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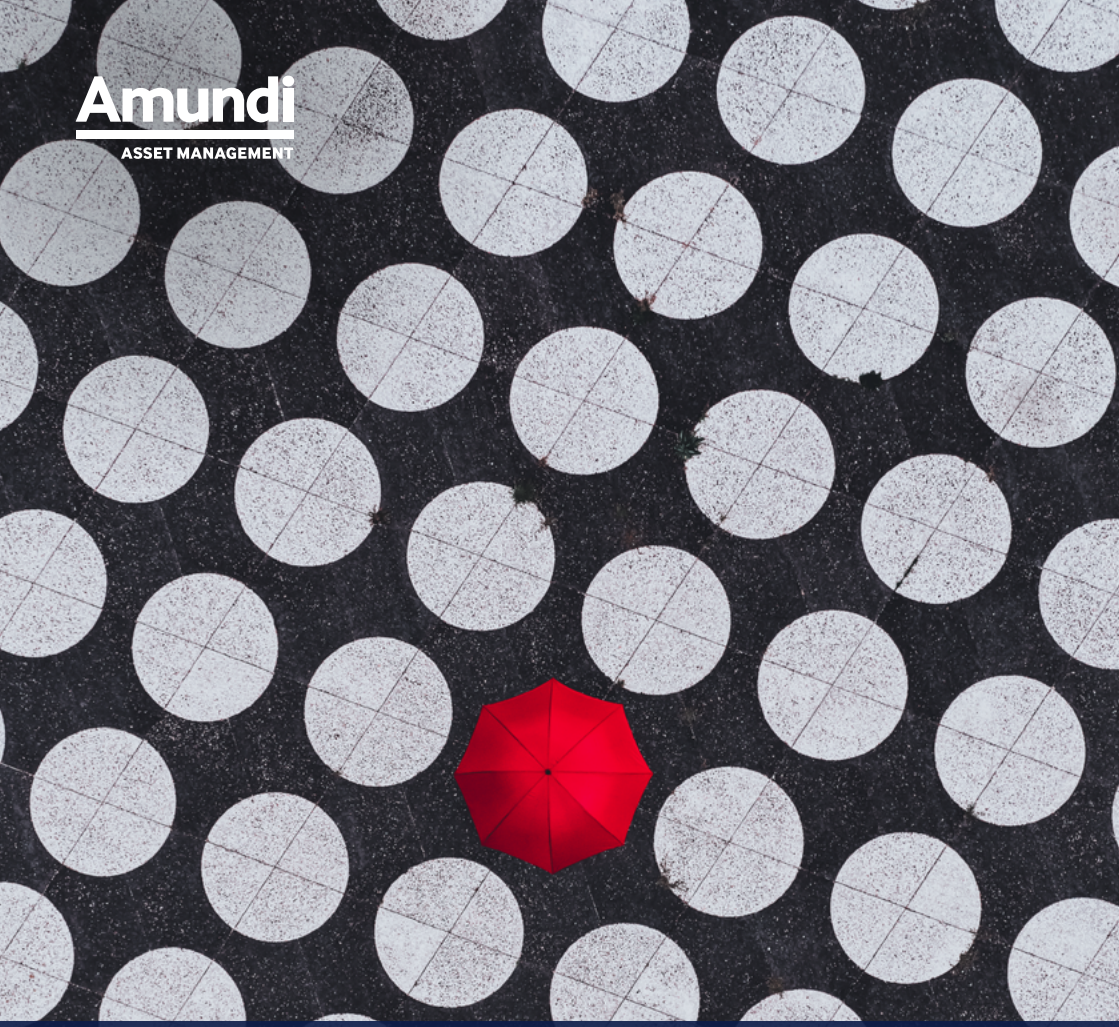

Reindustrialisation, interventionism, sovereignty, de-globalisation...

How Covid-19 and iconomics transform the world

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Reindustrialisation, interventionism, sovereignty, de-globalisation …

How Covid-19 and iconomics transform the world

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Abstract

With the **third industrial revolution** and the **Covid-19 crisis,** the world has entered into a period of global transformations. The current industrial revolution shows the need for an industry adapted to the "new world", while the Covid-19 crisis has shown that national or European sovereignty (in health and medicine, food, digital, etc.) is essential. The combination of the two global transformations makes the task even more complicated because i) Covid pleads for de-globalisation, while the digitalisation favours – so far - IT giants and globalisation, and ii) because at the same time it highlights the degree of urgency. Research and development (R&D) and industry (which performs more than 85% of global R&D) are essential to stay at the forefront of the kind of transformations that are shaping this new economic world. This is all the more critical as history recalls that a country that misses an industrial revolution becomes relatively underdeveloped and rapidly impoverished.

