
Global Trends to 2035

Geo-politics and
international power



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This study considers eight economic, societal, and political global trends that will shape the world to 2035, namely an ageing population, fragile globalisation, a technological revolution, climate change, shifting power relations, new areas of state competition, politics of the information age and ecological threats. It first examines how they may affect some of the fundamental assumptions of the international system. Then it considers four scenarios based on two factors: an unstable or stable Europe and world. Finally, it presents policy options for the EU to address the challenges created by these trends.

AUTHOR

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ABBREVIATIONS USED

A2/AD	anti-access/area denial
AI	artificial intelligence
APT	advanced persistent threats
ASEAN	Association of South-East Asian Nations
CCS	carbon capture and storage
CETA	Comprehensive Economic and Trade Agreement
CIFs	Climate investment fund
CLCS	Commission on the Limits of the Continental Shelf
EDF	European Defence Fund
EM	emerging markets
ESA	European Space Agency
FAO	Food and Agriculture Organisation
FTA	free trade agreement
G3	EU, China, and the United States
GCF	Green Climate Fund
GDP	gross domestic product
GHGs	greenhouse gases
GMO	genetically modified organism
ICANN	Internet Corporation for the Assignment of Names and Numbers
IDA	International Development Association
IMF	International Monetary Fund
kWh	kilowatt hour
OPEC	Organisation of the Petroleum Exporting Countries
R&D	Research and Development
RCEP	Regional Comprehensive Economic Partnership
TPP	Trans-Pacific Partnership
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees
UUVs	underwater unmanned vehicles
WIC	World Internet Conference

EXECUTIVE SUMMARY

Section 1: Trends since 2015

In 2015, the European Strategy and Policy Analysis System (ESPAS) launched its report “Global Trends to 2030: Can the EU meet the challenges ahead?” This report aims to update and extend that report by including developments that have occurred in European and global geopolitics since then, and will project developments out to 2035.

By paying attention to longer-term trend development, how breakthrough technologies may be overhyped, and the reinforcing intersection of trends, this report attempts to avoid the cognitive trap of placing too much emphasis on the most high-profile events that emerged at the time of its writing. Nonetheless, there are some major stories that, despite being relatively recent, could have major long-term implications for Europe.

- **US President Donald Trump.** While immediate US foreign policy is highly uncertain, given Trump’s unorthodox policy agenda, in the long-term it can be expected that the usual pressures and incentives of the international system will come into effect and force the United States to engage with the world along the lines of policy under the Obama Administration and George W. Bush’s second term.
- **Brexit.** This report does not make a prediction for how or whether Brexit will be negotiated. It does assume that the population and economy of the UK will remain broadly the same as projected and that by 2035, at least, it will have an extensive relationship with the EU, either as a member or partner.
- **Refugee/migration crisis.** Although the numbers of illegal border crossings have dropped since their peak in 2015 and a resolution to the conflicts in Syria and Iraq will presumably reduce the pressure for migration from there, migration pressures overall will increase. It is likely that 2015 could be a precedent for the next time a conflict or natural disaster occurs in Europe’s neighbourhood.
- **Information and cyber warfare.** Despite the near-certainty of damaging cyberattacks as internet-enabled devices proliferate and zero-day vulnerabilities are found by criminal actors and hostile governments, this report assumes that the developed world will remain dependent on the internet and technology. In some areas, such as top-level political campaigns, there may be a reversion to pre-internet workflows, but the economic advantages of information and communications technology will continue to outweigh the risks of hacks.
- **Terrorism.** The high-profile nature of the lone wolf attacks that have occurred across Europe in the last few years inspire copycats and are difficult to prevent. Security services will not be able to track every potential terrorist in Europe, especially as the collapse of the Islamic State in Syria and Iraq triggers a return for foreign fighters. Individual attacks against ‘soft targets’ are likely to persist as a constant threat in Europe, alongside more traditional modes and sources of terrorism.

Section 2: Trends to 2035

Trend 1: An ageing global population

The world is facing an ageing population due to a combination of increased life expectancy and declining fertility rates. As dependency ratios shift with growing elderly populations, governments will be faced with falling saving rates, falling consumption, and growing pressure on social services. There are stark differences in demographic changes between developed countries and developing countries. In general, high-income countries are experiencing population stagnation or decline. Conversely, many developing countries, particularly in sub-Saharan Africa, are experiencing “youth bulges” and expansion of working-age population. Both demographic scenarios pose challenges for governments seeking to create policies that are economically sustainable and politically palatable.

Trend 2: Fragile globalisation in a multipolar world

Fears about weakening enthusiasm for globalisation have, seemingly, been realised in the past few years. However, there are numerous variables that will shape whether the purported anti-trade environment of 2016 lasts to 2035. In the most likely scenario, globalisation patterns will be shaped less by politics and more by structural factors. Global trade is steady as a percentage of global growth, likely due to China’s reorientation towards domestic consumption and the maturing of trade in goods. A more services-oriented economy will have different requirements for global trade governance, but Beijing, Brussels, and Washington will remain the key decision points for global economic affairs.

Trend 3: Industrial and technological revolution

By 2035, technological advances will have a major impact on the social and economic foundations of society, potentially more far-reaching than the initial phase of computerisation from the 1980s onwards. Technologies involving automation and machine learning have the potential to disrupt job markets, making millions of jobs obsolete. As technologies like self-driving cars begins to proliferate, governments at all levels will be faced with questions of adaptation, governance, and human development. Countries will be forced to consider how much of their core information infrastructure they will permit to be run by companies domiciled in other countries. Parties may be faced with a trade-off between protecting consumers’ privacy and encouraging the growth of artificial intelligence firms that rely on large amount of data for training and improving algorithms. The question of when platform companies achieve monopolistic power will be a key issue brought before the court system in many countries.

Trend 4: Climate change and resource competition

Changes in the global climate due to rising greenhouse gases will not be reversed by 2035, even if great strides are made with the implementation of political agreements to greatly reduce carbon usage in the future. As the consequences of climate change become increasingly apparent -- and natural events such as famines and water strain become linked to climate change in popular discourse -- the world is likely to see climate-related political disputes proliferate at the national and international level. Renewable energy will proliferate and become cost-competitive around the world, but will trigger instability in countries dependent on fossil fuels, many of which are in Europe’s neighbourhood.

Trend 5: Changing power in the international system

In many ways, the power balance in the international system in 2017 looks broadly similar to the world in 2000. Yet in some fundamental ways, the world has changed considerably. The wars in Iraq and Afghanistan have left its participants wary of foreign intervention. China has expanded its global presence. Russia has demonstrated a willingness to intervene in neighbouring countries and attack democracies with information ‘wars’. And the impact of the 2007-08 financial crisis has hit many nations’ capabilities to fund military increases. There are some broad trends that are likely to continue through 2035: the United States will remain the largest military power; China and regional leaders will see their power grow; Russia will focus on areas of asymmetric advantage to counteract its declining population; and the creation of a unified European military structure with significant expeditionary power will be one of the biggest wild cards in the international system.

Trend 6: New arenas of state competition

When projecting long-term trends in international affairs, it is important to consider the possibility that the major conflicts of 2035 will be centred on issues that barely register in the international arena today, or are secondary matters at best. Over the next two decades, these will likely include: the space market; new weapons systems like unmanned vehicles; policing rogue states; cyberwarfare and internet governance; and the Arctic Ocean.

Trend 7: Politics of the Information Age

Politics often evolves as a reaction to changing societal and economic trends. There is evidence -- from measures on inequality to the percentage of the economy comprised of services -- that in much of the developed world, the industrial era has transitioned to an information economy. Political reactions to these economic changes are already underway across the United States and Europe. While they are highly unlikely to completely overturn the existing political landscape by 2035, they will add new layers that will shift partisan coalitions and incentive structures. Some of the most important aspects will be industry disruption and political competition for new or more important voting blocs such as newly upper middle class professionals, former industry workers, gig economy contractors, and the elderly.

Trend 8: Ecological threats

While climate change is a gradual process that will be felt over the course of decades, it also increases the likelihood of relatively sudden disasters, from stronger hurricanes, deeper famines, or droughts. By 2035, the world will most likely be confronted by more natural disasters, and the political system will be required to adjust to them. Northern Europe will see greater flooding. Southern Europe will experience more frequent heatwaves. The international system will need to create a more robust system to protect climate refugees and migrants, who will grow as climate change increases the power of natural disasters and rapid urbanisation means that natural disasters will affect more people.

Section 3: International power to 2035

The eight global trends discussed in the previous section will have significant consequences for some of the more fundamental assumptions about the nature of the international system. They will likely add up to a continued evolution away from what might be known as the post-Cold War order, dominated by a unipolar United States, into a multipolar order, in which

medium-sized powers will have considerably greater power and corporations and international institutions will be major constraints on state action.

Two of the major uncertainties of the international system involve states' freedom of action. If the nuclear taboo remains in place and states' surveillance and air defence systems improve, the feasibility of interstate conflict or cross-border action declines. However, if states are increasingly unable to prevent domestic politics from spilling over into other countries, either through refugee flows, terrorism, or criminal activity, there may be a pattern of regional coalitions intervening in unstable countries.

Another variable is the resilience of global institutions in the face of changing economic and political weights. Countries such as China will demand greater representation, but will be opposed by those countries that would stand to lose influence. If reforms are not undertaken, there is a high probability of alternative institutions being created by those countries pushing for reform.

Section 4: Scenarios to 2035

This section uses the scenario planning method developed by Pierre Wack at Royal Dutch Shell in the 1970s to propose alternate futures about the environment in which European decision-makers are operating in 2035. The scenarios are not meant to be predictive of what will happen, but to create internally consistent and plausible scenarios of what could happen, so as to test assumptions and encourage policy-makers to create contingency plans.

The scenarios are built from the combinations of the two following variables.

1. Adaptation (or non-adaptation) of European economies to the challenges of the information age, leading to (in)stability in Europe
2. Managed (or disorderly) evolution of the global system towards multipolarity, leading (in)stability outside Europe.

The two macro drivers were combined in their extreme versions to create four mutually exclusive scenarios.

Scenario 1: Sick men of Europe: unstable Europe in a stable world.

In this scenario, Europe fails to adjust to the economic dislocations driven by the information economy and the growing power of China, India, and others are directed towards maintenance of the international order.

Europe sees relatively low average economic growth, with a recession affecting many of its members as the United Kingdom leaves the EU without a transition deal. Greece leaves the euro and speculation is persistent that more countries will leave during the next recession. Political parties across Europe find their support dropping quickly once in government and the political system fragments, with extremist, nationalist, or personal vehicles comprise a greater percentage of the vote share.

The United States abandons its "America First" foreign policy quickly, moving to complete its pivot to Asia. Developing countries are brought more closely into international institutions,

but find their demands for reform met largely at the expense of Europe's influence, such as the loss of a UN Security Council seat and voting rights at the IMF.

Scenario 2: Cold Wars: stable Europe in a stable world.

In this scenario, Europe adapts to the information economy and the United States, Europe, and China collaborate on ensuring that a multipolar world does not descend into conflict.

Europe's growth is in part attributable to a European 'New Deal', which revamps the social contract. A Europe-wide fiscal union and social safety net are introduced, minimising the extent to which the common currency is over- or undervalued in each country of use. The result is not an immediate panacea, just as the New Deal under President Franklin D. Roosevelt did not lead to an end to the Great Depression. Instead, the gradual accumulation of new policies leads to a transformation of the political culture over the course of 15 years to a more federalist system, with greater power for the European and sub-national levels of government.

The greater stability in the international system encourages a summit on the norms of cyberwarfare and a series of global agreements, modelled on the Strategic Arms Reduction Treaty, attempt to create an acceptance that hacking and purposely damaging civilian targets is not permissible and that proportional responses are accepted.

The stability of this scenario contains the seeds of future problems. Seeking a peaceful transition to multipolarity leads the United States and Europe to acquiesce to authoritarian regions, climate change may be neglected by a focus on employment, and ageing populations may encourage governments to win votes by delaying pension adjustments, thereby imperilling future fiscal health.

Scenario 3: Hollow foundations: unstable Europe in an unstable world.

In this scenario, Europe fails to adjust to the information economy, and few European firms are able to compete with tech companies in the United States and China. Global governance is increasingly frayed, as the United States, China, and others clash over the roles they seek to play in shaping the norms of the system.

Integration is effectively reversed by states promoting their own policies that had previously been under the aegis of the EU. Ad hoc groups collaborate on various issues together, but rarely achieve a European consensus, while member states frequently clash on foreign policy. The United States becomes increasingly isolationist and sees NATO as less relevant for its agenda. Article V remains applicable to the territorial integrity of its members, but is seen not to cover information warfare or terrorism.

Tax evasion becomes a greater source of lost revenues for countries around the world and the developed world sees the de facto creation of a two-tiered tax system, with the wealthiest individuals and corporations paying significantly lower taxes. This is a source of contention at international forums and a source of distrust between citizens and their governments.

Scenario 4: The EU as a global power: stable Europe in an unstable world.

In this scenario, Europe increases wages for all parts of the population and stabilises the financial system. China is aggressive internationally, in part to distract from domestic economic and governance challenges. Brazil, Russia, Nigeria, and India advocate an end to the Western-led international order.

Economic growth and instability elsewhere create the push and pull factors for migration to Europe, which leads to a continent-wide system modelled on Australia's immigration approach. A series of external crises produce European common responses. These create a new integration momentum which is codified in a new treaty, termed a Constitution. The United Kingdom rejoins the EU.

The High Representative becomes a more powerful actor on the international stage. Russia's declining economy has led to conflicts in neighbouring states, as countries seek to reincorporate Russian-backed enclaves. Europe is requested as a mediating power both in its neighbourhood and abroad, as it is accepted as a credible interlocutor by the United States and non-Western countries.

Section 5: Policy challenges and options

The trends and scenarios present a number of challenges to the EU for the next two decades. The following is not a proscriptive list of policy recommendations, but an overview of ten areas that the findings of the previous sections show will be of particular importance to Europe in the next two decades.

1. Manage tensions related to NATO

NATO is likely to remain the leader in major areas of security and defence for European countries to 2035. However, European governments will need to manage or resolve a series of dilemmas surrounding the organisation in the coming years. These include: the US pivot to Asia; whether NATO involves itself with border security; and whether a specific policy is needed for Turkey.

2. Enhance EU defence and security institutions

The year 2035 may be too soon for a unified command structure that might rival that of a nation-state. Nonetheless, progress on defence and security integration is likely, in part due to new threats and the possibility of US inattention to European issues. Specific policy challenges that the EU will need to focus on in the next 20 years include: reducing inefficiencies in defence procurement; developing a common strategic outlook; and how to use piecemeal approaches to defence and security collaboration in the coming years in the service of larger strategic goals.

3. Strengthen cybersecurity

Cyber attacks will present major challenges for EU countries over the next 20 years, in large part due to their unpredictable nature. For example, most cybersecurity experts failed to foresee the apparent Russian attempts to influence the outcomes of the US election by manipulating online information and hacking key participants' email accounts. Nonetheless, certain specific challenges appear very likely over the next 20 years, such as attempts by

foreign intelligence services or related groups to influence European elections; data localisation regulations, as EU citizens' pressure may mount to stop non-EU intelligence agencies or criminal groups from accessing their online data; and the development of a cyberwarfare doctrine.

4. Employ sustainability as a source of soft power

Over the next 20 years, the EU will be challenged in areas of soft power in which it currently enjoys leadership. An important one of these is the area of sustainable trade and investment. The EU and its member states have developed some of the most comprehensive sustainability legislation worldwide. In the long term, this provides strong support for the reputation of both the EU and EU corporations. This body of legislation gives the EU a platform from which to drive similar change towards sustainable trade and investment in other parts of the world. As sustainability and environmental awareness becomes a greater concern to countries around the world, the EU could use its leading position to increase its power in this area, countering some of the loss in diplomatic influence that its relative economic decline would otherwise entail.

5. Regain fiscal space in an environment of ageing workforces

Over the long term, the EU will need new policies to combat the impact of ageing populations. As European governments seek to enact further reforms to social programmes to account for an ageing population, they will face the prospect of voting publics who will not accept the prospect of diminished living standards in their retired years. Over the next 20 years, policies in the EU may need to include: measure to increase the pension age in a politically sustainable manner; schemes to extend the working life of citizens or enhance their productivity; and policies to increase participation in the labour force for working-age citizens.

6. Harness the power of artificial intelligence

Automation and artificial intelligence will accentuate several economic and public policy trends over the next 20 years. While there is a tendency to emphasise employment displacement, there is also a positive impact, as new jobs are established in R&D, programming and technology-related services. Major policy challenges and potential solutions include: building a social consensus around the future of automation; encouraging the rapid adoption of relevant new technologies, particularly by small- and medium-sized companies, which are at a disadvantage in any field that requires access to large amounts of data; re-assessing the development models for poorer countries; and considering income assistance programmes for those whose jobs have been eliminated by technological change.

7. Combat food and water scarcity in Africa and the Middle East

Between now and 2035, climate change and resource competition could increasingly make food and water scarcity in Africa and the Middle East into a geopolitical and security issue for the EU, rather than primarily a development issue. There is a chance that there will be a sharp rise in the number of people displaced by climate change seeking to migrate to the EU. Some responses to this include: expanding aid budgets on issues such as governance, corruption, social safety nets and quality of institutions; better managing global grains stocks, which can prevent price spikes on the most basic foodstuffs; and encouraging developments in biotechnology, in areas such as drought-resistant crop technology.

8. Gain from the opportunities of space exploration

From its genesis at the end of the 1950s, the development of Europe's space activities has been unique in its purely scientific origins. In the European Space Agency (ESA), it has also produced an organisation that has flourished in parallel with the EU, but with a remit that can offer membership to a wider range of countries. Over the next twenty years, several factors are likely to feed into the development of European space policy, such as: considering Europe's emphasis on heavy lift rockets as a commercial product; integrating space into military doctrines; and deciding whether to compete with the private sector in commercial areas, or focus governmental action on non-commercial tasks such as space exploration.

9. Create business clusters to build Europe's leading edge

Clusters of interconnected businesses and institutions can drive productivity and innovation in various fields, and often rely on government support, either directly (through the location of a government facility) or indirectly (through grants to universities). In order to compete with firms in the United States, China, and Japan, European businesses would benefit from the development and deepening of clusters. However, this may go against the political impetus of the EU, to ensure that prosperity is spread evenly across the union, rather than concentrated in a few areas that may already be wealthy. Some ways to balance these two needs include: developing cluster-based policies to replace industry-level and firm-level policies; encouraging more government funding of basic research at universities; facilitating European-level social services and pension policies, to encourage migration from across the Union to clusters; and ensuring access to capital and markets to help an innovative business find the success that grows a cluster wherever it emerges.

10. Adapt to new types of terrorist threat

The threat from terrorism will remain a major challenge for European policymakers to 2035. In addition to seeking ways to respond to the currently known types of terrorist threats, new types of threats will emerge over the next 20 years. These may include, but will not be limited to: bio-hacking, the design of new germs and viruses; advanced robotics, allowing precise assassination attacks or mass casualty attacks to be remotely launched by individuals and small groups; 3D-printing weapons; and lone wolf attacks against soft civilian targets.

SECTION 1: TRENDS SINCE 2015

In 2015, the European Strategy and Policy Analysis System (ESPAS) launched its report “Global Trends to 2030: Can the EU meet the challenges ahead?”¹ This report aims to update and extend that report, including developments that have occurred in European and global politics since then, and will project out to 2035.

By paying attention to longer-term trend development, this report attempts to avoid the cognitive trap of placing too much emphasis on the most high-profile events that emerged near the time of its writing.

Nonetheless, there are some stories that, despite being relatively recent, could have major long-term implications for Europe, both domestically and in relation to its geopolitical power, which this report defines as its ability to influence events at the international level.

Their interaction with the trends and impact on policy challenges is explored in further depth in the report, but it is useful to foreground the issues that this report considers of particular importance.

- **US President Donald Trump.** At the time of writing this report, Trump is the president of the United States, but there are strong indications -- from the firing of the director of the FBI to historically low approval ratings -- that impeachment or resignation is possible. Further, there are institutional constraints on the presidency and Vice President Mike Pence, should he take office or become de facto president, would likely manage a more conventional foreign policy. Therefore, while immediate US foreign policy is highly uncertain, given Trump’s unorthodox policy agenda, in the long-term it can be expected that the usual pressures and incentives of the international system would come into effect. This is not a certainty, to be sure, given the long-term consequences of immediate decisions that could lead to a war, but is the most likely scenario for how his administration will affect US power to 2035.
- **Brexit.** The process of the United Kingdom departing the EU is underway, with little indication from London or Brussels on the contours of the post-Brexit relationship. This creates a wide range of possible outcomes to 2035: from a weakened UK, which has suffered a major depression and seen Scotland and Northern Ireland leave the country, to a country that has proceeded largely along pre-Brexit economic projections, to a reversal of Brexit or re-application of the UK to the EU. In forecasting the trends for the EU, this report assumes that the population and economy of the UK will remain broadly the same as projected and that by 2035, at least, it will have an extensive relationship with the EU, either as a member or partner. Contingencies in which Brexit leads to a domino effect are addressed in Section 4: Alternate scenarios.
- **Refugee/migration crisis.** In 2015, the EU received more than 1.2 million asylum application, more than double the amount in 2014 and more than four times the applications received in 2010. The surge in migration appeared to be driven by the conflicts in Syria, Afghanistan, and Iraq, which were the main three sources of origin for asylum

¹ “Global Trends to 230: Can the EU meet the challanges ahead?.” *European Strategy and Policy Analysis System*, <http://ec.europa.eu/epsc/sites/epsc/files/espas-report-2015.pdf>.

applications. Although the numbers of illegal border crossing dropped by more than three-quarters from 2015 to 2016, and a resolution to the conflicts in Syria and Iraq will presumably reduce the pressure for people there to migrate, it is likely that 2015 could be a precedent for the next time a conflict emerges in Europe's neighbourhood.

- **Information and cyber warfare.** In US and French presidential elections, hackers attempted to disrupt campaigns (and arguably succeeded). Damaging hacks and viruses have also been seen in settings as diverse as Hollywood -- with Sony Pictures in 2014 -- and the healthcare sector -- with WannaCry in 2017. Despite the near-certainty of more hacks as internet-enabled devices proliferate and zero-day vulnerabilities are found by criminal actors and hostile governments, this report assumes that the developed world will remain dependent on the internet and technology. In some areas, such as top-level political campaigns, there may be a reversion to pre-internet workflows, but the economic advantages of information and communications technology will continue to outweigh the risks of hacks.
- **Terrorism.** Since 2015, there have been numerous terrorist attacks in Europe, some of which appear to have been planned by terrorist organisation, and many of which appear to be 'lone wolf' attacks. While terrorism is not a new phenomenon in Europe, the pace and methods of the new round of attacks are particularly hard to prevent. Six of the seven most recent terrorist incidents causing fatalities in Europe have involved attackers using cars or trucks to drive into crowds of pedestrians. It is likely that security services will be hard-pressed to track all those radicalised, especially as the collapse of ISIS in Syria and Iraq triggers a return for foreign fighters, and that the high-profile nature of these lone wolf attacks inspire others to copy their techniques.

SECTION 2: TRENDS TO 2035

TREND 1: AN AGEING GLOBAL POPULATION

The world is facing an ageing population due to a combination of increased life expectancy and declining fertility rates. As dependency ratios shift with growing elderly populations, governments will be faced with falling saving rates, falling consumption, and growing pressure on social services. The ability of states to adapt to changing demographics will largely depend on their capacity to install policies that are sustainable both politically and economically in the long term.

There are stark differences in demographic changes between developed countries and developing countries. In general, high-income and predominately western countries are experiencing population stagnation or decline. Conversely, many developing countries, particularly in sub-Saharan Africa, are experiencing “youth bulges” and expansion of working-age population. Both demographic scenarios pose challenges for sustainable development that could have global political and macroeconomic impacts.²

I - Developing countries

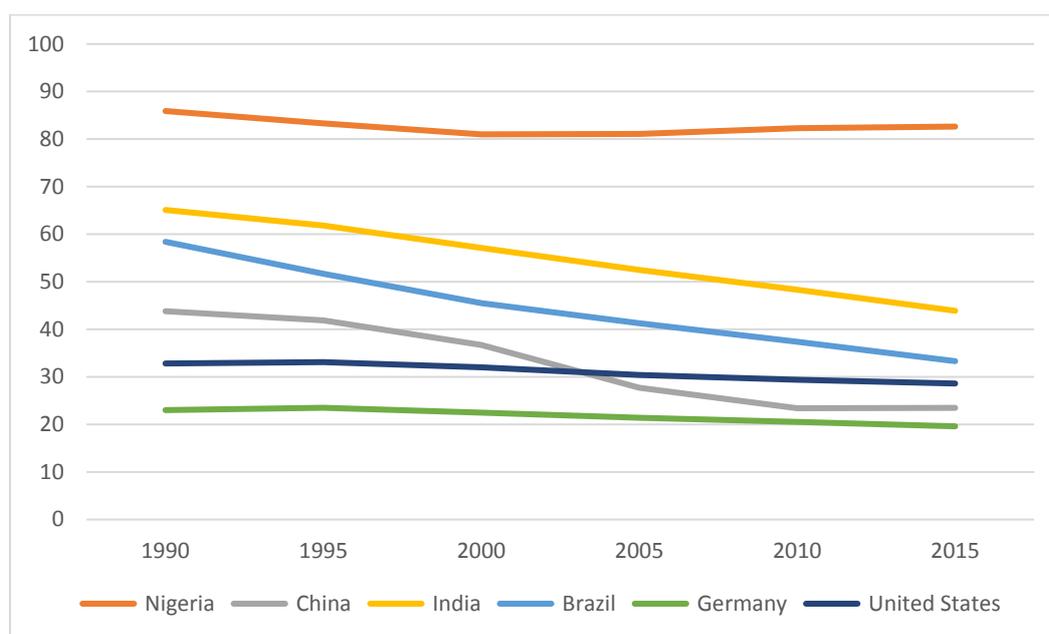
Many developing countries are seeing a growth in working-age citizens, helped by high fertility rates in recent decades combined with greater medical care. However, the youth bulge has passed through some developing countries already and these will experience the same ageing patterns as developed countries. As Figure 1 shows, the ratio of children to the working age population to 2015 (indicative of how many will enter the workforce by 2035), has steadily declined in many large emerging or developed countries, but remains extremely high in most of Sub-Saharan Africa. This will hinder the chances that the Sub-Saharan African economies grow strongly, as their dependency ratio will be high, but is also a reflection of an underlying economic problem, in that fertility rates are most often high when women have the least access to the workforce. High fertility rates will be both a cause and effect of pressures driving down broad-based economic growth.

The fall in the youth dependency ratio, in those countries where it occurs, can be tracked with the demographic dividends that countries enjoy, with a higher youth dependency ratio indicating a demographic dividend that will extend further into the future.

By 2040, the median citizen of Brazil and Mexico will be almost as old as the that of the United States, and China’s will be older. South Korea, Taiwan, and Singapore have median ages similar to Germany, Italy, and Japan.³ More than one-third of the global over-80 population will live in China and India by 2040 and 10% will be in Latin America. Social spending in these countries will require a much larger budget share than in advanced markets if similar levels of healthcare are to be provided, given the smaller per capita earnings of the working age population.

² “World Population Trends.” *United Nations Population Fund*, <http://www.unfpa.org/world-population-trends>.

³ Where data in this report projects beyond 2035, it is because those years provided the most accurate data available.

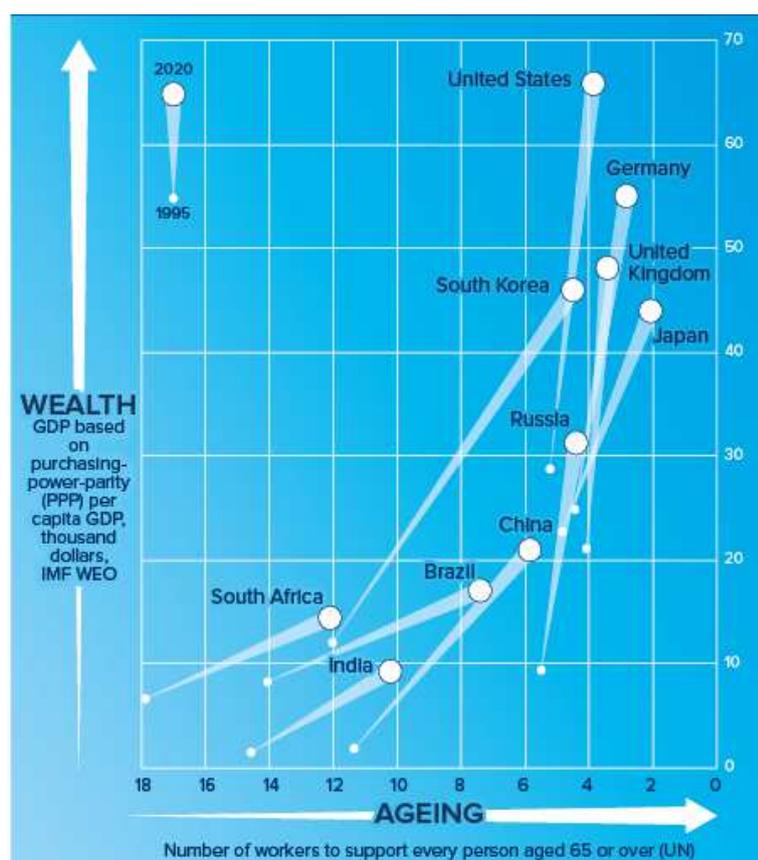
Figure 1. Youth bulges worldwide. Size of youth (0-14) population to working age (15-64) population per 100.

Source: World Bank

Developing countries face the challenge of capitalising on the demographic dividend they are experiencing now, with rising workforce populations, while planning for the eventuality of an ageing population in the future. The World Economic Forum forecasts developing countries' health spending will rise at 10% per year to 2022, compared to only 3.7% in developed countries.⁴ Higher spending increases are likely to persist through 2035, as the workers who constituted the leading edge of the demographic dividend in many countries begin to retire. As seen in Figure 2, many developing countries have been growing older more than they have been growing wealthier, as compared to developed countries, over the past two decades.

⁴ World Economic Forum, "Health Systems Leapfrogging in Emerging Economies," Jan. 2014, http://www3.weforum.org/docs/WEF_HealthSystem_LeapfroggingEmergingEconomies_ProjectPaper_2014.pdf.

Figure 2: Ageing and economic development trends



Source: IMF, Oxford Analytica

1. China and East Asia

East Asia's sharp decline in fertility, partially due to China's one child policy, will soon present as an age wave, with the elderly share of the population rising from 11% to 24% by 2030. By 2030, China's working-age population will be contracting by 0.7% per year, and internal migration from rural to urban areas will not be sufficient to supply new workers for the manufacturing labour force. Rates of saving and investment will likely fall as the Chinese population ages, leading to a downturn in foreign direct investment, as China's economic landscape presents lower rates of return on capital investments.

