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13th Survey of Emerging Risks – Executive Summary

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AUTHOR Max J. Rudolph, FSA, CFA, CERA, MAAA
Rudolph Financial Consulting, LLC

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13th Survey of Emerging Risks – Executive Summary

It is impossible to comprehend the results of this survey without some context. The survey was open during November 2019. In retrospect this seems like a calm, stable time when few risks were emerging. But the seeds had been planted for an event that triggered other risks, and the coronavirus pandemic prompted a flurry of risk events where multiple emerging risks took center stage.

Early 2020 saw a competition for oil dominance where countries opened their taps hoping that they could outlast competitors as prices fell. Wildfires, especially in Australia, dominated the news as they destroyed land and property, leading to direct and indirect deaths. Economic growth was slowing despite low volatility in financial markets. Trade wars were raging and cyber-attacks so common that reactions were typically muted.

The pandemic hit hard worldwide starting in mid-March. An epidemic is an infectious disease that attacks a regional area. A pandemic is worldwide, and COVID-19 has become endemic in many parts of the world, using community spread for most infections. Economic growth and asset prices initially fell precipitously and demand for energy of all kinds dropped as economies were locked down. Central banks revisited the tools they had used during the great financial crisis, moving faster and expanding them further, and this helped asset prices. They added protections to junk bonds and municipal bonds, placing floors below their prices. In the U.S., stimulus of 15% of gross domestic product (GDP) was added and then expanded, effectively taking the debt to a GDP ratio over 130% and quarterly GDP reduction of nearly 10%. Despite these efforts, some measures of un(der)employment reached 30% and bankruptcies were common, especially among small businesses.

The pandemic did the unthinkable, moving climate change to a back burner. Lower economic activity initially slowed carbon dioxide emissions by about the annual amount necessary to meet the goals of the Paris Agreement. Offsetting this were the lower sulfate emissions and the feedback loops in the Arctic regions that have led to temperature increases there over double the world average. Ice at the poles is regularly in the news as it nears record low levels and ice shelves collapse.

Whether climate change, pandemics, cyber, war or financial volatility, the risk landscape is moving quickly and historical distributions are no longer stable. Unknown knowns, where historical distributions are no longer predictive, are becoming the norm for many risks. The good news is that it takes proficiency to recognize these impacts. It is difficult for artificial intelligence (AI) tools to predict these changes before the experienced practitioner. Perhaps the best analysis comes from experienced modelers working with AI tools. This has worked best in other settings, but will require the analyst to overcome the thought that markets are always and everywhere efficient. This survey attempts to track the thoughts of risk managers about emerging risks across time. It is the 13th survey of emerging risks sponsored by the Joint Risk Management Section (JRMS), a collaboration of the Canadian Institute of Actuaries (CIA), Casualty Actuarial Society (CAS) and Society of Actuaries (SOA). The researcher thanks them for their support. Trends are as important as absolute responses, helping risk managers contemplate individual risks, combinations of risks and unintended consequences of actions and inactions. The survey responses, especially the comments, give risk managers a way to anonymously network with peers and share innovative ways they think about risk. Each completed survey helps those who participate think more deeply about the topic, and it is anticipated that the reader will benefit in this way as well.

In this report, the Executive Summary contains a high-level overview of the survey and the Results section provides commentary about the survey in its entirety. Appendix I includes definitions for all 23 individual risks. Complete survey results can be found in Appendix II, allowing the reader to scan specific sections or questions, and they include every comment received for the open-ended questions. Everyone has a different level of expertise and experience, and reading the comments will allow the reader to reach their own conclusions and pick out ideas that are useful to them. Appendix III provides a link for those interested in reviewing previous surveys in the series.

Section 1: Executive Summary

While not a blockbuster for risk events, 2019 endured its share of them. An Ebola outbreak in Congo, Cyclone Idai in Africa, the typhoons Lekima in China and Hagibis in Japan, Hurricane Dorian in North America, heat waves in Japan and India, wildfires in Australia and flooding in the U.S. Midwest and across Europe were all material regional events. Geopolitical tensions and deglobalization continued, and 2019 was reported to be the second warmest year on record.[1] This evolution of risks is captured in the *13th Survey of Emerging Risks*, completed in November 2019. These events provide examples where recent occurrence of an event leads those who experienced it to overestimate its reoccurrence. This is called *recency bias*[2] and has consistently affected the results of this and other surveys.

