# *Index Investor LLC*

## *Annual Three Year Scenarios Update*

as of January 2021

# *About Index Investor LLC*

- Since 1997, the mission of Index Investor and Retired Investor has been to help investors, corporate, and government leaders better anticipate, more accurately assess, and adapt in time to emerging macro threats
  - We provided early warning of the 2000, 2008, and 2020 crashes
- Index Investor is affiliated with Britten Coyne Partners and the Strategic Risk Institute LLC
- Britten Coyne has offices in London and Denver, and advises clients how to establish methods, processes, structures, and systems that enable them to avoid strategic failures
- The Strategic Risk Institute provides online and in-person courses leading to a Certificate in Strategic Risk Governance and Management

# *Agenda*

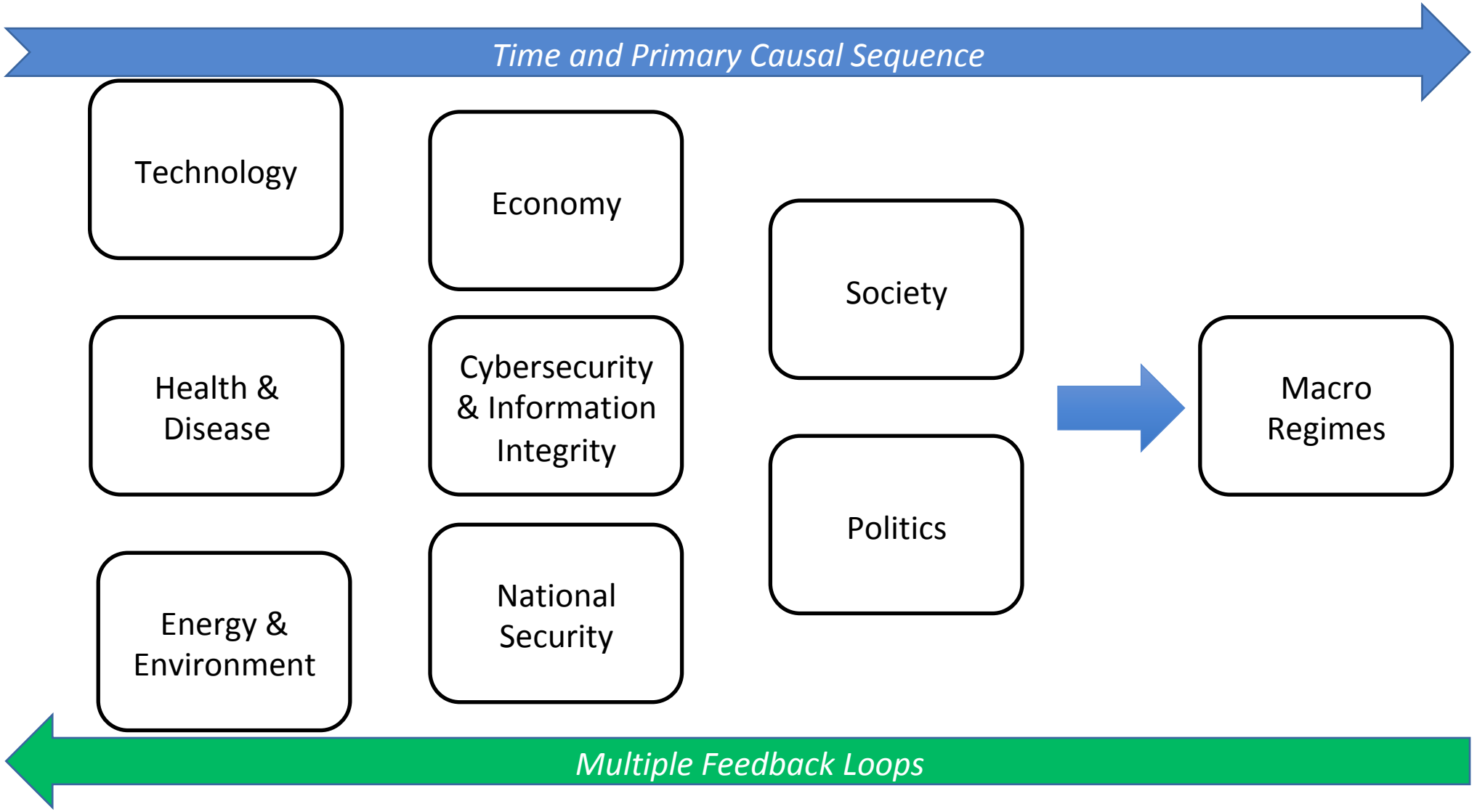
- Our Goals and the Underlying Forecasting Challenge We Face
- Multipath Methodology
- Slowly Changing Trends and Tipping Points
- Critical Uncertainties, Probabilities, and Scenarios
- Prospective Hindsight: Finding Paths that Lead to Each Macro Regime
- Conclusions and Implications
- How to Further Improve Your Forecast Accuracy

# *The Challenge: Forecasting Macro Regimes at a 36 Month Time Horizon*

# *Background*

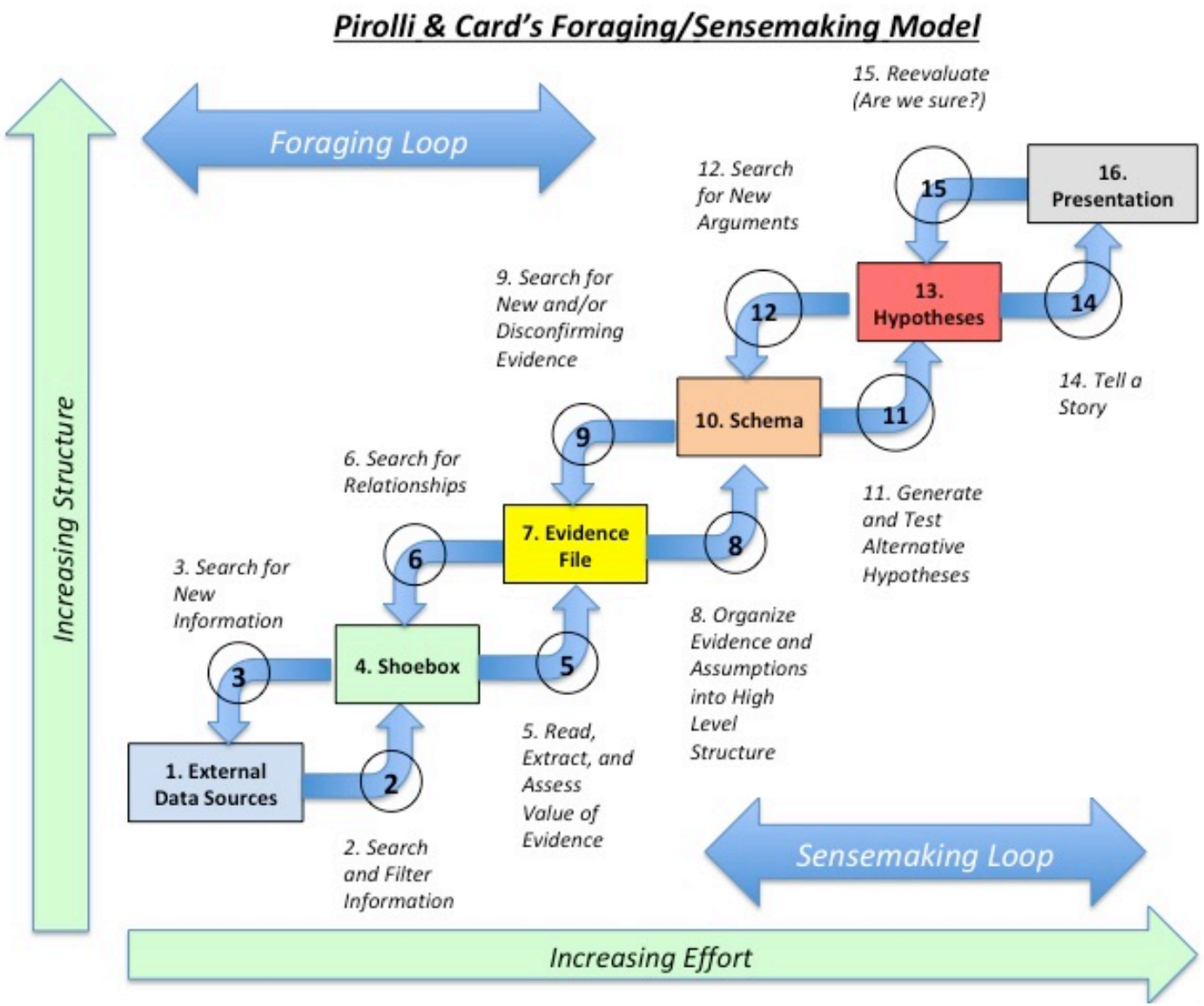
- At the Index Investor, we provide insights about the evolving dynamics of the global macro system, and early warning of emerging threats that lie beyond the detection horizon and analytical capabilities of quantitative algorithmic methods
- Our goal is to accurately forecast the probabilities of four possible macro regimes, at 12 and 36 month time horizons
  - Normal Times (e.g., when equities deliver the best relative returns)
  - High Uncertainty (e.g., short Treasuries, foreign bonds, Swiss Franc)
  - High Inflation (e.g., real return bonds, property, commodities)
  - Persistent Deflation (e.g., long term bonds, consumer staples equities)