> "The present would be full of all futures, if the past did not already project a story into it"
>
> *André Gide (1869-1951), « Les nourritures terrestres », 1917*

Generally speaking, **the globalisation of business (the economic globalisation) has certainly become excessive**

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in certain aspects, such as when it is based on artificially created comparative advantages. It can lead to offshoring, dumping, quality reduction, trade disputes, unfair competition, and patent infringements (particularly by China).

One of the great certainties of the Covid crisis is the return of state interventionism, i.e. the great comeback of the state as master of resources and manager of the economy. In that sense, the health sector has been completely reassessed by this crisis. In the recent past, health investments were more inspired by economic globalisation (based on the attraction of value chains, search for the lowest cost) than by financial globalisation (better risks and prevention risks, cooperation and regulation). The Covid-19 pandemic has emphasised all the dangers of such a logic. Big changes - such as relocations of industry, creation of more efficient regional eco-systems, a clearer vaccine policy, the creation of an industry of war against the viruses, state interventionism... - are to take place in the coming years in this area. More generally, the Covid crisis represents a collective awareness and a change in behaviour, with the enhanced role of electronic commerce, the increased role of telecommuting, and the increased role of digital technology and robots.

> "The demands of a great people are on the scale of their misfortunes"
>
> *Charles de Gaulle (1890-1970), Président of French republic*

The third industrial revolution, which began in the 1980s, is based on computer science and technology, including digital. As regard IT, the lag of Europe (compared to the US or China, e.g.) is unfortunately quite big. **Getting back in the race in the IT sector seems a very difficult task in view of the market situation (oligopolies) and the exorbitant entry costs.** As regard digital sovereignty, radical changes seem necessary. Europe needs to evolve from a regulatory superpower to a technological superpower if it truly hopes to safeguard its values and interests in the digital space, reap the economic benefits of emerging digital technologies and protect Europeans against disinformation and cyber attacks. Until now, Europe has been more concerned with writing the rules of the game than playing it, continuing to follow China and the United States in the development of leading technology solutions and companies. But **the referees - no more than the spectators - never win games:** the EU must complement its regulatory influence with investments in digital infrastructure, skills and industry in order to become a fully-fledged digital player. Europe has missed the first generation of digital transformation, but it must position itself to compete in the next wave of technology, such as advanced computing, in which European companies have several competitive advantages.

A good combination of positive regulation and strong industry can be found in the US defence sector. To strengthen its defence strategy, **the United States has equipped itself with a massive arsenal of legal and economic weapons.** The extraterritoriality of US laws can sometimes stifle its competitors ... and allies. These laws play a crucial role, and the fight is fierce.

This article deals with many issues, including the different forms of globalisation (economic, financial, political, social, cultural and legal globalisations), the scale of deindustrialisation and the reasons that have led to such a decline in industry, especially in Europe. This process has even been amplified in recent years due to multiple causes such as the drop in domestic demand for industrial products, relocations of firms, unfavourable taxation or difficulties in recruiting. In addition, the countries of Eastern Europe have specialised in subcontracting by emphasising their cost competitiveness, which has accelerated the deindustrialisation of the large EU countries.

> "This public person which is thus formed by the union of all the others [...] is called State when it is passive, and Sovereign when it is active"
>
> *Jean-Jacques Rousseau (1712-1778), Du Contrat Social, Livre I, Chapitre V*

The article also presents some concrete cases of necessary sovereignty, such as the pharmaceutical sector, the food sector, the energy sector (and in particular electricity against hydrogen), the defence sector, the space or digital sovereignty, which represents a symbol of the third industrial revolution. A number of avenues are presented to encourage reindustrialisation and the reconquest of a certain sovereignty.