The short-term boom in Chinese fertility due to the ending of the one-child policy in 2016 is unlikely to do more than create a mild alleviation of China's ageing issue. In fact, for at least the next 15 years, the dependency ratio will grow, as more children are born but do not yet reach working age.

South Korea and Singapore have incentivised having children with tax breaks and government-sponsored dating services. It is possible that China will consider further boosting policies that support more children per family. Nonetheless, increased fertility in the region now will not add to the workforce until after 2035.

2. India

The elderly population in India is expected to rise from 5% to 8% by 2030, and to 12% by 2050. Unlike China, India's working age population will continue to expand in the coming decades. However, India will be challenged to find productive employment for all these workers. Less than half of Indians in their twenties have completed any form of secondary education and 37% of all Indian adults are illiterate. This has contributed to a large gap between the skills demanded by the growing Indian workforce, and the skills available in the Indian population.

Large discrepancies in regional fertility rates will shape India's ability to cope with demographic shifts. Birth rates have fallen in the Southern parts of the country, meaning the less developed Northern states will have to create many more jobs than projected to employ its young citizens. It is possible that India's long democratic tradition will aid its efforts in adapting to these demographic shifts, but the internal dynamics of ageing and richer states against younger and poorer states raises difficult questions of the political sustainability of any policy arrangement.

3. Latin America

The demographic transition towards an older population is happening much faster in Latin America than in other parts of the developing world, with fertility rates as low as 1.9 births per woman in Brazil and Chile. The elderly population in Argentina is expected to reach 17% by 2050, 20% in Brazil and Mexico, and 22% in Chile, a ratio on par with the United States. The challenges of Latin America will be to sustain their social welfare systems, as with Europe, but with a lower per capita GDP.

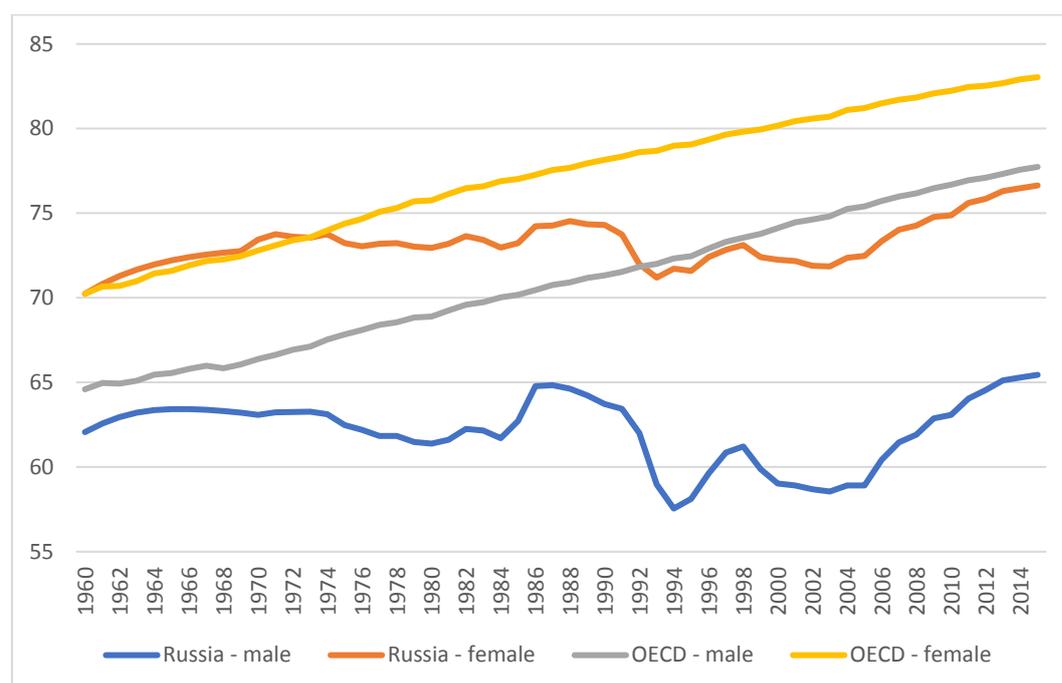
4. Russia

Russia's demographic transition began early, and its fertility rate is already down to 1.4 births per woman. Low birth rates have been accompanied by deteriorating health and lower life expectancy, which have severely trailed the consistent improvements in life expectancy among OECD members. Nonetheless, by 2050, Russia's median age will have risen to 48, making it slightly older than the developed world, assuming that there is not another repeat, in macroeconomic terms, of the collapse of the Soviet Union, which accompanied a precipitous drop in Russian life expectancy

Russia's human capital will be eroded by the population's poor health and life expectancy, the combination of which will put a damper on economic growth. Sick workers are less productive, which discourages foreign direct investment in Russia. Russia's total population, now around 140 million, is expected to drop to 125 million by 2030.

This will put Russia in a precarious position, as it becomes increasingly dependent on natural resources as its labour force declines, but these resources are prone to sharp cyclical swings. Its reliance on hydrocarbons may prove to be a major weakness if renewable energy becomes the default energy source. The Russian economy is not, for the medium-term, likely to be able to generate much stronger growth through innovation.

Figure 3: Life expectancy at birth, years



Source: World Bank

II – Developed world

An ageing population poses a series of challenges to the global economy, due largely to a combination of lower saving rates, changes in investment patterns, impacts on asset prices and returns, and the effects of globalisation.⁵

Saving rates generally conform to a person's lifecycle, meaning that they rise over the course of a career, and fall to negative during retirement. As workers head towards retirement, they transfer savings from volatile assets such as equities to low-risk assets such as bonds and money market funds. This will place downward pressure on the value of stocks, by reducing consumer demand.⁶ This economic shift will be felt unevenly throughout the world, as some countries see a savings boom as their growing working age population permits a demographic dividend.

The United States will be less vulnerable to ageing pressures than most developed world countries. It has a younger population than most developed world countries (median age of 38 compared to a median age of 47 for Germany) and has a tradition of accepting younger immigrants.

⁵ Bosworth, Barry P., Gary Burtless, and Ralph C. Bryant. "The impact of Aging on Financial Markets and the Economy: A Surety | Brookings Institution." *Brookings*, Brookings, 28 July 2016, <https://www.brookings.edu/research/the-impact-of-aging-on-financial-markets-and-the-economy-a-survey/>.

⁶ Institution of Medicine (US) Committee on the Long-Run Macroeconomic Effects of the Aging U.S. Population. "Saving and Retirement Security." *Aging and the Macroeconomy: Long-Term Implications of an Older Population.*, U.S. National Library of Medicine, 10 Dec. 2012, <https://www.ncbi.nlm.nih.gov/books/NBK148839/>.

Japan will be on the leading edge of developed world ageing trends. It has the oldest median age of any large country, one of the lowest fertility rates, and has a foreign-born population of only 1.5% of the country, demonstrating a resistance to immigration.

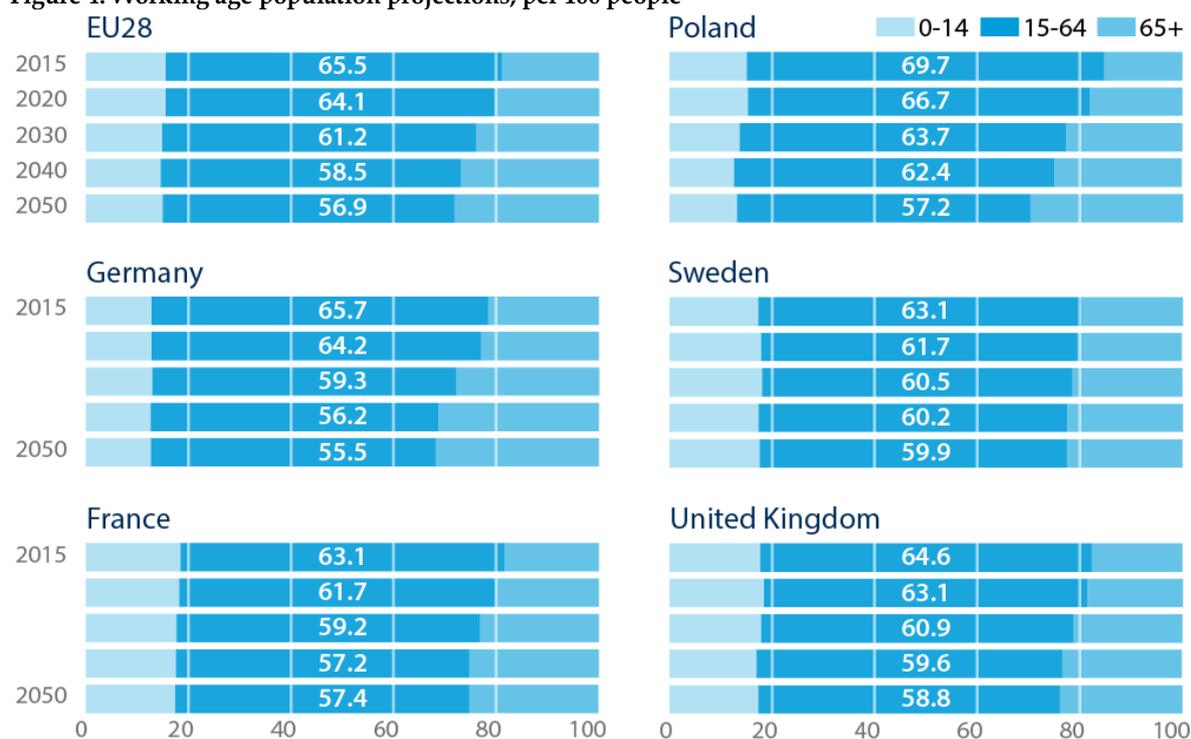
1. Europe

Europe will sit between the United States and Japan in its demographic shift.

European states can be divided into two main categories: on one hand, countries such as France, the Netherlands, and much of Scandinavia are experiencing a fertility rate ranging from 1.8-2.0 per woman, close to replacement level. In the other group, Germany, Central and Eastern European countries, and Mediterranean countries are experiencing fertility rates between 1.3 and 1.6, leading to a sharply contracting workforce population.

Overall, the demographic old age ratio (people over 65 per 100 people aged 15-64) in the EU is expected to increase from 27.8 to 50.1 by 2050, meaning that there will only be two working age people for every person over the age of 65.⁷ As Figure 4 shows, although the low fertility rates will reduce the number of young dependents in each society, the working age percentage of the population will decrease as a result of growing older generations.

Figure 4: Working age population projections, per 100 people



Source: Eurostat, Oxford Analytica

⁷ European Commission. "The 2015 Ageing Report: Economic and Budgetary Projections for the 28 Member States (2013-2060)." *European Economy Series*, 2015, http://ec.europa.eu/economy_finance/publications/european_economy/2015/pdf/ee3_en.pdf.

The cost associated with an ageing population will have fiscal impacts throughout Europe. The declining working-age population and costs associated with an ageing population are together expected to reduce growth rates by 0.2%, offset primarily by labour productivity growth due to technological innovation and automation. The projected change in age-related expenditures is expected to be two percentage points of GDP by 2050, primarily driven by the costs of providing healthcare to the elderly, who use more health services on a per-year-of-life basis than younger people. In countries such as Germany, where total GDP will fall because of low fertility rates, there will be efforts to extend work lives and to boost labour force participation.

1.1. Political stability

Many European countries have recognised the implications of an ageing population and contracting workforce, and have initiated reforms to pension systems. For example, in France, pension contributions by employers and employees will slowly rise in an attempt to prevent an increase in retirement age.⁸ However, there is a tension between pension systems that are sustainable – with pension benefits that can be supported by the working population – and acceptable – not triggering an electoral backlash.

As European governments seek to enact further reforms to social programmes to account for an ageing population, they will face the prospect of voting publics who will not accept the prospect of diminished living standards in their retired years. The shift of populations to being nearer to retirement age will constrain the ability of politicians to enact reforms that will take effect soon, creating an incentive to transfer wealth from the young to the old. The Social Security reform agreement by President Ronald Reagan and Congress in the United States in 1983 phased in changes so gradually that the largest tax increases and benefit cuts targeted people who were at the time 11 years old -- and therefore could not vote against the measure.

Politics in the coming decades will see a constant balancing act by European governments between temptations to increase benefits for the growing ranks of elderly voters, and the need to make unpopular cuts if costs become unsustainable.⁹

One possible solution to Europe's ageing population could be immigration. Four-fifths of asylum applicants in Europe in 2015 were under 35 years old; refugees and immigrants could partially offset the contraction of Europe's working age population. However, the process of integrating immigrants is a contentious political issue; politics may become divided between parties that would rather increase immigration to pay for higher social spending, and those that would rather restrict immigration and pension benefits.¹⁰

Immigrants themselves age and their birth rates quickly mirror those of the overall population and so immigration would delay but not solve the problem of ageing populations. Further,

⁸ Carnegie, Hugh, "France avoids radical overhaul in pension reforms," *Financial Times*, 27 Aug. 2013, <https://www.ft.com/content/a39fea58-0f35-11e3-ae66-00144feabdc0>.

⁹ Hernan Winkler. "How will aging populations affect politics?" *World Economic Forum*, 18 June 2015, <https://www.weforum.org/agenda/2015/06/how-will-ageing-populations-affect-politics/>.

¹⁰ "Attitudes about Aging: A Global Perspective." *Pew Research Center's Global Attitudes Project*, 30 Jan. 2014, <http://www.pewglobal.org/2014/01/30/attitudes-about-aging-a-global-perspective/>.

the volume of immigrants required – some estimates have suggested 800,000 per year in Germany – may well be beyond what is politically, socially, or economically sustainable.

1.2. Europe's position in the geopolitical order

As Europe's working-age population contracts while the developing world sees increased growth, Europe's position in the global economy and international political order will be threatened, a pressure that will grow to 2035. While GDP per capita may be sustained, the region's power in international institutions and its ability to fund its military depends on aggregate GDP, which is dependent on population.

However, Europe will not see a rapid decline in global power before 2035. It will increase relative to Japan and Russia, and China may be more constrained in its spending, as the effects of the one child policy are felt in its worker-dependency ratio. Europe may therefore cede some ground to India and developing countries in Africa, but will remain one of the largest economies in the world, have considerable military expenditures, and have stable political and economic institutions.

One possible wild card is automation and machine learning. If large numbers of jobs are eliminated worldwide by technological substitution, then countries such as Germany and Japan, with high innovation and declining populations, may be best positioned. They would enjoy the advantages of economic growth, while avoiding the unemployment issues that would affect other countries.

However, given current trends, that is a small probability event. While rapid adoption of automation would permit greater productivity with fewer workers, it is currently impossible (and unlikely to be possible before 2035) to automate the high numbers of jobs in the healthcare sector needed to accommodate an elderly population, and employment losses in the working age population would further strain the tax base for a country with a high dependency ratio.

Trend 2: Fragile globalisation in a multipolar world

Fears about weakening enthusiasm for globalisation have, seemingly, been realised in the past few years. The United Kingdom voted to leave the EU. China has launched the Asian Infrastructure Investment Bank, which could be a signal that it will be shifting away from Western-led international institutions. Donald Trump campaigned against nearly all existing trade agreements, and pulled out of the Trans-Pacific Partnership (TPP) as one of his first acts of his presidency.

However, not all of these events are definite indicators of a more fragile era of global trade. There are numerous variables that will shape whether the purported anti-trade environment of 2016 lasts to 2035. In the most likely scenario, globalisation patterns will be shaped less by politics and more by structural factors dependent on the contours of a services-oriented global economy, and Beijing, Brussels, and Washington will remain the key decision points for global economic affairs, and rhetoric on trade moving from an emphasis on “free” trade, to greater discussion of what constitutes “free and fair” trade.

I - Economic leaders

1. United States

Donald Trump appears personally opposed to the concept of multilateral negotiations and institutional frameworks for discussions, but Congress remains opposed to protectionism.

Therefore, it is unlikely that the United States will completely withdraw from international trade agreements through 2021, when the next president will take office, but neither will it be at the forefront of advocating for them. From 2021 (or earlier) through 2035, there will likely be a return to a commitment to free trade principles. As China becomes more powerful and its military spending increases, there will be a greater geostrategic impetus for the United States to engage in global institutions. The desire to constrain China was one of the main drivers of the TPP, but was not powerful enough to override other concerns held by members of Congress, particularly that it would lead to job losses in the manufacturing sector. As China builds new aircraft carriers and seeks to expand its influence in East Asia, national security issues will rise and the United States, as it did after the Second World War, will likely turn away from protectionist impulses.

One indicator of whether a more pro-globalisation attitude will take hold in Congress is if the United States adopts a much stronger suite of policies to help workers displaced by a changing economic landscape. Increased funding for trade adjustment assistance -- financial support to those workers who can show their job loss was as a result of a trade agreement -- would permit lawmakers to back new trade deals with less fear of electoral consequences, granting more relative weight to the pro-trade business and defence communities.

2. Europe

Headlines on EU trade policy in the near term will be dominated by Brexit negotiations. Yet a more worrying indicator for the EU’s ability to conduct trade agreements may have been the Comprehensive Economic and Trade Agreement (CETA) with Canada, which was approved with difficulty after opposition in the Wallonia regional parliament. CETA may

send the signal to other interested parties that agreements with the EU are uncertain, even after negotiations are complete.

A May 2017 European Court of Justice decision has clarified some of the divisions of competencies between the EU and member states. This may help to protect future agreements. However, the ruling stated that non-direct foreign investment and dispute settlement regimes are not the exclusive competence of the EU, which raises the possibility of internal deadlocks on those parts of economic flows.¹¹

Europe will likely still be one of the drivers of global trade rules, despite the course of specific major trade deals, simply because all European states have exports and imports as higher percentages of their economies than the United States, and the EU is itself the world's largest exporter and importer.

3. China

In January 2017, at the World Economic Forum Annual Meeting, Chinese President Xi Jinping pushed back against protectionist sentiments from the United States and Vice Premier Zhang Gaoli reiterated China's commitment to multilateral free trade agreements (FTAs) at the Boao Forum for Asia in March 2017.¹² However, Zhang also stated that China intends to prioritise regional free trade relationships, rather than strengthening global institutions.

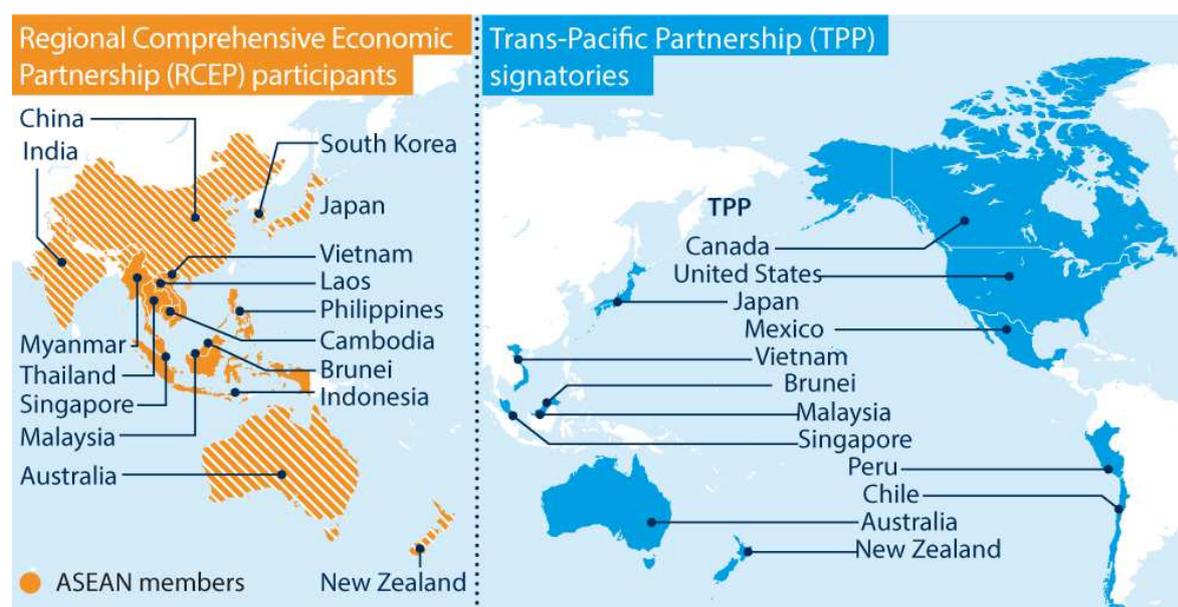
One example of this strategy is the 16-nation Regional Comprehensive Economic Partnership (RCEP), composed of the ten member states of the Association of Southeast Asian Nations (ASEAN), together with Australia, China, India, Japan, South Korea, and New Zealand. RCEP membership represents about 46% of the world's population, and about 30% of the global economy. While there are obstacles to completion, it is likely that sufficient compromises will be found for its passage. As Figure 5 shows, the RCEP includes all of the Asia-Pacific members of the TPP.

This process, if repeated, may see a bifurcated system emerge by 2035: a series of trade deals and institutions promoted by the United States and Europe competing with a China-driven set of FTAs.

¹¹ Court of Justice of the European Union, Press Release No 52/17, Luxembourg, 16 May 2017, <https://curia.europa.eu/jcms/upload/docs/application/pdf/2017-05/cp170052en.pdf>.

¹² "China Vice Premier Sees 'Unstoppable Momentum' of Globalization." *Bloomberg.com*, Bloomberg, 24 Mar. 2017, <https://www.bloomberg.com/politics/articles/2017-03-25/china-vice-premier-sees-unstoppable-momentum-of-globalization>.

Figure 5. Membership in RCEP and TPP, before the United States withdrew from TPP



II - Globalisation elsewhere

Between now and 2035, countries that are not in the G3 of the United States, EU, and China, will have a major impact on how global trade develops.

There will be a push from developed countries for higher environmental and labour standards in developing countries. This will be carried out both bilaterally and unilaterally; developed countries will seek to engage emerging markets through governmental and business ties, while raising standards on imported goods.

For example, Myanmar, Cambodia, Vietnam, the Philippines, and Laos have implemented measures to ensure higher food and beverage standards to comply with Japanese, US and EU food and drug codes. Such policy developments may lead to gradual changes that will, while not replacing the lack of major US- or EU-led trade deals, mitigate the effects of their absence.

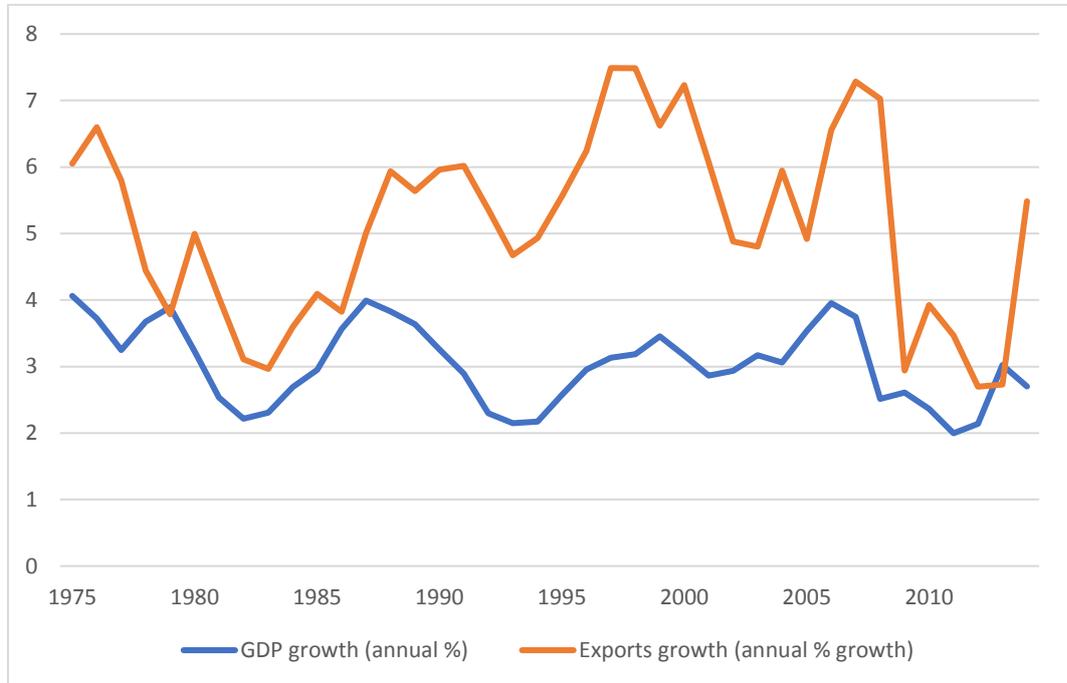
Regional agreements that do not include the G3 will expand and deepen. As the middle class in Africa grows and has consumer power, the economic linkages created by the trade across borders in Africa will pressure leaders to regulate trade. It is unlikely that a major trade breakthrough will occur in these areas; the once-discussed monetary union and single market within the East African Community seems highly unlikely, as domestic agendas and concerns regarding economic sovereignty dominate member states. Nonetheless, gradual changes will occur here to create a situation in which there are more power centres in the global economy, most likely led by countries in the G20 or regional economic organisations.

III - Structural changes in globalisation

It is doubtful that world trade can sustain past trend annual growth rates of as much as 6-7% in volume and 10% in value terms. Such rates were around double typical GDP growth. The global average for the ratio of imports/exports to GDP rose from just over 10% in the mid-1960s to a peak of more than 30% in 2007, where it has broadly stayed since. Data shows that the difference between GDP growth and trade growth may be linked to the rapid increase in exports in China from 1990 to 2006, as it became a major manufacturing exporter. As China

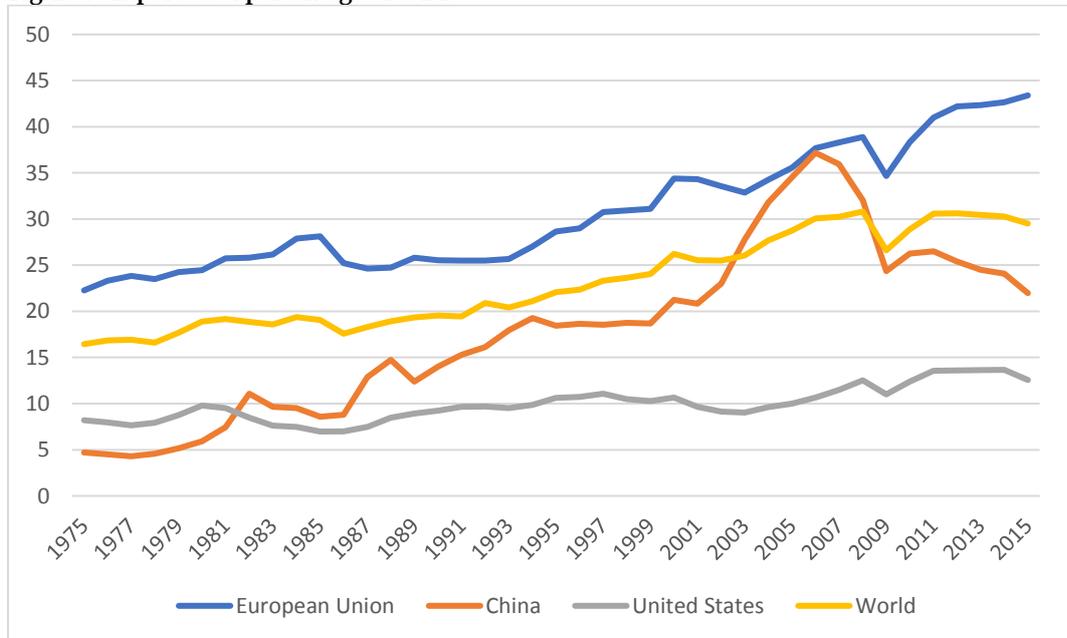
redirects growth more towards domestic consumption, disconnect between trade and GDP may be seen as a unique occurrence, and that world trade will not experience a similar phenomenon through 2035.

Figure 6. Annual growth rates in GDP and trade, five-year rolling average



Source: World Bank

Figure 7. Exports as a percentage of GDP



Source: World Bank

The IMF estimates that subdued trade in investment goods (volumes and prices) accounts for about 75% of the world trade slowdown. The maturing of global supply chains has also

contributed to slowed trade growth. China is transitioning towards more domestic-led growth and domestic firms are internalising more of their supply chains. The growth of the US shale oil and gas sector has also led to less offshore manufacturing by US companies, through reducing energy input prices in US factories, helping the United States become more self-sufficient.

Furthermore, there are limits to any policy measures countries could adopt to reverse the fall in world trade growth. Particularly if the lack of demand for capital equipment is the most important contributing factor to the drop in trade, a boom in countries that manufacture capital goods, such as the United States or Germany, or in sectors that require few major pieces of equipment, will not reset trade growth.

1. Goods trade maturing

The falling share of the advanced economies in world trade raises questions about the relevance of encouraging world trade. Over the medium to long run, increasing trade benefits the world economy, despite its costs to some industries, according to the consensus of economists. It spurs global efficiency, acting as a conduit for transmission of skills and technology and raising long-term productivity through technical progress. However, other drivers of growth could become more important to global GDP than trade, as on-demand business requires shorter supply chains, 3-D printing reduces the need for manufacturing hubs, and an emphasis on customisation benefits service providers located near the consumer. The trade/GDP ratio may not return to its previous peak and may not be a key indicator of economic strength of a region, in the way that it has been.

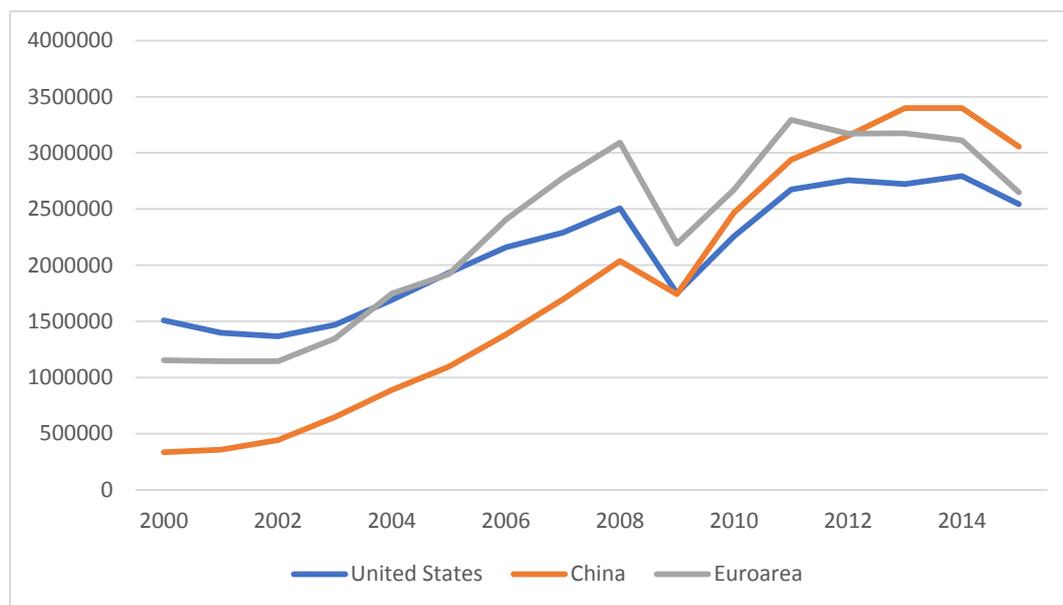
2. Shift to services

The trade outlook for global trade may depend on the balance between emerging market developments that will boost trade and changes in developed countries that will decrease trade.