# *Regimes Emerge from a Complex Adaptive System*



# *Our Forecasting Process Has Three Anchors*

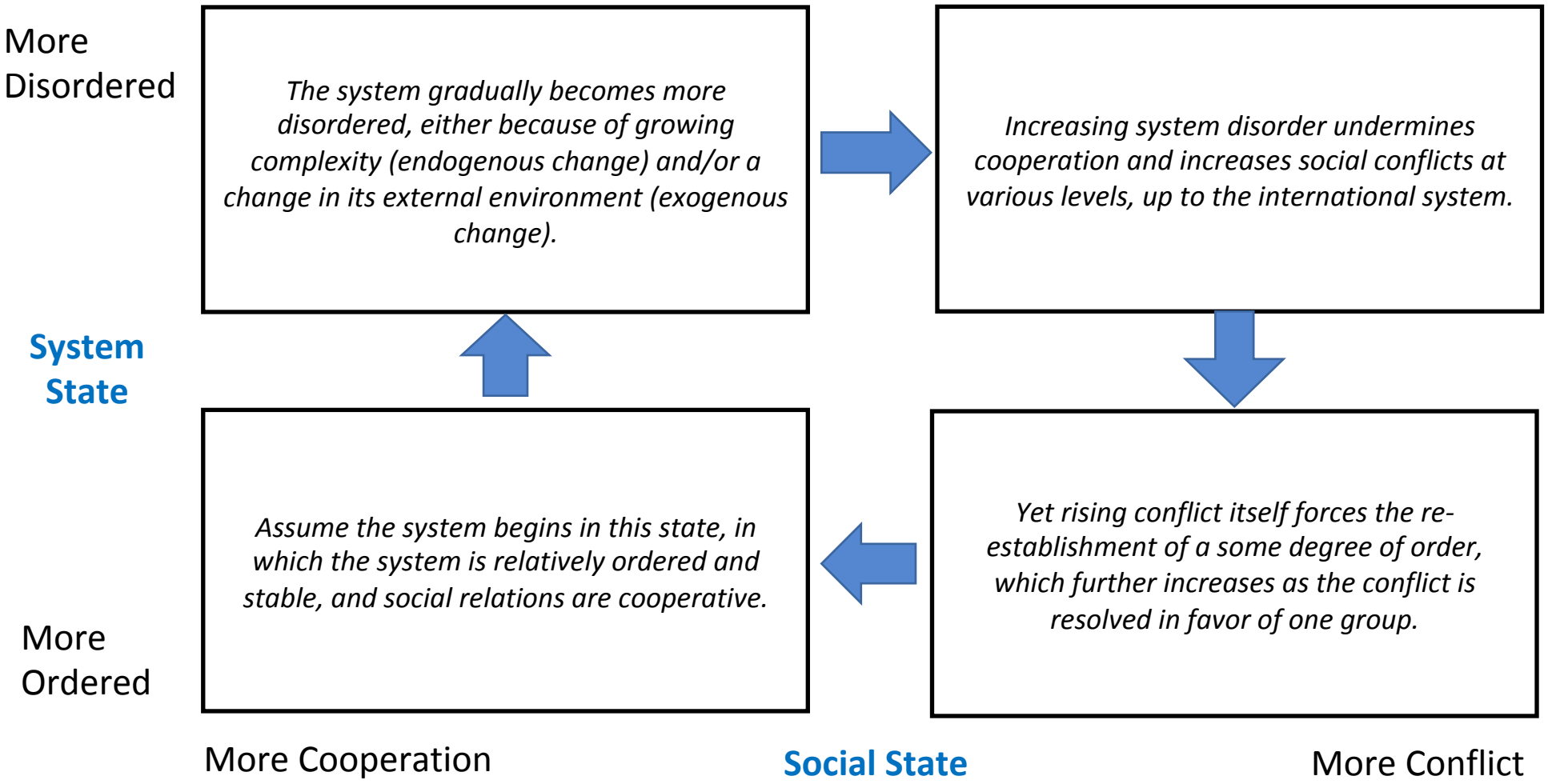
- The first is the what we learned from four years on the Good Judgment Project
  - Ask the right forecasting questions! What are the key causal drivers and critical uncertainties that underlie the target of your forecast?
  - When answering them, start with Base Rates, then use new high value evidence to update your estimates over time
    - In the cases of unique events and evolving systems, these base rates are inescapably noisy
  - Be ever alert to surprises. They warn that your mental model is wrong, and may indicate substantial discontinuities lie ahead
  - As Thomas Schelling famously noted, "*There is a tendency in our planning to confuse the unfamiliar with the improbable. The contingency we have not considered seriously looks strange; what looks strange is thought improbable; what is improbable need not be considered seriously*."
- The second is Pirolli and Card's dual top-down and bottom-up model of foraging and sensemaking in complex adaptive systems, as described by the graphic on the next slide


Pirolli & Card's Foraging/Sensemaking Model
Foraging Loop
Increasing Structure
15. Reevaluate (Are we sure?)
12. Search for New Arguments
16. Presentation
15
13. Hypotheses
14
12
9. Search for New and/or Disconfirming Evidence
14. Tell a Story
10. Schema
11
9
6. Search for Relationships
11. Generate and Test Alternative Hypotheses
7. Evidence File
8
6
3. Search for New Information
8. Organize Evidence and Assumptions into High Level Structure
4. Shoebox
5
3
1. External Data Sources
2
5. Read, Extract, and Assess Value of Evidence
2. Search and Filter Information
Sensemaking Loop
Increasing Effort

# *Our Third Anchor: The Macro System's Deep Historical Dynamics*

- Beneath the drivers and uncertainties in different issue areas, our reading of history and complex adaptive systems theory suggests that there are even deeper dynamics at work, which are driven by interacting degrees of system order/disorder and social cooperation/conflict
- This yields four different states. A crude reading of history suggests they last for roughly ten years
- Growing disorder and conflict of the 1930s gave way to the more ordered but still conflict ridden 1940s, which in turn evolved into the relatively more ordered and cooperative 1950s., which gave way to the increasingly disordered, but still cooperative 1960s, and then the disordered and relatively conflict ridden 1970s
- The system became more ordered again as conflict intensified in 1980s, which ended with the fall of the Berlin Wall and dissolution of the Soviet Union. This was followed by the more ordered and cooperative 1990s. Once again disorder increased during the 2000s, and in the just ended 2010s it grew worse and cooperation gave way to much higher levels of domestic and international conflict
- Assuming this model of macro dynamics has some predictive validity, in the 2020s conflict will increase. However, that should also drive the system into a more ordered state (e.g., due to heightened fear of new existential threats, such as more aggressive China)

# *The Macro System's Deep Historical Dynamics*



# *Multipath Methodology*

# *Multipath Analysis: A Structured Approach to Reasoning About Key Trends and Critical Uncertainties*

- Start by identifying important but slowly changing trends that are hard to change but easy to ignore until they pass a critical threshold (i.e., a "tipping point")
  - Estimate when that point will be reached, and what consequences will result
- Identify the key causal drivers of your forecasting goal, the critical uncertainties that will have the biggest effects on their outcomes, and their likely consequences
  - Given base rates (if available) for these uncertainties, and accumulated high value evidence, estimate your subjective probabilities of different outcomes
- Identify potential causal relationships between these drivers (e.g., chronological relationships, path dependencies and key feedback loops)
- Identify different paths through time and across trends and uncertainties that could lead to the emergence of different macro regimes