The rotating question in this survey's iteration, where respondents are asked to choose up to three applicable risks, asked which emerging risks are undervalued and deserving of more attention over the next 20 years. Interestingly, *Climate change* and *Demographic shift* were the only risks selected by more than 10% of respondents.

The responses across all questions highlight a continued surge of perceived risk from climate change, along with concerns about financial volatility and a steady but large cyber risk. Using this report as a contrarian indicator can help a risk team anticipate future issues that are not currently in the public eye. An example in this iteration of the survey may be earthquakes and energy price shocks, which finished with the lowest responses when five emerging risks were chosen. Another risk to consider following concerns the supply of fresh water and potential implications on regional stability.

1.1 SURVEY FRAMEWORK

In addition to the top emerging and top five emerging risks, the survey also looks at the top current risk and risk combinations. Combinations of risks often follow the patterns shown when looking at emerging risks one at a time but sometimes also reflect surprises. Some risks are more common when viewed with others than by themselves. This paper will review these quantitative responses, looking for material changes and trends, in addition to considering qualitative risk assessments and current topics. First, we will review the questions that headline the survey.

Respondents select from 23 risks in five categories as follows. When a chart shows 24 risks, the last one is *Other*, and the survey asks specifically which risks are missing so they can be considered in the future.

Economic Risks

1. *Energy price shock*
2. *Currency shock*
3. *Chinese destabilization*
4. *Asset price collapse*
5. *Financial volatility*

[1] www.climate.gov/news-features/featured-images/2019-was-second-warmest-year-record

[2] People tend to recall something that has happened more recently more easily than something that occurred in the more distant past. This is recency bias, defined by Daniel Kahneman and Amos Tversky.

Environmental Risks

6. *Climate change*
7. *Loss of freshwater services*
8. *Natural catastrophe: tropical storms*
9. *Natural catastrophe: earthquakes*
10. *Natural catastrophe: severe weather*

Geopolitical Risks

11. *Terrorism*
12. *Weapons of mass destruction*
13. *Wars (including civil wars)*
14. *Failed and failing states*
15. *Transnational crime and corruption*
16. *Globalization shift*
17. *Regional instability*

Societal Risks

18. *Pandemics/infectious diseases*
19. *Chronic diseases/medical delivery*
20. *Demographic shift*
21. *Liability regimes/regulatory framework*

Technological Risks

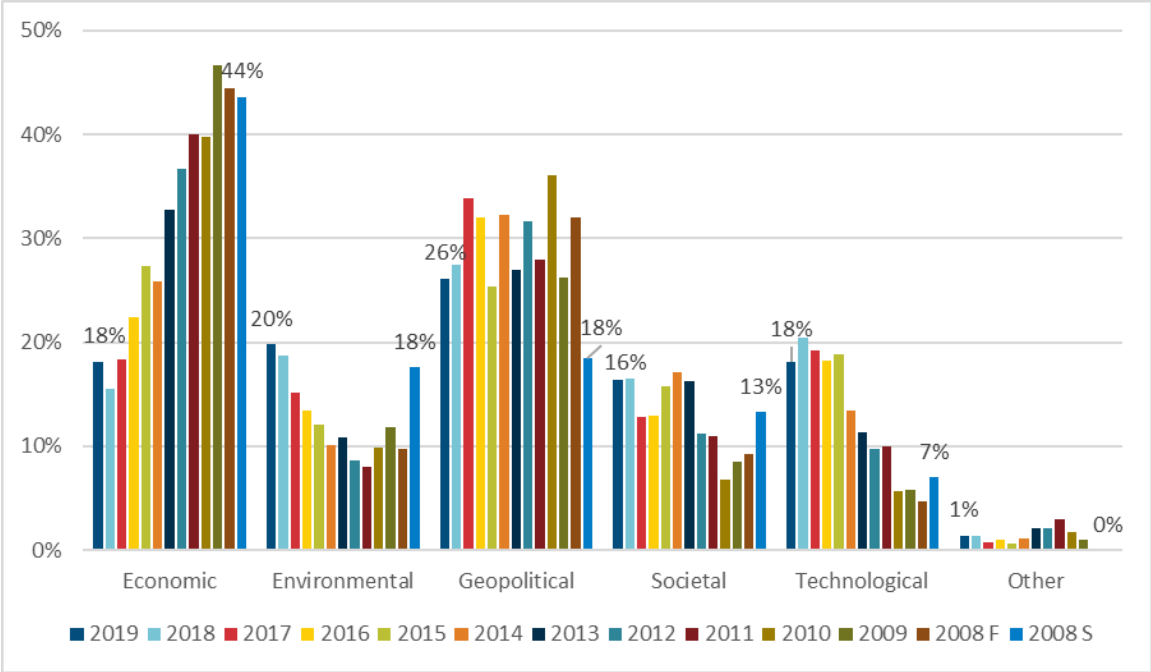
22. *Cyber/networks*
23. *Disruptive technology*