Developing countries are witnessing growth in consumption and a rising middle class which demands imported goods. Further, their exports and imports are increasingly flowing between other developing countries, protecting trade flows from being tied wholly to the economic preferences of the developed world.

Advanced economies are moving towards services as the main source of economic value, even in manufactured goods. This, alongside shifts within the trade in goods, are likely to curb the demand from advanced countries for imports and thus lessen their role in world merchandise trade. As shown in Figure 8, trade in goods rose much more rapidly than trade in services from 2000-2008 for the euroarea, China, and the United States. Since the initial recovery from the financial crisis, the share of trade has been even for these three blocs, and has recently begun trending towards services.

Figure 8. Difference between value of goods trade (exports and imports) vs services trade (exports and imports), millions of US dollars



Source: OECD

IV- New drivers of growth to 2035

It looks likely that the EU, focused as it is on its goods-export industries, will continue to lag behind the United States in harnessing new services and digital drivers of growth. While EU collaboration has encouraged research and development (R&D) spending, it does not have the fundamental research drive or capacity of a large single state, like the United States or China, with investment in innovation needing to be shared among 27 countries.

In 2015, the EU spent less than 2% of GDP on R&D. To compare, OECD members on average spent 2.4%, the United States spent 2.8% and Japan spent 3.5%. In addition, the EU venture capital market is underdeveloped relative to the United States and the EU also lags behind the United States in numbers of large high-tech companies and patents.

Trend 3: Industrial and technological revolution

By 2035, technological advances will have a major impact on the social and economic foundations of society, potentially a more far-reaching impact than the initial phase of computerisation from the 1980s onwards. Technologies involving automation and machine learning have the potential to disrupt job markets, making millions of jobs obsolete. As technologies like self-driving cars begins to proliferate, governments at all levels will be faced with questions of adaptation, governance, and human development. Countries will be forced to consider how much of their core information infrastructure they will permit to be run by companies domiciled in other countries.

I - Technologies

1. Self-Driving Cars

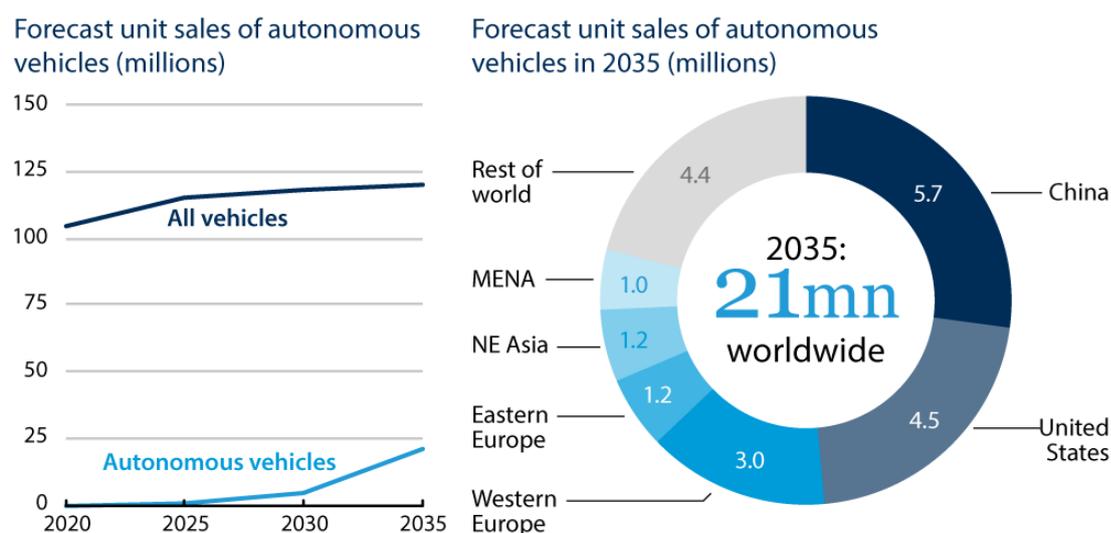
Self-driving cars have left the realm of science fiction, with companies such as Google, Uber, and Baidu investing in (R&D) for commercial self-driving car programmes. The success of self-driving vehicles could eventually lead to the banning of human driven vehicles, as the safety of driverless vehicles surpasses that of traditional cars. While this shift will not happen overnight, the possibility of a proliferation of self-driving car technology by 2035 is likely. The technology for fully autonomous cars will likely be in place by 2025, but human drivers will still be wary of giving up control.

Until then, regulators will struggle to keep up with the commercial ambitions of the sector. There will likely be several million fully autonomous vehicles on public roads by 2022, albeit still with drivers present because of regulatory, insurance and safety issues, and with an expected shift to non-drivers not long thereafter.

Autonomous vehicles are already deployed in dangerous locations, such as mines, and where long hours of operation or tedious, repetitive trips are needed, like airport terminal shuttles. Progress on developing self-driving cars is most advanced in China and the United States, the world's two largest car markets as well as its two leading polluters. Unless major regulatory changes occur elsewhere, it can be expected that self-driving cars will advance most rapidly in those places. Some cities that see self-driving cars as a component of an urban transit model, like Helsinki and Singapore, will be the largest factors encouraging adoption elsewhere.

A tipping point may come when the first generation of drivers to have grown up with self-driving cars takes the road. Young and new drivers are already the most dangerous; a generation who rarely need to steer the car may not be trusted to take over from the car if necessary, prompting more rapid regulatory change. However, it is still uncertain whether that would happen before 2035 or which countries would be most skittish about this age group. According to industry projections, self-driving cars would be about one-fifth of all vehicle sales by 2035, with nearly half of all sales in the United States and China.

Figure 9. Forecast sales of cars and light trucks



Source: IHS Automotive, Oxford Analytica

Beyond changing the way that people use transportation, the proliferation of driverless vehicles will put a dent in the tax income generated from traffic violations and other costs associated with private transportation, or may not be privately owned at all, reducing registration fees. Local governments will have to create new tax schemes to make up for the lost revenue in order to maintain their funding streams to maintain roads and bridges.¹³

It will also require governments to reconsider public transit options. It may be that self-driving cars reduce traffic to the point that every commuter relies on an autonomous vehicle to get to work, and the cars spend the day providing ride-sharing services. In this case, public transit would be less and less relevant for commuting (unless the cars became owned and operated by public transit systems). Or, conversely, self-driving cars may be combined with public transit services in a hub-and-spoke model. Self-driving cars can bring workers to a train or subway station efficiently, where they travel long distances on a cheaper per-person basis. This scenario would extend the reach of each station and increase the reliance on public transit. Deciding which model a city will adopt should be a key component in transportation investment decisions.

2. Artificial intelligence and automation

Automation, which involves programming a machine to perform a task previously done by a human, and artificial intelligence (AI), which involves programming a machine to learn about the task as it performs it, are realities in many industries. While automated processes have been present in many industries for decades, combining it with AI permits its use to spread to many new industries much more rapidly than before, when each task required programming by humans.

¹³ Desouza, Kevin C., et al. "Local government 2035: Strategic trends and implications of new technologies." *Issues in Technology Innovation*, no. 27, May 2015, <https://www.brookings.edu/wp-content/uploads/2016/06/desouza.pdf>.

2.1. Employment

In the next 20 years, researchers at the Oxford Martin School estimates that 47% of jobs in the United States will become vulnerable to computerisation, and that 35% of UK jobs could be eliminated as a direct consequence of artificial intelligence.¹⁴ Particularly at risk are jobs that consist of a set of tasks following defined procedures, such as data entry.

While automation and artificial intelligence are usually associated with lower skilled jobs, they have also begun to replace highly skilled workers. For example, oncologists at Memorial Sloan Kettering, a leading cancer hospital in New York, have begun using IBM's Watson artificial intelligence platform for diagnostics, and many law firms have begun replacing paralegals with software such as Symantec's Clearwell system. As education improves in many countries, there could be a growth of high-skilled workers that exceeds the growth of high-skilled positions available.¹⁵ This could contribute to the shift in the makeup of the workforce, as many highly skilled workers will be forced to take jobs below their pay-grade or be supported with continual job retraining opportunities.

2.2. Governance

AI has the potential to generate significant wealth, but not everyone will benefit equally. A small number of large companies will attract a significant amount of the relatively small pool of people with AI expertise because they have the resources to develop sophisticated AI systems. AI must be trained on vast amounts of data, and only a few companies in the world have this supply. As their AI systems improve, and they can offer better products, they will attract more customers, creating a feedback loop that builds their market position while locking out others.

One of the concerns with this trend is that it gives a few companies a powerful yet hidden influence. AI is used to present advertisements, search results and newsfeeds to users, which gives power to the designers and owners of such systems to control what users see and how they see it. Governments will need to decide whether anti-trust actions should be levied against AI companies, especially if rounds of industry consolidation create a single entity with monopolistic power, in addition to the economies of scale in big data and AI.

To address these issues, some organisations have started trying to become more transparent with their work on AI by making their algorithms and data publicly available for others to use and analyse. Companies including Google, Microsoft, Facebook, Amazon and IBM have formed a partnership for this purpose, while others, such as OpenAI -- a non-profit founded by Elon Musk - were built on the idea of AI benefiting everyone in society.

Calls for transparency in AI will increase, as AI adoption grows and its failures, when they occur, affect more people. By 2035, the social impacts of AI will be a major point of political concern. If AI algorithms begin to evolve faster than engineers can understand them, such as

¹⁴ Frey and Osborne, "The Future of Employment: How susceptible are jobs to computerisation?", 17 Sept. 2013, http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf.

¹⁵ "Technology, globalisation and the future of work in Europe: Essays on employment in a digitised economy." Dolphin, Tony. (eds.), *Institute for Public Policy Research*, Mar. 2015, http://www.oxfordmartin.ox.ac.uk/downloads/academic/technology-globalisation-future-of-work_Mar2015.pdf.

the Facebook chatbots that invented their own non-human language, there will likely be incidents that cause questions of legal liability for the creators of destructive or invasive algorithms.¹⁶ Questions about how AI runs advertising or news aggregation in the run-up to elections may be one of the first debates to be held about this issue, and will likely arise in the next few years.

3. Sharing economy

It is estimated that a sharing economy, one in which non-full time employees use assets they already own (such as a car or a spare bedroom) to generate additional income, could have an annual global value of 335 billion dollars by 2025. Governments have had mixed success regulating sharing economies. Firms that coordinate such activities are growing in popularity among providers and users of the service, and their legal, lobbying and marketing resources have often helped them prevail as force in highly regulated markets -- although in other cases they have adapted to comply with at least some existing rules.

By 2035, most governments will have adopted some regulatory framework for these companies, given the unsustainability of the current system of firms operating in legal grey areas and then adopting post-hoc lobbying campaigns. However, the time of adoption will likely depend on whether incumbent actors decide to co-opt the new market entrants, or fight to exclude them.

One question will be whether any sharing economy achieves monopolistic status. This has not yet happened. In the New York City taxi market, one of the most currently lucrative of all sharing markets, Uber and Lyft combine for more weekly trips than taxis in 2017. However, Uber faces a number of reputational challenges and licenced taxis are adopting ride-hailing software.¹⁷ Nonetheless, platform economics -- in which companies act as the intermediary between vendor and customer -- lead naturally to monopolies, because having a larger number of customers attracts a larger number of suppliers (such as drivers for Uber, homeowners for AirBnB, or sellers on eBay), which increases the options for customers, creating a mutually reinforcing cycle of growth. As the sharing economy matures and monopolies emerge in various markets, governments will likely find themselves pressured to break up firms that are preventing new entrants into that market.¹⁸

4. Data privatisation

The amount of private data ownership is rapidly rising, creating a unique problem for governance. Questions of data ownership, consent, passive and purposeful data exchanges, and individual liberties will enter public discourse as government ability to secure data is tested.

¹⁶ LaFrance, Adrienne, "An Artificial Intelligence Developed Its Own Non-Human Language," *The Atlantic*, 15 Jun. 2017.

¹⁷ Schneider, Todd W., "Taxi, Uber, and Lyft Usage in New York City," <http://toddwshneider.com/posts/taxi-uber-lyft-usage-new-york-city/>.

¹⁸ Choudary, Sangeet Paul, "The Dangers of Platform Monopolies," INSEAD Blog, 8 May, 2017, <https://knowledge.insead.edu/blog/insead-blog/the-dangers-of-platform-monopolies-6031>.

Local governments will increasingly need access to data in order to deliver human services and enforce laws. Location data from personal devices could be used to help support search and rescue operations and disaster response teams. Sociometrics could help innovate communication systems. Governments will have to collaborate with companies developing new technologies, which could be difficult given limited budgets.

Yet privacy concerns will only grow as the amount of data expands.¹⁹ Governments will be asked to pass regulations to ensure citizens' privacy, while also being tempted to pass legislation allowing governmental access to data for law enforcement purposes. If glasses that include cameras like Google Glass, or home listening devices like the Amazon Echo, proliferate, then citizens will be unwittingly creating recordings of nearly every moment of their lives, creating a political debate that will touch some of the most sensitive issues in society.

II - Implications for Europe

The European Commission estimates that new technology will boost Europe's GDP by 110 billion euros annually over the next five years, benefiting sectors that account for 60% of the regions GDP.²⁰ However, the poorer EU Member States are likely to face severe drastic job losses because they have higher concentrations of low-skill jobs. The disruption of the job market will be particularly challenging for countries that have less developed pension systems and even the richer states will lose out if Europe as a whole does not compete in the field of AI.

One of the largest problems Europe will face in the next two decades is that most of the largest tech providers in the world are based in the United States and China, and their dominance in the sector will be consolidated by the shift to AI. The knowledge economy is particularly suitable to economic clusters, in which a concentration of workers, companies, and capital create a competitive advantage that is difficult to break. The United States has the world's largest cluster for information technology in Silicon Valley, with clusters for other industries in New York (finance), Boston (biotech), and Detroit (automobiles).

Europe does not have similarly dominant clusters in these some of these sectors. Rather, many industries are spread out across countries.²¹ Widespread networks can function well in some sectors, especially complex manufactured products which can have separate hubs for types of parts or assembly factories. However, industries in which there is a high level of turnover within companies, or rapid start-up formation, tend to favour clusters, for the simple reason that changing jobs does not necessitate a person move houses, thereby reducing friction in the labour market. Of further concern to Europe, a 'hard Brexit' could damage UK-based clusters, such as the finance cluster in the City of London.

Therefore, the EU will face the challenge of either supporting the development of single clusters, which will require picking which regions will benefit from investment and job

¹⁹ Totty, Michael. "The Rise of the Smart City." *The Wall Street Journal*, Dow Jones & Company, 16 Apr. 2017, <https://www.wsj.com/articles/the-rise-of-the-smart-city-1492395120>.

²⁰ Karnitsching, Matthew. "Why Europe's Largest Economy Resists New Industrial Revolution." *Politico*, 4 Apr. 2017, <http://www.politico.eu/article/why-europes-largest-economy-resists-new-industrial-revolution-factories-of-the-future-special-report/>.

²¹ For details on clusters by industry, see <http://clustermapping.us> and <http://www.clusterobservatory.eu>.

growth, or rely on US or Chinese technology, with the concern that Brexit negotiations will lead to the disruption of some existing clusters. Both are politically difficult approaches, and there has already been considerable US-EU friction over EU rulings against US technology companies. The mismatch between the relative profiles of US and EU firms in the web economy means that EU interventions in applying EU rules and designing new legislation will have differential impacts and major US firms will lobby European governments and regulatory agencies -- perhaps with US government support -- to minimise any adverse effects.

Trend 4: Climate change and resource competition

Changes in the global climate due to rising greenhouse gases (GHGs) will not be reversed by 2035, even if great strides are made with the implementation of political agreements to greatly reduce carbon usage in the future. As the consequences of climate change become increasingly apparent -- and natural events such as famines and water strain become linked to climate change in popular discourse -- the world is likely to see climate-related political disputes proliferate at the national and international level.

I - Growing GHG emissions

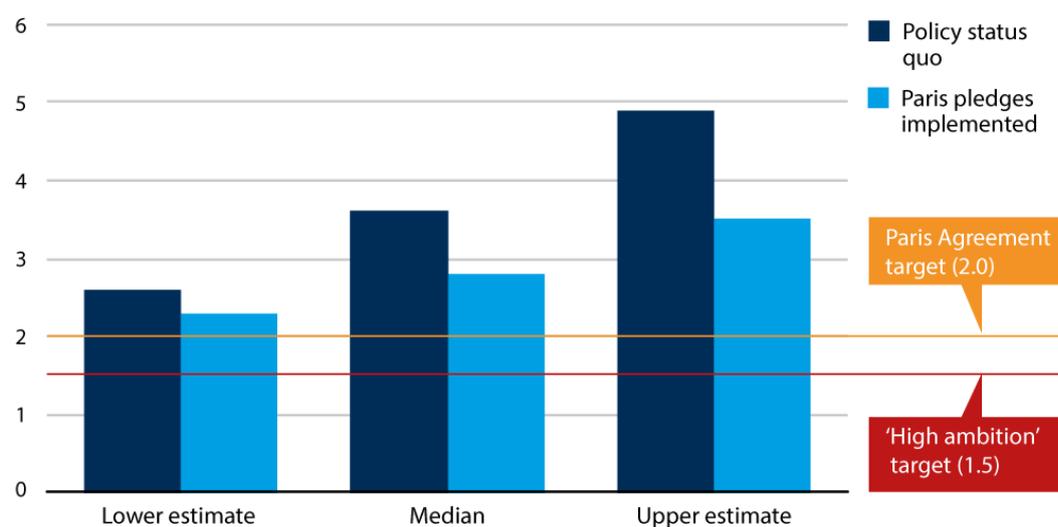
According to the European Environment Agency, Europe is on track to hit its 2020 GHG emissions target, and to miss its 2030 target.²² By 2023, all countries will be expected (at a UN Framework Convention on Climate Change 'stocktake') to indicate trajectories and possible targets for GHG reduction efforts beyond 2030. By 2035, a new round of GHG emission reduction targets will be underway, more demanding than the current round.

Despite the efforts of countries to fulfil their targets set out in the 2015 Paris Agreement, climate change will have drastic effects by 2035. Globally, emissions will continue to rise, by about 13% for carbon dioxide emission by 2035, according to the base case in the 2017 BP Energy Outlook.²³ Even if there were a major breakthrough in renewable technology soon, the amount of GHG already in the atmosphere and the time needed to shift the global economy away from carbon means that some of the most damaging effects of climate change will begin to be experienced in 2030-35. The result will be disruption in weather and climatic patterns that will lead to competition and possible conflict over resources, with spillover into the political realm.

²² "Total Greenhouse Gas Emissions Trends and Projections." *Total Greenhouse Gas Emissions Trends and Projections* – European Environment Agency, 21 June 2016, <http://www.eea.europa.eu/data-and-maps/indicators/greenhouse-gas-emission-trends-6/assessment>.

²³ "BP Energy Outlook 2035," Feb. 2015, <http://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2015/bp-energy-outlook-2035-booklet.pdf>.

Figure 10. Global warming above pre-industrial levels by 2100, degrees centigrade



Source: Climate Action Tracker

II - Resource competition

1. Food

Food sits at the nexus of many trends in resource competition and is one of the most important topics for its effects on political and humanitarian matters.

The Arab Spring of 2011 has been attributed, in part, to a spike in worldwide grain prices in 2010, caused by weather effects lowering the size of harvests in Russia, Ukraine, China, Argentina, Canada, Australia, and Brazil.²⁴ Political change triggered by rising food prices is not new; the French Revolution followed two years of poor harvests. However, in the next decades, that climate volatility is expected to increase the frequency and severity of these events.

Food scarcity on a global scale is not inevitable. In its latest working paper, the UN Food and Agriculture Organisation (FAO) is sanguine about the ability of agriculture to provide for population growth.²⁵ It projects that population growth will be lower than in the past century, especially in richer countries with more land-intensive diets, and the bulk of population growth will come in poorer countries, which will have diets based on grains and vegetables that are more efficient to farm.

However, there are three major wild cards. Climate change could make existing agricultural areas less suited for cultivation. A global middle class may shift more rapidly to demanding

²⁴ Kelley, Colin P., et al. "Climate change in the Fertile Crescent and implications of the recent Syrian drought." *Proceedings of the National Academy of Science of the United States of America*, vol. 112, no. 11, 2015, <http://www.pnas.org/content/112/11/3241>.

²⁵ Alexandratos, Nikes., Bruinsma, Jelle., "World agriculture towards 2030/2050: the 2012 revision." *ESA Working Paper No. 12-03*, FAO, 2012, <http://www.fao.org/docrep/016/ap106e/ap106e.pdf>.

meat -- itself a driver of climate change. And yields may cease to rise quickly enough to keep up with demand.

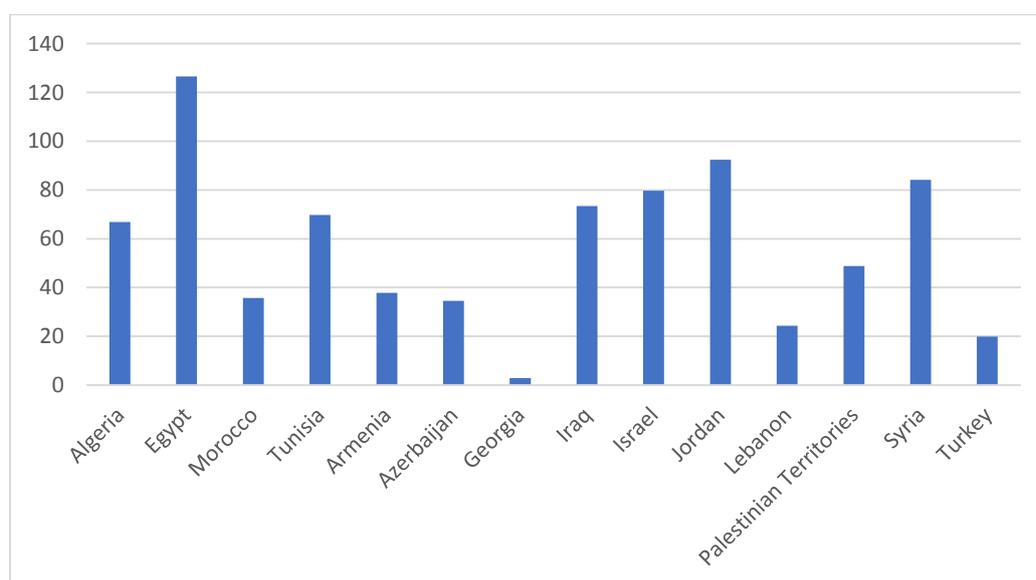
The most likely course for food competition in 2035 is that there are sufficient resources for the world population, but with periodic protest movements as importers face price rises. Developed countries will be investing in innovative farming techniques, such as indoor farms or meat grown in laboratories, but the vast majority of the world's calories will come from traditional farms. Food supply measures will come increasingly to focus on minimising wastage -- the EU wasted about 88 million tons of food in 2012 -- and maximising yield through better monitoring of farmland.²⁶

However, food production may increasingly be in competition with other environmental objectives. The need to limit deforestation, and thereby constrain development of palm oil and the area available for grazing cattle expansion, or the demand for renewable biofuels, could cut into the supply of affordable food.

2. Water

The availability of water is becoming one of the most important inputs for a country's economy. In many parts of the world, such as the Middle East, water basins are becoming "closed," meaning that all water has been allocated for use, and climate change is adding additional pressure.

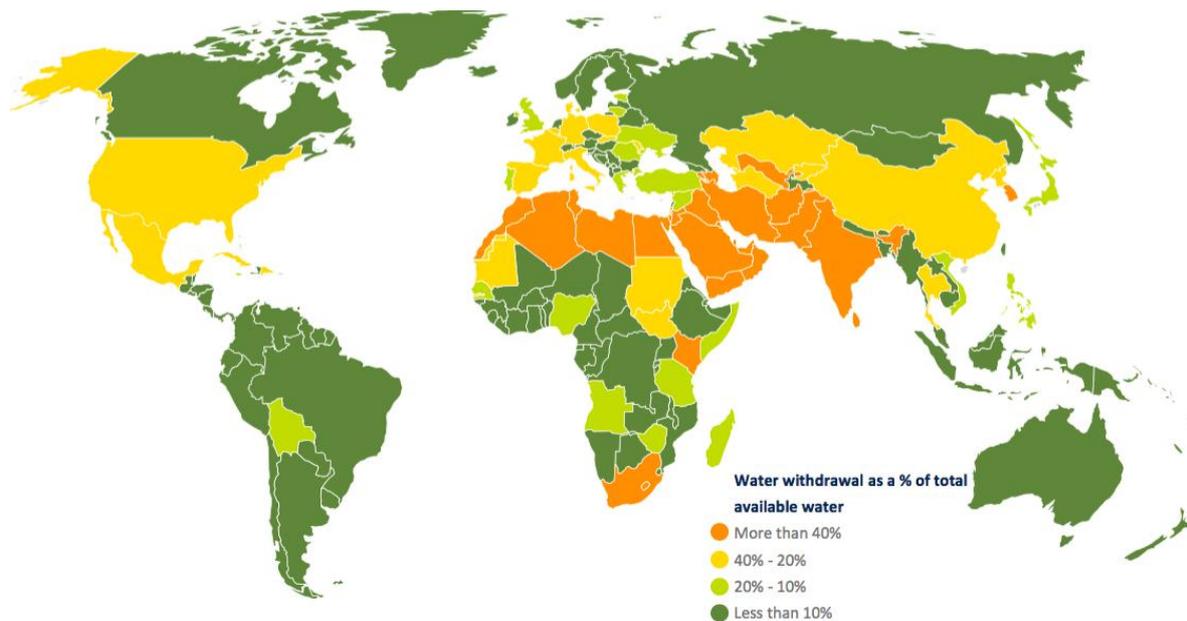
Figure 11. Freshwater withdrawal as percentage of total renewable water resources in countries near Europe.



Source: FAO AQUASTAT

²⁶ Stenmarch, Åsa. et al. "Estimates of European food waste levels." FUSIONS, 31 Mar. 2016, <http://www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf>

Figure 12. Projected water withdrawal in 2025



Source: FAO AQUASTAT

To tackle this issue, governments are experimenting with a variety of regulatory and legislative reforms. These include:

- _ restricting the amount of water rights available;
- _ creating tradeable water permits; and
- _ increasing effluence controls and introducing tradeable effluent permits;

Water prices rarely reflect the true cost of provision, as governments have often created indirect or direct subsidies. Reform of water practices will therefore increase the cost of water for industry and agriculture. This will lead to business adaptation to minimise the use of water, or to minimise the effect of using water, such as building factories that can recycle their wastewater.

Emerging policy developments and technological innovations will significantly shape water management practices and opportunities in the coming decade. These innovations will occur in three main areas:

- _ **Water Data.** Advances in satellite and drone-based remote sensing allow systematic data collection of water uses while sensors allow water utilities to monitor water use, leaks, and contaminants in real time.
- _ **Water supply.** Emerging desalination technologies will make desalination increasingly viable for many uses. New generation membranes incorporating nanoparticles, carbon tubes, and graphene-based materials are showing superior permeability and salt-rejection. Combined with renewable energy, which will allow easy power supply to desalination plants, coastal cities around the world may be able to supply their own water by 2035 through ocean water. However, it will still be

inefficient to move water inland, given the power challenges inherent in moving the weight of water against gravity.

- **Water Use.** Agriculture claims 70% of world water withdrawals, so precision irrigation techniques, such as drip systems delivering water directly to crop roots, can be some of the most effective water control measures possible. Advanced genomics could help farmers optimise growing conditions, watering amounts, and schedules based on better understanding of plant genomes.

2.1. Water in Europe

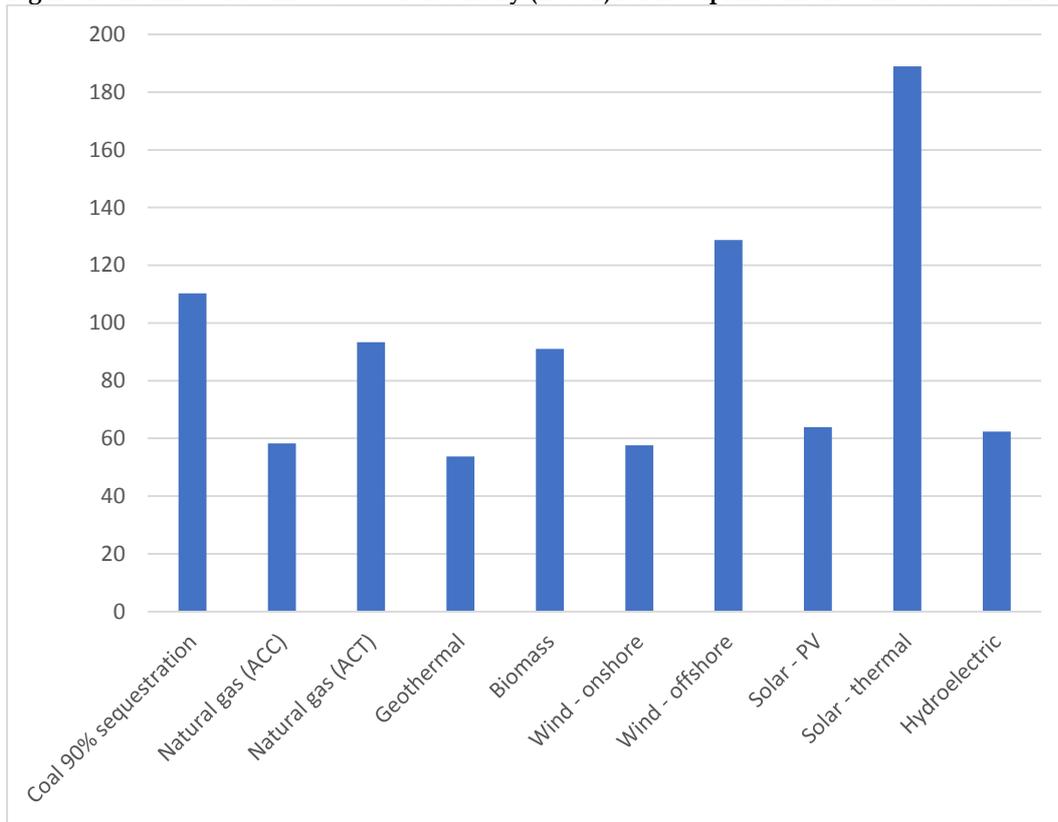
Europe is, as a region, relatively resilient in terms of water availability, but will be affected negatively by migration pressures from areas of collapsing water supply, notably the Middle East, and positively from the demand for European technology to monitor and minimise water usage.