# *Slowly Changing Trends*

# *Two Long-Term Trends are Critical*

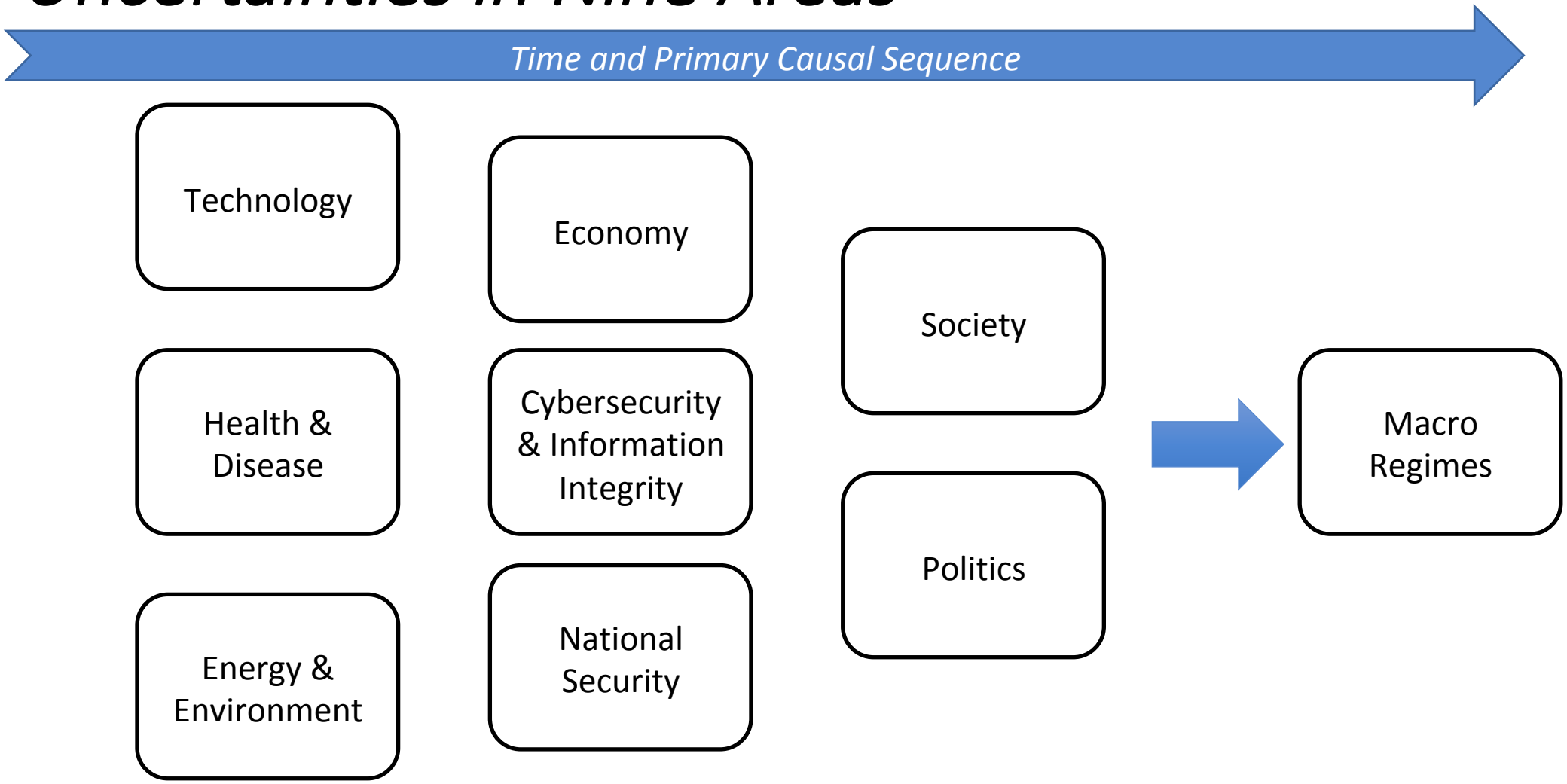
- Demographics
  - Around the world, baby boomers are retiring and living longer
  - Fertility is declining in developing nations
  - The Working Age Population (WAP) will therefore decline and, in the absence of productivity gains, put downward pressure on economic growth
  - Higher immigration can offset this. However, aging may also lower nations' cultural capacity and political willingness to absorb larger immigration flows
  - Differential birth rates across ethnic groups is also changing the makeup of the electorate in many countries.
  - In some cases this is weakening social cohesion and increasing political polarisation and conflict

# *Long-Term Trends (cont'd)*

- Climate Change
  - As we have noted in our Evidence Files, the global climate is a very complex system, and models that seek to forecast both the timing and consequences of warming are subject to substantial uncertainties
  - While people disagree about the relative importance of various underlying causes, the evidence is clear that our planet is (on average) growing warmer (at an accelerating rate), and this is causing a range of effects
  - The critical point is that we cannot say with any significant degree of confidence how close we may be to potentially critical tipping points, such as a substantial weakening or shutdown the the Atlantic Meridional Overturning Circulation, that could potentially trigger major consequences (e.g., for food supplies and/or migration flows)

# *Critical Uncertainties, Probabilities, and Scenarios*

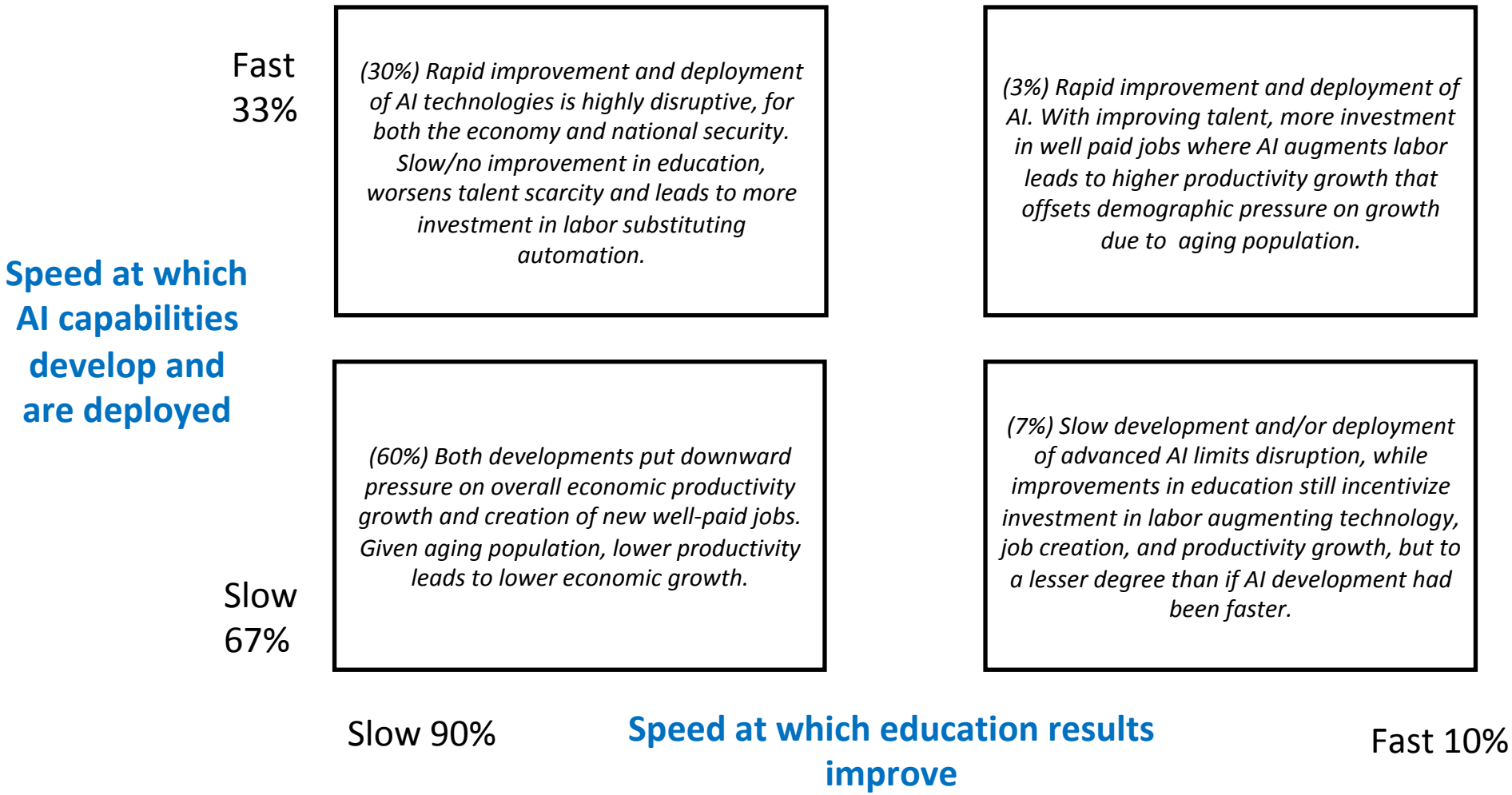
# *We Have Created Scenarios Based Critical Uncertainties in Nine Areas*