1.2 TOP FIVE EMERGING RISKS

The results continue to show interesting trends, although some were broken in this iteration of the survey. Figure 1 shows the pattern of responses when respondents were asked to choose their top five emerging risks from among 23 individual risks (and "Other"). The risks roll up into five categories (Economic, Environmental, Geopolitical, Societal and Technological). The Geopolitical category of risks decreased from the prior survey (26% of the total chosen when up to five emerging risks were selected), yet maintained the top category response, as Environmental moved into second place (20%), just ahead of Economic (18%), Technological (18%) and Societal (16%). The uppermost choices (although not ranked among the top five risks overall) from the Geopolitical category were *Wars (including civil wars)* (25% of respondents choosing it in their top five, up from 18% in the prior survey) and *Regional instability* (22%, up from 18%). After traditionally being in the top five emerging risks, with a high of 43%, *Terrorism* has dropped for this question over the past two iterations by 24% to 17%.

Figure 1: Emerging Risks by Category (Up to Five Risks Chosen per Survey)

% of Responses in Given Year



Risks with new highs across the survey history were *Climate change* (54%), *Natural catastrophe: severe weather* (16%), *Wars (including civil wars)* (25%), *Chronic diseases/medical delivery* (12%) and *Demographic shift* (33%). A new low was recorded by *Terrorism* (17%). From the prior iteration of the survey all five of the Economic risks were higher, with several bouncing off record lows.

The reductions in the Technological and Geopolitical categories are the source of gains for the Economic and Environmental categories (the change for the Societal category was immaterial). It may be that technology is becoming a risk that is expected to be managed on a regular basis and not an emerging risk, and geopolitical risk may have found a temporary stable level of perceived activity.

For the first time, *Climate change* is the top response, followed by *Cyber/networks* and *Disruptive technology*.

The evolution of the top five risks chosen provides evidence that trends can be relied on in this survey, and the general continuity between survey iterations adds credibility (the top five are consistent, with only the top two choices switching places). As shown in Table 1, several risks have remained consistently at the top over the past four years.

Table 1: Top Five Emerging Risks, 2016–2019

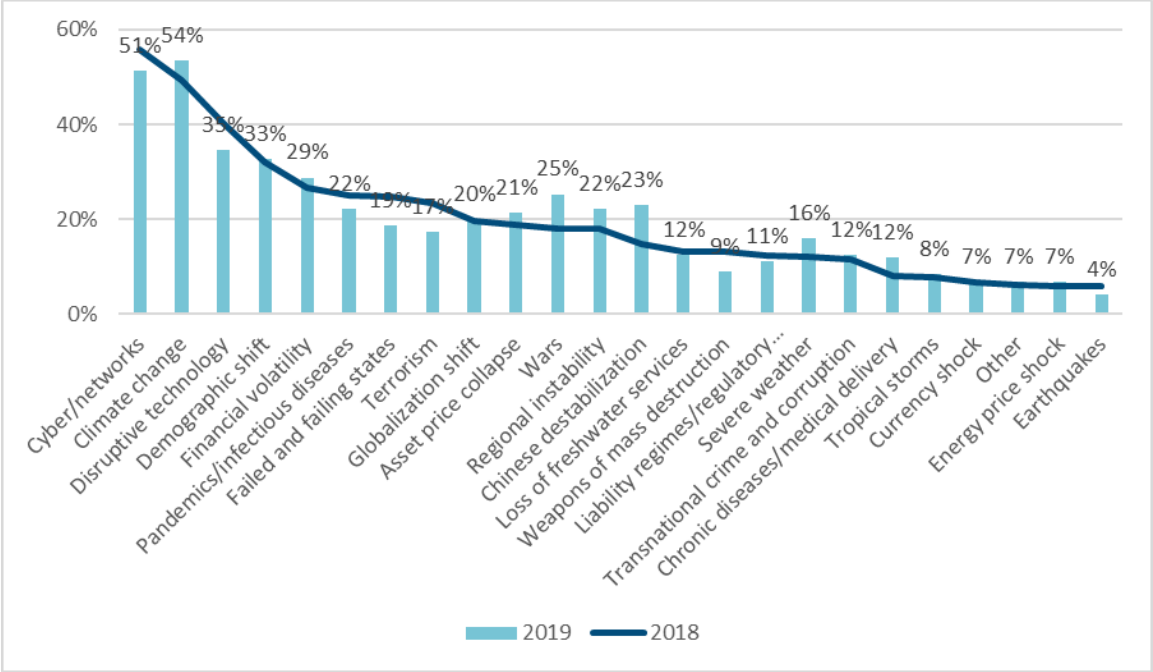
Year	2016	2017	2018	2019
1	Cyber/networks	Cyber/networks	Cyber/networks	Climate change
2	Financial volatility	Terrorism	Climate change	Cyber/networks
3	Terrorism	Disruptive technology	Disruptive technology	Disruptive technology
4	Disruptive technology	Regional instability	Demographic shift	Demographic shift
5	Retrenchment from globalization	Asset price collapse	Financial volatility	Financial volatility