3. Energy

The energy sector may see little to no competition for resources by 2035. This is, in large part, due to the rapid advances made by renewable energy in the last decade. Energy companies are attempting to position themselves for this new business model. They are shedding high carbon assets such as coal-fired generation power plants.

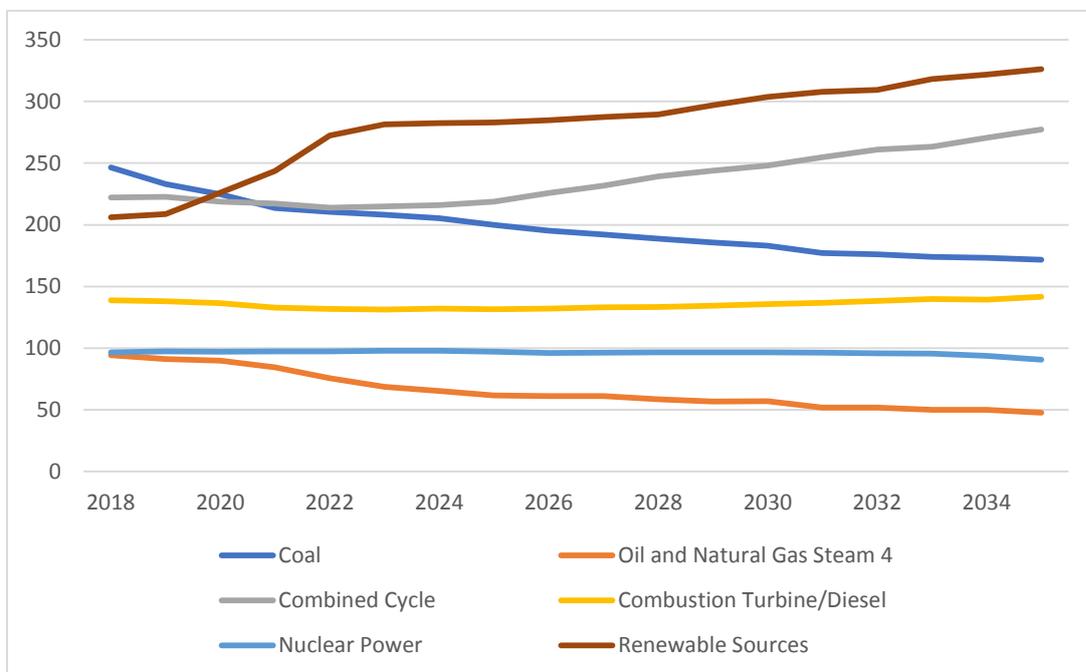
The fall in solar and onshore wind costs puts renewable energy on a new footing. Previously, renewables helped countries to meet climate change targets and secure supply, but were relatively expensive. By 2035 they will likely meet affordability criteria, and do so without subsidy in developing countries, leading to increased generating capacity worldwide, tracking the shape of the power market in the United States, as shown in Figures 13 and 14.

Figure 13. Estimated levelised cost of electricity (LCOE) for new plants in the United States in 2040, dollars



Source: Energy Information Administration Annual Energy Outlook 2017

Figure 14. Estimated electricity generating capacity in the United States, gigawatts



Source: Energy Information Administration Annual Energy Outlook 2017

3.1. Fracturing the global market

By 2035, the proliferation of renewable energy technologies, especially wind, solar, and tidal, combined with more energy efficient buildings and electric vehicles, could put an end to the concept of countries as energy exporters. Because renewable energy can be produced in any country that has wind and sun, the local energy market may be largely supplied by a country's own resources. For many developing countries, this will require the development of grid infrastructure across countries. This would allow the peaks and troughs in the solar and wind to be balanced out across large distances.

There may still be a need in many electric grids for a fossil fuel-generated baseload, which can take over when renewable sources are lagging, or to produce on-demand increased load. However, this market may soon be serviced by natural gas, which can be globally traded when more LNG terminals are built in both exporting and importing countries. The baseload could become more climate friendly if technology develops surrounding bio-energy with carbon capture and storage (CCS). This involves using biomass in energy plants, then storing the carbon. The technology is at an even earlier level of maturity than regular CCS, but it features heavily in many future energy models, and is probably the main requirement in terms of meeting climate targets by 2100. However, there are land-use implications of bio-energy with CCS because it would require turning agricultural land away from food production.

Nonetheless, the development of alternate sources of energy will likely fail to create climate-friendly fuels for aviation and shipping, which will form a rising proportion of GHGs.

For Europe, the downside of this will be the geopolitical instability that a shift to renewable energy could unleash. Many countries in its neighbourhood are dependent on oil and natural gas; fuels comprise more than 50% of merchandise exports for the Republic of Congo, Oman, Russia, and Kazakhstan, more than 75% of exports for Saudi Arabia, Qatar, Azerbaijan, and Kuwait, and more than 90% of exports for Nigeria, Algeria, Angola, and Iraq. A drop in those exports could trigger unrest, as governments find that they are unable to fund services or maintain the social contract that, in some countries, was dependent on the revenues oil and gas provided.

III - Political solutions

Many of the developments in this era will impact the outlook for climate change and spur new divisions within international politics.

1. US-China rivalry

After the 2009 Copenhagen summit, which led to no concrete plans, much of the developed world's efforts on climate change focused on encouraging China to reduce emissions. At the 2015 Paris summit, these efforts succeeded, only to see the United States turn away from a climate-friendly trajectory when President Donald Trump announced plans to pull out of the Paris Agreement.

However, by 2035, Trump's Administration will most likely be seen as a blip in the historical trajectory. US cities and states have promised to keep their own emissions targets, mitigating the damage to climate efforts from US withdrawal. Nonetheless, Trump may delay concerted US action by four years, which will make global targets difficult to achieve.

More importantly, the US business community will look to keep pace with China on renewable energy technology. Beijing has announced a 2.5-trillion-renminbi investment programme in renewable energy as part of its 13th Five-Year Plan (2016-20). This continues the twin strategies of boosting the share of non-fossil fuel in the energy mix and supporting the growth and internationalisation of China's renewable energy manufacturing industry. As long as the Chinese economy does not suffer a major collapse during the next two decades, investment and state support for the sector is likely to continue in the 14th and 15th Five-Year Plans.

2. Developed world vs developing world

One of the major accomplishments of the Paris summit was to commit all signatories, both the developing world and developed world, to GHG reduction targets. However, this will continue to be one of the key dividing lines, as developing countries such as India will push for greater flexibility and financial assistance, while Europe, the United States post-Trump, and China will push for stricter controls.

Climate change could become a source of international power dynamics, much in the way that terrorism has shaped diplomatic efforts since 2001. If a major ecological disaster hits the United States, China, or the EU (see Trend 8), there may be political will to use both hard and soft power to enforce climate governance on recalcitrant countries. Tariffs on exports or sanctions on companies known to use fossil fuels could be used to mandate compliance; more likely, foreign aid will be targeted to renewable and energy efficient programmes, while bilateral assistance in carbon-intensive industries will receive international scrutiny.

Trend 5: Changing power in the international system

In many ways, the power balance in the international system in 2017 looks broadly similar to the world in 2000. The United States is still the world's only superpower, able to launch and sustain major military operations around the world. The international system can be most accurately described as unipolar. NATO and the EU provide for security in Europe. Second-tier powers, notably China and Russia, do not yet have the capability to challenge for global leadership.

Yet in many fundamental ways, the world has changed considerably. The wars in Iraq and Afghanistan have left the United States and its coalition partners wary of foreign intervention. China has expanded its global presence with foreign investment, aid and military bases. Russia has demonstrated a willingness to intervene in neighbouring countries and attack democracies with information 'wars'. The impact of the financial crisis and economic downturns have hit many nations' capabilities to fund military increases.

Projecting the future power balance of the world in 2035 is highly susceptible to wild cards and black swan events. Nonetheless, there are some broad trends that are likely to continue through 2035.

I - Country power projections

1. United States

In 2035, the United States will most likely still be the world's preeminent military power. It will have the world's largest defence budget and have the most technologically advanced military. The US armed forces have spent the last two decades learning how to better operate in the "Long Wars" in Iraq and Afghanistan, with an emphasis on small unit action and defences against irregular forces.

The United States will likely continue to have the capabilities for a wide range of operations, from carrier group actions to Special Forces raids. Its plans for these actions will include greater budget space for drones, special operations, and cyberwarfare.

2. Russia

Russia's military will be highly constrained by its economy. This in turn will be affected by the income from the country's mineral wealth, which is currently suffering from the fall in oil prices from the peak of 2014 and the impact of a declining workforce. If current trends hold, the working force population would drop from about 85 million to less than 75 million by 2035.

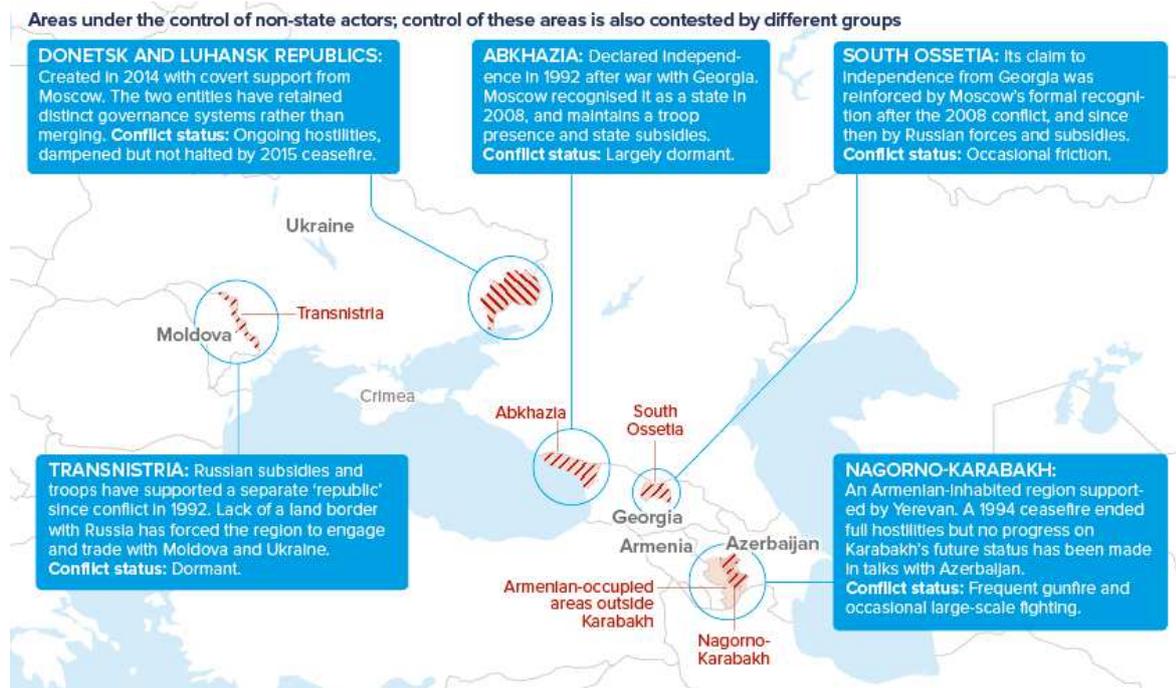
However, this does not necessarily mean that the geopolitical power of Russia will drop precipitously. Military capabilities are slow to develop; an economic boom cannot be immediately translated into the hardware and tactical proficiency needed for adequate operations. Just as China's military rise has lagged its economic rise by at least a decade, and maybe more, Russian military power will remain significant even if its economy crumbles.

Russian power will be focused on areas of high impact and relatively low cost. One of the most important will be anti-access/area denial (A2/AD) systems, which would prevent operations by other countries in or near its territories. In the Russian case, the A2/AD 'bubbles' that Moscow has created along its western frontier include the S-400 air defence system, the Iskander ballistic missile, and the K-300 Bastion anti-ship missile.

These long-range anti-access systems are complemented by platforms, including new generations of submarines and fighter jets, which further contribute to Russia's ability to keep NATO at a distance during a crisis. However, a major issue will be the extent to which the Russian defence industry can remain competitive. It has been heavily dependent on export orders, which will dry up if Chinese or Indian manufacturing reaches Russian levels of quality and price.

Russia will therefore likely be playing a "spoiler" role through 2035, concentrating its forces in preventing freedom of action for NATO, or in state-based asymmetric warfare, such as informational attacks and cyberwarfare. Geopolitically, it will likely focus its attention on its neighbours, especially former members of the Soviet Union with internal disputes, as described in Figure 15.

Figure 15. Russian-backed regions that claim sovereign or autonomous status



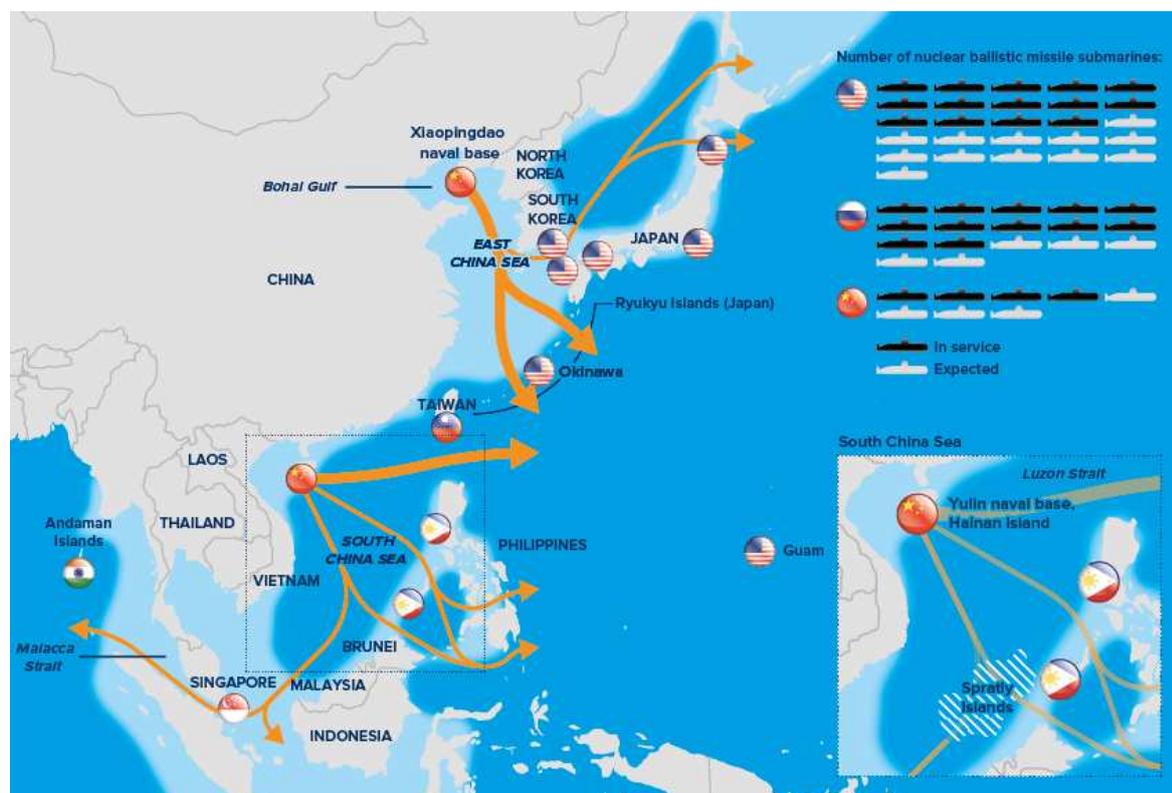
Source: Oxford Analytica

3. China

China's military capabilities will continue to grow, a product of increased expenditures as its GDP grows and time spent incorporating modern equipment into tactical and strategic plans. By 2035, it will have multiple aircraft carriers and will likely have more basing rights for its forces in other countries. Most likely, it will attempt to do so in the ports it is building or funding around the Indian Ocean rim.

China's military will not equal that of the United States by 2035, but it will be sufficient to play a major role in its near abroad. The South China Sea may be the first flashpoint, as island building and territorial disputes could be the ingredients of miscommunication leading to conflict. It may also play a role in peacekeeping operations outside of Asia.

Figure 16. South China Sea provides a strategic advantage to China’s growing nuclear-armed submarine force as a more secure outlet to the open ocean



Source: Oxford Analytica

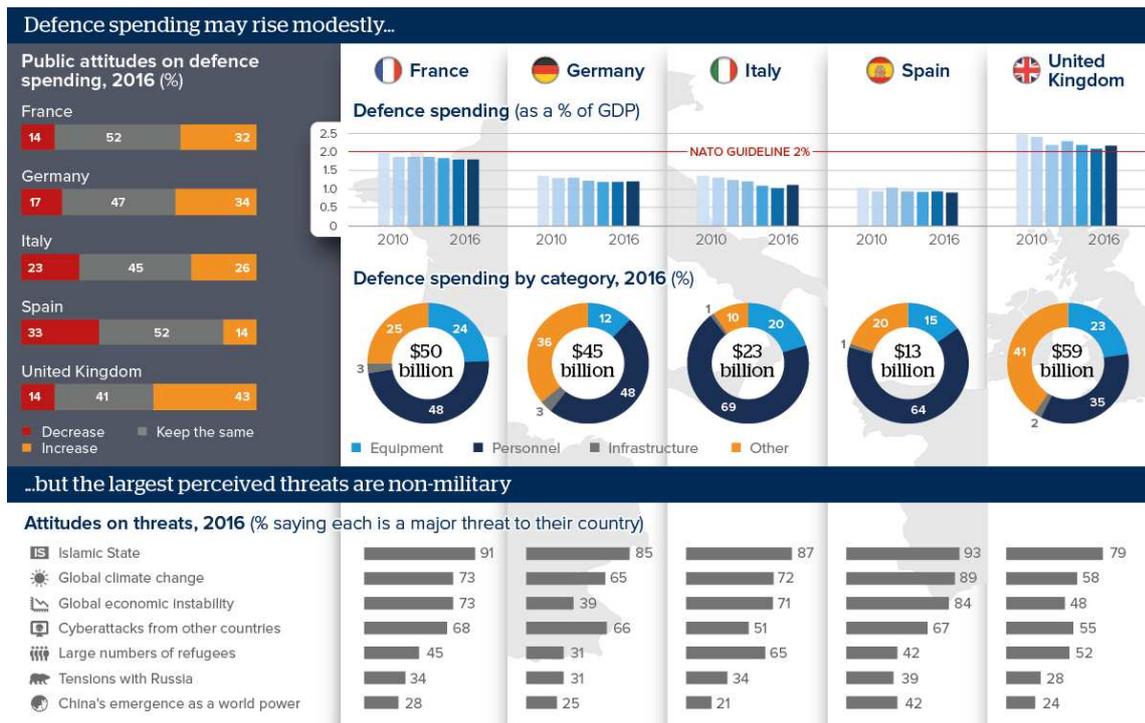
China’s greatest strategic liability is the threat that it poses to others. Although it will have less military power than the United States, balance of threat theory suggests that it will be seen as the larger concern to countries nearby. The United States has been able to play the role of the offshore balancer and a supporter of an Asia-Pacific order that is largely supported by the other states in the region.

China may become severely constrained in its freedom of action if its greater strength leads to the creation of coalitions against it. This seems to have already happened in the Indian Ocean. The United States and Japan are helping India to develop advanced naval platforms and weapons systems, giving it privileged access to their military technology. India may eventually become a security contributor not only in the Indian Ocean but throughout the Indo-Pacific as the trilateral relationship deepens.

4. European Union

The largest variable in projecting global military power in 2035 is that of the EU. At the moment, one of the largest tensions within NATO is European members spending less than the 2%-of-GDP guidelines. In part, this is because, within member states, the largest perceived threats for Western Europeans are not geostrategic, but relate to climate change, economic stability, and domestic terrorism. Defence spending may increase over the next decade in response to US calls, but large increases are unlikely as public support appears to be weak, especially in Italy and Spain which face large debt burdens.

Figure 17. European defence spending and attitudes



Source: Pew Research Center, NATO

Yet the EU collectively trails only the United States in military spending. The difficulty for European states is translating funds into power projection. The Commission estimates that a lack of cooperation costs the EU Member States between 25 and 100 billion euros annually, and duplication in administration and personnel means that far fewer of its service members can be deployed on operations at a given point in time than is the case for the United States.²⁷

If the European Union continues on post-2008 trends, it and its Member States will be minor powers by 2035, with military spending falling to only two-thirds as much in real terms as in 2005. The EU is also vulnerable to more EU member states leaving or choosing to prefer defence cooperation through NATO in order to partner with a post-Brexit United Kingdom and its defence industry.

If the EU consolidates its defence procurement procedures, ensures interoperability, and creates a more streamlined decision-making process, it will be one of the most significant actors in international security. While a unified command structure may not be in place by 2035 -- thereby limiting the EU's scope of operations in conflicts -- it will play a large role in areas of immediate interest the Middle East or Africa.

5. G20

It is to be expected that economic growth will translate into military power and so by 2035, regional powers will be playing a much larger role in military operations. Even if no other

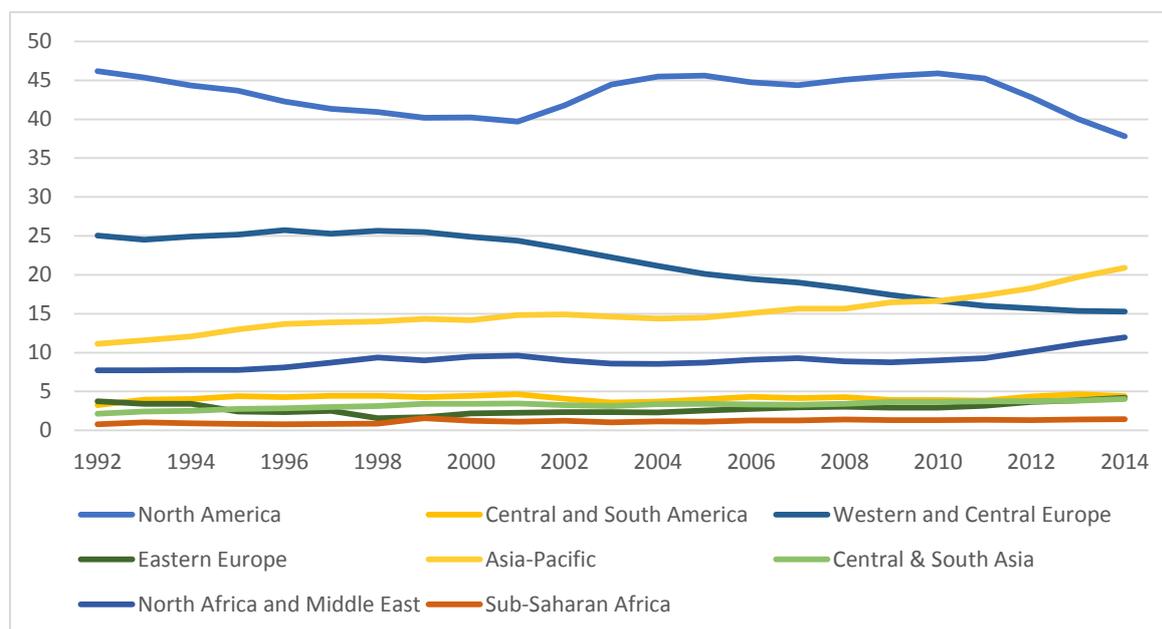
²⁷ European Commission, "European Defence Action Plan: Towards a European Defence Fund," 30 Nov. 2016, http://europa.eu/rapid/press-release_IP-16-4088_en.htm.

country approaches the military capabilities of the United States, China, or Russia, there will be countries or coalitions powerful enough to launch and sustain operations of their own. The Saudi-led campaign in Yemen may be an example of these types of operations.

Likely places for these campaigns to emerge would be in Sub-Saharan Africa, the Middle East, and Southeast Asia, where there are a number of countries with some expeditionary military capabilities, although militaries in those countries may be mostly preoccupied with internal conflicts. As seen in Figure 18, the share of worldwide military expenditures has declined for North America and Western and Central Europe, while the Asia-Pacific region has nearly doubled its share since the end of the Cold War.

One variable is the role of Turkey over the next twenty years. While it is not likely to be expelled from NATO in the near future, if it continues towards an authoritarian style of government, it is more likely that it will pursue a foreign policy increasingly divergent from Europe or the United States. Turkey may seek to become the most pivotal power in the Middle East, North Africa, the Caucasus, and Central Asia, taking positions at odds with the rest of NATO. This could elevate Turkey's influence in the region at the same time undermining the US and Europe, which may be reluctant to press Turkey for fear of causing greater disruptions within NATO. However, this could spur greater defence cooperation within the EU, as member states seek to work together in an institution not affected as much by policy towards Turkey.

Figure 18. Share of world military expenditures by region, %.²⁸



Source: SIPRI

²⁸ Data does not include: Cuba, Eritrea, Iraq, North Korea, Somalia, Syria, Turkmenistan, Uzbekistan, former Yugoslavia

Trend 6: New arenas of state competition

When projecting long-term trends in international affairs, it is important to consider the possibility that the major conflicts of 2035 will be centred on issues that barely register in the international arena today, or are secondary matters at best. While this section focuses on state action, it is important to note that corporations and international institutions will play a key role in each of these areas.

I - Space

Space is marked by the amount of civilian international cooperation that exists alongside military competition.

US-Russian cooperation on the International Space Station is the most obvious example, but the joint European-Russian ExoMars mission, the China-Brazilian joint effort to develop remote sensing satellites, and other examples of scientific collaboration all continue the long tradition of linkages between national space activities and diplomacy. Cooperation will become even more important as developing countries grow their consumer sectors but have no satellite production capabilities.

However, space plays a key role in conflicts. The use of satellites as a linchpin of command, control, and communications networks seems unlikely to change in the next two decades. They will also continue to play a key role in military monitoring, although they will increasingly be supplemented by airship-based surveillance networks and drones. Militaries will seek ways to reduce satellite vulnerability to protect their systems from attacks.

Space will continue to be an important component of international prestige. The United States has signalled an intent to reinvigorate its space programme with Moon, Mars and asteroid recovery missions. Europe, China, India and Russia all have plans to continue their space exploration efforts and, although the next major bout of exploration will lack the frenzied timeline of the 1960s, comparisons in achievements will be inevitable.

The domestic impact of space achievements will also be an important consideration for governments at a time of continuing pressures on funding allocation. ESA's Rosetta mission to comet P67 captured the public's imagination across Europe, in part through the social media skills of the Rosetta mission control team. Space achievements will remain a source of domestic pride and international admiration.

1. Trends in space market

The next two decades will see three distinct trends in the space industry, which has the potential to reshape how it is viewed and operated by policymakers.

1.1. Market differentiation

The satellite manufacturing market will split into two distinct types of products. The first will be a continuation of the current trend of developing larger chasses for direct broadcast satellites, as improvements in design and materials allow the number of transponders per satellite to increase without a commensurate increase in cost. This will mean a market for launch vehicles capable of carrying heavier payloads to geosynchronous orbit, such as the Ariane 6.

At the same time, there will be a growth in microsatellite constellations operating in low earth orbit that offer a robust network for constant communications or remote sensing. This will open up the market for launch vehicles that carry relatively small payloads at low cost and short notice, able to replenish these constellations when necessary. US companies, notably SpaceX and Blue Origin, are developing the ability to recover and re-use the expensive engines housed in the first-stage of launch vehicles.

1.2. Broadband

The second trend is the full-scale commercial development of global space-based broadband internet. The use of small low-cost satellites will be a key development here, and would generate a sizeable share of the commercial activity in the space sector.

1.3. Data collection

The third trend is a greater incorporation of space-based remote sensing data into systems operations. This has already been deployed in sectors such as oil and gas, but the combination of images collected from earth orbit with evolving interpretative software will both lower the cost of this data and increase its utility across commercial sectors. Advances in software to extract and incorporate the data means that the space-based component can be less sophisticated, more disposable and therefore cheaper. In a sense, the satellite market is moving closer to a mass market -- or at least high-volume -- product. Given the utility of satellites for military uses, the country that can capture this market will receive a boost in its strategic reach.

II - Maturing weapons systems in development

Given the long lifespans of many weapons systems, many of the foundational elements of the militaries of 2035 are already in development or deployed. However, their use and the mix of technologies could drastically change how technology is used.

1. Air

The F-35 Joint Strike Fighter was first declared combat-ready in 2015; it is projected to be in production until 2038 and operational until 2070. The F-35 has procurement orders from the United Kingdom, Italy, the Netherlands, Denmark, Norway, and Turkey, among others, which will make it a central element in NATO's flight arsenal for the next few decades.

While the F-35 is the most technologically advanced aircraft in production, it is likely that Russia, and perhaps China, will develop aircraft or air defence systems by 2035 that can negate some of its technical attributes, such as its stealth capabilities.

Despite considerable setbacks in the research and development of this aircraft, the F-35's proponents argue that it will transform aerial combat as a fully networked plane whose software can be updated. The Pentagon is exploring plans to allow the F-35 to be a manned command vehicle controlling a fleet of unmanned drones, or even retrofitted unmanned F-16 "wingmen" to fly alongside it.

While the F-35 may not fulfill its supporters' highest expectations, it does seem apparent that air warfare by 2035 will be marked among NATO militaries by a mix of manned and unmanned aircraft, which can operate in areas too dangerous for solely manned fighter jets and too delicate for solely unmanned drones.

Europe will face severe internal tensions in air procurement. The Typhoon and Rafale fighter aircrafts will still be operational by 2035 and there will be trade-offs between fostering intra-European cooperation versus purchasing aircraft developed outside the EU.

Europe will also face challenges to expanding its strategic transport capabilities -- if it is to become a greater expeditionary power -- and to engage in the drone market, currently led by US and Israeli designs.

2. Land

In the last fifteen years, US and European military forces have seen considerable technological advances, such as drone-based reconnaissance working in conjunction with ground troops. In the same time frame, however, low-tech adversaries in Iraq and Afghanistan proved highly effective at using improvised explosive devices and suicide attackers.

Land-based combat appears likely to evolve along the same lines. In many combat areas, small units of Special Forces will use superior technical and tactical capabilities to achieve national security aims. However, armies seeking to hold territory will develop systems to guard against asymmetric attacks, including using unmanned ground vehicles, such as the existing bomb disposal robots to monitor areas deemed too threatening for soldiers.