# *Technology Uncertainties*

- Will AI that is capable of causal and counterfactual reasoning about complex adaptive systems be developed and deployed by 1 Jan 2024?
  - This will mark an order of magnitude change in AI's capabilities
  - Probability forecast: 33% yes; 67% no
- Will the US achieve a substantial improvement in education, reskilling, and lifetime learning results, to induce the creation of more new jobs in which advanced AI is used to augment rather than substitute for labor? If this doesn't happen, there will likely be more investment in labor substituting automation and much weaker growth well-paid jobs
  - Probability forecast: 10% yes; 90% no

# *Technology Scenarios*

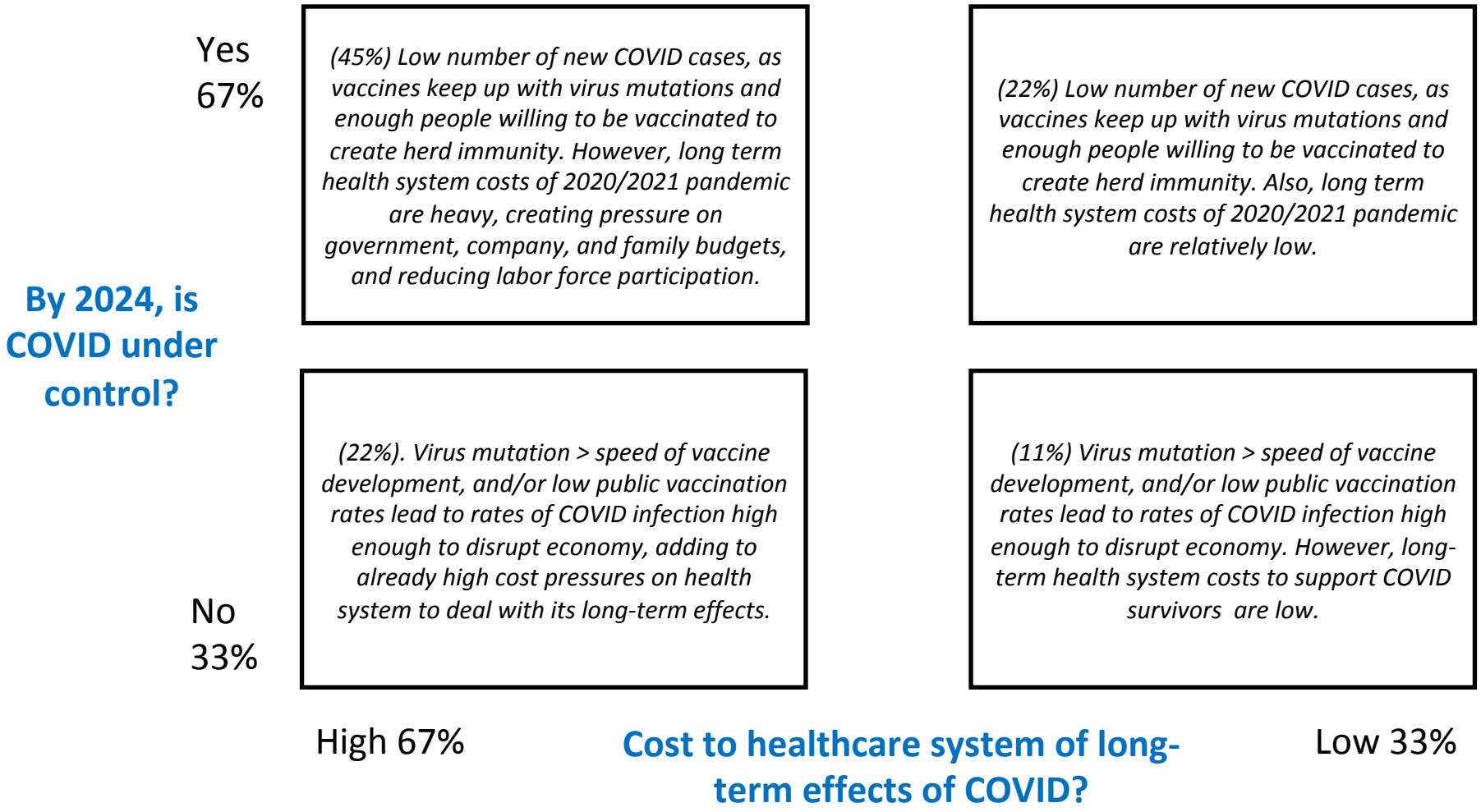


# *Health and Disease Uncertainties*

- By 1 Jan 2024, will vaccinations have brought COVID under control, despite continuing mutations of the virus and emergence of new variants, so that the Case Fatality Rate (currently 1.7% in the USA) has declined to 0.15% (the CFR for seasonal influenza)?
  - Probability forecast: 67% yes; 33% no

- In 1 Jan 2024, will the cost to the health and social care systems of COVID survivors' long-term mental and physical health effects be relatively low or high?
  - Probability forecast: 67% high; 33% low

# *Health and Disease Scenarios*

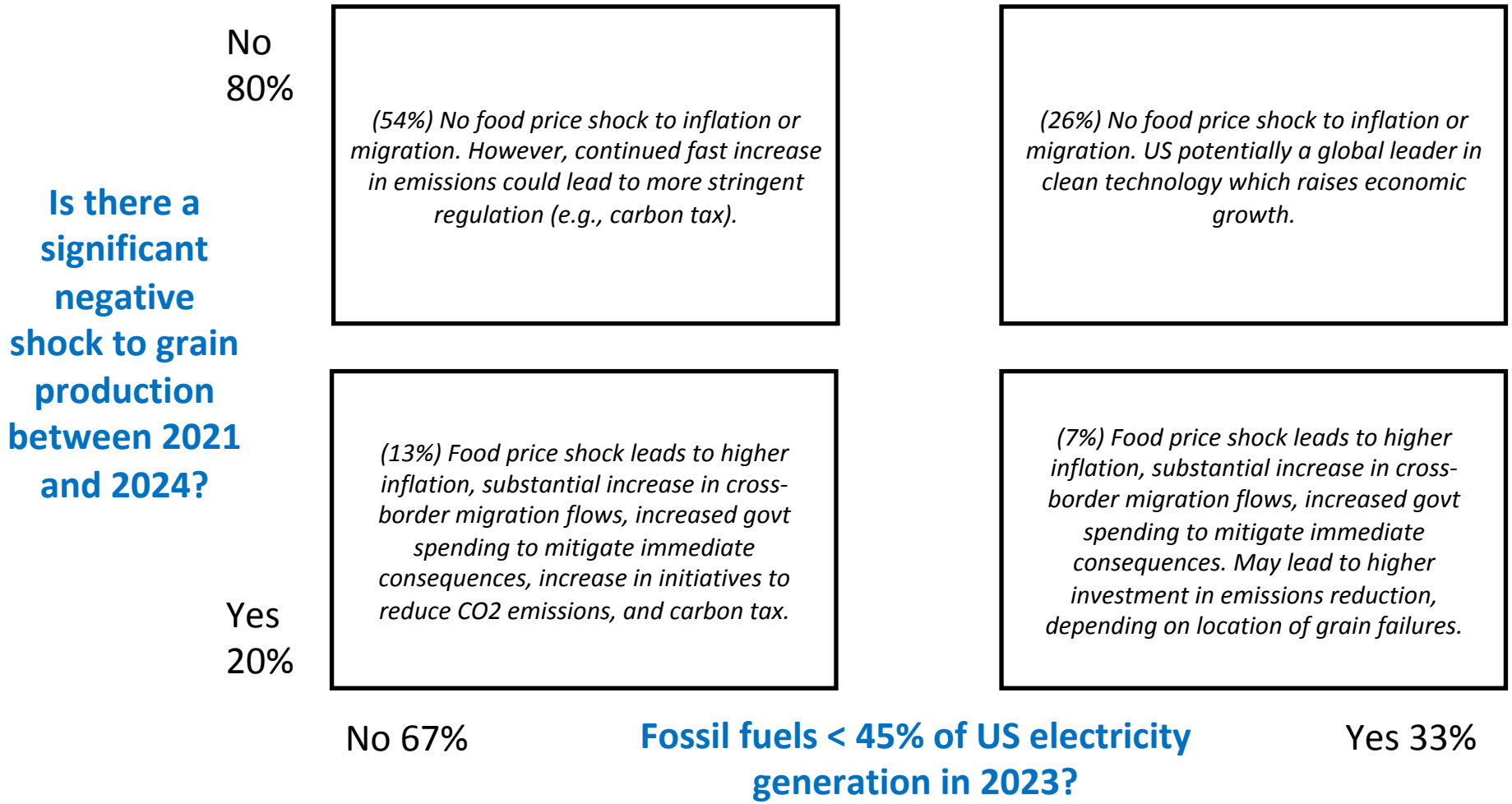


# *Energy and Environment Uncertainties*

- Will there be a significant negative shock to grain production (>10% reduction in the annual global wheat or corn crop) between 2021 and 1 Jan 2024?
  - Probability forecast: 20% yes; 80% no

