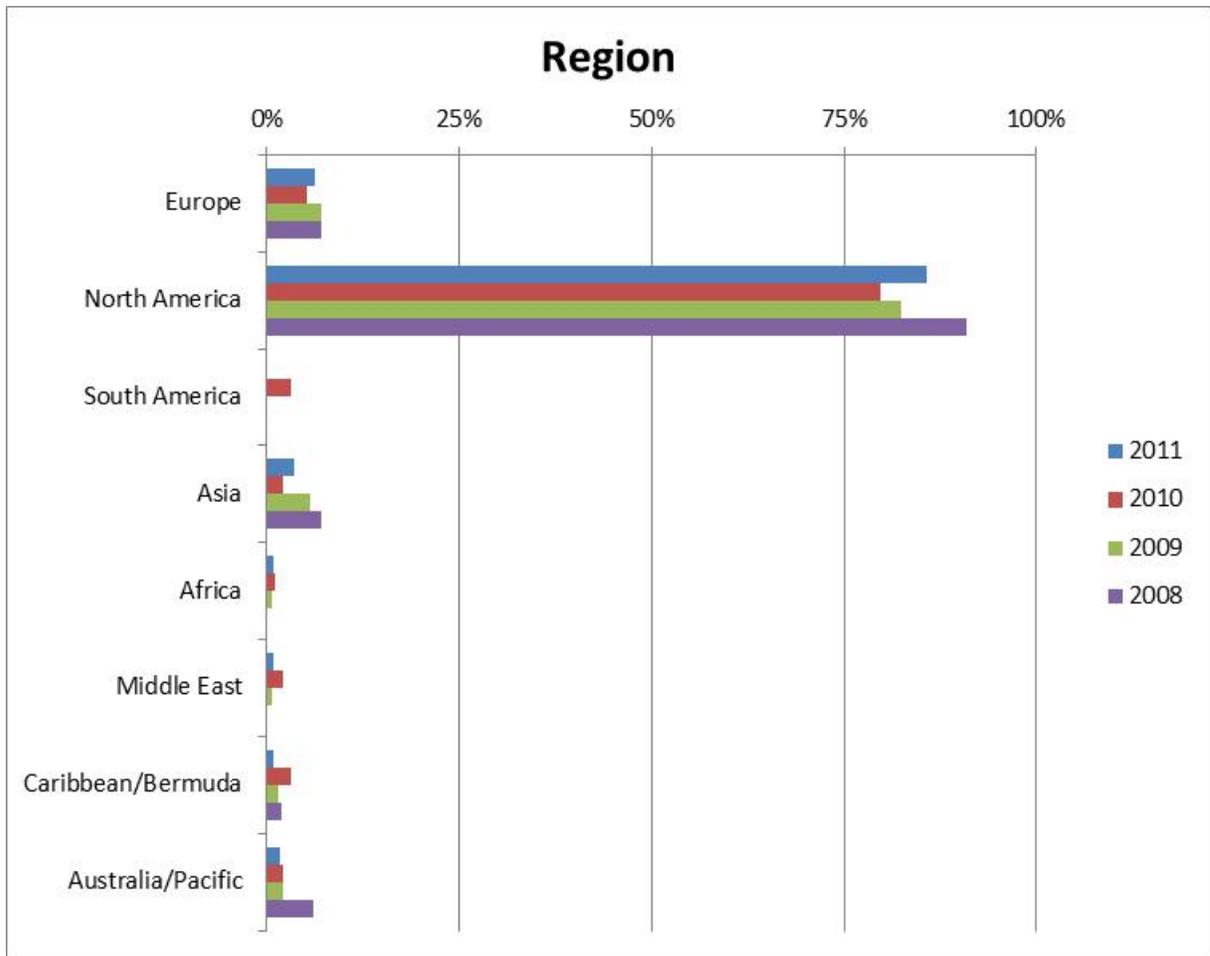
- 19 responses    17% (17%/21%/17%)    Consultant
- 2 responses    2% (2%/3%/1%)            Software
- 5 responses    4% (1%/3%/2%)            Banking
- 2 responses    2% (4%/3%/4%)            Brokerage
- 0 responses    0% (2%/3%/1%)            Intermediary
- 86 responses    75% (69%/54%/70%)      Insurance/Reinsurance 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**