3. Sea

Aircraft carriers will remain central to the US Navy, which will retain its position as the most powerful ocean-going force by a large measure. By 2035, there will be at least three, and likely five, Ford-class supercarriers in the US Navy. These ships, and the Marine "Lightning carriers" that will deploy F-35s, will have a significant mobility advantage over land bases while maintaining extensive power projection capabilities.²⁹ Yet carriers could have a moment of extreme vulnerability. Defensive missile technology or stealth submarines carrying anti-ship guided missiles could make combat zones too dangerous for the expensive carriers, leading to a push to increase naval defensive measures.

Dominance by a US-led alliance in sea power is more likely to lead to other nations developing area denial capabilities, rather than competing in power projection capabilities. China is the exception. Although it is unlikely to compete in a conspicuous way with the United States by 2035, China's goal is to develop a blue-water navy within the next 25 years -- not least to assert its maritime claims in the East and South China Seas and protect its so-called 'first island' chain. Also, the view that carriers are linked to being a great global power will be hard to dislodge. The fact that China has begun investing in overseas naval bases suggests that the country is already moving in the direction of competing with the US Navy.

One exception to this trend may be submarines. Germany already has developed a submarine-launched unmanned aerial vehicle and advances in drone technology could make this a more effective weapons delivery platform. Additionally, underwater unmanned vehicles (UUVs) have been receiving increasing attention from the United States as a means of tracking enemy submarines.

²⁹ "Document: 2017 U.S. Marine Corps Aviation Plan." *USNI News*, 2017, <https://news.usni.org/2017/03/28/document-2017-u-s-marine-corps-aviation-plan>.

III - Policing rogue and failing states

Since the end of the Cold War, a dominant trend in international security has been military interventions in states that threaten the international order -- either through their actions or their inability to control their territory. In Iraq, the former Yugoslavia, Somalia, Afghanistan, Libya, Syria, and Yemen, international coalitions have been formed to replace regimes and try to build new ones more amenable to the global order.

While it is uncertain whether such interventions will be triggered for reasons of responsibility to protect, democracy promotion, or other ideological drivers, the security risk that such countries can pose to surrounding regions will be sufficient to ensure that such interventions will, at least occasionally, continue through 2035.

However, the initial post-Cold War interventions benefited from the willingness of the United States to bear a considerable portion of the costs, such as in the Gulf War of 1991, or for NATO to act as the umbrella organisation, as in Bosnia or Afghanistan. In recent years, this trend has waned; the Libya intervention in 2011 received crucial support from the Arab League before it was approved and the Syria conflict was driven mainly by regional powers prior to the Russian intervention.

A multiplicity of actors with different agendas will complicate strategic and tactical decisions. Actions against rogue or failing states in 2035 are more likely to resemble the mixed alliances of the Syrian conflict than the cohesive coalition of the Gulf War. Further, unlike the Gulf War, for which Soviet and Chinese abstentions at UN Security Council votes were critical to winning international legitimacy for the eventual Operation Desert Storm, there will likely be competition from China, Russia, and leading regional powers for policing operations, as this will give them greater political sway in the conflict zone.

IV - Cyber

Advanced persistent threats (APT), a term cyber specialists use to describe government-sponsored offensive actions in cyberspace, have been growing in recent years. Success in several arenas, from destroying nuclear centrifuges in Iran, to cutting information systems in Crimea in 2014 to hacks during the 2016 US presidential election, means that they will multiply in the near- and medium-term.

Businesses will collaborate with governments closely in public-private defence partnerships, but they will be unlikely to find ways to stop APTs. As government-sponsored cyber units experiment with operational concepts and doctrine, new forms of threats will emerge and mission objectives are likely to shift from espionage to more integrated cyber operations including sabotage and subversion.

By 2035, advanced intrusion capabilities will be available to many countries willing to use these techniques. The threat of altering medical records, accessing government personnel files, and targeting low-level bureaucrats for blackmail may become common and a routine part of conflict negotiation.

1. Government collaboration over norm-setting

As the spectrum of operations is explored, governments' incentives to agree on acceptable norms of behaviour will rise. The United States and China will be leading actors in gradually developing these norms over the next decade.

Although cyber espionage had been and is a major source of tension between the United States and China, there is evidence that China has begun to recalculate its use of cyber attacks.³⁰ An initial downward trend was visible before China concluded an agreement with the United States in 2015 to cease commercial cyber espionage and therefore, implicitly, to limit cyber attacks to governmental objectives such as national security or diplomatic advantage.

By 2035, the scope and scale of societal damage from a major civilian-focused cyber attack -- combined with the widespread access to cyber weapons -- will see states attempting to institutionalise control over such tools. Cyber may follow the same path as nuclear weapons, where, after an initial period of intense competition, a series of summits and international bodies attempted to regularise and control nuclear weapons, while deterrence theory pushed states away from their use.

2. Balkanised internet

However, cyber weapons are far harder to monitor than nuclear weapons. Debates over cyber defence may blend together with international disagreements on the idea of internet sovereignty. Chinese President Xi Jinping expressed a desire to establish sovereignty as the foundational norm of internet governance at the December 2015 Wuzhen World Internet Conference (WIC).

By 2035, China will have the largest or second-largest online population. With the purchasing power of its market, it, along with like-minded countries, such as Russia, Pakistan, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, will push to set rules for global internet governance. There is a significant risk that technical standards diverge over the next decade, making it difficult for Chinese and foreign systems to talk to each other. The impact of this could be serious on, for instance, the banking transaction platforms supporting Chinese import and export transactions.

Europe would then face squeezed economic opportunities, with China and similar countries locking out foreign companies and US firms seeking to capture what markets are left elsewhere.

V - Arctic

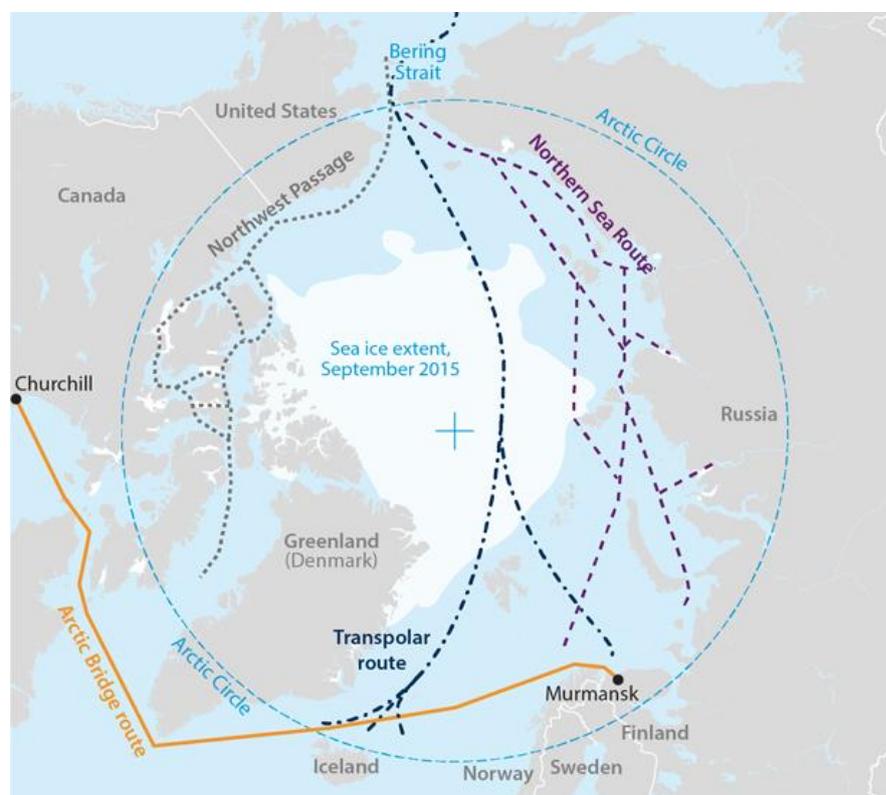
The 2014 synthesised International Panel on Climate Change report stated with very high confidence that the Arctic will continue to warm more rapidly than the global averages.³¹ Some models predict that the Arctic Ocean will be nearly ice-free before 2050, which means

³⁰ "Redline Drawn: China Recalculates its use of cyber espionage." *Fireeye iSight Intelligence*, June 2016, <https://www.fireeye.com/content/dam/fireeye-www/current-threats/pdfs/rpt-china-espionage.pdf>.

³¹ Intergovernmental Panel on Climate Change. "Climate Change 2014: Synthesis Report." *IPCC Fifth Assessment Report*, http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_All_Topics.pdf

that both the Northwest Passage and the Northern Sea Route will be open to shipping well before then.

Figure 19. Arctic sea routes



Source: Oxford Analytica

1. Territorial claims

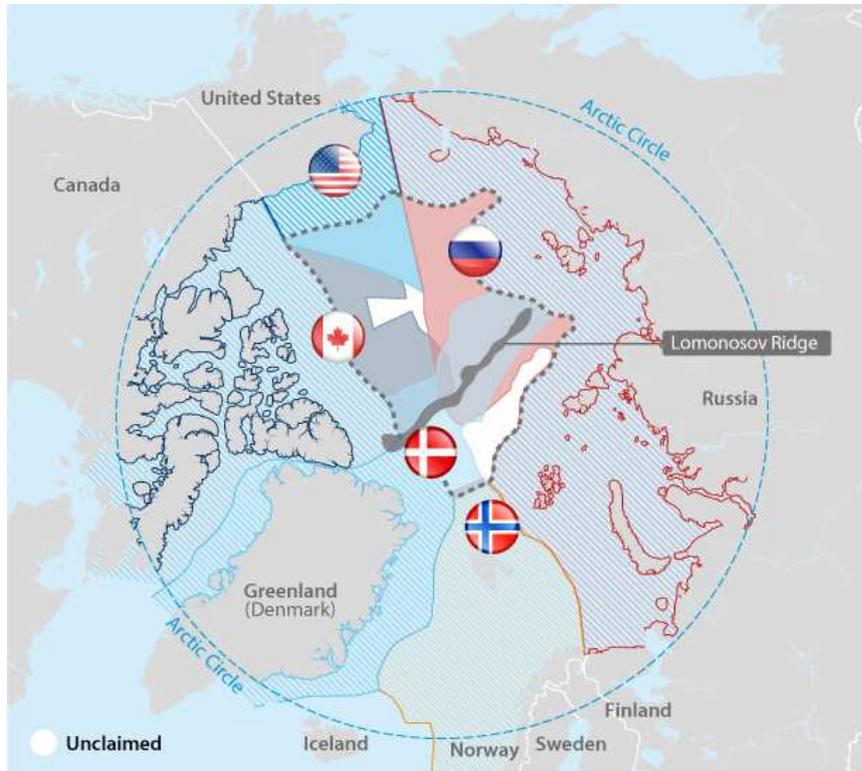
President Vladimir Putin describes the Arctic as an area where the military, political, economic, technological, environmental and resources aspects of national security converge. Moscow achieved an important win in 2013 with a positive decision from the UN Commission on the Limits of the Continental Shelf (CLCS) regarding the Okhotsk Sea enclave. This increased Russia's territory by 50,000 square kilometres.

In February 2016, Russia submitted evidence to the CLCS that the southern part of the Gakkel Ridge and Podvodnikov Basin, as well as the Lomonosov Ridge, the Mendeleev Ridge and Chukotka Plateau, represent a continuation of the Russian continental shelf.

The total area claimed is 1.2 million square kilometres, but this will be contested. Denmark has submitted its own claim to the CLCS and in September 2016 refused to negotiate with Russia bilaterally. Canada is expected to file its own claim with the CLCS in 2018; this is expected to lay claim to some of the same territory as Russia and Denmark.

By 2035, these claims will have been adjudicated in some way. The region contains 13% of the world's undiscovered conventional oil and 30% of its undiscovered conventional natural gas, according to estimates by the US Geological Survey, as well as mineral deposits.³²

Figure 20. Arctic territorial claims beyond existing boundaries (dashed line)



Source: Oxford Analytica

2. Institutional jurisdiction

Arctic concerns are currently managed by rules under the UN Convention of the Law of the Sea (UNCLOS) and the Arctic Council. China calls itself an “Arctic stakeholder” and a “near-Arctic state” and will push to have governing influence in the Arctic.

Outside interest in resources will act as a driver of cooperation among members of the Arctic Council. Arctic states will promote strict adherence to the UNCLOS regime and work within the Arctic Council to ensure that the decision-making powers of outsider states are held in check and that they can join only those governance structures and regimes that have been agreed by Arctic states.

There are three futures for the Arctic.

- **The next South China Sea:** competing territorial claims constantly threaten to devolve into armed conflict.

³² “Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle.” USGS, 2008, <https://pubs.usgs.gov/fs/2008/3049/fs2008-3049.pdf>.

- **New OPEC:** an oligopoly of resource-rich nations work to ensure that they alone determine policy for the region.
- **Marginal value:** If renewable energy and electric automobiles drive down the price of oil and natural gas, or if unconventional oil and gas extraction becomes significantly cheaper, Arctic resources may be too expensive to drill, providing significantly less incentive to turn the region into an arena for state conflict by 2035.

Trend 7: Politics of the Information Age

Politics often evolves as a reaction to changing societal and economic trends. The economic changes in the developed world from the 19th century to the middle of the 20th century, broadly speaking, led politics to be focused on the question of the role of the state in economic life, with left-wing or centre-left parties advocating more social democratic policies and right-wing or centre-right parties advocating more free market policies.

There is evidence -- from measures on inequality to the percentage of the economy comprised of manufacturing versus services -- that in much of the developed world, the industrial era has transitioned to an information economy. While there is no 'official' start to this era, the mid-1970s are a potentially useful dividing point. Around this time, advances in information technology and the entry of China into global markets created a situation in which the developed world's middle class -- its most powerful political bloc -- saw stagnating income prospects as an individual's productivity became decoupled from earnings.

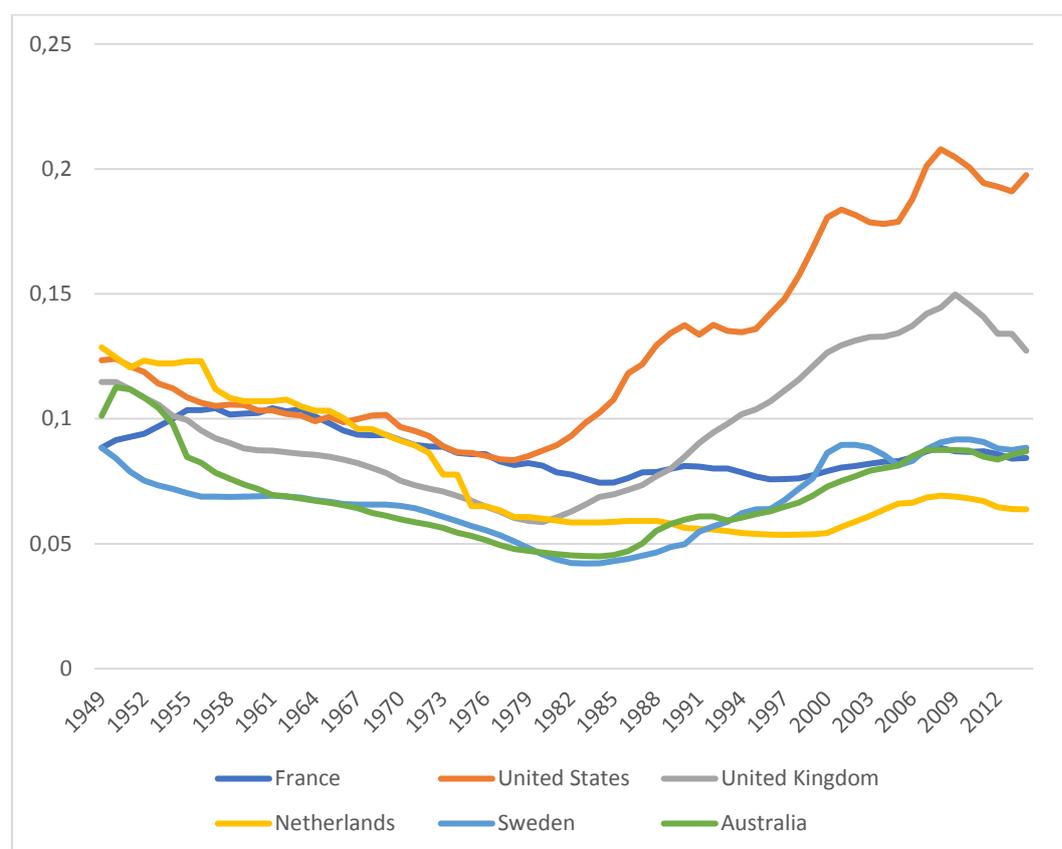
Political reactions to these economic changes are already underway and can be observed across the United States and Europe. While they are highly unlikely to completely overturn the existing political landscape by 2035, they will add new layers and issues that will shift partisan coalitions and incentive structures. Furthermore, although the next two decades will not be shaped directly by the global recession of 2008, they will be marked by the many trends the recession accelerated.

I - Inequality

Economic inequality has grown in the United States and Europe for most of the last thirty years in real terms and in political salience. The gap between the rich and poor was described as a "very big problem" by a majority of respondents in France, Italy, Spain, and Greece in a 2014 Pew survey.³³ Economically, the trend shows no sign of abating across the developed world, although, as Figure 21 shows, there is considerable variation between countries, with the United States seeing the most rapid change since the mid-1970s and France and the Netherlands seeing gradual changes.

³³ "Emerging and Developing Economies Much More Optimistic than Rich Countries about the Future." *Pew Research Center's Global Attitudes Project*, 2015, <http://www.pewglobal.org/2014/10/09/emerging-and-developing-economies-much-more-optimistic-than-rich-countries-about-the-future/>.

Figure 21. Percentage of national income earned by the top 1%, five-year rolling average



Source: World Wealth and Income Database

Researchers at the IMF have found evidence that the drivers of inequality include:³⁴

- Technological change, which increases the value of high-skilled work and replaces low-skilled work;
- Globalisation, which in the developed world, at least, contributes to the value placed on high-skilled work that can be sold to global markets, while offering cheaper labour input for low- and medium-skilled work;
- A decline in labour market protections, such as minimum wages and union memberships, which gives greater economic power to those at the higher end of the income spectrum;
- Tax policies, which have shifted since the immediate post-war era to lower marginal tax rates on the highest earners.

None of these trends appear close to disappearing and technological change will only accelerate them to 2035. Therefore, inequality in Europe is likely to rise.

³⁴ Dable-Norris, Era. et al. "Causes and Consequences of income inequality: A Global Perspective." *International Monetary Fund*, June 2015, <https://www.imf.org/external/pubs/ft/sdn/2015/sdn1513.pdf>.

While it is impossible to predict which issue will gain the most prominence in every country, there is evidence that people universally respond more towards situations of unfairness rather than strict inequality.³⁵ Therefore, it is most likely that the topic perceived as involving the most unfair practices, such as tax evasion, will attract the most popular attention.

II - Industry disruption

Despite popular press coverage of claims that AI and automation will lead to a sudden elimination of various industries, research performed on occupational data from 24 OECD countries since the 1950s demonstrates that changes in broad job categories often occur along smooth trends.³⁶ The share of the workforce in middle- or high-skilled jobs increased throughout the 20th century and displacement has happened over decades.

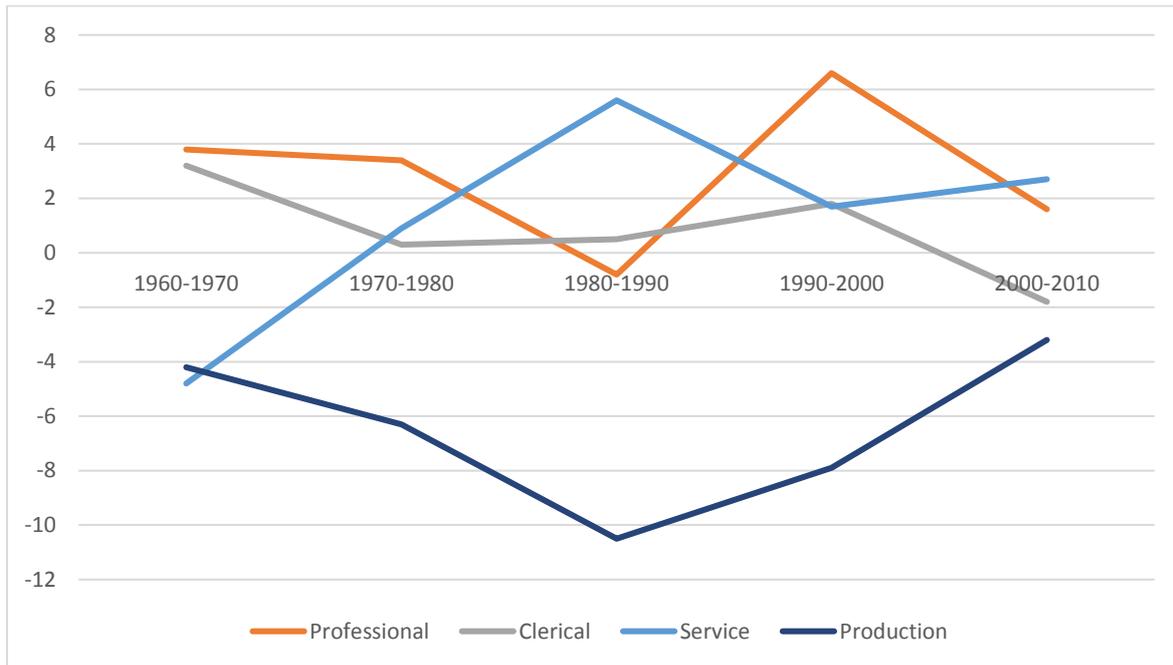
As seen in Figure 22, the share of jobs in the UK economy that labelled “Production” (including manufacturing and repetitive clerical work), has consistently dropped since 1960, with its biggest losses coming in the 1980s. As Figure 23 demonstrates, the decline in production jobs has occurred across the developed world, where the only decade in this sample where it increased by a large degree was in 1960s Japan, when it was in the middle of its post-war economic boom.

Therefore, the evolution of the workforce until 2035 must be considered in view of two factors: gradual changes that will accumulate to become major changes in industry employment; and industries vulnerable to drastic disruption.

³⁵ Starmans, Christina., Sheskin, Mark., and Bloom, Paul. “Why people prefer unequal societies.” *Nature News*, Nature Publishing Group, 7 Apr. 2017, <https://www.nature.com/articles/s41562-017-0082>.

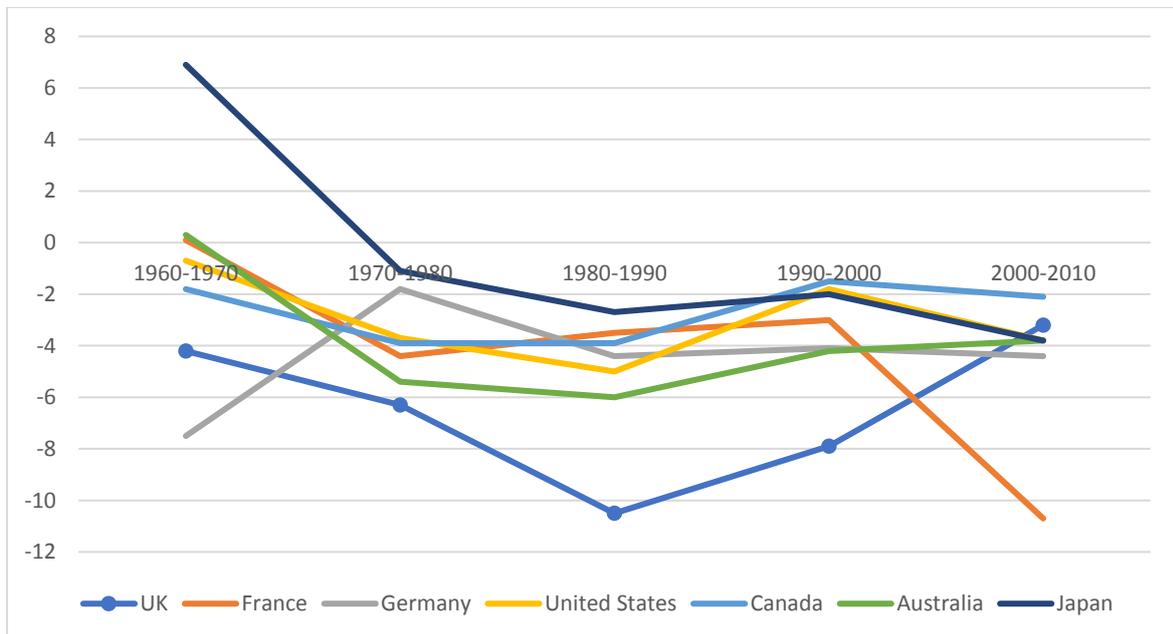
³⁶ Handel, Michael J. “Trends in Job Skill Demands in OECD Countries”, *OECD Social, Employment and Migration Working Papers* (2012), <http://dx.doi.org/10.1787/5k8zk8pcq6td-en>.

Figure 22. Per decade change in share of occupations in the United Kingdom, %



Source: Michael Handel, OECD

Figure 23. Per decade change in share of production jobs in selected countries, %



Source: Michael Handel, OECD

1. Gradual change

The largest change in occupation across Europe over the past century has been the steep decline in agricultural jobs that resulted from the advent of mechanised farming. This

occurred at different times in various countries; in Ireland the fall was from 36.8% of jobs in agriculture in 1960 to 1.9% in 2009, while the more industrial United Kingdom started with only 4.4% of jobs in agriculture in 1960, but only 2.0% in 2009. We can expect that the same process of convergence will happen in those European countries with still-sizeable agricultural sectors, such as Greece, with 12.2% of its jobs in agriculture in 2009.³⁷

The other major trend in employment has been the consistent decline in manufacturing and low-skilled work, what can be defined as “production” jobs. In France, production jobs fell from 42.0% of all workers in 1960 to 21.6% in 2009. Declines were consistent in every decade since 1960, a pattern repeated in Austria, Belgium, Denmark, Finland, Germany, Italy, the Netherlands, Norway, Sweden, and the United Kingdom, among European OECD members.

Therefore, even without a major disruptive force, and a continuation of existing trends, we can expect to see the share of the workforce in manufacturing decline, perhaps by around 25% by 2035, while high-skilled workers are in greater demand.

Employment growth over the next decade will primarily be driven by positions requiring greater preparation (in-employment training, work experience and formal education) and social skills (interpersonal, communication and management), most notably in the healthcare sector. Jobs requiring above-average preparation are expected to grow 2.8 percentage points faster than their below-average counterparts by 2024, and positions requiring greater social skills will grow by 8.8% over the period, compared to 4.4% with lower requirements. It is likely that such a trend will continue through 2035.³⁸

2. Rapid disruption

It is nearly impossible to predict which specific businesses or subsectors will face precipitous declines. For example, online book sales have surpassed sales from traditional book stores. However, groceries, for which there was speculation of huge online sales during the Dot Com bubble of the late 1990s, saw relatively little disruption to their industries during that time. The employment effects of this are considerable, eg, Amazon employs 70% fewer workers per unit of revenue than brick-and-mortar retailers.

Some industries are particularly vulnerable to “tipping point” economics, whereby crossing a threshold leads to a quick downward spiral, as shown in Figure 24.

³⁷ Handel, Michael J. “Trends in Job Skill Demands in OECD Countries”, *OECD Social, Employment and Migration Working Papers* (2012), <http://dx.doi.org/10.1787/5k8zk8pcq6td-en>.

³⁸ DeSilver, Drew. “Jobs requiring preparation, social skills or both expected to grow most.” *Pew Research Center*, 13 Oct. 2016, <http://www.pewresearch.org/fact-tank/2016/10/13/jobs-requiring-preparation-social-skills-or-both-expected-to-grow-most/>.

Figure 24. Potential industry disruption and tipping points

Industry	Tipping point
Taxi/truck drivers	Self-driving cars become safe for use on roads and 3-D printing reduces the need for long supply chains
Fast-food and retail workers	Self-service checkouts and RFID checkouts become ubiquitous
Low-cost hotels	Services like AirBnB achieve regulatory acceptance
Oil workers	Electric cars make up a majority of the automotive fleet in the United States and Europe
Translators	Machine learning allows for natural language processing sufficient for most business needs

Source: Oxford Analytica

3. Political effect for Europe

While media attention will focus on high-profile companies and subsectors that have shuttered due to digital disruption, most of the electoral weight will be behind the gradual changes that have a far larger total impact on the distribution of the workforce. This will be especially true if the jobs lost are low-skilled, and equivalent jobs are not being created elsewhere in the economy.

III - Populism

Several academics, such as New York University social psychologist Jonathan Haidt, have argued that the next global partisan divide will not be left/right, but between “nationalists and globalists.”³⁹ This divide may already be seen in the rise of populist/nationalist political parties in the 2010s.

Populists can come from a variety of ideological backgrounds and are present in some form in many countries. They are marked not by a set of policies but, according to most academic definitions, an attitude and a worldview of a cohesive “people” who have been betrayed or attacked by an “other,” usually some form of elite establishment, who must be combatted by electing the populist. As Figure 25 shows, populist movements in the developed world tend to be right-wing in origin, compared to left-wing or nationalist/sectarian in the developing world, but those are only approximate groupings.

³⁹ Haidt, Jonathan, “When and Why Nationalism Beats Globalism,” *The American Interest*, 12:1, 10 Jul. 2016

Figure 25. Populist movements/leaders worldwide and their closest ideological source

Left-wing	Right-wing	Anti-establishment	Nationalist/sectarian
National Democratic Convention (Ghana)	Fujimorismo (Peru)	Youth protest movements (Ethiopia)	Orange Democratic Movement (Kenya)
Patriotic Front (Zambia)	Pauline Hanson's One Nation (Australia)	M5S (Italy)	Economic Freedom Fighters (South Africa)
President John Magufuli (Tanzania)	New Zealand First Party (New Zealand)	Bersih (Malaysia)	Hindu Nationalists (India)
Lulismo (Brazil)	President Donald Trump (United States)		VMRO-DPMNE (Macedonia)
Chavismo (Venezuela)	Peronism (Argentina)		Vetevendosje (Kosovo)
	Law and Justice (Poland)		FDC (Uganda)
	PVV (Netherlands)		AKP (Turkey)
	UKIP (UK)		Fidesz (Hungary)
	FPO (Austria)		President Rodrigo Duterte (Philippines)
	Front National (France)		PAP (Singapore)
	Alternative fur Deutschland (Germany)		
	Swedish Democrats (Sweden)		
	Danish People's Party (Denmark)		

Source: Survey of academic experts conducted by Oxford Analytica

1. Populist prospects

While populist politicians have been active throughout the history of democratic societies, there are indications that they will have greater sway over the next two decades.

1.1. Causes

In the information age, unseen forces like automation or global market changes can quickly translate into job losses. Because the source of social displacement is difficult to identify, human psychology is susceptible to a charismatic politician offering a group to blame.