- Will fossil fuels be used for 45% or less of US electricity generation in 2023? According to the US Energy Information Administration, in 2020 they accounted for about 60%.
  - Probability forecast: 33% yes, 67% no

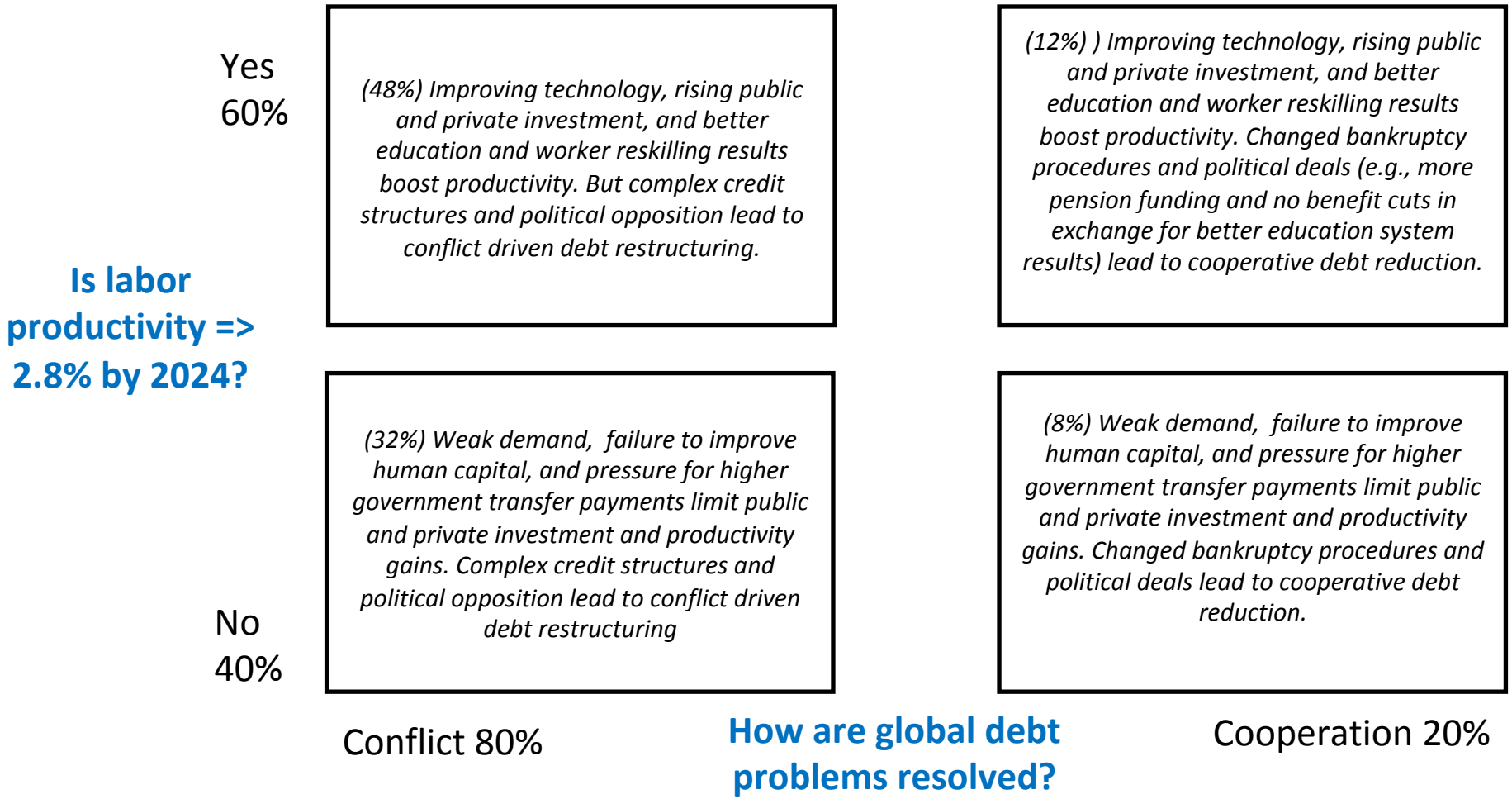
# *Environmental Scenarios*



# *Economic Uncertainties*

- Will labor productivity growth in the US non-farm business sector be equal to or greater than 2.8% between 2022 and 2023?
  - Between 1947 and 1973, average annual US labor productivity growth was 2.8%. Between 20027 and 2019 it fell to 1.4%. With a declining working age population, increased labor productivity is critical for economic growth
  - Raising productivity requires a combination of improved technology, higher public and private investment, and/or workers with more knowledge and skill
  - Probability forecast: 40% yes; 60% no
- Debt (included unfunded defined benefit pension plans) is at high levels, and in the coming years, some of it must be restructured. Conflict driven restructuring will slow growth; while a less disruptive cooperative approach would increase it
  - Probability forecast: Conflict driven 80%; cooperative 20%