Two major questions surface:

- **What does reindustrialisation mean in today's world?** It is certainly not about going back to old industries or saving outmoded businesses at all costs, or letting our economies shift into essentially service economies. It is about fostering the structural changes underway in all the industrial sectors. **Reindustrialising means essentially facilitating robotisation and digitalisation.**
- **Which sectors should be prioritised?** The American (or even Chinese) example is instructive: the United States have never ceased to ensure efficiency, power and sovereignty in five strategic sectors: defence (being ready for an eventual confrontation), pharma (being ready to face pandemics and treating the population), finance (being able to finance possible conflicts in particular), agrifood (being able to feed its population) and energy (being able to any situation to operate the industrial tool in particular). At their disposal, new weapons of economic war such as the extraterritoriality of laws (which stifles competitors and allies), but also agencies such as DARPA (Defense Advanced Reearch Projects Agency), which finances and promotes innovation, and seeks to bring together research and entrepreneurs and BARDA (Biomedical Advanced Research and Development Authority), the office responsible for the purveyance and the development of medical solutions against bioterrorism, pandemic influenza and emerging diseases. **It is therefore a question of financing, but also and above all of long-term industrial strategy.** Europe

would do well to learn more from it. The EU has clearly taken this path, with the increase in dedicated budgets, and the creation in 2018, at the initiative of France and Germany, of the European foundation JEDI (Joint European Disruptive Initiative), the European equivalent of the American DARPA. A solution for other sectors?

Without a systemic and strategic reaction, the European Union could well find itself reduced to a market that continues to lose sovereignty, buys American or Chinese products at first, then underdeveloped afterwards**. No sovereignty without industry, it's that simple.** In addition, the strategic, political and cultural dimensions of an industrial revolution are as important as its technical and scientific dimensions. Without industry, given its current geopolitical place, Europe could continue to lose ground, with France being undoubtedly the most downgraded country in terms of power, considering its current political status.

Keywords: reindustrialisation, de-globalisation, Covid-19, digitalisation, robotisation, iconomics, Europe, United States, China

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Executive Summary

1. Three major events have impacted all countries in the past 15 years: the 2008 Great financial crisis, the development of entrepreneurial iconomics (with an "i" for intelligence, IT, internet, innovation, integration) and the Covid-19 crisis. These major events have emphasised some issues, of which globalisation (or de-globalisation), sovereignty (or excessive dependence), state interventionism, re-industrialisation …

Among the insidious forces, which take us by surprise, such as floods, earthquakes or other natural disasters, **Covid-19** represents a rupture: it has affected all countries, all populations, it has caused same fear to everyone, and because of the measures taken by the various governments, it strongly paralysed production and led to recession. This rupture is also lasting, and it will lead to transformations: a desire for greater independence (in particular *vis-à-vis* China, with incentives of relocation of activities and a need for reindustrialisation), increased interventionism by States (in particular in the health and food sectors), the search for greater national sovereignty (pharmacy, energy, digital, etc.), the return of borders, etc. It will also strongly contribute to the acceleration of ongoing transformations, like de-globalisation. More generally, the Covid crisis represents a collective awareness and a change in behaviour, with the enhanced role of electronic commerce, the increased role of telecommuting, and the increased role of digital technology and robots (Ithurbide – Maillard (2020)).

Entrepreneurial iconomics is the result of three new forms of innovation, production, distribution and consumption:

- The economics of computers, the Internet and networked software, which is based on the lightning progress of microelectronics and systems integration, a real capital and entrepreneurial transformation;
- The entrepreneurial economy of innovation, which is a capital and entrepreneurial transformation, has been accelerating since the beginning of the 20th century;
- The service-based economy, real-time management using new computer and communication technologies. The entrepreneurial iconomics is the engine of future growth, intensive productivity and above all the main factor explaining the growth differences between countries. The hierarchy of nations will be upset. Without a systemic and strategic reaction, the European Union could well find itself reduced to a market that buys American or Chinese products at first, then underdeveloped afterwards. No sovereignty without industry, it's that simple. In addition, the strategic, political and cultural dimensions of an industrial revolution are as important as its technical and scientific dimensions. Without industry, given its current geopolitical place, France would undoubtedly be the most downgraded country in terms of power.

No doubt we are living, with the third industrial revolution and the Covid crisis, a period of global transformations. The first shows the need for an industry adapted to

the "new world", and the second has shown that national or European sovereignty (in health, food, digital, etc.) is essential. The combination of the two global transformations makes the task even more complicated because i) Covid pleads for de-globalisation, while the digitalisation favours – so far - IT giants and globalisation), and ii) because at the same time it highlights the degree of urgency. Research and development (R&D) and industry (which performs more than 85% of global R&D) are essential to stay at the forefront of the kind of transformations that are shaping this new economic world. This is all the more critical as history recalls that a country that misses an industrial revolution becomes relatively underdeveloped and rapidly impoverished.