Second, media disintermediation allows politicians to connect more directly to voters, bypassing the institutions that have often worked to block aspiring populists. Fundraising can also be crowdsourced, allowing populist leaders the funding to compete with traditional politicians with party backing. Microtargeted advertising can hinder the ability of traditional politicians to build large coalitions.

Finally, populism thrives on attacking an “elite” that does not seem to follow the rules of society. If global tax evasion and tax avoidance proliferates over the coming decades, whittling away at a country’s revenues and causing cuts to social services, populist politicians would have evidence to support their rhetoric.⁴⁰ Failure to tackle these issues would permit populist leaders to paint governing parties as siding with those who do not share the same burdens as the rest of the people, a typical populist attack.

1.2. Lifecycle

Populists have usually failed to sustain their momentum when in office, as often-vague campaign promises meet the reality of governing trade-offs. Therefore, over the next two decades, there are three possibilities for how populists might fare if they should win:

1. Failure and rejection from office, as opponents are joined by now-disillusioned supporters. This appears to be the eventual end of Chavismo in Venezuela.
2. Turn to traditional party policies, as has happened in the United States with Trump’s adoption of Speaker of the House Paul Ryan’s agenda.
3. Creation of a new political alignment, against which future political battles are fought, as happened with Peron in Argentina.

In Europe, the success of populists in creating new domestic alignments would create greater stress on the integration process. Unlike ideological parties, which are likely to favour similar policies to those of resembling parties in other countries, Members of the European Parliament (MEPs) and Commissioners representing a populist party may not have allies with whom to work on policies in Brussels. Therefore, they will find it difficult to advocate policies at the European level and would likely try to repatriate competencies to the national level, where they have more control over governance.

IV - New voting blocs

One of the hallmarks of the political reaction to the Industrial Revolution was the political power of unions and the labour movement and a counter-reaction from conservative movements. An information economy is likely to lead to the creation of new voting blocs, either through increasing job sharing in the economy or voters who have had similar experiences. These blocs may become crucial elements of winning electoral coalitions. Coalitional realignment is a regular feature of politics, and can see parties slowly change their geographic and popular base. The shift to an information economy could trigger a series of realignments across Europe.

Some likely voting blocs include:

- **Newly upper-middle class professionals.** Tony Blair’s New Labour strategy was centred on targeting this group, which was outside Labour’s traditional working-class support and many of whom were the result of expanded access to education since the 1950s. They might

⁴⁰ Yikona, Stuart, “How corruption and tax evasion distort development,” *Governance for Development*, World Bank, 12 Jun. 2011.

be considered one of the first 'new' voting blocs of the information age emerging in the 1980s and 1990s, unconnected to previous political identities.

- **Former industry workers.** As high-employment industries succumb to the forces of automation, there will be large numbers of voters who are bound together by similar interests, attitudes, and life experiences. Truckers and taxi drivers may be the largest single bloc of this type if self-driving cars become ubiquitous over the next decade.
- **Gig economy workers.** Part-time and flexible workers are already common in the on-demand 'gig economy', which includes companies such as Uber and Amazon TaskRabbit. These workers exist in a contested legal area between being self-employed contractors and employees of multi-billion dollar corporations. As their status becomes regularised, they may comprise a highly interested voting bloc, given how much of their work environment may depend on government regulations.
- **Cities vs. rural voters.** Eurostat projects that the rural population in Europe will fall by 8 million people by 2050, while the urban population will rise by 24 million. As population and economic growth is increasingly concentrated in cities, a key divide in national governments will be between those officials representing rural areas and those representing urban areas. One key challenge for elected officials will be to ensure that the interests of voters in areas of declining population are not overlooked, without sacrificing necessary investments in areas of growth.
- **Elderly.** While this voting bloc is not a product of the information age, it will be growing rapidly through 2035 due to demographic shifts. This group is likely to push for consideration of higher taxes on corporations and high-profit/low-employment industries to fund maintenance of living standards for retirees. However, catering to elderly voters could polarise the rest of the population away from those policies, especially as maintaining pension schemes would require tax increases on the working-age population.

Trend 8: Ecological threats

While climate change is a gradual process that will be felt over the course of decades, it also increases the likelihood of relatively sudden natural disasters. By 2035, the world will most likely be confronted with more of these natural disasters, and the political system will be required to adjust to them.

I - Natural disasters

Natural disasters can be broken down into rapid onset (eg, storms and floods) and slow onset events (eg, drought). The disaster risk management community, of which the EU is one of the primary supporters and funders, tends to use the following conceptual framework:

$$\text{Risk} = \text{Hazard} \times \text{Exposure} \times \text{Vulnerability}$$

Exposure is the people or things that lie in harm's way. Hazard is the size and destructive power of the weather event. Vulnerability is the susceptibility of a person or asset to harm.

1. Hazard

The link between climate change and extreme weather is clear. Energy from higher temperature levels can be translated into kinetic energy that disrupts usual weather patterns. The subsequent strength of hydro-meteorological events (ie, weather-related, rather than earthquakes and volcanoes) increases the hazards facing communities.

Assessing the extent of a causal connection between climate change and specific events has until recently been difficult. In the past, scientists have supported general statements about climate change increasing the chances of extreme weather events as a long-term trend. Now, a growing body of climate scientists argue it is possible to model accurately how much more or less likely a single event has become as a result of climate change. This will help us understand the climactic origins of extreme weather events, but also indicates that extreme weather will become more frequent by 2035.

2. Exposure

Economic growth, population trends, and often unplanned urbanisation contribute to a trend of growing disaster losses. People and economic assets are increasingly concentrated in cities in hazard-prone locations such as low-lying coastal areas. The increased exposure to disaster risk pushes potential losses upwards.

The OECD estimates that about 40 million people were exposed to a 1-in-100-year coastal flood event in 2005, and that the number will grow to about 150 million by 2070, as well as an almost doubling in the share of assets exposed. Population exposure will be concentrated in developing countries, while assets will see high levels of exposure in the United States, China, the Netherlands, and Japan.⁴¹ By 2035, this trend will already be evident.

⁴¹ Nicholls, R.J., et al. "Ranking of the world's cities most exposed to coastal flooding today and in the future," OECD, 2007.

Figure 26. Top 20 cities exposed to coastal flooding in 2070 by population and assets

Cities with highest population exposed		Cities with the most assets exposed	
1. Kolkata	11. Alexandria	1. Miami	11. Ningbo
2. Mumbai	12. Tianjin	2. Guangzhou	12. New Orleans
3. Dhaka	13. Khulna	3. New York	13. Osaka-Kobe
4. Guangzhou	14. Ningbo	4. Kolkata	14. Amsterdam
5. Ho Chi Minh City	15. Lagos	5. Shanghai	15. Rotterdam
6. Shanghai	16. Abidjan	6. Mumbai	16. Ho Chi Minh City
7. Bangkok	17. New York	7. Tianjin	17. Nagoya
8. Rangoon	18. Chittagong	8. Tokyo	18. Qingdao
9. Miami	19. Tokyo	9. Hong Kong	19. Virginia Beach
10. Hai Phong	20. Jakarta	10. Bangkok	20. Alexandria

Source: OECD

3. Vulnerability

Rapid urbanisation in developing countries leads to the creation of informal settlements where building standards are not enforced. The confluence of urbanisation and climate change will drive increased losses from hydro-meteorological hazards such as flash floods and coastal flooding, tropical storms and landslides. It is estimated that losses from hydro-meteorological disasters in coastal cities could reach 1 trillion dollars or more per year by 2050.⁴²

4. Seismic events

While climate change is not connected to seismic risk, this area remains one of the largest sources of risk in the insurance industry. Earthquakes in San Francisco, Tokyo, Seattle, or Mexico City are possible by 2035, and would have enormous effects on the global economy.

II - Risks from natural disasters

1. Risks to Europe

Throughout Europe, extreme weather events are likely to increase in frequency and impact by 2035. In extreme scenarios, regions of Europe that currently see flooding and other extreme

⁴² Hallegatte, Stephane. et al. "Future flood losses in major coastal cities." *Nature Climate Change*, 18 Aug. 2013, <http://www.nature.com/nclimate/journal/v3/n9/full/nclimate1979.html>.

sea level events roughly every 100 years would need to prepare for annual or semi-annual events of the same magnitude.⁴³

Southern Europe will be severely hit with prolonged heat waves, causing increased water scarcity, decreased agricultural productivity, coastal flooding, and loss of biodiversity. Northern Europe will struggle mostly with coastal and river flooding.⁴⁴ Overall, Europe is predisposed to experience more instances of flooding and greater precipitant events, rather than prolonged drought.⁴⁵ Soil erosion, caused by flooding and high winds in storms, will create environments less hospitable to farming.⁴⁶

2. Global risks

However, the areas at greatest risk of natural disasters are located elsewhere in the world.

In South America, the western flank of the Andes is normally an area of near-zero rainfall. Sudden heavy rainfall can produce widespread landslides and flooding. Houses are often built of materials that cannot withstand adverse weather conditions, some urban areas lack proper drainage, and transport infrastructure (primarily roads and bridges) is easily washed away under torrents of water. This area is exposed to climate change and the cyclical effects of El Niño.

The Caribbean is one of the world's most disaster-prone regions, as measured by disasters per capita and per square kilometre. The effects on growth and debt are significant. According to research by the IMF, output typically falls by about 1% in response to an average hurricane or severe storm.

In South Asia, the delta areas of Eastern India and Bangladesh are highly vulnerable to flooding. By 2050, as many as 25 million Bangladeshis will be affected by climate change, and Asia as a whole has seen a rising number of natural disasters in the past 65 years. As the most populous region of the world, cyclones, typhoons, and floods can have a devastating effect, with ripples throughout the global economy.

III - Climate refugees and migrants

Climate disasters drive people away from their homes. For example, a decline in rainfall in the Sahel would force larger numbers of people to migrate from rural areas into cities, further south into West Africa, or north towards Europe. In this situation, migrants would place new

⁴³ "Increase in extreme sea levels could endanger European coastal communities." *AGU Newsroom*, 14 Mar. 2017, http://news.agu.org/press-release/increase-extreme-sea-levels-endanger-european-coastal-communities/?utm_source=CPRE&utm_medium=email&utm_content=17-21+extreme+sea+levels

⁴⁴ Behrens, Arno., Georgiev, Anton and Carraro, Melis., "Future Impacts of Climate Change across Europe: CEPS Working Document No. 324." *Centre for European Policy Studies*, Feb. 2010, [http://aei.pitt.edu/14586/1/WD_324_Behrens_Georgiev_Carraro_final_updated_\(1\).pdf](http://aei.pitt.edu/14586/1/WD_324_Behrens_Georgiev_Carraro_final_updated_(1).pdf).

⁴⁵ Hulme, Philip E. "Adapting to Climate Change: Is There Scope for Ecological Management in the Face of a Global Threat?" *Journal of Applied Ecology*, Blackwell Science Ltd., 28 Sept. 2005, <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2664.2005.01082.x/full>.

⁴⁶ "Agri-Environmental Indicator-Soil Erosion." *Agri-Environmental Indicator-Soil Erosion - Statistics Explained*, 2015, http://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_soil_erosion#Key_messages.

pressure on social services in destination cities, or strain the productive capacity of the land in surviving fertile areas, particularly along the Niger and Senegal rivers and around Lake Chad, if they move to rural areas. These migrants would also likely prompt political debates about migration and humanitarian burden-sharing in recipient countries.

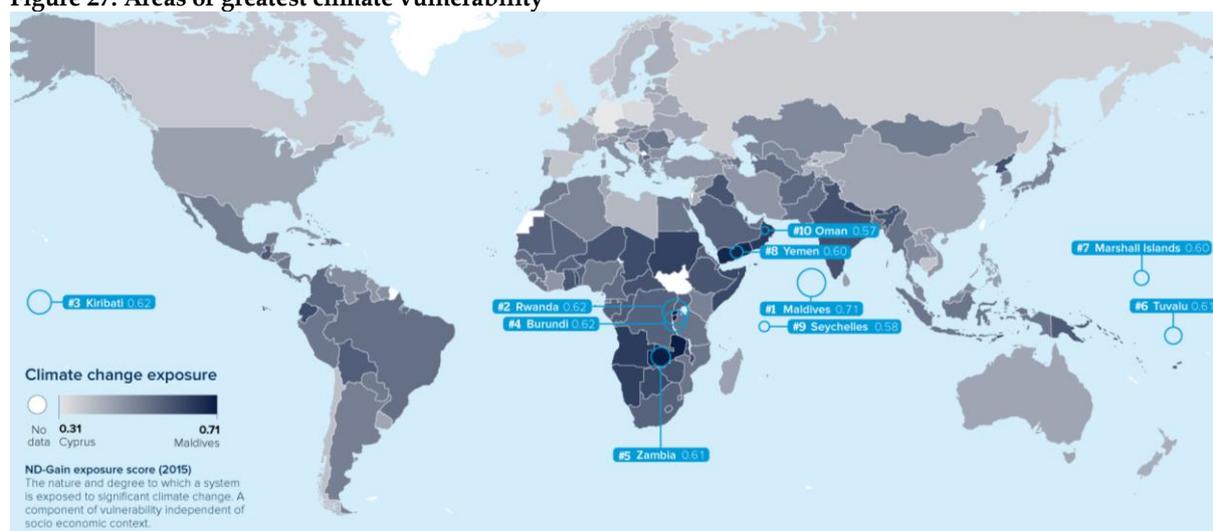
The UNHCR estimates that an average of 21.5 million people are displaced by climate-related disasters every year. The highest total numbers of displaced persons have come after disasters in India and Myanmar; the highest number of displaced as a percentage of a country's population have been in Pacific Island nations.

Because climate change places strains on resources, it can lead to, or trigger social upheavals, and can indirectly lead to wars and subsequent migratory flows. Indeed, the war in Syria has caused 13.5 million people to become displaced, 4.8 million of whom have left Syria. One of the drivers of the Syrian war was a drought, and so this massive displacement can be considered, in part, climate-related.

Europe will continue to be one of the main recipients of climate-related migration. It is close to the climate-insecure areas of North Africa, the Sahel, East Africa, and the Middle East, from which there are existing migration patterns, as shown in Figure 27.

In an extreme scenario, climate change could cause one of the largest single humanitarian disasters in history. The failure or re-routing of the three Himalayan rivers -- the Ganges, Brahmaputra, and Indus would affect hundreds of millions of people, many of whom would seek to move across borders, with Europe being a likely destination. A disaster in South Asia would prompt individuals to leave their home countries and, combined with other push factors, would exacerbate current migration flows to Europe. Citizens of Bangladesh, a country significantly exposed to climate change, represented the third most common nationality arriving in Italy during the first quarter of 2017.

Figure 27. Areas of greatest climate vulnerability



Source: University of Notre Dame Global Adaptation Initiative

IV - International response

One of the major variables determining the impact of this trend will be the degree of political resolve to mitigate and prepare for climate disasters. Bilateral support to the most affected countries is unlikely to be sufficient, given the wide areas across which these disasters can hit and the many systems that can be impacted by them. Therefore, there are three major sources of action after disasters, and one crucial pre-disaster warning system.

1. Aid and assistance

There is currently a reorientation of multilateral development aid to support climate adaptation. Indeed, almost all aid could be categorised as climate aid, and the World Bank made its recent pitch to donors for an International Development Association (IDA) top-up by saying 'IDA is a resilience fund.' Adaptation to climate change requires action on many fronts: social safety nets or insurance systems that can help households who lose agricultural income due to storms or drought; slum upgrading projects; water projects; building flood-resilient road systems; and rehabilitating ecosystems.

Therefore, the prospects of foreign and multilateral aid to 2035 will play a large role in shaping climate adaptation and resilience.

2. International bodies

The Paris Agreement included a reference to migrants in its preamble and directed the Executive Committee of the Warsaw International Mechanism to create a task force on "displacement related to the adverse impacts of climate change."⁴⁷

Through 2035, new cooperation frameworks on climate disasters will flourish, such as the Global Disaster Alert and Coordination System, a partnership between the European Commission and the United Nations. There could be gradual improvements in the coordination and capabilities of relevant bodies, such as the UN Refugee Agency (UNHCR), whose remit includes those displaced by natural disasters.

However, much will depend on countries willing to fund these bodies, whose budgets will come under strain from the demands of climate disasters. Without an increase in commitment to funding and accepting the leadership of these bodies, future climate disasters are likely to be handled in the same way as the 2015-2016 migration flows into Europe.

3. Risk pooling

Countries are increasingly developing rules-based frameworks, informed by actuarial analysis on financing statistically probable disaster events. For example, Mexico's Fonden

⁴⁷ United Nations High Commissioner for Refugees. "Cop 22 Technical Inputs: Climate & Disaster Displacement." UNHCR, <http://www.unhcr.org/en-us/protection/environment/583455267/cop-22-technical-inputs-climate-disaster-displacement.html>.

scheme sets aside annual tax revenue and disburses to Mexican states based on strict rules to help them rebuild after disasters.⁴⁸

The Caribbean and Pacific regions have both created risk pools, with assistance from international donors such as the EU, the United States and Japan. These allow access to catastrophe risk insurance policies at the sovereign level. Such policies would not otherwise be available on the market but, by cooperating, the countries can now receive rapid payouts when a disaster hits, providing instant liquidity for crisis response and rebuilding. The approach is also being used in Africa, in the form of the African Risk Capacity, supported by the EU.

4. Early warning and hydromet

Weather forecasting (hydro-meteorological services) will receive increased attention due to climate change. Weather agencies of poor countries are often underfunded, but weather alerts are crucial to encourage people to act to protect themselves and their property. With greater satellite coverage, there may be a push for a global weather forecasting service funded or operated by wealthy countries.

⁴⁸ "FONDEN: Mexico's National Disaster Fund." *Disaster Risk Financing and Insurance Program*, Jan. 2013, http://siteresources.worldbank.org/EXTDISASTER/Resources/8308420-135776325692/FONDEN_final_FCMNB.pdf.

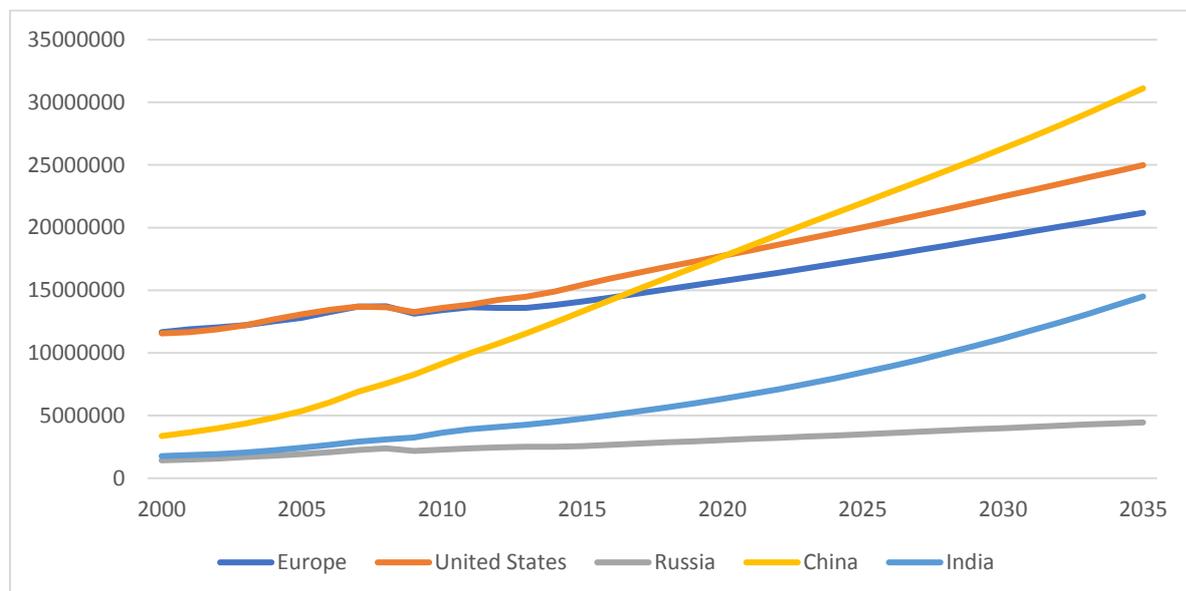
SECTION 3: INTERNATIONAL POWER TO 2035

The eight global trends discussed in the previous section will have significant consequences for some of the more fundamental assumptions on the nature of the international system. They will likely add up to a continued evolution away from what might be known as the post-Cold War order, dominated by a unipolar United States, into a multipolar order, in which corporations and international institutions will provide major constraints on state action.⁴⁹

I - Balance of power

One of the most important shifts to 2035 will be driven by the extent to which the basic power levels of countries -- whether measured by military or economic size -- change. There is a high deal of uncertainty about how countries will choose to exercise their power in 2035, but some of the fundamental elements of power, such as GDP, can be modelled with a greater degree of certainty.

Figure 28. Projection of total GDP, Europe, China, India, Russia, United States, millions of US dollars⁵⁰



Source: OECD

1. US hegemony

The extent to which President Donald Trump will shift the basic tenets of long-term US foreign policy is currently unclear. However, some tendencies are evident regardless of the length of his administration and his successor's policy positions.

⁴⁹ Krauthammer, Charles. "The Unipolar Moment," *Foreign Affairs*, 1991.

⁵⁰ Europe includes all European countries for which the OECD has forecasts: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, the United Kingdom, Estonia, and Slovenia.

The United States will be the world's largest military power in 2035. Even if China were to dramatically increase its military spending, the lag time between increased spending and the deployment of new technology, equipment, and tactics means that it will be nearly impossible for China to catch up with the United States in terms of military effectiveness.

The United States will be extremely wary of any intervention that would require a major occupation force of another country. The US military in 2035 will be run by generals and admirals who began their careers as junior officers during the wars in Afghanistan and Iraq. It is likely that they will carry the experiences of those wars into strategic discussions of policy options. As such, the United States may follow the path of the post-Vietnam generation, which avoided occupation of Iraq at the end of the Gulf War partly as a result of concerns over repeating the mistakes of the 1960s and 1970s. President George H.W. Bush said at the start of military action in Iraq: "I've told the American people before that this will not be another Vietnam, and I repeat this here tonight."⁵¹ It is likely that future US presidents will make similar statements using Iraq as a reference for the next twenty years.

The United States will be the most powerful actor in the international system, but with a smaller advantage over other powers than it enjoys today, and one that will be reluctant to use its power in major kinetic operations. The United States would thus be expected to have much less power in the global security environment than it has had since 1990.

2. Balance of power or balance of threat

Kenneth Waltz, a professor at Columbia University, developed the theoretical framework of neorealism in 1979.⁵² This framework places as the central explanatory variable of international relations the balance of power between states. The theory accounted for the nature of the Cold War -- two superpowers created a bipolar system -- and the pre-World War I era -- multiple great powers created a multipolar system.

Under this framework, the relative decline of the United States would lead to the emergence of a multipolar system in which there is greater competition between the United States and its closest rivals. A balance of power framework would suggest that this would likely lead to a higher chance of great power war in 2035 than in 2017.

A corollary theory was developed by Harvard professor Stephen Walt, which he termed balance of threat.⁵³ In this framework, states respond not to the overall balance of power in the global system, but to the levels of threat they face from every other country. Threat in this formulation is a function of power, geography, and aggressiveness. For example, Vietnam fears the United States equipped with eleven aircraft carriers less than it fears China with two carriers, because China borders Vietnam. Additionally, North Korea, while weaker than its neighbours, is a greater threat because of the unpredictability of its leaders.

⁵¹ "Transcript of the Comments by Bush on the Air Strikes Against the Iraqis." *The New York Times*, The New York Times, 16 Jan. 1991, <http://www.nytimes.com/1991/01/17/us/war-gulf-president-transcript-comments-bush-air-strikes-against-iraqis.html?pagewanted=all>.

⁵² Waltz, Kenneth. *Theory of International Politics*. Long Grove, IL: Waveland Press, 2010.

⁵³ Walt, Stephen. *The Origins of Alliances*, Ithaca: Cornell University Press, 1990.

Balance of threat suggests that the rise of rivals to the United States, US preference for non-intervention, and its location between two oceans, could enhance Washington's power around the world. In any region that will have a major power by 2035, such as China in Asia-Pacific, the United States will be seen as a less threatening state. Smaller countries in the region would turn to the United States for support and, because that support may be in greater demand worldwide, the United States would gain leverage on its allies.

This style of "offshore balancing" already exists, and in some regions has existed since the end of the Second World War. The shift from a unipolar to a multipolar system would heighten and expand it.

3. European pole

The balance of power is highly contingent on the nature of Europe within the global system.

If the EU, or the European member states collectively, were to change their defence policies to permit more effective expeditionary forces, a European pole in the multipolar system could emerge. This could be the result of two methods: either an increase in military spending towards the NATO suggested level of 2% of GDP (or higher), or a rationalisation of military expenditures away from administration and personnel and towards equipment and research and development.

Both methods would likely require pooling of resources and the rationalisation of procurement mechanisms to create a European defence industry that could rival the US defence industry in size. They would also rely on greater political will to launch military operations.

A European pole would shape the international system by simultaneously expanding and minimising the influence of the United States. US power would be increased by the active support of European allies in military operations, as in the intervention in Libya in 2011, encouraging the United States to act in crises. Even if European states only wished to take part in operations in the Eurasian, Middle East, and African theatres, this would aid the United States by allowing Washington to shift more resources towards other regions. A European pole would also temper US influence by guiding it to act in accordance with European wishes so as to ensure European participation.

This scenario would be a security extension of the diplomatic balance in the 2015 agreement over Iran's nuclear programme. Support for sanctions from European states was crucial in building the leverage that the P5+1/E3+3 were able to exert on Iran to reach an agreement. Similarly, European unwillingness to reinstate sanctions despite the results of the US presidential election in 2016 has constrained Washington's ability to abrogate the agreement.

II - Freedom of action

Nearly every theory of international relations posits that states will act in their own interest, even to the point of declaring war.⁵⁴ These theories therefore assume that states can act if they wish to do so. This assumption will be tested in the coming decades, in the multipolar system,

⁵⁴ Constructivism, which is not based on the logic of rational action, but on the logic of appropriateness (following norms), accepts war as a possibility if it is considered part of normal state behavior.

as countries that had limited capacity to act in the last 70 years due to alliance pressures or lack of military power will find themselves tempted to resort to force. This will lead to reconsideration of some foundational elements of the international system.

1. Nuclear weapons

Since the invention of nuclear weapons, there have been no full-scale wars between great powers. Even at the height of the Cold War, when the United States and the Soviet Union believed themselves to be in an irresolvable struggle, the presence of nuclear weapons prevented the two sides from sparking direct conflict. During the Cuban Missile Crisis, President John F. Kennedy sought ways to avoid a nuclear exchange, which he called “obviously the final failure” and President Harry Truman repeatedly denied authorisation of atomic bombs in the Korean War, despite extreme pressure from one of the most famous military commanders of the time.⁵⁵

If the restraints imposed by nuclear weapons during the Cold War still apply, it would be expected that there is little chance of war between or on any of the declared nuclear powers.

This would mean that many of the hot spots around the world are much cooler than currently considered. India and Pakistan, for example, will have reached strategic stability, as have China and any state in Asia covered by the US nuclear umbrella. If nuclear weapons have fundamentally changed the calculations of leaders, then the lack of great power war is not simply a historical quirk of the Cold War and US unipolarity, but a new, permanent state of affairs. Major states would have less freedom of action against each other, because attempts to coerce others by full-scale war will be impossible.

However, the deterrent effect of nuclear weapons may be eroding or eroded. Evidence suggests that the use of nuclear weapons is one of the strongest taboos in the international system.⁵⁶ Even if a nuclear-equipped state were embroiled in a crippling war, the convention against detonating nuclear weapons is so great that they would not be used. If this is true, the lack of a great power war is not indicative of any new state of international relations. Countries such as India and Pakistan might still go to war, confident that neither side would use its nuclear arsenal, and therefore strategic stability is not present.

There is no guarantee of which role nuclear weapons will play in grand strategy. Indeed, most nuclear powers have an incentive to say that they would use nuclear weapons in a defensive situation so as to act as a deterrent, especially if that is untrue. However, some indicators about the potential for nuclear powers to go to war are:

- funding of nuclear systems compared to funding for conventional offensive weapons systems, with less spending on conventional weapons leaving leaders with fewer means to begin conflict;

⁵⁵ Evans, Michael. “The Cuban Missile Crisis, 1962: Audio Clips.” *The Cuban Missile Crisis, 1962: Audio Clips*, http://nsarchive.gwu.edu/nsa/cuba_mis_cri/audio.htm.

⁵⁶ Tannenwald, Nina. “Nuclear Taboo Unites States and Non Use Nuclear Weapons 1945 | International Relations and International Organisations.” Cambridge University Press, 20 Dec. 2007.

- aggressiveness of states towards nuclear powers, with belligerent acts towards nuclear states implying that the aggressor does not believe nuclear war is a possibility; and
- level of control over nuclear launch authorisation, with highly centralised systems less likely to use them in a wartime situation.

2. Sovereignty

Although the UN Charter entitles all states to sovereignty and protection from the “threat or use of force” against their “territorial integrity or political independence,” this is often violated whenever a state deems it to be in its interest.⁵⁷ The global trends offer two divergent ways in which this can evolve by 2035.

2.1. Stronger sovereignty

Since states refrain from intervention in others’ affairs when it is deemed counterproductive, the sovereign status of many states could rise if technological and military shifts reduce the differences between them and their neighbours. The proliferation of precision weaponry and cheap A2/AD systems would contribute to greater strategic parity. For example, if Pakistan had possessed advanced air defence and warnings systems, the United States would have been less likely to authorise the 2011 raid that killed Osama bin Laden without seeking Pakistan’s consent (although, in the particular case of bin Laden, the United States may still have acted).

There are two technological systems that appear likely to advantage weaker states over the stronger. The first is surveillance. Many violations of sovereignty appear likely to come in the form of counterterrorism raids or small-unit action. Protesting states can use video footage of these raids, especially if civilian casualties occur, to win propaganda victories -- thereby lessening the utility of such raids. If states know that every cross-border action is likely to be filmed and posted online within a few days, the calculus of such raids changes.

The second is cyberattacks. Due to the relatively low cost of writing a destructive computer virus and the vulnerable nature of most companies and systems to dedicated hacking, cyberattacks can be used by adversaries of vastly different power differentials. More importantly, the uncertain nature of one country’s infiltration of another’s critical infrastructure may give the more powerful nation pause. For example, the United States may decide that a threat to its security requires an operation against Iran, but it knows that Iran may have infiltrated critical US infrastructure and would retaliate. Not knowing the extent of the infiltration, and not wishing to risk a market crash or widespread power outages, the US president may choose to halt the operation. This would give smaller countries a deterrent effect, even if they do not possess the capabilities.