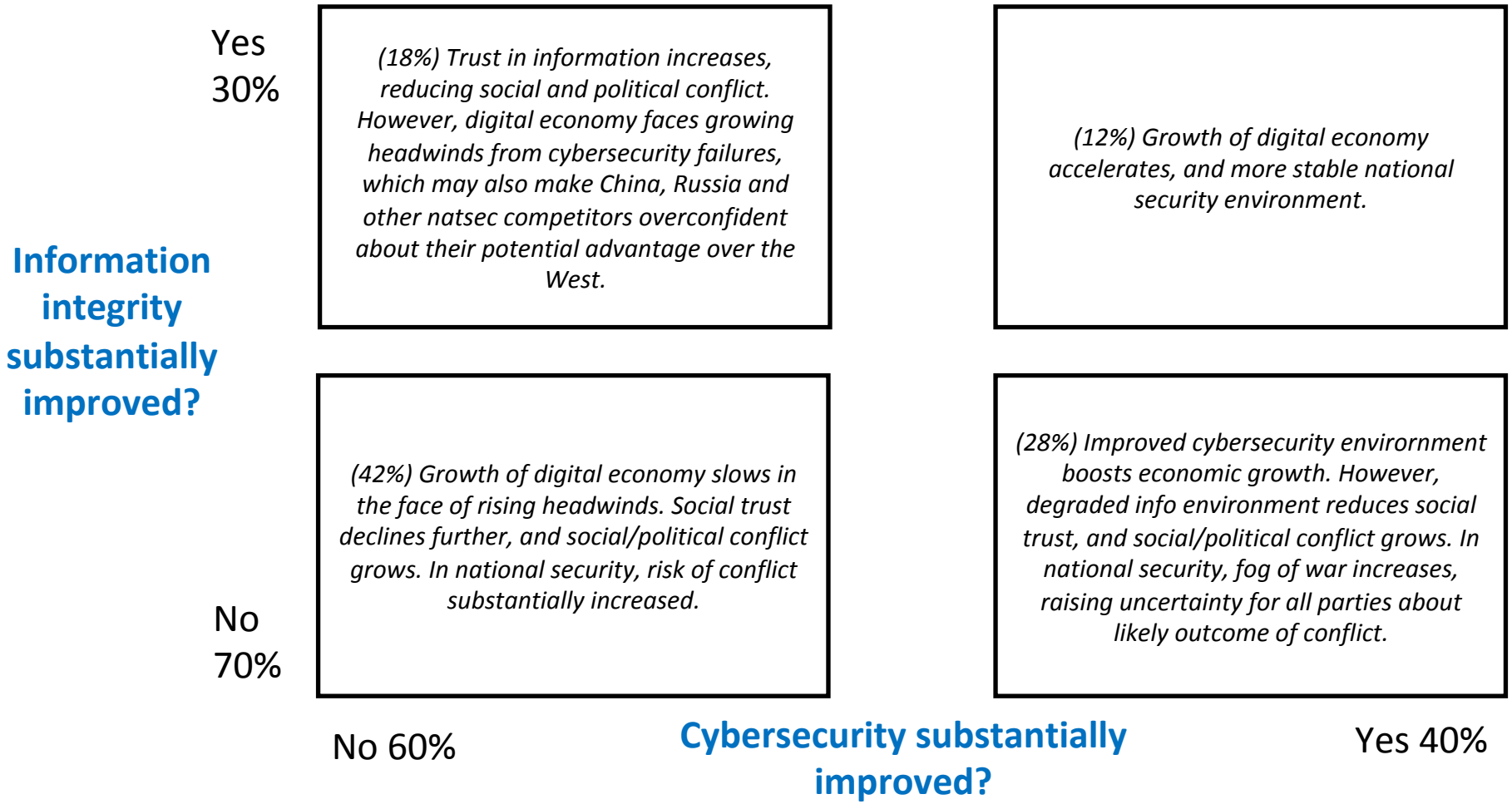
# *Economic Scenarios*



# *Information Integrity and Cybersecurity Uncertainties*

- The rise of fake news and fake images/videos have highlighted information integrity (accuracy and reliability) as a pervasive issue. If not resolved, it will depress the growth of our digital economy, and also have negative implications for national security.
  - Probability forecast: Substantial gains in information integrity by 1 Jan 2024: 30% yes; 70% no
- In recent years the cybersecurity environment has also been degraded, as evidence by increased hacking, ransomware attacks, data theft/espionage, etc. In this area, the advantage lies with the attacker who must be right only once; the defender must be right all the time
  - Probability forecast: Cybersecurity substantially improves by 1 Jan 2021: 40% yes; 60% no

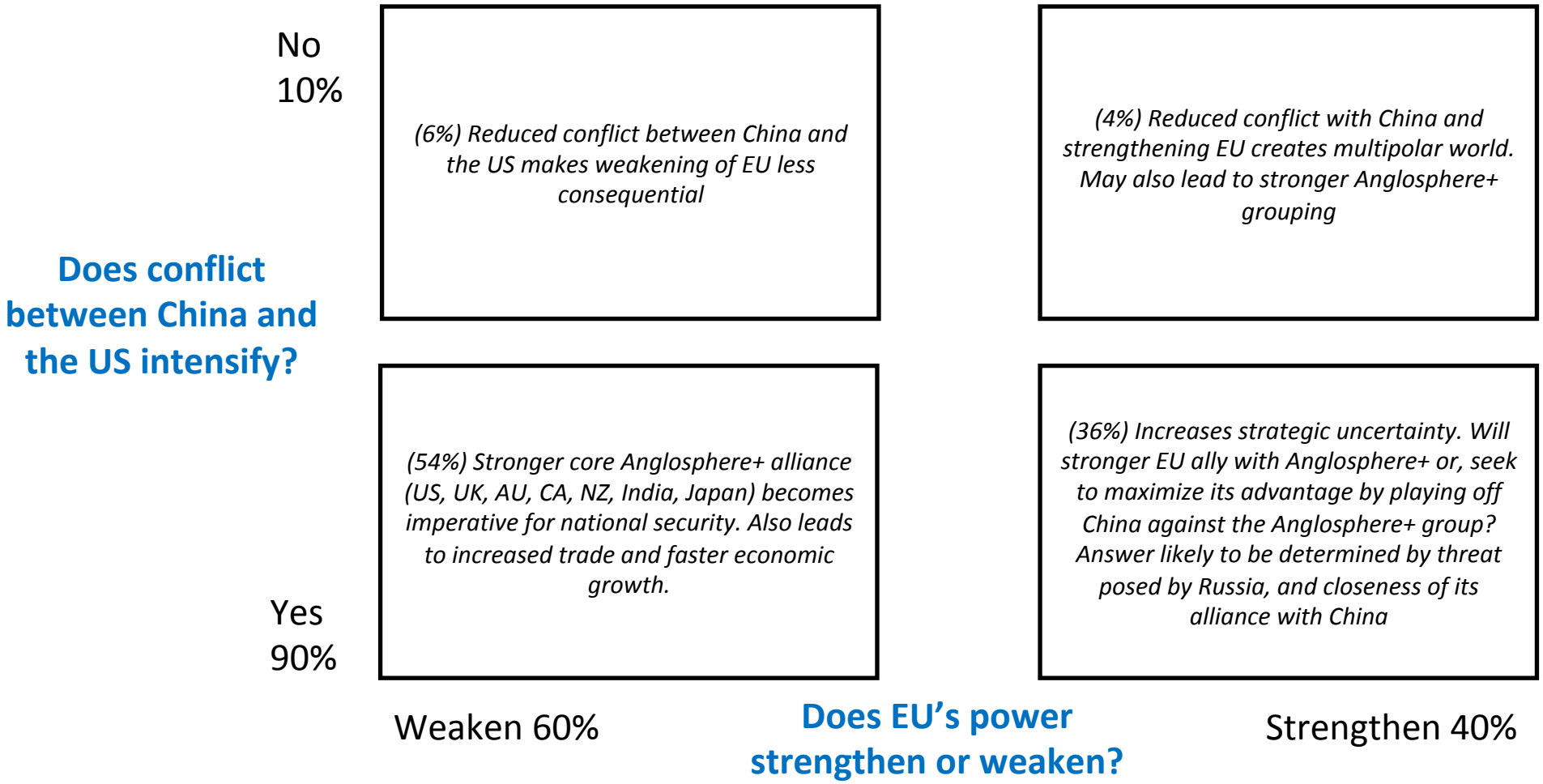
# *Information Integrity and Cybersecurity Scenarios*



# *National Security Uncertainties*

- We have written extensively about the intensifying conflict between the United States and China (e.g., "*Will Xi Jinping Launch a Surprise Attack on Taiwan Before the 20th Party Congress of the CCP in November 2022? And What Happens if He Does?*" in our October 2020 issue).
  - Probability forecasts: Will the US/China conflict intensify between now and 1 Jan 2021? 90% yes, 10% no
- In the US/China conflict, the European Union (even without the UK) could play a critical role, assuming it isn't substantially weakened by demographic forces, social conflicts within countries, and political differences between them (e.g., the north/south and east/west divides)
  - Probability forecast: Between now and 1 Jan 2021 will the EU's power grow stronger (40%) or weaker (60%)?