Four risks increased materially from the previous survey when respondents were asked to choose their top five emerging risks. These included *Chinese destabilization*, *Climate change* and *Wars (including civil wars)*. Several risks were materially lower, including *Terrorism* (17%, down from 23%), *Failed and failing states* (19%, down from 25%) and both Technological risks, with *Cyber/networks* (51%, down from 56%) and *Disruptive technology* (35%, down from 40%) both maintaining rankings in the top three.

Figure 2 shows the results for the top five emerging risks from the most recent two surveys, listed in order of the rankings from 2018, highlighting the volatility between years for some risks.

Figure 2: Year-Over-Year Emerging Risks (Up to Five Risks Chosen per Survey)

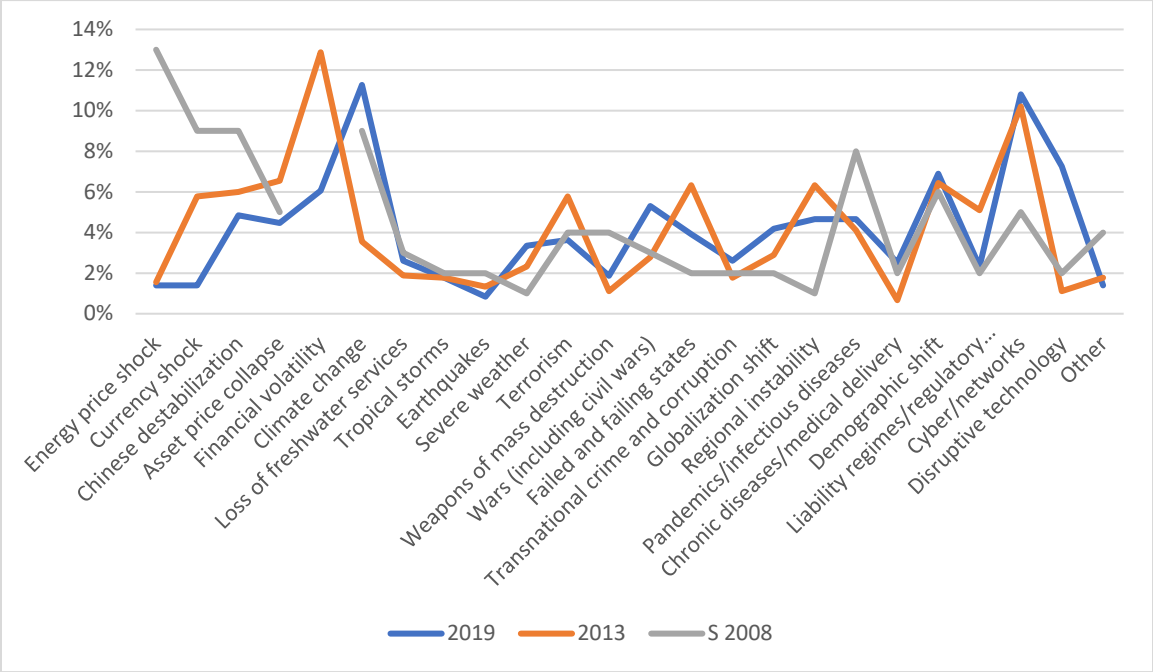
% of Responses in Given Year



These results evolve over time, with risk responses ebbing and flowing. Figure 3 shows an example of how the responses for each risk have changed over time, displaying results from spring 2008, 2013 and 2019. (Note that risk number 5, *Financial volatility*, was not added until the 2011 survey.)