2. Globalisation / deglobalisation: what are we talking about?

There are in fact **several types of globalisation** (political globalisation, economic globalisation, financial globalisation, cultural globalisation, social globalisation, legal globalisation). Some of them continue, some retreat, and some retreat are accelerating.

There are also **several forms of globalisation:** some are inspired by economic globalisation (based on the attraction of value chains) than by financial globalisation (better risks and prevention risks). Globalisation is an economic and financial affair but also a question of trust. This confidence has waned in recent years, and especially since the Covid-19 crisis.

The perception of the United States and China has deteriorated sharply in Europe, as has the mutual perception between the United States and China. Although it may be too early for firm conclusions, Covid-19 will accelerate the retreat of economic globalisation. **Health investments were more inspired by economic globalisation (based on the attraction of value chains) than by financial globalisation (better risks and prevention risks).** The Covid-19 pandemic has emphasised all the dangers of such a logic. Big changes are likely to take place in the coming years in this area. **De-globalisation was a major trend long before Covid-19, but the pandemic accelerates it, since it upends local, regional and national production and supply chains.** Local shops have grown in importance as people seek comfort and certainty on the origin of products. At the country level, governments will try to lessen dependence on foreign trading partners for essential goods and services. And on the regional level, such as in the EU, trade within trusted blocks will grow. The current situation may exacerbate protectionist behaviour from political leaders, especially but not only the populist parties. The role of borders will be revisited.

In summary, globalisation is changing, and the trends observed over the past ten years should continue. These are a decline in economic and financial globalisation, and an intensification of cultural, social, legal, and political globalisation.

3. Post-Covid environment: a lot a issues have surfaced

A questioning on what should not be the post-Covid health system: the health sector has been reassessed by the Covid crisis. From a non-productive sector which was considered to be poorly managed due to a lack of competition, it has become an essential sector in the preservation of public health.

A questioning on what should not be post-Covid globalisation: the globalisation of business (**the economic globalisation**) has become excessive in certain aspects, such as when it is based on artificially created comparative advantages. It can lead to offshoring, dumping, quality reduction, trade disputes, unfair competition, and patent infringements (particularly by China). Health investments were more inspired by economic globalisation (based on the attraction of value chains) than by financial globalisation (better risks and prevention risks). Health policy (and some other policies) cannot be at the mercy of the search for profit, of production at the lowest cost thousands of kilometres away … The Covid-19 pandemic has emphasised all the dangers of such a logic. Big changes are likely to take place in the coming years in this area.

A questioning on the role of post-Covid borders: the Covid-19 crisis has shown the importance of borders, but also, at times, their ineffectiveness. Here lies also the difficulty of clearly defining what is local, national and common (European Union). This is true for health as for any other productive sector. What should we protect or promote? How to proceed? To raise national and European industries, one should follow the concept of subsidiarity: to do at the scale of the people, and failing that, when this is more efficient, to entrust the realisation to the higher political level. The "industrial rocket" thus comprises three stages, the local level, the national level and the common level (Europe):

- At the local level, the ecological and health emergency is ringing the hour for short circuits and recycling, and sometimes militant goodwill is not lacking. This urgency is vital, even if it requires a questioning of the current political logic: Europe before the Nations, the Nations before the regions, the regions before the local …
- At the national level, it is a question of national industrial patriotism. It is also necessary to invite (encourage) national residents to prefer the national products (the "made in France" in France, the "made in Germany" in Germany…), to push savers to finance national projects and above all to encourage employers to produce on their soil, thanks to undoubtedly to fiscal and regulatory adjustments. Sectors that directly affect national sovereignty (defence, health, energy, food, etc.) should thus emerge at the national level.
- On the top floor, at the European level, multinationals and states must use competition to control their costs, but on condition of doing so at European level and not planetary under penalty of giving a premium to the lowest social, fiscal or environmental located on the other side of the world.