# *National Security Scenarios*

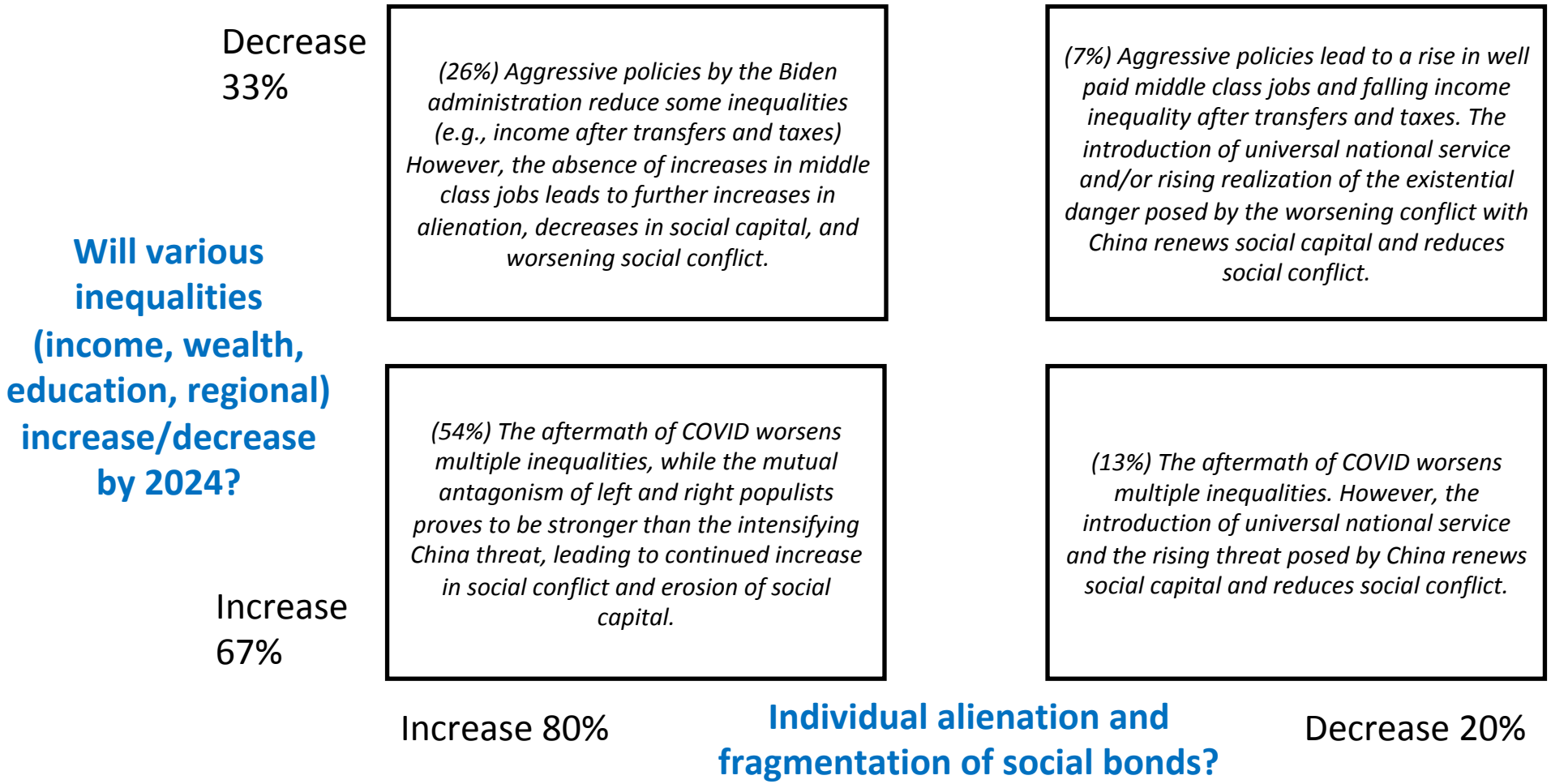


# *Social Uncertainties*

- Will income (after government transfer payments), education, health, and other measures of socially corrosive inequality in the United States increase or decrease between now and 1 Jan 2021?
  - Probability forecast: 67% increase; 33% decrease

- Increasing individual alienation/anomie and declining social capital have increase support for left and right populism. Will they further increase or decrease in the United States between now and 1 Jan 2021?
  - Probability forecast: 80% increase; 20% decrease

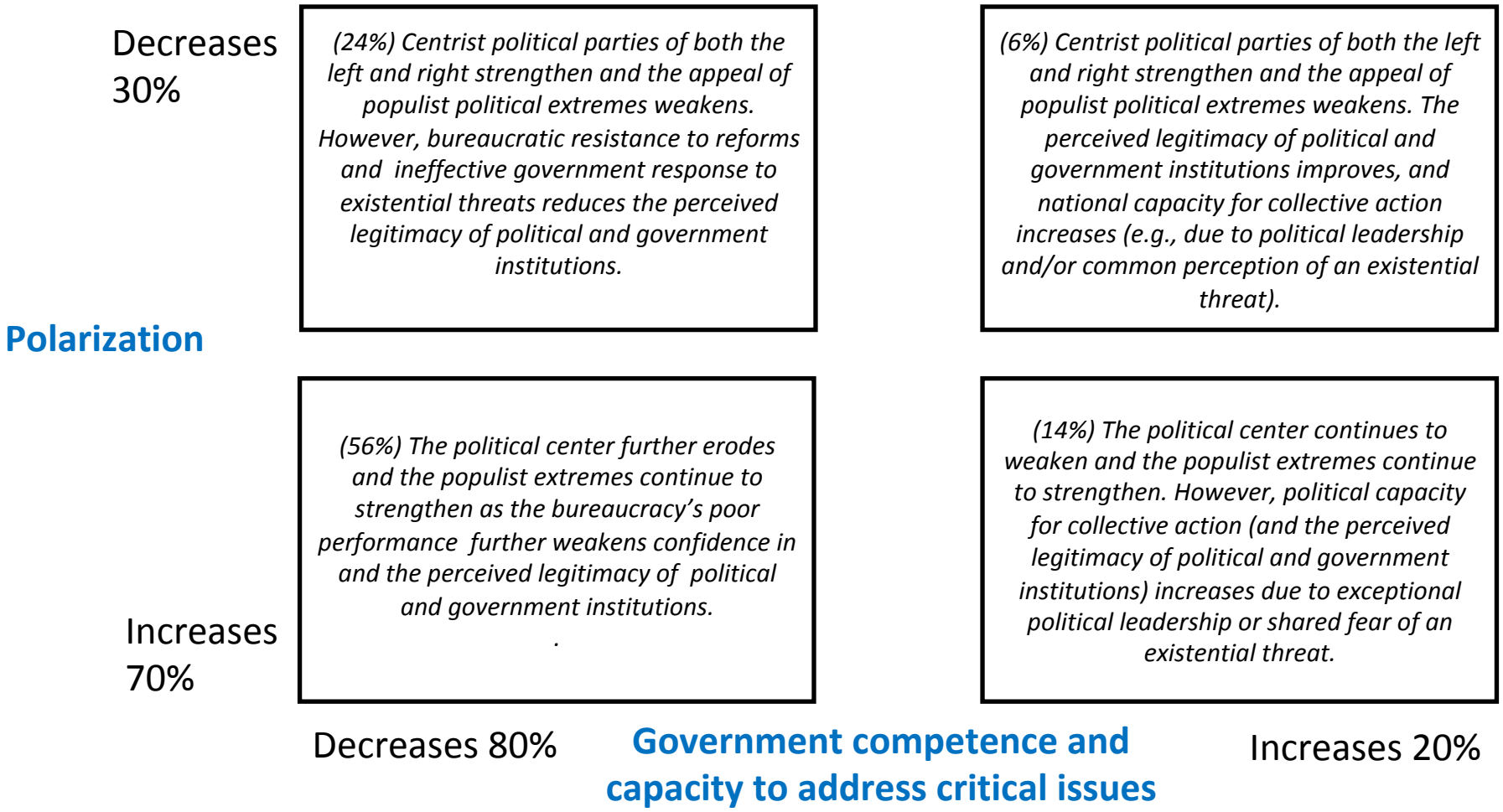
# *Social Scenarios*



# *Political Uncertainties*

- Will polarization (left and right populism) strengthen (and the center further weaken) in the United States between now and 1 Jan 2021?
  - Probability forecast: 30% increase; 70% decrease
- Following the loss of confidence public sector institutions during the COVID pandemic, will government's competence and capacity for effective action to successfully address critical problems facing the nation increase or decrease between now and 1 Jan 2021?
  - Probability forecast: 20% increase; 80% decrease

# *Political Scenarios*



# *There Are Feedback Loops Between Many of These Issues that We Haven't Explicitly Considered*

- This framework focuses on the time-based dependencies between the eight causal drivers we identify
- It does not explicitly discuss feedback loops between these drivers, some of which are often equally important
  - For example, in the economy labor productivity gains depends not only on improvements in AI technology and human capital quality, but also on the willingness of businesses to invest, which in turn depends on the extent of their uncertainty about future demand, taxes, and other factors
  - This uncertainty is strongly affected by uncertainties about the expected outcomes for other causal drivers
  - As John Maynard Keynes long ago noted, the "state of confidence" has a critical impact on willingness to spend and invest, thus on future demand

# *Prospective Hindsight: Finding Paths Through Eight Uncertainties that Lead to Each Macro Regime*

# *The Challenge of the Forecasting Complex Systems*

- Even after using these scenarios to reduce the dimensionality and complexity of our macro forecasting challenge, we are still left with a seemingly unwieldy 65,536 ($4^8$) possible combinations of scenario outcomes, if we assume all combinations can occur.
- For this reason, we use these scenarios as tools for reasoning both forward and backward in time to better understand the dynamics that could produce different macro regime outcomes, and to identify potential sources of future non-linearities and discontinuities
- This method also makes it much easier to gain an edge by developing early warning indicators and more efficiently sifting through the daily data deluge to identify high value information that is much more likely to be observed (or not observed) if a particular outcome for a critical uncertainty is developing

# *Prospective Hindsight*

- Human beings are much better at explaining why something happened in the past than they are at forecasting what will happen in the future
- “Prospective Hindsight” takes advantage of this, and asks forecasters to assume something has already happened, and to explain the causal sequence that led to it
- Forecasters using this method usually place higher probabilities on different outcomes than forecasters who use traditional methods that reason about the future from the perspective of the present