Figure 3: Top Emerging Risks (Choose up to Five)

% of Responses in Given Year



1.3 TOP EMERGING RISK

When asked for a single emerging risk from the respondents' top five, the results saw some repositioning, with *Climate change* increasing its lead and *Disruptive technology* moving up one place to second.

The results for the top emerging risk question were as follows (60% of respondents selected one of the top five, steady with the previous survey):

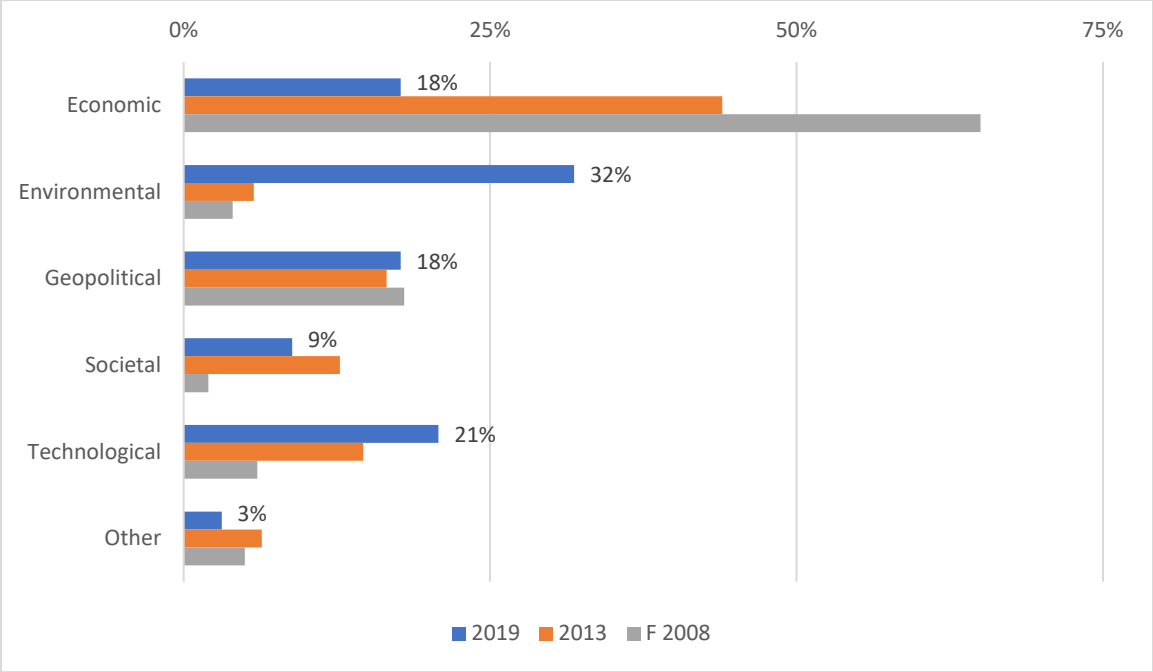
1. *Climate change* (27%, up from 22%)
2. *Disruptive technology* (11%, down from 13%)
3. *Cyber/networks* (10%, down from 15%)
4. *Financial volatility* (6%, up from 5%)
5. *Asset price collapse* (6%, up from 5%)

Demographic shift dropped out of the top five (remaining at 5%). All of the risks except *Natural catastrophe: earthquakes* were selected by at least one respondent as top emerging risk in this iteration of the survey. The increase in *Climate change* responses led to the highest Environmental category result over the history of the survey (32%, up from the previous year's former high of 26%).

Figure 4 shows how the categories have evolved over the lifetime of this survey, with Economic risks reductions offset by increases in Environmental and Technological risks.