In these ways, an increased ability to broadcast violations of sovereignty and an increased ability to hit back would create an international system in which cross-border military actions are considerably rarer.

⁵⁷ Charter of the United Nations, Chapter I, Article 2

2.2. Weaker sovereignty

Two major factors would drive the international system towards an environment where cross-border action was common.

First, if civil conflicts, natural disasters, or poor governance lead to increased refugee flows, as has been the case with Syria, countries may claim that interventions in other countries fall under national security provisions.

An intervention may also be justified under the principle of Responsibility to Protect, in cases in which there is evidence of crimes against humanity. Based on the Syrian conflict, it will become easier for evidence of such crimes to reach the international community through social media and independent journalists. A moral and a security justification for intervention is more likely to win support for intervention, either internationally or domestically.

Second, if non-state actors become greater threats to security and appear to have connections with elements in their host nation's government, there may be a greater acceptance of the need for policing actions that do not respect national sovereignty. The raid against Osama bin Laden in Pakistan is again an example of such an action; the United States considered bin Laden worth the costs of any diplomatic fallout with Pakistan, and that Islamabad could not protest too vehemently because of their own intelligence agencies' apparent failure to notice bin Laden.⁵⁸

Divisions between countries on interventions may be replaced by a coalition of countries that can control their territory countenancing incursions into any country that cannot. The joint naval operations against piracy off the coast of Somalia is the template for such an operation. This type of coalition will lead to burden-sharing disputes: European states, for example, may argue for contributions based on a country's GDP, while China and India would argue that global contributions should reflect a country's level of development.

If these trends continue, sovereignty in the international system would become dependent on a country's ability to prevent any action in its own territory spilling over into others'. Weaker and less developed states would be affected most by this, and would find a less sympathetic audience at the UN and elsewhere.

III - Global governance

A multipolar world will create strains on the existing system of global governance, as rising states wish for a greater share of control, while others will seek to maintain their existing position.

This can lead to disputes, even on relatively anodyne topics. In 2016, after nearly two years of discussions, the Internet Corporation for the Assignment of Names and Numbers (ICANN) finalised proposals to shift US government oversight of the corporation to a broader online community -- in effect ending the central role of the US government in internet governance. This is a technical aspect of internet regulation, but still attracted opposition in the US Senate and in partisan media. More consequential shifts in control, such as changes in

⁵⁸ Hashim, Asad. "Leaked Report Shows Bin Laden's 'Hidden Life'." *Leaked Report Shows Bin Laden's 'Hidden Life'* - *Al Jazeera English*, 8 July 2013, <http://www.aljazeera.com/news/asia/2013/07/20137813412615531.html>.

IMF voting shares, delayed by five years by the US Congress, would trigger more protracted disputes by whichever state is to lose influence.

1. Institutional reform

It is probable that many institutions will seek to reform themselves to accommodate shifts in power. Path dependency suggests that once an institution has been created and states have shaped their behavior around it, abolishing it is highly unlikely.⁵⁹ Further, employees within the institutions have a personal and professional incentive to maintain the prestige of the institution, which encourages bureaucratic entrepreneurialism.

Reform is likely to emerge by institutions shifting their activities to suit the needs of their membership. This will reflect the shift that NATO underwent in the post-Cold War era, from territorial defence of its members to providing an umbrella for expeditionary warfare. Institutions with limited memberships facing similar problems are likely to become the arenas for collaborative efforts, rather than institutions with global membership which would see challenges in achieving consensus.

2. Non-global institutions

In 2013, China launched an initiative to create what would become the Asian Infrastructure Investment Bank, in part due to its frustrations at its low voting shares at the IMF, World Bank, and Asian Development Bank. This could become a pattern, in which countries that believe they are being stymied by slow-moving institutional reforms create their own. Given that any push against the existing institutional bodies would likely not be made by, or include, the United States or other leading European stakeholders, the resulting institutions would probably be regional in focus.

As Figure 29 demonstrates, China will be heavily underrepresented at the IMF in 2035 if current voting patterns stand, while most Western members would be overrepresented, which will lead to constant pressure to reform the IMF or create new institutions.

⁵⁹ Pierson, Paul. *Politics in Time: History, Institutions and Social Analysis*, Princeton: Princeton University Press, 2011

Figure 29. Difference between share of country's GDP in the world in 2035 and its current vote share at the IMF. Positive numbers indicate the country will be overrepresented at IMF based on its economy.⁶⁰

Country	GDP share (%)	Voting share (%)	Difference (%)
Australia	1.35	1.34	-0.92
Brazil	2.87	2.22	-22.66
Canada	1.62	2.22	36.99
China	24.31	6.09	-74.95
France	2.50	4.04	61.29
Germany	2.85	5.32	86.89
India	11.33	2.64	-76.70
Indonesia	2.69	0.95	-64.69
Italy	1.85	3.02	63.12
Japan	4.06	6.16	51.84
Mexico	2.43	1.80	-26.00
Russia	3.48	2.59	-25.54
South Africa	1.06	0.64	-39.71
South Korea	2.22	1.74	-21.63
Turkey	2.01	0.96	-52.31
United Kingdom	2.94	4.04	37.62
United States	19.52	16.53	-15.32

Source: IMF, OECD

The world in 2035 will contain new regional economic organisations, such as the Eurasian Economic Union, or regional political groupings, like ASEAN. Most regional institutions will be created for specific purposes, as the AIIB was for infrastructure investment. These will face less diplomatic pushback, as they can claim to be only supporting, rather than replacing the broader institutional order.

⁶⁰ Difference is the voting share minus GDP share, divided by voting share.

It could be that transnational cooperation in the coming decades will also reflect shared ideology, and that sub-national units will be members in international institutions, conducting, to some extent, their own foreign policy.⁶¹ The C40 group of cities collaborating on climate change would be the model for this type of institution. Given the expected variance in economic development within countries, sub-national institutions will be particularly powerful if they include the richest parts of countries, such as California, Toronto, or provinces in Northern Italy.

3. Ungoverned areas

One area where global governance may come under particular stress through 2035 is in ungoverned areas. Spaces where armed groups are equally, or more present than the state often tend to go unnoticed by the international community unless they garner media attention with high-profile violence. The ability of non-state groups to exercise authority and provide government functions allows them to gain support, attract recruits and raise revenue.

Providing effective state governance to mitigate the appeal of non-state armed groups will require difficult questions of financial and/or military aid to the countries nominally in control of these areas, or of unpalatable political compromises with local forces. The rejection of a peace process with the FARC in Colombia by popular referendum (although subsequently approved by parliament) is one example of this difficulty, and one that may grow worldwide as populations move towards urban centres, and may become less vulnerable to these often rural insurgencies.

While each ungoverned space will have its own causes and attract its own set of particular solutions, the common threats created by them may make ungoverned spaces one of the themes of global governance to 2035 in the same way that terrorism was in the period of 2001-2017.

IV - Norms

Francis Fukuyama wrote in a 1989 essay, "The End of History?", that grand ideological disputes may have ended after the Cold War, and Western liberal democracy will become the only system of government that will enjoy widespread normative support.⁶² That prediction, clearly, has not become true.

Over the coming decades, global norms will evolve in two directions: domestic and international.

On the domestic front, it appears likely that there will be three types of government: liberal democracies; authoritarian regimes; and illiberal democracies, in which protections of minority interests or checks and balances are limited or eliminated. Illiberal democracies may be only a transition state, before a country returns to democracy or moves further towards autocracy. But the length of the transition may be years, requiring that they be treated as a

⁶¹ Jarra, Yasar. "By 2030, What will Regional Governance Look like?". *World Economic Forum*, 9 Dec. 2016, <https://www.weforum.org/agenda/2016/12/by-2030-what-will-regional-governance-look-like/>.

⁶² Fukuyama, Francis. "The End of History," *The National Interest*, 1989.

unique category. Illiberal democracies will be a particular challenge to Europe, as the EU is predicated on a community with broadly similar political values.

Populism, which can often lead to illiberal democracies, is correlated with societal factors that may be aggravated by the global trends. For example, Figure 30 shows the results of a model that correlates social and economic variables with support for populist parties in a country. Being dissatisfied with one's national government -- which may rise if economic disruptions are not managed -- is correlated with an increased share of the vote for populist parties. Boycotting a certain product, which indicates a more politically active and, perhaps, angry population is most strongly correlated with populist parties.

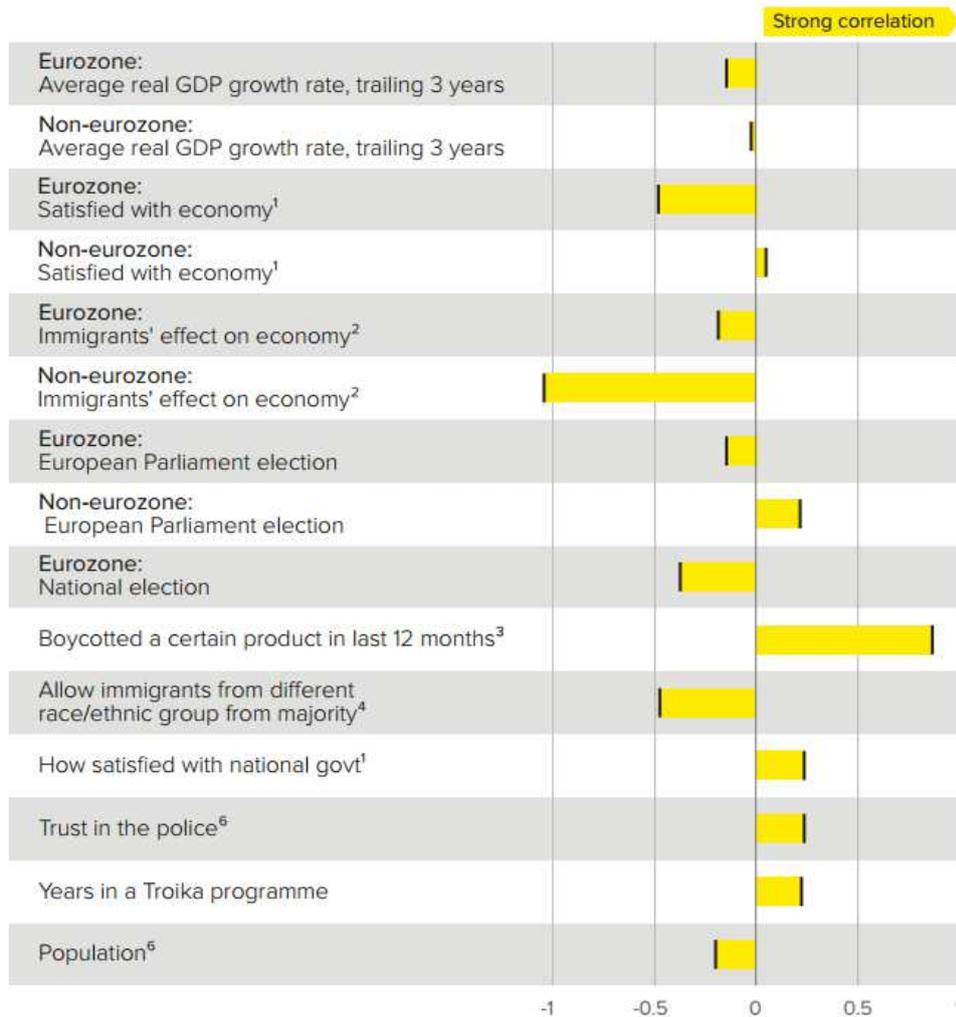
It is possible for governments to co-opt populist movements. Negative views of immigrants' effect on the economy is correlated with a decrease in support for populist parties, most likely because mainstream parties adopt restrictionist policies or rhetoric to appeal to an anti-immigrant electorate. However, moving the centre of the political spectrum to appease voters who might back populist parties is one of the quickest ways to change the norms of a society, which indicates that the pull of populism may not be seen in top-line data.

In the international arena, there may not be much difference between illiberal democracies and liberal democracies in security matters. Democratic peace theory has mixed predictions about whether they would be more likely to go to war with each other; while there is evidence that democracies do not fight each other, the historical co-variance of democracy and liberalism means it is difficult to draw conclusions about when they diverge.

The two types of governments may diverge when they come to questions of human rights and the need for humanitarian actions. Because populist societies or illiberal governments often base their legitimacy on the supremacy of some conception of the "people" over universal principles, it is easy for them to discount the need to sacrifice their own resources for other countries.

Figure 30. Correlation between socio-economic factors and vote share of populist parties in Europe⁶³

Which social and economic factors drive populism?



Source: European Social Survey, IMF, Oxford Analytica.

Therefore, a rise in illiberal democracies or authoritarian regimes may lead to a decline in global humanitarian funds or willingness to contribute to military interventions to prevent crimes against humanity. The extent of the change may be offset by the rising interest in humanitarian operations for other reasons, such as image promotion by authoritarian regimes, building alliances, or security reasons. But it would nonetheless contribute to an international arena where liberal norms are given less credence.

⁶³ 1: Very/extremely dissatisfied (%). 2: Bad/very bad (%). 3: Yes (%). 4. "Allow many" (%). 5: No/almost no trust (%). 6. Logarithmic.

SECTION 4: SCENARIOS TO 2035

It is common, when making long-term forecasts, to simply extend existing trends indefinitely, or to be concerned most by what is important at the time of writing. Even when it is possible to identify a likely disruptive force, one can mistake the way in which it will happen. For example, the United States National Intelligence Council's Global Trends to 2015 report, published in 2000, wrote that:

*"Regions, countries, and groups feeling left behind [by globalization] will face deepening economic stagnation, political instability, and cultural alienation."*⁶⁴

While this prediction matches many of the popular media accounts of the wave of populism in 2016, the authors did not appear to be referring to the United States and Europe, but to the developing world. The scenario of a backlash to globalisation was foreseen, but the assumptions of an NIC analyst in 2000, at the heights of the Dot Com bubble, prevented thoughts of economic malaise in parts of the United States.

In consideration of the potential for forecasters to miss plausible alternatives, the oil company Royal Dutch Shell introduced a practice of creating scenarios in 1971. Under the guidance of former magazine editor Pierre Wack, scenarios were built not to be predictive, but to be interesting concepts that would test decision-makers' preconceived notions of the future.⁶⁵ In the time since then, scenario planning derived from Wack's basic frameworks and purposes has spread throughout governments and corporations which need to make long-term investments.⁶⁶

Scenarios are not intended to replace the consideration of major driving trends or the likely contours of the international system as discussed in Sections 2 and 3. They are instead designed to consider how those trends and system might combine to produce dramatically different outcomes. The process of deriving scenarios forces decision makers to think about what could happen, rather than what they expect to happen -- and whether long-term plans are sufficiently resilient to be successful if an alternative scenario emerges.

⁶⁴ National Intelligence Council. "Global Trends 2015: A Dialogue About the Future with Nongovernment Experts." *Central Intelligence Agency*, Dec. 2000, https://www.dni.gov/files/documents/Global%20Trends_2015%20Report.pdf

⁶⁵ Wack's work was itself based on the work of Herman Kahn, who studied nuclear weapons theory at the RAND Institute and the Hudson Institute. Wack, Pierre. "Scenarios: Uncharted Waters Ahead", *Harvard Business Review*. September-October, 1985; Wack, Pierre. "Scenarios: Shooting the Rapids", *Harvard Business Review*. November-December, 1985. https://www.rand.org/pubs/research_memoranda/RM1829-1.html

⁶⁶ Kupers, Angela and Wilkinson, Roland. "Living in the Futures." *Harvard Business Review*, 31 July 2014, <https://hbr.org/2013/05/living-in-the-futures>; Schoemaker, Paul J. "Scenario Planning: A Tool for Strategic Thinking." *MIT Sloan Management Review*, 15 Jan. 1995, <http://sloanreview.mit.edu/article/scenario-planning-a-tool-for-strategic-thinking/>; Roxburgh, Charles. "The use and abuse of scenarios." *McKinsey & Company*, <http://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-use-and-abuse-of-scenarios>.

I - Constructing scenarios of Europe's future

To build alternative scenarios of Europe's future, a workshop was convened to apply the following process to Europe by 2035:

- **Step 1:** Define the focal question.
- **Step 2:** Identify the predetermined factors, trends, and critical uncertainties.
- **Step 3:** From the list of critical uncertainties, determine two that are the most impactful and the most uncertain. These will be the two macro drivers.
- **Step 4:** These macro drivers are then brought into the same plane to provide a basic matrix framework for the scenarios.
- **Step 5:** Consider what kind of future the different combinations of outcomes might produce, especially how the critical uncertainties interact with trends and predetermined factors.
- **Step 6:** Create a narrative for each scenario, incorporating wild cards.

Figure 31. Elements of scenario planning



Predetermined factors

Predetermined factors are few and far between: where they exist, they are phenomena that we can take for granted within a given time period. They will not change or shift and therefore do not vary between different scenarios. Examples might include the continuation of extreme weather events or the geographic location (but not the quantity) of strategic resources like oil.



Macro drivers

Macro drivers are determined by prioritising the critical uncertainties both by level of uncertainty and by level of impact on the focal question. They must meet both of these conditions so that the resulting macro drivers are the most critical uncertainties that (a) have a high impact and (b) have a wide spread of possible outcomes. Macro drivers provide a framework for the scenario matrices, where the interactions between the various outcomes will determine the basic parameters of the scenario narrative.



Critical uncertainties

Uncertainties are events or processes for which there are multiple outcomes. For an uncertainty to be considered critical or relevant, it will need to affect the focal question of the scenario analysis. Each uncertainty identified should have a number of different plausible outcomes. Examples of uncertainties might include whether a legislature will adopt a particular reform, whether two states will go to war or whether a new technology will become popular.



Trends

Trends are developments or processes that can be predicted on the basis of conditions that are present today. Trends are important components of the scenario narratives. While they can vary substantially between different scenarios – for example, by projecting high versus low economic growth over a certain timeframe – trends follow an established trajectory: they are not volatile or random in nature. Examples of fundamental trends over a medium-term time frame might include price rises or urbanisation.

To construct scenarios for this report, a series of workshop groups were asked to examine this focal question:

“What will be the environment in which European decision-makers are operating in 2035?”

Discussion led to the creation of the following lists of the ten most important predetermined factors, trends, and critical uncertainties.

Figure 32. Building blocks of the scenario planning workshop

Predetermined factors	Trends	Critical uncertainties
Europe will undergo working age population stagnation in some countries, and decline in others	European countries’ fiscal space will be constrained, buffeted by ageing populations and low economic growth.	Political stability within Europe could fluctuate rapidly, as party systems coalesce or fragment
Climate change will grow in its effects on natural weather systems	Low-skill jobs are increasingly being lost to automation, with middle-skill jobs also at risk	State response to disasters could sow distrust in institutions
Economic growth will, assuming no major redistributive policies, produce a high variance in “winners” and “losers” within countries	The United States is retrenching its military, and seeking to move away from the early-2000s trend of interventions	Efforts to lessen inequality could flounder
Demographics will cause working age population difficulties for China, Russia, and Japan	Regional powers, like Japan, India, and Brazil, are seeking a permanent seat at the UN Security Council	Voting blocs may disrupt assumptions of left and right as post-Cold War and post-recession generations age
Natural resources will come under strain, especially in the Middle East	Inequality is rising across the developed world	EU membership and European states could be at risk, as with Brexit and Scottish independence
The United States will most likely have the world’s most powerful military	China is seeking to set norms and international governance rules in Asia	The United States may have a “Suez moment,” declaring regions of the world no longer in its interest
Nuclear weapons will exist and have destructive power that will concern the international community	There will be strains on currency quotas in the IMF	The Middle East could see progress for democracy, a move towards authoritarianism, or sudden state collapse
Trade will still lead to greater wealth, despite what advances in 3-D printing and renewable energy may happen by 2035	Centre-left and centre-right parties across Europe have lost ground to more extreme or populist parties	The future of Russia’s political system is at stake as President Putin will be 83 in 2035
Sub-Saharan Africa will see a boom in its working age population	Urban/rural divides are becoming the dominant political and economic dichotomies in many countries	China may choose to project power militarily on a global scale
The US tech industry begins this era with a lead on global rivals that will continue to pay dividends to 2035, barring a major disruption larger than what might occur in most plausible scenarios	Natural disasters will create more economic damage and dislocation worldwide	Entrepreneurial leaders may take EU member states in illiberal or populist directions

The workshop group chose two macro drivers that would provide scenarios broad enough to include discussion of all global trends, but focused enough to allow for coherent narratives:

1. Adaptation (or non-adaptation) of European economies to the challenges of the information age, leading to (in)stability in Europe.
2. Managed (or disorderly) evolution of the global system towards multipolarity, leading (in)stability outside Europe.

The two macro drivers were combined in their extreme versions to create four mutually exclusive scenarios. These scenarios are described with an eye to two features:

1. What would be the steps that would occur on the path to this scenario by 2035?
2. What would be some of the consequences of this scenario in 2035?

Both questions were answered by consultation to the predetermined factors, trends, and critical uncertainties listed above, in addition to the findings of the earlier sections of this report. The narratives are written as if describing historical events, although it must be stressed that these scenarios are not designed to be considered forecasts of what would necessarily happen under these circumstances, but only plausible stories with internal logical consistency based on the building blocks highlighted in the workshop.

Scenario 1: Sick men of Europe: unstable Europe in a stable world

In this scenario, Europe fails to adjust to the economic dislocations driven by the information economy, and the United States and other countries bring the growing power of China and India into a workable global governance structures.

1. Economic decline

From 2018 to 2035, Europe sees relatively low average economic growth. What growth there is has been highly uneven and highly volatile.

A breakdown in Brexit talks leads to the first big economic story of the era. The United Kingdom's insistence that it be permitted access to the single market without accepting the primacy of the European Court of Justice leads to the UK leaving the EU without a transition deal. Recession quickly ensues, worse for the United Kingdom than that which had affected it in 2008. Recession also hits Ireland, the Netherlands and Belgium.⁶⁷ As the UK stabilises, it sees that it has become permanently poorer, with much of its financial sector -- and the taxes and employment it generates -- moving to Paris, Dublin, and Frankfurt.

Although the Brexit recession has limited effects on most of the EU-27, the European economy nonetheless becomes a constant headache for policy-makers. After nearly 15 years of depression or near-zero growth, Greece leaves the Eurozone, following the basic playbook first created by Finance Minister Yanis Varoufakis for a parallel payment system. The fallout in the bond markets from Greece leaving is contained, but the political implications are much more far-reaching, especially as Greece recovers, with the new drachma making its tourist sector one of the most competitive in Europe. Politicians in Italy, Spain, and Portugal argue that they should adopt their own currencies and leave a currency more suited for Germany. While no country in fact breaks with the euro, there is constant speculation that a new recession will be the last straw, and that unravelling will quickly ensue.

However, the daily headlines about the advance of anti-euro parties obscure what is perhaps the larger story of the European economy: a severe innovation gap. Efforts to build clusters of sectoral excellence fail as politicians insist on spreading research and development funds among as many Member States as possible, diluting their effect. Some national clusters do emerge naturally, but the medium-sized companies that grow there find an easier path via acquisition by a foreign company, just as the Swedish-founded Skype was acquired by the US-based eBay and then by Microsoft.

European companies are increasingly dependent on automation and machine learning technology designed in the United States and China. Although Europe is still one of the richest parts of the world on a per capita basis in 2035, its firms are increasingly uncompetitive with those from elsewhere which can take advantage of large internal markets and a relatively peaceful global environment.

⁶⁷ Brinded, Lianna., "ING: Bad Brexit Deal for Britain Could Kick Europe into a Recession." *Business Insider*, Business Insider, 4 Apr. 2017, <http://www.businessinsider.com/bad-brexit-deal-impact-on-european-and-uk-economy-trade-single-market-2017-4>.

2. US expansion

The promise of an “America First” foreign policy agenda, like President George W. Bush’s pledges of non-interventionism in his 2000 campaign, turns out to be mostly rhetorical. The United States remains the pre-eminent military force in the world and mostly completes, though it does not advertise the fact, its pivot to Asia.

It is helped in this re-orientation by a diplomatic solution to the South China Sea dispute. Other nations in the region, emboldened by China’s concerns with its own economic problems, a rickety banking system and asset bubbles, begin asserting their claims more forcefully. When a naval vessel lands on one of China’s artificial islands, a series of summits on the future of the area are held. Resolution of the issue encourages China to recommit itself to President Hu Jintao’s policy of China’s peaceful development. China will participate in international security missions and will act as a major military power in East Asia, but takes efforts to demonstrate that it will not act as a revisionist power.

In Europe, the United States continues to provide a security guarantee for the continent under the auspices of NATO, but the alliance is under severe strain after years of lower European military spending. However, European nations have developed extensive defences against hacking and informational warfare, which become commonplace in nearly every election.

3. Global institutions

Rapprochement between the United States and China has helped to ease the tensions over many of the institutional disputes that helped to create the Asian Infrastructure Investment Bank. China continues to advocate for regional institutions and forums, but these are in addition to, rather than in competition with, established global institutions like the IMF, World Bank, and UN.

Unfortunately for Europe, China’s acquiescence comes at Europe’s expense. Reform of the UN Security Council removes one of Europe’s permanent seats and economic institutions see Europe’s voting share diluted.

Europe’s soft power can be effective in some circumstances in cajoling developing countries to adopt human rights legislation, and its economic weight can be used to add conditions to trade agreements, but it has largely ceased to be an example to other regions of integration to be emulated.

4. European political upheaval

A relatively benign external environment means that there are no major crises that force greater European cooperation or -- more importantly for domestic audiences -- that can act as a unifying issue for major parties. Dislocation from the growing role of automation in the economy has created a large pool of voters unhappy with the status quo, but the repeated failure of mainstream parties to create broad-based economic growth means that they have no natural political home.

European countries accept as the new political normal a fragmentation of the political system. Parties that enter into government or a government coalition will frequently see their support crater at the next election, as happened to the UK’s Liberal Democrats in 2015 and France’s

Socialist Party in 2017. Extremist, nationalist, or populist parties will consume a greater percentage of the vote share, as will parties that are vehicles for charismatic politicians or activists. Yet the underlying problems of economic growth based around a few sectors and major cities, leaving behind much of the population, means that these parties will also fail to deliver on their promises if they enter government.

The result is not any particular overall governing strategy. Instead, there is an acceptance of a greater diversity of political systems, including illiberal democracy, and greater volatility in the make-up of governments. Europe-wide investments decrease and there is debate about whether European nations are similar enough to be in the same Union.

Scenario 2: Cold Wars: stable Europe in a stable world

In this scenario, Europe quickly adapts to the challenges of the information age, while the United States, China, and Europe collaborate on ensuring that an evolving power structure does not descend into miscalculation and conflict.

1. European New Deal

The turning point for Europe happens in the late-2010s and early-2020s. The effects of what is known as the “Brexit recession” are devastating for the United Kingdom and for many nations around Europe. The banking system of Europe is disrupted, which, combined with existing problems in the Italian financial system and the Greek economy, leads to a near-disaster.

However, that eventuality is averted and a series of summits lead to a dramatic shift from existing economic and institutional structures. Led by a German political culture that has come to a consensus that persistent surpluses and high exports are a problem for the European political economy, European leaders propose the creation of a European fiscal union and policies that would provide a continent-wide social safety net. This minimises the extent to which the monetary union over- or undervalued the currency in each country and encourages citizens to move to areas of economic growth.

The result is not an immediate panacea, just as the New Deal under President Franklin D. Roosevelt in the United States did not immediately end the Great Depression. Instead, the European New Deal lays the groundwork for future integration efforts, which proceeded along functionalist logic. The gradual accumulation of new rights and benefits for citizens transform the political culture of Europe over the next 15 years.

Political disputes continue over this agenda, especially in countries that see themselves as subsidising other Member States. The Europeanist agenda is a crucial issue in elections throughout the era and will still be debated. Nonetheless, by 2035, it has become common for citizens to accept that the usual style of politics is federalist. National governments retain primacy in overall power, but cities (where much of the economic growth is located), regions (especially the largest in a country) and the European Parliament (where European policies are debated) attract considerable interest from news media, parties, and lobbying groups. The threat of automation and machine learning, which has already devastated industries in many small towns, and the necessities of adapting to an ageing population, make the economic advantages of a unified bloc as potent as they were when the European Economic Community was first launched.

2. Cyber START

Relative global stability permitted the construction of a global agreement on cyberwarfare, deliberately modelled on the Strategic Arms Reduction Treaty, and based on the groundwork laid by the UN Group of Governmental Experts. The United States, European states, China, Japan and South Korea are leaders in making the treaty a reality. The democratic nations have all experienced a damaging hack; indeed, it has become expected for elections to be preceded by a document dump designed to embarrass one candidate or for voting systems to be targeted. China holds concerns that cyber weapons developed for military purposes would allow its citizens to attack its system of internet controls.

The summit does not produce an immediate global acceptance. Russia, in particular, is adamant that the agreement is simply a Western plot to mobilise a global audience against it. Nonetheless, the summit leads to norms on cyberwar broadly agreed to by its participants. Hacking of military and high-level government systems are considered similar to traditional espionage and are permitted. Accessing records of non-military government personnel, as China did to the United States in 2014, is strongly discouraged, although left vague about where the boundary should be. Attacks on voting systems, interference in electoral campaigns to favour one candidate or party, and any attacks on a civilian infrastructure would be considered hostile acts.

Moreover, nations agree, not always explicitly, to a ladder of escalation in response to such acts, which would involve sanctions or targeted response strikes. This escalation pattern does not eliminate cyber warfare by non-treaty nations, but it does structure state behaviour in this area, which leads to retaliatory attacks being somewhat accepted by the international community.

3. Barriers and borders

Europe's economic growth will attract migrants from its neighbourhood, with periodic crises -- such as natural disasters or wars -- spurring surges in the number of migrants seeking a home in Europe. The ageing population of some countries will encourage the acceptance of some refugees and migrants, and growing levels of wealth will lessen some of the popular antipathy to migrants.⁶⁸ Nonetheless, European leaders will be pressured to ensure that borders are controlled and can prevent waves. European support for Frontex will increase, as may support for Justice and Home Affairs integration to ensure that migrants who make it into Europe are handled appropriately by every country's authorities.

Elsewhere, barriers will emerge in a number of areas, pulling back on the globalising trend of the post-Cold War era. Financial crises will be handled by the introduction of capital controls, following the lead of Iceland, and worries about the use of data by US or Chinese tech firms will lead to greater government regulation of the sector. The internet will not become as balkanised as some fear, but it will see obstacles in the path to maximum tech profits. In various countries, these will be requirements to house data in servers located in that country, mandatory privacy regimes that reduce the profitability of free software, or greater taxation on digital products.

4. Problems growing

This scenario may seem like the most positive of all the choices. But while Europe has headed off domestic instability through addressing issues of economic dislocation and China has acceded to global norms, this global stability may also contain the seeds of future problems, or be the product of delaying necessary changes.