# *Paths that Lead to Each Macro Regime in 2024*

- Return to the Normal Regime
  - Improvements in education lead to increased creation of well paid jobs when advanced AI is deployed (3% probability)
  - COVID under control, and its long-term healthcare costs relatively low (22%)
  - Significant reduction in fossil fuel use for electricity generation, and no food supply/ price shock (26%)
  - Cooperative debt reduction and higher labor productivity lead to faster economic growth, despite shrinking working age population (12%)
  - Improved information integrity and cybersecurity reduce misinformation and uncertainty, leading to faster growth of the digital economy (12%)
  - Reduced conflict with China and a stronger Europe reduce uncertainty, supporting higher investment spending and stronger growth (4%)
  - Inequality  and alienation decrease, reducing social conflict (7%)
  - Political center strengthens and government competence improves (6%)
  - Biden administration gets lots of things right, and we return to the Normal Regime

# *Paths that Lead to Each Macro Regime in 2024*

- High Inflation Regime
  - Slow deployment of advanced AI along with failure to improve education results both limit productivity growth (60%)
  - COVID is under control, but its long-term healthcare costs are relatively high (22%)
  - No reduction in fossil fuel use for electricity generation and a food supply/price shock (13%)
  - Conflict driven private sector debt and public pension debt reduction, slow productivity growth, weak private sector demand, more fiscal stimulus (32%)
  - Information integrity/cybersecurity challenges not met; uncertainty increases (42%)
  - A stronger Europe seeks a middle road in US/China conflict, weakening confidence in future of US and the international order (36%)
  - Increased taxes and transfer payments reduce inequality, but absence of job creation increases individual alienation and social conflict (26%)
  - Government fails to effectively address critical challenges; populism increases (56%)
  - Increasing uncertainty and growing US government deficits with no end in sight, lead to flight from US government debt and US dollar

# *Paths that Lead to Each Macro Regime in 2024*

- Persistent Deflation Regime
  - Failure to improve education worsens talent shortage, leading to more labor substituting investment when advanced AI technologies are deployed, which puts pressure on governments' social safety net budgets (30%)
  - COVID is under control, boosting economic growth, and its long-term healthcare costs are relatively low (45%)
  - Weak reduction in fossil fuel use for electricity generation (green infrastructure projects only provide weak growth boost), but no food supply/price shock (54%)
  - Conflict driven private sector debt and public pension debt reduction, along with low productivity growth raise uncertainty and weaken private sector demand (32%)
  - Information integrity/cybersecurity challenges not met; uncertainty increases (42%)
  - Intensifying conflict with China and a weaker Europe reduce growth (54%)
  - Inequality increases (further weakening growth). Individual alienation increases and social conflict grows, increasing uncertainty and depressing growth (54%)
  - Government competence increases, but polarization still worsens (14%)
  - Persistent weak demand with debt overhang and high uncertainty leads to deflation

# *Paths that Lead to Each Macro Regime in 2024*

- High Uncertainty Regime
  - Within each of the eight issue areas, the lower left outcome is the worst, and the upper right the best
  - The other two are mixed; their development is more likely to increase uncertainty in that issue area
  - The more of these uncertain outcomes that emerge across the eight issue areas, the more likely it will be that the macro system will be in the High Uncertainty Regime

# *Conclusions and Implications*

# *Highest Probability Scenario Outcomes*

- Slow deployment of advanced AI and slow/no improvement in education results (60%)
- COVID under control by 2024, but survivors' long term costs to healthcare system are high (45%)
- No food price shock, but fossil fuel reduction targets aren't met and actual demand stimulus from green investments is weaker than hoped (54%)
- Improved labor productivity, but intense conflicts over restructuring private sector debt and public pension debt (48%)
- Neither information integrity nor cybersecurity challenges are successfully met; both continue to worsen (42%)
- Conflict with China worsens and the EU becomes weaker (54%)
- Inequality increases and social conflicts grow (54%)
- Government competence to address critical challenges does not improve, and both left and right populism strengthen as the center weakens (56%)

# *Macro Regime Probabilities for 1 Jan 2024*

- Based on this analysis, our current regime probabilities are as follows:
  - 45% for Persistent Deflation
    - See our December 2019 analysis of "*What Do We Know About Escaping the Persistent Deflation Regime?*"
  - 35% for High Inflation
    - High Inflation is more likely to follow Persistent Deflation than precede it
  - 15% for High Uncertainty
  - 5% for a return to the Normal Regime

# *The Rough Time Sequence of Different Drivers Highlights Key Leverage Points/Warning Indicators*

- In the short term, winning the battle against COVID is critical
  - Without that, emergence of the Persistent Deflation and/or High Inflation Regimes becomes almost certain
- Early deployment of advanced AI capabilities (causal and counterfactual reasoning) and substantial improvement in education and reskilling results are important indicators at they will have a strong impact on productivity and the extent and nature of future job creation
- Lower fossil fuel use for power generation (without large price increases for end users) and a significant demand boost from the Biden administration's green spending plans both critically depend on three key assumptions that are very uncertain:
  - That large amounts of new transmission can be built, grid-scale battery storage can be quickly deployed, and the grid control challenges posed by a substantial increase in variable renewable generation (from wind and solar) can be overcome

# *Leverage Points and Warning Indicators (cont'd)*

- A food supply/price shock would almost certainly trigger more aggressive regulatory actions to force larger emissions cuts more quickly, which would almost certainly be accompanied by significantly higher energy costs. In turn, this would very likely have a substantial negative impact on both demand and inflation, similar to the 1973 and 1979 oil price shocks
- The potential negative impact of worsening cybersecurity and information integrity conditions in multiple areas (the economy, national security, society, and politics) has almost certainly been underestimated by many
- The potential negative impacts of increasing public pension funding deficits (which have grown much worse as interest rates have declined), and prolonged conflicts over private sector debt restructuring have also been underestimated

# *Leverage Points and Warning Indicators (cont'd)*

- While the potential negative impact of intensifying conflict between the US and China is widely recognized, the negative consequences of a weakening European Union are less appreciated. Whether the EU can successfully stop COVID and raise productivity and growth in economies that face daunting demographic headwinds are critical indicators
- As political conflicts have become driven identity as much as policy issues, social and political uncertainties have become deeply intertwined. Inequality reduction is critical; however, the relative emphasis on achieving it via redistribution (tax and transfer payments) or via the creation of more well-paid jobs will be critical. The former will very likely generate more conflict than the latter

# *Leverage Points and Warning Indicators (cont'd)*

- Job creation, economic growth, reduced social conflict, and demonstrated improvement in the governments' competence and capacity to successfully meet the large challenges facing the United States and other nations are all critical to weaken left and right populism and renew the political center − speeches alone are very unlikely to accomplish this
- The most important "wild card" that could dramatically alter this forecast  is the almost certain reaction to the outbreak of violent conflict between the United States and China that involves significant casualties
  - Regardless of economic and social conditions, this would almost certainly reduce political polarization, as well as trigger the removal of bureaucratic obstacles that have blocked improvements in government competence

# *How to Further Improve Your Forecast Accuracy*

# *To Improve Your Predictive Accuracy, Combine This Forecast With Others*

- Research has found that three steps can improve forecast accuracy. The first is seeking forecasts based on different forecasting methodologies, or prepared by forecasters with significantly different backgrounds (as a proxy for different mental models and information). The second is combining those forecasts (using a simple average if few are included, or the median if many are). The final step, which significantly improved the performance of the Good Judgment Project team in the IARPA forecasting tournament, is to "extremize" the average (mean) or median forecast by moving it away from 50% and closer to 0% or 100%.
- Forecasts for binary events (e.g., the probability an event will or will not happen within a given time frame) are most useful to decision makers when they are closer to 0% or 100% rather than the uninformative "coin toss" 50%. As described by Baron et al in "*Two Reasons to Make Aggregated Probability Forecasts More Extreme*", forecasters will often shrink their probability estimates towards 50% to take into account their subjective belief about the extent of potentially useful information that they are missing.
- When you average multiple forecasters' estimates, you are including more information, which should reduce forecast uncertainty and push the mean estimate closer to 0% or 100%. However, this doesn't happen when you use simple averaging. For this reason, forecast accuracy is increased when you employ a structured "extremizing" technique to move the mean estimate closer to 0% or 100%. You can download our extremizing XLSX model here