Figure 4: Top Emerging Risks by Category – Single Greatest Impact

% of Responses in Given Year

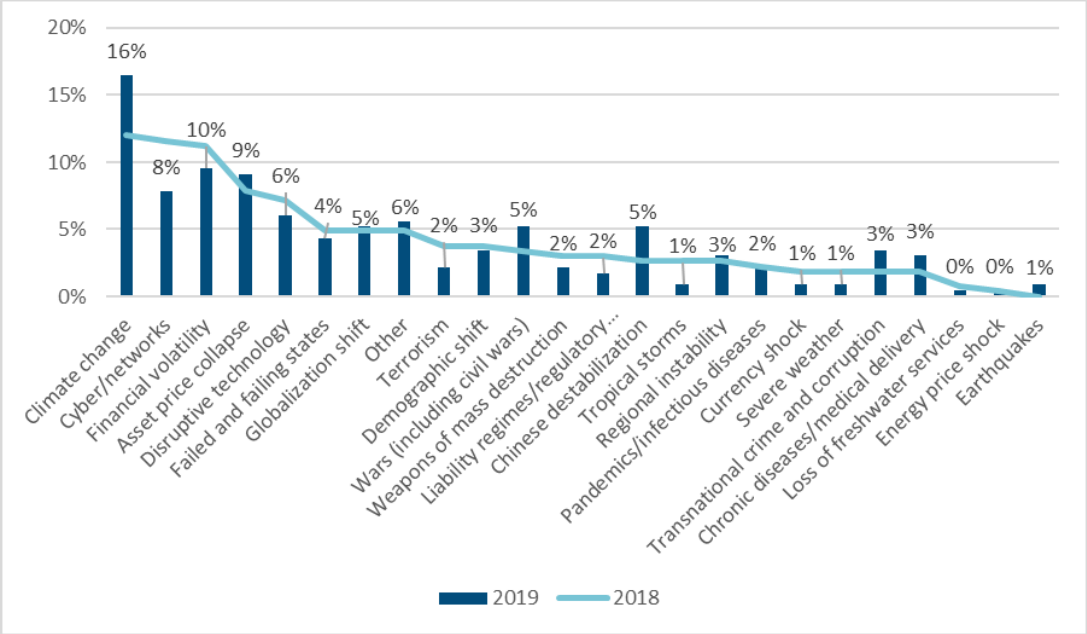


1.4 TOP CURRENT RISK

Following a close contest in the last survey, *Climate change* surged from 12% to 16% to beat out *Financial volatility* with 10%. *Cyber/networks* fell from 12% to 8% but was still in the top five.

Figure 5: Top Current Risk, Year-Over-Year

% of Responses in Given Year



1.5 RISK COMBINATIONS

There are several terms represented by *risk combinations* in this report. *Compounded risks* are correlated risks that impact a specific result. An example of this would be the impact on climate change from financial growth and regional conflicts. *Risk clusters* do not require correlation, looking at multiple risks that an organization like an insurer or reinsurer could incur either in parallel or sequentially and that could threaten solvency. Risk combinations can be insightful, as readers can review which risks other risk managers think interact in material ways. The top three risks chosen in combination were consistent with the previous survey: *Climate change*, *Cyber/networks* and *Financial volatility*. Interestingly, no combination of these three risks appears in the top 10. Moving into the top five, after being 10th in the prior survey, was the combination of *Wars (including civil wars)* and *Failed and failing states*. Overall, the categories were stable from the prior survey with none changing by more than 1%.

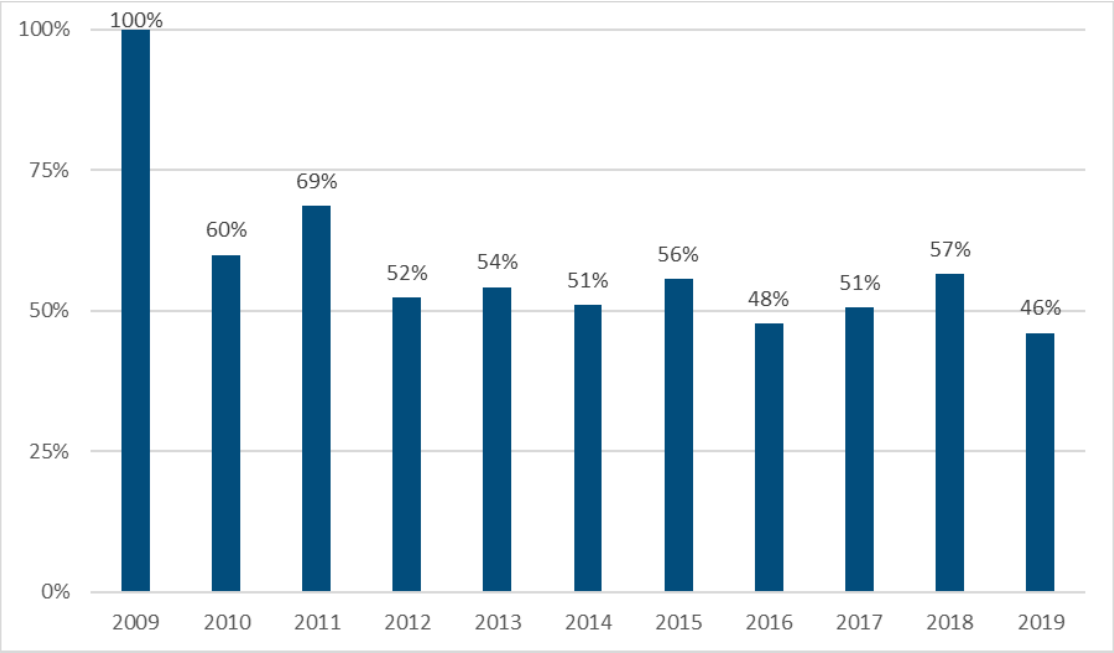
These are the top five combinations that were selected:

1. *Cyber/networks* and *Disruptive technology* – 7%
2. *Climate change* and *Natural catastrophe: severe weather* – 5%
3. *Climate change* and *Loss of freshwater services* – 3%
4. *Asset price collapse* and *Financial volatility* – 3%
5. *Wars (including civil wars)* and *Failed and failing states* – 3%

Results this year for the top five combinations were less concentrated, with their total adding up to 21% after last year's comparable total of 27%.

There are 253 possible two-risk combinations of the 23 risks, and the risk concentration ratio is a metric showing how diverse results are. Comparisons are made by ranking the risks and comparing the resulting statistics, looking at the 25th percentile, 50th percentile (median), 75th percentile and total. A higher percentage reflects greater concentration of concerns. A result of 100% would be comparable to the base year of 2009, which has turned out to be an outlier of concentrated risk, when respondents were dealing with the aftermath of the great financial recession. As shown in Figure 6, the distribution of results was less concentrated than in the prior year and at its lowest level since the question was added in 2010.

Figure 6: Risk Concentration Ratio (Base 2009 = 100%)



As a relative measure, the risk concentration ratio represents the current feeling among the risk management community. A low risk concentration ratio can be interpreted as reduced risk, or it may mean a greater variety of risks are being considered. This will be a telling metric to consider in the 2020 survey as there have been a number of major risk events.

1.6 TRENDING

Figure 7 shows results for this survey by category for the top current risk, the top five emerging risks (as a percentage of the total), the top emerging risk and combinations. Risk managers are given an option (*Other*) if they feel a risk is not represented in the list; typical references were to political and health/longevity issues. The survey question with the highest response rate includes a data label for each category. Generally, the top five emerging risks and combination questions generate similar results, while the top current risks drive the top emerging risk categories higher.