To ensure that a multipolar world is managed peacefully, the United States and Europe may acquiesce to authoritarian regimes worldwide. This has occurred many times before in world politics (and can even be said to be the norm), but in this scenario, it is heightened, as it may become one of the cornerstones of stability. Deals with authoritarians in the Middle East,

⁶⁸ Friedman, Benjamin, *The Moral Consequences of Economic Growth*, New York, Vintage, 2006

Africa, and Central Asia are crucial to ensuring that migrants do not have a free passage to Europe's borders. Chinese influence in global institutions means that political rights are downgraded as priorities. Nationalist politicians seeking to shield their countries from the economic effects of US and European-led technology, while using that technology for surveillance, also creates a difficult environment for human rights to flourish.

Further, stability does not solve global governance issues like nuclear proliferation or climate change. In fact, nuclear proliferation may become a larger worry; a 'black swan' event like a collapse of Pakistani control over its nuclear arsenal is possible in this scenario and even the most well-coordinated efforts by all countries may not be enough to prevent terrorists from detonating a bomb in a major city. And climate change may be neglected if governments believe that reducing carbon emissions is at odds with ensuring broad-based employment.

Moreover, economic happiness in Europe could be achieved at unseen costs. While political anger can be allayed through a diffusion of benefits, there is always an incentive for politicians to delay the costs of those benefits. Increasing the generosity of pensions would please an ageing population, as would robust welfare payments, but it would leave Europe vulnerable to a rapid economic shift that reduces revenues.

This scenario should not be viewed as the ideal path for Europe, only one in which some of the major issues have been addressed, with many more that may grow to take its place in the minds of policy-makers and citizens. Those include: social immobility; antibiotic resistant disease; resource depletion; Russian economic and demographic decline; and the challenges from asymmetric warfare.

Scenario 3: Hollow foundations: unstable Europe in an unstable world

In this scenario, European countries fail to adjust to the information economy, leading to jobs and industries lost to automation, while few European firms are able to compete with tech companies from the United States and Asia. Additionally, China and the United States are clashing over the nature of the international system and the proper role for each to play in it.

1. Ad hoc Europe

As employment and wealth creation stagnate across Europe, nationalist and anti-system politicians turn their ire towards Brussels, seeking a scapegoat for the problems of globalisation and automation. In this context, there is little appetite for expanding the competencies of the EU, but the problems affecting European countries remain, in many cases, transnational. This situation leads to the development of various groupings of countries working on issues -- a multiplicity of multi-speed Europes.

Migration issues are dealt with by a coalition of Mediterranean countries and recipient countries, with others preferring to avoid any involvement. Economic integration is left to those whose economies are relatively similar in makeup and business cycle. Climate policy and support for innovative industries is led mostly by informal groupings of cities, who resemble each other much more than they do the rest of their own countries.

While no other members leave the EU, having seen the economic downturn in the United Kingdom following Brexit, there is a constant push among member states to repatriate powers from Brussels. Integration is effectively reversed by states promoting their own policies on issues that had previously been under the aegis of the EU. Foreign policy is one of the main areas of independent action, as European states seek foreign investment from China, India, and others, who are happy to pay European Member States against each other for international support.

2. Obsolete NATO

The United States adopts a foreign policy that is more isolationist than at any time since before the Second World War. The United States remains engaged in diplomatic talks over international incidents, and participates in military interventions from time to time, especially against non-state actions. But its diplomatic efforts are most frequently as part of multilateral panels, in which the lead is taken by the largest power in the region and its military interventions are focused on special forces conducting precision raids.

Yet the United States remains the world's largest military force, with a fleet of aircraft carriers and squadrons of F-35s that cannot be matched by any single country. US military posture is, therefore, to act as an offshore balancing force in most regions of the world against territorial encroachments.

This combination leads to continued disputes between the United States and other nations. While the United States wishes to preserve the existing norms of the international system, its disinterest in engagement abroad leaves openings for other countries to assert their own preferences. Regional institutions, like the Asian Infrastructure Investment Bank, proliferate and norms become major debates. The remaining global institutions see their funding stagnate. Disputes over shipping and mineral rights in the Arctic become particularly tense, as it is one of the few areas where the United States sees vital national interests at stake.

In this environment, the United States views NATO as less and less relevant for its agenda. Weak European economies mean that the United States is providing a larger share of total NATO defence spending. Unstable European political systems, focused on allaying domestic anger, mean that European countries are less reliable at international settings. NATO remains in force and the United States guarantees the territorial integrity of all members, but Article V is seen not to apply to information warfare or terrorism, and the capabilities of NATO are rarely used.

3. Cyber retreat

One of the consequences of a fragmented international system is that there is no agreement on the proper use of cyber warfare. Hacking and denial of service attacks become standard parts of life in Europe, much as traffic accidents became accepted as the cost of automobiles.

Internet-enabled devices are repeatedly the vector through which attacks are delivered and government efforts to mandate security features often fail to match the pace of hacking developments. Infrastructure and financial systems are frequently hit by hackers, many of which are suspected to be supported by states. Elections are commonly disrupted and sometimes must be re-run, as voting systems are found to be compromised.

The result is that societies move away from a reliance on technology for many purposes, or must create multiple fail safes for each critical element of infrastructures. While technology remains potent in its ability to replace the human workforce, it is less effective at delivering the societal benefits from its use in common goods. Economic growth and the quality of living is thereby less than what would be expected by extending baseline projections.

4. Tax evasion

One of the smaller consequences of this scenario is that tax evasion becomes a major source of lost revenue by 2035. Because Europe has weak economic growth, firms are increasingly investing in emerging markets. This permits an even greater percentage of corporate revenue to be routed through tax havens, and the practice becomes adopted by wealthy individuals to an extent far beyond its present levels.

Attempts to coordinate against tax evasion fail at the G20 and OECD as rivals to the United States and Europe begin to see tax evasion in terms of relative gains. If widespread tax evasion and avoidance reduce total government revenues, it also reduces the capacity for military expenditures. Thus, agreement even on small island tax havens become contentious issues for international forums, and serve as another source of distrust between citizens and their governments in Europe.

Scenario 4: The EU as the global power: stable Europe in an unstable world

In this scenario, Europe uses new technologies to increase economic growth at all wage levels and introduces policies to encourage stability in its financial system. China is aggressive in its rise, in part to distract from its own economic troubles and mouting evidence of corruption among government officials. Beijing frequently clashes with Washington in international arenas and with its neighbours over territorial disputes. India, Brazil, Nigeria, and Russia all have advocated an end to the Western-led order and greater control over their respective regions.

1. Australia in the Mediterranean

One of the immediate consequences of an economically dynamic Europe is a drastic need for labour, especially to perform low-skill service, agricultural and manufacturing jobs. However, the European political establishment is still scarred from the divisions caused by the migrant crisis of 2015, which threatens to be repeated as natural disasters and political unrest make repeated appearances in its neighbourhood.

The EU therefore adopts a continent-wide immigration system modelled on Australia's. There is no acceptance of migrants who enter by sea or are caught on its land borders, and agreements are made with bordering countries to hold detained migrants in exchange for economic support. A points system and method of allocating migrants to countries with the fastest ageing population is introduced. The system is broadly accepted by centrist parties, but is a constant source of attack from left-wing parties (for neglecting humanitarian commitments) and from right-wing parties (for being too generous).

2. Faster integration

A series of external crises threatens to imperil Europe's economy and security: China declares an embargo on the sale of rare earth minerals; Saudi Arabia experiences a great depression as oil prices are persistently below the break-even price for the country's social contract; and the transition from President Vladimir Putin to his successor sparks severe bureaucratic infighting in Russia, with some factions using foreign affairs to position themselves as the heirs to his legacy.

The repeated threats produce a series of European common responses. While each response is unrelated -- for example, a common fund dedicated to the advancement of renewable energy or a counter-terrorism policy that can adapt to the large numbers of unemployed and possibly radicalised young Saudi men -- they combine to form a greater competence for European institutions. A treaty to codify and regularise these changes -- informally known as a Constitution (though it is not officially labelled as such) -- is passed.

3. Unbrexit

The need for euro-denominated clearances to be in the eurozone lead to much of the UK financial system either moving to Dublin or Paris, or setting up offices there. Although the Brexit talks end with a mutually agreeable transition deal and trading arrangement with the customs union, a recession nonetheless ensue for the United Kingdom. Even though the UK government claims that a recession was possible anyway, the government's popularity plummets and there are greater calls for independence in Scotland.

Gradually, the United Kingdom signs up for more and more elements of the EU's economic arrangements, including paying into the EU budget. Eventually, a party runs on a platform that argues against being subject to EU rules while having no say on how they are created, and pledges to re-enter the EU. A victory, largely on the backs of an electorate that is mostly made up of the previous decade's pro-Remain generations, ensues.

The re-entry talks spark dispute within Europe, as many pro-integrationists fear that UK membership would imperil the policies that have been introduced since it left and new financial centres worry that UK entry will rob them of the industry they have come to rely on. Nonetheless, with considerable US lobbying, the EU agrees to accept the United Kingdom, although without many of the opt-outs it had once held.

4. Eurasian wars

Instability in Russia, which is facing severe economic pressures from a declining working age population, a drop in the value of oil and natural gas, and a transition from the presidency of Vladimir Putin, creates the space for conflicts between neighbouring states and irredentist movements. Countries seek to reincorporate Russian-backed enclaves. While some of these movements are accomplished diplomatically, miscalculation does occur, leading to armed conflict near enough to Europe to trigger the EU's involvement. A military occupation and peacekeeping force is not deployed, for fear of antagonising Russia, but the EU High Representative is the most powerful presence in the summits that surround the disputes.

5. EU further abroad

The United States remains the pre-eminent military power, but frequently meets opposition to by regional powers who wish for a free hand in events in their area. US allies increasingly demand military support for their actions, without receiving any, and US adversaries are increasingly willing to defy threats, or to seek support from antagonistic medium powers. The EU becomes the force that is considered credible by US and non-US powers, and becomes used as a diplomatic leader in disputes and as the umbrella organisation to coordinate multinational peacekeeping operations.

The result is that foreign policy throughout Europe is directed through the office of the High Representative. However, that becomes one of the sources of tension within Europe, as member states see the stakes of the European consensus raised. While the move promotes greater institutional unity, it also creates greater political disagreements, with fears that the EU's democratic deficit will be a major threat to the stability of the Union as soon as a controversial mission results in the death of a soldier from a country that vociferously opposed deployment. First missions attempt to avoid this by ensuring combat places are only given to supportive countries, but this creates further disagreements over burden-sharing.

Conclusions and common themes

This section was not designed to create a series of predictions or policy prescriptions, but to tell stories of what might unfold from what a workshop group considered two of the most important critical uncertainties facing Europe through 2035.

Nonetheless, the exercise did produce some commonal conclusions that are relevant to any consideration of various scenarios:

- Brexit is almost certain to hurt the UK economy -- significantly if there is no ensuing deal or if UK financial firms relocate into the eurozone. Whether or not Brexit inspires other member states to leave the EU, or whether the UK applies for membership again, is dependent not only on the immediate consequences of Brexit, but also the global environment. If globalisation is reversed or stagnant among major economies, the attractiveness of being in the single market will increase.
- Cyberwar and hacking attacks are some of the most critical threats to European security. How this issue is addressed is also dependent on external events. A benign international environment and the support of most major powers is crucial for the construction of a set of norms.
- Integration can be driven forward by the need for common responses to crises, especially in foreign policy. However, as with the construction of the euro, this can sow the seeds for greater political division if unified outputs are generated without democratically sound inputs.

SECTION 5: POLICY OPTIONS AND CHALLENGES

The trends and scenarios present a number of challenges to the EU in the next two decades. The following is not a proscriptive list of policy recommendations, but an overview of ten areas that the findings of the previous sections show are of particular importance to Europe, and some of the ways in which the challenges arising from them might be mitigated.

1. Manage tensions related to NATO

NATO is likely to remain the leader in major areas of security and defence for European countries to 2035. However, European governments will need to manage or resolve a series of dilemmas surrounding the organisation in the coming years. These include:

- The strategic ‘pivot’ by the United States away from Europe and towards Asia is very likely to be a multi-decade trend. It was articulated by former President Barack Obama and is arguably being reinforced by President Donald Trump. This means that US pressure for increased European expenditure on NATO is likely to remain high and even to rise further in future, not just under the Trump administration. It is almost inevitable that the United States will divert more resources to other regions of the world, notably Asia.
- As Africa experiences the fastest population growth worldwide over the next two decades, the flow of migrants to Europe is likely to continue rising. Many of these may be economic migrants, as well as those fleeing political or security risks. This is generally not an issue on which NATO leads (rather, leadership is taken by EU institutions and member state governments on issues such as border security). However, more is likely to be expected from NATO in areas such as surveillance, capacity building and collaboration with local (non-NATO) security forces.
- China’s growing economic and business interests in and around Europe will pose security questions for Europe. For example, China’s growing investment interests in Europe, Africa and the Middle East are likely to make China a stakeholder as the EU, its member states and NATO seek to manage migrant flows in the Mediterranean region. China’s investments in Greek ports make it a frontline stakeholder in that region of the Mediterranean.
- Over the next 20 years, heightened vigilance will be required by NATO with respect to Russia. In the long-term, Russia appears to be on a path to demographic and economic decline. Yet history suggests that declining powers can seek to deflect attention from domestic problems by engaging in military action abroad. At the very least, Russia is likely to continue cyber and informational warfare targeting European institutions and individuals. In response to these cyber threats, Europe needs to move from being solely reactive, by strengthening its own institutions to make these less vulnerable. This could be accomplished by building cyber defences, but also through governance improvements, such as fighting corruption, thereby reducing the range of targets available to Russia.
- Turkey’s slide towards authoritarianism poses a problem for NATO. Strategically, Turkey is too important to force out of NATO. However, NATO’s existence is based in part on the notion that it is an alliance of democracies. Keeping an authoritarian member inside the

alliance will weaken NATO politically and in the view of its members' general publics, making a Turkey-specific policy stance likely necessary.

The above tensions will lead longstanding divergence within NATO to widen: Southern European countries would like to see NATO play a stronger role on issues involving Africa and the Middle East, while Eastern European countries wish to continue prioritising the security threat posed by Russia. Any policy must be considered along the lines of whether it would bridge or exacerbate that divide.

2. Enhance EU defence and security institutions

The year 2035 may be too soon for a unified command structure that might rival that of a nation-state. Nonetheless, progress on defence and security integration is likely, in part due to new threats and the possibility US inattention to European issues. Specific policy challenges that the EU will need to focus on in the next 20 years include:

- Reducing inefficiencies in defence procurement would create huge financial savings, which would help to free up space in defence budgets. It will be especially important for European militaries to coordinate their procurement efforts given the pace of technological change in the defence sector, and the high cost of new technological solutions. This will be especially important if unmanned vehicles become the most common weapons on the battlefield. The current proposals around the European Defence Fund (EDF) could allocate somewhat more funding to such solutions.
- Using military force requires a common strategic outlook. Several steps have been taken in this regard in 2016-17, but member states often remain far apart on the question of deepening collaboration on defence and security. Many Northern and Eastern European countries are particularly sceptical, trusting the United States to be their key partner on security issues more than other European states. This may mean that it makes sense for a select group of member states to move ahead on their own.
- A piecemeal approach to defence and security collaboration in the coming years is likely to be helpful, in parallel to more strategic efforts. The former would involve deeper information sharing around specific missions or deployments, for peacekeeping and stability operations, which could set precedents for later action.

3. Strengthen cybersecurity

Cyber attacks will present major challenges for EU countries over the next 20 years, in large part due to their unpredictable nature. For example, most cybersecurity experts failed to foresee the apparent Russian attempts to influence the outcomes of the US election by manipulating online information and hacking key participants' email accounts. Nonetheless, certain specific challenges appear very likely over the next 20 years:

- Attempts by foreign intelligence services or related groups to influence European election outcomes are likely to become a permanent feature of elections in the EU. Such activities could extend beyond support for certain candidates. They are quite likely to involve attacks on state institutions, eg, government departments, in attempts to undermine these and generate chaos. This is an area where NATO is likely to play the leading role within Europe over the next 20 years.

- The Internet of Things will rapidly become a feature of European homes and workplaces, with an increasing variety of household and professional appliances connected to the Internet and controlled online. This will present a heightened risk of surveillance by governments or cybercriminals, with intruders seeing internet-enabled devices as back doors to valuable intelligence networks. Public services may increasingly become vulnerable to attack. This is likely to become a critical area of regulatory focus for the EU, with an important geopolitical dimension.
- Quantum computing will progress over the next 20 years, though it is difficult to estimate exactly how far. At some point quantum computing will pose a challenge to currently-used encryption regimes -- especially public ones.
- New efforts may be required in data localisation, as EU citizens' pressure may mount to stop non-EU intelligence agencies or criminal groups from accessing their online data. This would involve physically relocating key internet functions and services within the EU.
- The West needs to accelerate the establishment of principles of use, doctrines, and strategies in cyber warfare, as it has fallen behind Russia in this regard. This is primarily a task for NATO. However, a broad international effort is likely to be needed to update the principles in the United Nations Charter to make these relevant for cyber warfare, and the EU's diplomatic capabilities would help with this effort.
- National and regional governments within the EU should appoint Chief Technology Officers/Chief Information Officers or similar cabinet-level positions responsible for liaising with intelligence services on cybersecurity, as well as overseeing networked government solutions, measuring delivery and implementing best practices.

Brexit will pose a challenge to the EU's remaining members in cybersecurity (and security more generally), as the UK is a leading player in many of these areas. However, the UK's longstanding resistance to the EU developing as a security actor will also dissipate if Brexit materialises. This could give a boost to collaboration in areas of cybersecurity among Member States.

4. Employ sustainability as a source of soft power

Over the next 20 years, the EU will be challenged in areas of soft power in which it currently enjoys leadership. An important one of these is sustainable trade and investment:

- The EU and its member states have developed some of the most comprehensive sustainability legislation worldwide in air quality, climate change mitigation, noise pollution, chemicals, green labelling, and water quality. About 80% of environmental law implemented by member states now comes from the EU. Stringent EU regulation on sustainability affects not only all companies operating within the EU, but also EU companies operating abroad or exporting. In the long term, this provides strong support for the reputation of both the EU and EU corporations.
- This body of legislation gives the EU a platform from which to drive similar change towards sustainable trade and investment in other parts of the world. There is an

important role for EU policymakers in continuing to persuade policymakers elsewhere to adopt legislation on sustainability and implement it to the standards set by the EU.

- The EU faces the risk that some of its key trading partners will permit their companies to gain competitive advantage by failing to enforce best-practice sustainability regulation. Whether the EU can face down such challenges will be a key test of its soft power, and in turn will have a tremendous impact, over a 20-year period and beyond, on a world that increasingly is witnessing the impacts of climate change.

As sustainability and environmental awareness becomes a greater concern to countries around the world, the EU could use its leading position to increase its power in this area, countering some of the loss in diplomatic influence that its relative economic decline would otherwise entail.

5. Regain fiscal space in an environment of ageing workforces

Over the long term, the EU will need new policies to combat the impact of ageing populations. As European governments seek to enact further reforms to social programmes, they will face the prospect of voting publics who will not accept the prospect of diminished living standards in their retired years. The shift of populations to being nearer, on average, retirement age, will constrain the ability of politicians to enact reforms that will take effect soon, creating an incentive to transfer wealth from the young to the old -- with the result of a potential youth backlash or migration to less redistributionist states.

Over the next 20 years, policies in the EU may need to include the following:

- Increases in the pension age would reduce expenditures, but are difficult to implement politically. Therefore, such adjustments need to be made far in advance, ie, with a start date several years in the future, and a gradual raising of the retirement age. An alternative measure with similar effect would be a higher age limit for compulsory employer contributions. For example, in Australia this has been raised to age 75. Or, retirement ages could be matched to life expectancy. This exists in Sweden, and in Denmark is scheduled to be introduced as of 2025.
- Schemes to permit older workers to claim part of their pensions while continuing to work, as has been implemented in Sweden and Australia, may be more feasible than changing payout plans and would extend the average working life. This could also be accomplished through tax credits that incentivise later retirement, as implemented in Denmark's 2006 Welfare Reform.
- Policies could be introduced to maximise the productivity of older workers. This may include, for example, funding grants for networking organisations or training grants for specific skills most appropriate to older workers. Measures to dissuade workers from using unemployment benefit schemes as a pathway to early retirement would have a similar effect. For example, the maximum duration of unemployment benefit for older workers can be decreased, and stricter job search requirements for older workers can be introduced. In 2007, this was implemented in Germany for workers aged 58 years and older.

- Labour market policies can also be directed to delaying the ageing of the population, by encouraging families to have more children, through tax credits or childcare support, or by admitting more immigrants and refugees. These policies are often controversial -- as with immigration policies -- or can be economically inefficient -- as with financial incentives. Nonetheless, ageing countries will likely experiment at national and sub-national levels of government with policies to increase the working-age population, and some innovations may prove to be effective, with the challenge being to identify and communicate successful policies.

6. Harness the power of artificial intelligence

Automation and artificial intelligence will accentuate several economic and public policy trends over the next 20 years. While there is a tendency to emphasise employment displacement, there is also a positive impact, as new jobs are established in R&D, programming and technology-related services. Policymakers must avoid being directed by the hyperbole (positive or negative) that surround the growth of automation, as the pace of AI adoption is still unclear. Nonetheless, some major policy challenges and potential solutions are already becoming clearer:

- EU institutions can play a leading role in helping to build a social consensus around the future of automation. This should involve consultation with all the stakeholders involved, and include sector-specific dialogues. In turn, such dialogue should lead to appropriate regulatory measures. In many cases the regulatory issues may have an ethical angle (eg, when robots can be used for medical surgery), which means that experts outside of government and technology should also be consulted on the nature of regulation required.
- Automation is likely to fuel further income inequality. Higher levels of automation have been accompanied by a widening disparity between productivity performance and industrial wage growth. The impact that automation will have on income levels will continue to come via the displacement of older or inappropriately skilled workers. According to the World Economic Forum, we are facing a near future of mass unemployment for some categories of low- or unskilled workers combined with a lack of skilled workers in other categories.
- Industrial policy needs to be continually updated and adapted to the changing technology landscape. EU institutions and member state governments have important roles to play in encouraging the rapid adoption of relevant new technologies, particularly by small- and medium-sized companies, which are at a disadvantage in any field that requires access to large amounts of data. This is often critical to these companies remaining internationally competitive.
- Automation will force poorer economies to re-assess their development models. It may become more difficult for low-wage economies to attract industrial investment, while the direct employment benefits of foreign investment in more automated manufacturing, distribution, or information technology sectors will be limited. The EU's development policies will, instead, need to focus on upgrading workforce skills in developing countries to compete for investment and maximise local spin-off benefits. Developing countries will also need to be strategic in targeting more labour-intensive services or more specialised manufacturing industries with lower rates of automation but high value added content.

- The EU will in the coming years need to further consider implementing income assistance programmes for individuals displaced by technology, such as universal basic incomes. Guaranteed annual incomes, accompanied by incentives for education and entrepreneurship, could act as a buffer against job losses and help displaced workers more quickly retrain. However, it is still unclear how costly universal basic income programmes may be to governments in the long term.
- Educational reforms will be critical, as automation will put a premium on the integrated technical, business, and services skills that will be required to drive new business growth in technology and services sectors.
- Artificial intelligence and platform economics will lead to the rise of monopolies in many areas of technology, which will necessitate government action to ensure that fair competition is possible in resource- and data-intensive industries.

7. Combat food and water scarcity in Africa and the Middle East

Between now and 2035, climate change and resource competition could increasingly make food and water scarcity in Africa and the Middle East into a geopolitical and security issue for the EU, rather than primarily a development issue. There is a chance that there will be a sharp rise in the number of climate refugees seeking to migrate to the EU. Some responses to this include:

- Development aid budgets will be pressured to expand on issues such as governance, corruption, social safety nets and quality of institutions. In many cases, droughts or food shortages can be adequately addressed if a country's institutions are functioning well and so aid organisations will push for a focus on basic governance.
- Even if the most immediate challenge for EU policy regarding food and water scarcity appears to lie in Africa and the Middle East, a global perspective will be needed. Countries dependent on food imports are vulnerable to fluctuations in global grains prices. Therefore, adverse weather patterns or other disruptions in producing countries can significantly affect prices and scarcity in parts of Africa and the Middle East. The EU can play an important role in this regard, by helping to better manage global grains stocks, which can act as a hedge, preventing price spikes.
- As part of an effort to create greater trust in the global food market, the EU can play a leading role in pushing for a UN resolution against using food as a weapon in geopolitical disputes or preventing governments from embargoing food. With such a resolution in place, countries that suffer water and food scarcity would have less need to keep high levels of food stocks (as currently happens in some Gulf countries).
- Over the next 20 years, the EU will face heavy pressure to loosen its controls on genetically modified organism (GMO) crops. GMO crop production has the potential to reduce food scarcity, particularly in Sub-Saharan Africa, but some of these countries are reluctant to grow GMO crops for fear of losing valuable access to the EU market for their exports.
- More generally, the EU should aim to position itself at the forefront of new developments in biotechnology, in areas such as drought-resistant crop technology. Breakthroughs in several areas of biotechnology relevant to agriculture are likely over the next 20 years.

These have the potential to lead to a secular lowering of global food prices. They also have the potential to lower the agriculture sector's water needs, which would have a substantial impact on water scarcity in these regions.

8. Gain from the opportunities of space exploration

From its genesis at the end of the 1950s, the development of Europe's space activities has been unique in its purely scientific origins. In the European Space Agency (ESA), it has also produced an organisation that has flourished in parallel with the EU, but with a remit that can offer membership to a wider range of countries. From the flights of ESA's Spacelab aboard US shuttle missions from 1983, to the current ExoMars rover project that involves partnership with Russia, international collaboration beyond Europe has been a feature of ESA.

ESA has two types of programmes, each funded differently. Mandatory programmes, which include space sciences, are funded by a contribution from all members that is assessed in relation to each country's GDP. Other programmes, including many of the most well-known ones, such as space transportation, earth observation, space-based telecommunications and navigation systems, and work associated with the International Space Station, are funded by optional contributions from members. This includes the EU as a distinct entity, which now supplies around 20% of the total ESA budget. Fiscal pressures on member countries over the next two decades may force a reassessment of contributions to ESA, leaving the EU to decide how much more it wants to invest in the space sector.

Over the next twenty years, several factors are likely to feed into the development of European space policy, related not only to financing but to relevance:

- Much of Europe's success in space, both political and commercial, has come from the Ariane series of launch vehicles. The latest is version is the heavy-lift Ariane 6, which received final approval in 2016 and is scheduled to make its first flight in 2020. However, competition in the satellite launch sector is expected to intensify over the next decade as new families of launch vehicles are developed by Space X and Blue Origin in the United States, India extends its interest in the commercial sector through its Antrix marketing arm, and the market to launch small and micro satellites develops. There is likely to be some debate over whether it makes sense for Europe to remain at the forefront of this area and if there is a more profitable sector to prioritise.
- Another factor, related in part to the growth in launch competition, is the extent to which space-based commercial systems are becoming commoditised. Galileo, Europe's own satellite navigation system that was intended to avoid reliance on the US GPS system, may be of the last such large-scale projects, as the balance between costs and revenue makes them questionable in purely commercial terms. Much may depend on the development of ideological and pragmatic attitudes about the role of government support.
- The development of European defence policy will feed into the space sector. If there is a need for a sophisticated independent capacity in this area, the cost of securing it may be high. Prioritising the development of reconnaissance via enhancements to ground-based analytical software would reduce some of the costs to Europe in this area.
- As commercial investment in the space sector rises, governments may feel a need to concentrate non-commercial areas such as planetary exploration, a field with the benefit

of creating and sustaining networks across academic institutions that help to design missions and then work on their results. However, these can be difficult to defend if budgets are under pressure.

An additional factor for European policymakers is how to deploy the collaborative aspects of space to best effect. Space activities can play an important role in international relations by offering multi-year partnerships built around specific, non-military projects. The teams of scientists and engineers involved can build ties capable of surviving the short-term shifts in bilateral relations. Positioning Europe as the partner of choice over a range of space-related endeavours, because of its experience with collaborative ventures as well as its scientific expertise, may contribute not only to European cohesion, but to its soft power.

9. Create business clusters to build Europe's leading edge

Clusters of interconnected businesses and institutions can drive productivity and innovation in various fields, and often rely on government support, either directly (through the location of a government facility) or indirectly (through grants to universities). In order to compete with firms in the United States, China, and Japan, European businesses would benefit from the development and deepening of clusters. However, this may go against the political requirements of the EU, to ensure that prosperity is spread evenly across the Union, rather than concentrated in a few areas that may already be wealthy. Some ways to balance these two needs may be to:

- Developing cluster-based policies to replace industry-level and firm-level policies. Harvard economist Michael Porter has argued that clusters are more efficient, minimise distortions to competition and are better aligned with the nature of competition in the modern economy. Policies based around the concept are more likely to help create them.
- Encouraging more government funding of basic research at universities. This will not only provide benefits from the research conducted, but these universities will also spin out companies that translate the research into commercial activity. Because universities are spread throughout the EU, grants can help clusters form in poorer areas.
- Facilitate European-level social services and pension policies, to encourage migration from across the Union to clusters.
- Since clusters can originate organically -- Detroit became the automobile capital of the United States in part because it was where Henry Ford lived -- ensuring access to capital and infrastructure connections to international markets can help an innovative business find the success that leads to a cluster.

10. Adapt to new types of terrorist threat

The threat from terrorism will remain a major challenge for European policymakers to 2035. In addition to seeking ways to respond to the currently known types of terrorist threat, which will remain relevant and pressing to policymakers, new types of threat will emerge over the next 20 years. These may include, but will not be limited to:

- Bio-hacking, the design of new germs and viruses by hobbyists, has opened up the possibility of the low-cost, low-visibility design of biological weapons, possibly leveraging

the mapping of the human genome to create designer plagues able to target certain segments of the population.

- Advanced robotics, allowing precise assassination attacks or mass casualty attacks to be remotely launched by individuals and small groups.
- 3D printing will allow weapons systems to be downloaded and fabricated within secured areas. With the advance of encryption methods, it may be impossible for governments to prevent complicated weaponry from being present in their countries.

While it is impossible to predict the causes of terrorism in 2035, the techniques used to great effect by the Islamic State -- online radicalisation and the encouragement of lone wolf attacks -- will likely persist over the coming decades, as they do not require extensive and vulnerable networks that can be disrupted by governments.

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This study considers eight economic, societal, and political global trends that will shape the world to 2035, namely an ageing population, fragile globalisation, a technological revolution, climate change, shifting power relations, new areas of state competition, politics of the information age and ecological threats. It first examines how they may affect some of the fundamental assumptions of the international system. Then it considers four scenarios based on two factors: an unstable or stable Europe and world. Finally, it presents policy options for the EU to address the challenges created by these trends.

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