A questioning on what should be post-Covid capitalism: there are many forms of capitalism, Anglo Saxon, Rhine capitalism, Nordic capitalism, Japanese capitalism, Chinese capitalism, GAFAM capitalism… In the middle is the European Union and its European States which most often represent a sort of defensive capitalism but free trade, concerned about freedoms but constraining or even interventionist. This capitalism has in some countries been unable to safeguard its industry, as it has

been unable at the global level to bring about the emergence of digital giants, as the United States (GAFAM) or the Chinese (BATHX) have been able to do. This system, in which we find softened forms of both the Nordic model, the Anglo-Saxon model, state capitalism, family capitalism, is adept at control, regulation, and it is not totally effective to cope with the current issues. Europe will therefore have to question the usual ways of thinking and functioning, and descend into the arena. **The spectators and the referees never win the matches, and Europe is undoubtedly today in a phase where its existence is at stake.**

A questioning of geopolitics and allies: another change lies in the perception that individuals, especially European countries, have of the United States and China. **The Covid crisis will leave traces in our memories, and it is very likely that the Chinese origin of the virus has become an original sin** that might weigh on China's reputation, limiting its geopolitical room for manoeuvre. **The Covid crisis has major consequences for China:** further de-globalisation, modification of value chains, less dependence on China … all of this might weigh on its growth … and therefore potentially on employment, growth prospects, reduction of inequalities, the level of poverty, the debt… the Chinese response will undoubtedly not be isolationist. When the people are angry, and lacking democratic remedies, an authoritarian regime may be tempted to divert that anger against outside targets. The exacerbated patriotism is part of the "Xi Jinping mind-set". An economically and socially challenged China is likely to be an aggressive China. **Americans and Europeans undoubtedly have many common grounds on which they can cultivate their complicity and proximity, historical and cultural in particular.**

The comeback of state interventionism was therefore an inescapable fact, with the state as master of resources and manager of the economy: it has been the case throughout the 20th century … at least until the conservative Reagan - Thatcher revolution, which changed the way people think about it. For the Covid crisis, it was the States, central banks and international financial organisations that were in the process. This role seems a priori easier for China or Russia for example (strongly centralised), and to a lesser extent for the EU (already relatively technocratic). For a country like the United States (whose capitalism is inherently less protective and which has forgotten how to operate in a New Deal situation), this could prove to be more complicated. One area in which this new role will be obvious and unavoidable is that of data, commonly called Big data (processing, monitoring individuals, etc.), which should be more regulated than it currently is. There is no longer any question of blindly relying on US GAFAM or Chinese BATHX.

There was also an inevitable - and accepted - strengthening of the power of the state in its role as protector of society. All countries are affected by the Covid crisis, and it is clear that it represents a great opportunity for "non-liberal democracies" (as V. Orban himself describes them) which have thus become totally unfettered authoritarian powers. All in all, is this a gain for democracies or for illiberal regimes? Paradoxically, this could rather serve the democracies which gained new powers on

this occasion, which is not the case for dictatorships or illiberal regimes like China, which already have all the powers.

The increased health role of governments resurfaced, with debates on nationalisation vs. protection of some services and activities. The Covid-19 health crisis forces governments to intervene more strongly in all matters relating to health and food, and the related logistics. They get more involved with private sector players, seeking new forms of cooperation between the public and private sectors to achieve the expected results. Even if nationalisation of key sectors or companies should be the exception, not the rule, boosting research programmes and repatriate the production of some products (e.g. the production of certain active ingredients in medicines) is now crucial. Having stocks of basic necessities, promoting the production of a national industry of medical and paramedical supplies and equipment, boosting research … would create an ***"industry of war against the viruses":*** good risk managers must equip themselves with protection for so-called "tail risk" events. **Not being prepared is definitely a mistake, being totally dependent is another.**

A 2016 report by the National Academy of American Medicine, authored by 17 international specialists, explained that pandemic threat was an overlooked dimension of global security. The WHO had also alerted to such risks, as had reputed virologists. So why were we so unprepared? Three factors explain the inaction:

- The dominant ideology of reducing the weight of the state, with reductions in public spending not sparing the health sector;
- The dominant ideology of the search for zero cost (shut down of unprofitable health services and hospitals, and "optimisation" of those that survive);
- Inaction linked to distrust of the precautionary principle, with the apostles of anti-precaution gaining traction in the political and administrative space.

Creating stronger and more efficient regional ecosystems would also make sense. This is not just regionalisation, but an assurance that regional ecosystems can function effectively with more autonomy and agility, and better support the regions under viral attack, for example. The role of public policy should be to promote greater decentralisation of services, particularly health and medical. In addition, **creating stronger and more efficient regional ecosystems would be positive in terms of territory development, to attract business, develop employment … some crucial criteria for a possible reindustrialisation of the regions.** The role of public policy should also be to promote a **safer food industry:** to adapt to the new consumer preferences, the food industry will have to be transformed. Once they have restocked essential products, consumers will adopt behaviours marked by caution, moderation, and a search for quality and food safety. This should push governments to impose their standards for food safety and traceability.