Figure 7: Category Comparison Across Four Questions

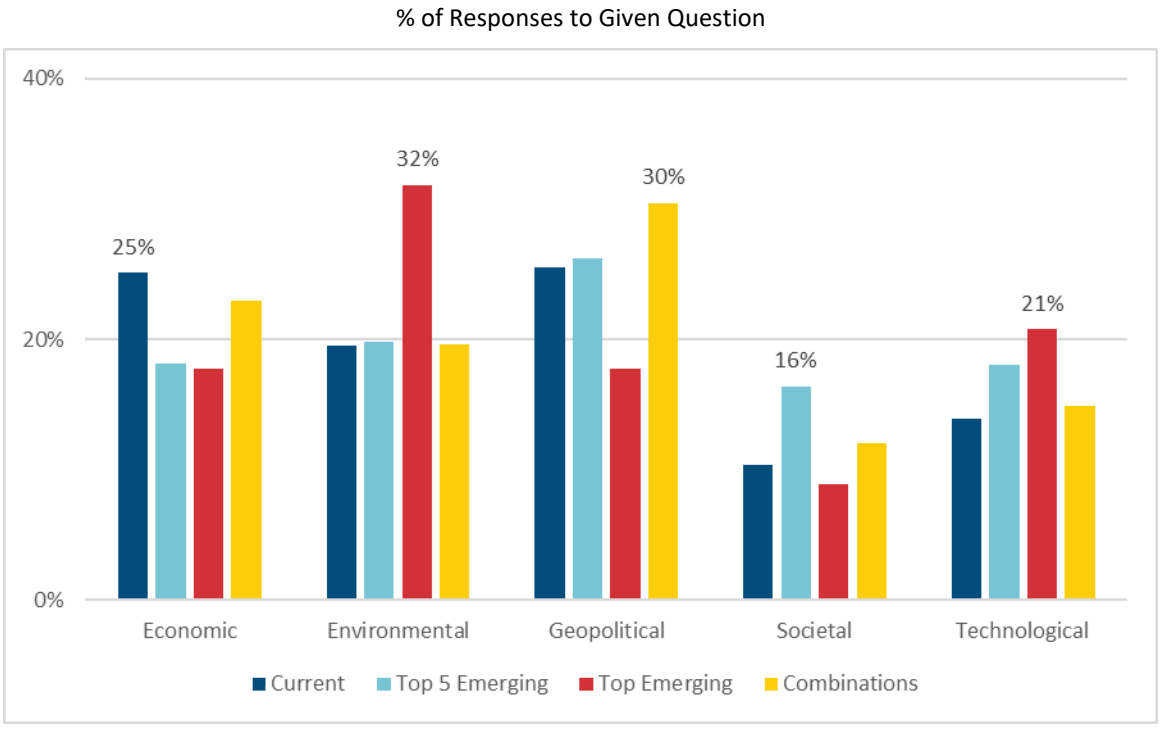
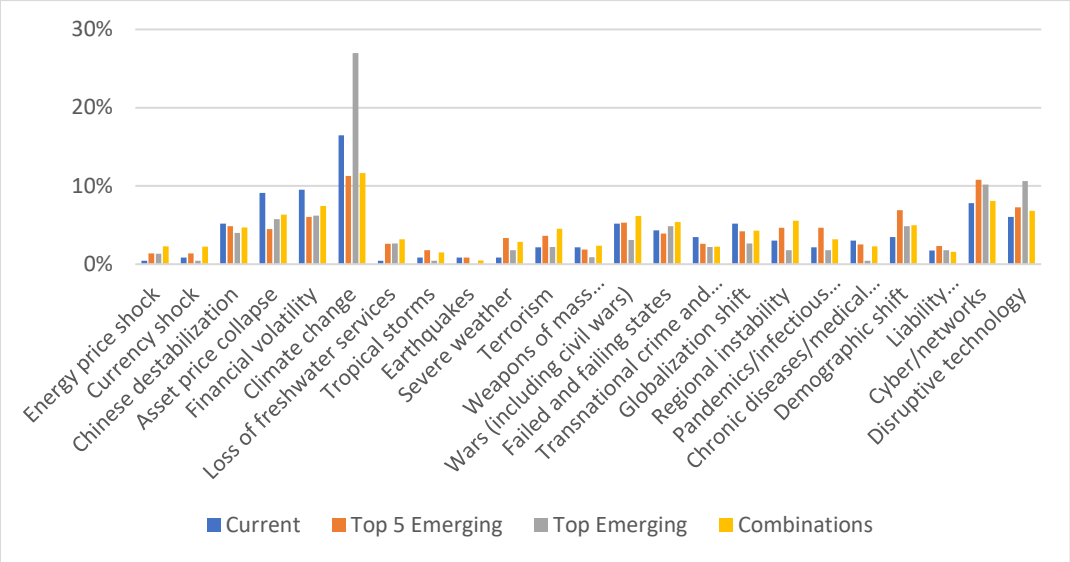


Figure 8 compares the current risk results with the top five, top emerging risk and combinations at the individual risk level. Hypothesizing why there are discrepancies is useful, and readers may have different viewpoints. The top three risks with the greatest disparity favoring the current risk over the top emerging risk are:

- *Financial volatility* (3.3% differential favoring current risk over top emerging risk)
- *Asset price collapse* (3.3%)
- *Chronic diseases/medical delivery* (2.6%)

Figure 8: Risk Comparison Across Four Questions

% of Responses to Given Question



The top three risks with the greatest disparity favoring the top emerging risk over the current risk (the analysis in this section ignores the "Other" category) are:

- *Climate change* (10.5%)
- *Disruptive technology* (4.5%)
- *Cyber/networks* (2.4%)

The top three risks with the greatest disparity favoring the top five emerging risks over the top emerging risk are:

- *Regional instability* (2.9%)
- *Pandemics/infectious diseases* (2.9%)
- *Wars (including civil wars)* (2.2%)

The top three risks with the greatest disparity favoring the top emerging risk over the top five emerging risks are:

- *Climate change* (15.7%)
- *Disruptive technology* (3.3%)
- *Asset price collapse* (1.3%)

The top three risks with the greatest disparity favoring the top current risk over the top five emerging risks are:

- *Climate change* (5.2%)
- *Asset price collapse* (4.6%)
- *Financial volatility* (3.4%)

The top three risks (including ties) with the greatest disparity favoring the top five emerging risks over the top current risk are:

- *Demographic shift* (3.4%)
- *Cyber/networks* (3.0%)
- *Pandemics/infectious diseases* (2.5%)
- *Natural catastrophe: severe weather* (2.5%)