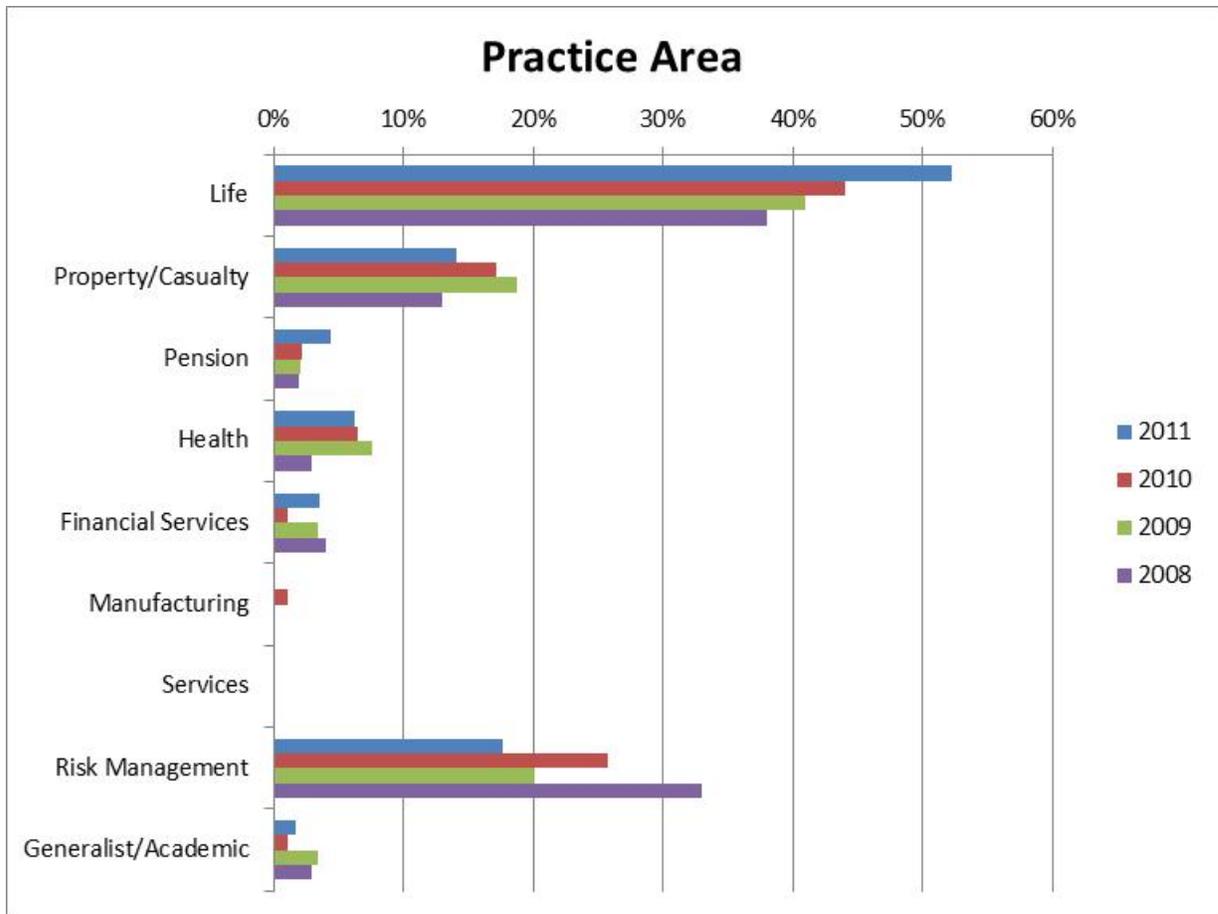
- 7 responses    6% (5%/7%/7%)    Europe
- 96 responses    86% (80%/82%/91%) North America
- 0 responses    0% (3%/0%/0%)    South America
- 4 responses    4% (2%/6%/7%)    Asia
- 1 response    1% (1%/1%/0%)    Africa
- 1 response    1% (2%/1%/0%)    Middle East
- 1 response    1% (3%/1%/2%)    Caribbean/Bermuda
- 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?