4. How to reindustrialise?

What does reindustrialisation mean in today's world? It is certainly not about going back to old industries or saving outmoded businesses at all costs, or letting our

economies shift into essentially service economies. It is about fostering the structural changes underway in the industrial sectors. ***Reindustrialising means essentially facilitating robotisation and digitalisation.***

Which sectors should be prioritised? The American (or even Chinese) example is instructive: the United States have never ceased to ensure efficiency, power and sovereignty in five strategic sectors: defence (being ready for an eventual confrontation), pharma (being ready to face pandemics and treating the population), finance (being able to finance possible conflicts in particular), agrifood (being able to feed its population) and energy (being able to any situation to operate the industrial tool in particular). At their disposal, new weapons of economic war such as the extraterritoriality of laws (which stifles competitors and allies), but also agencies such as DARPA (Defense Advanced Reearch Projects Agency), which finances and promotes innovation, and seeks to bring together research and entrepreneurs and BARDA (Biomedical Advanced Research and Development Authority), the office responsible for the purveyance and the development of medical solutions against bioterrorism, pandemic influenza and emerging diseases. **It is therefore a question of financing, but also and above all of long-term industrial strategy.** Europe would do well to learn more from it. The EU has clearly taken this path, with the increase in dedicated budgets, and the creation in 2018, at the initiative of France and Germany, of the European foundation JEDI (Joint European Disruptive Initiative), the European equivalent of the American DARPA. A solution for other sectors?

Without a systemic and strategic reaction, the European Union could well find itself reduced to a market that continues to lose sovereignty, buys American or Chinese products at first, then underdeveloped afterwards. **No sovereignty without industry, it's that simple.** In addition, the strategic, political and cultural dimensions of an industrial revolution are as important as its technical and scientific dimensions. Without industry, given its current geopolitical place, Europe could continue to lose ground, with France being undoubtedly the most downgraded country in terms of power, considering its current political status.

5. Will European countries be able to achieve sovereignty?

On the basic principles, everyone in Europe agrees: we must simultaneously focus on the environment, guarantee less dependence on products from China and elsewhere, develop national infrastructure, and reactivate territories thanks to reindustrialisation and the circular economy. Doing everything is undoubtedly not possible, because the whole requires financial and human resources that few countries have today, but also because belonging to Europe imposes constraints that guide or hinder choices. But between the deadly international division of labour and productive autarky, we will have to choose. The concept of sovereignty should help make these choices: in short, what are the areas where we (residents of an EU country) want to be independent, autonomous, those that we can share with our European partners and those finally where we can rely on the global market? Answering this question is essential.

Data show that Europe is experiencing increasing deindustrialisation for the past 5 decades. This process has even been amplified in recent years due to multiple causes such as the drop in domestic demand for industrial products, relocations, unfavourable taxation or difficulties in recruiting. The countries of Eastern Europe largely dominate the ranking of the most industrial countries, followed by Germany where the sector still accounts for 25% of all the wealth produced in the country. France and the United Kingdom are almost at the same level as Greece, around 14%. France, which was at the forefront of the industrial revolutions from the 1780s to the 1980s, has become in 3 decades an "industrial dwarf". In the same time, Germany has been able to retain its industry.

By no surprise, the fall in the share of industry obviously goes hand in hand with the fall in industrial employment. The share of industry in total employment has fallen in all Member States between 1995 and 2015, but the largest drops have been recorded in Malta (-54%), Luxembourg (-45%) and United Kingdom (-44%). In France, the share of industrial employment in the total fell by 32%. In Italy, Portugal and Spain, the decreases were 25%, 28% and 36% respectively. Germany, which maintained its industrialisation rate between 1995 and 2015, still saw its employment rate in industry fall by 19%. This decline should be seen as one of the consequences of the robotisation of German industry.

So, how to support relocation / reindustrialisation? One can suggest different proposals:

- The state should encourage businesses to increase their research and innovation efforts, invest locally to develop production and exports, equip themselves massively with computer systems and robots to catch up the development of competitive industry, whether European or global.
- Countries such as France need to robotise and digitalise our economies while modernising institutional systems. The European Union must powerfully continue to regulate our globalised economy, in which we must combine price competitiveness and product innovation competitiveness.
- We must develop long-term investors by developing family capitalism and cooperative system having integrated the requirement of competitiveness, and by promoting investment funds with a national reference shareholder, and employee shareholding in order to associate workers with the results of their efforts.
- The tax system should be reviewed whenever necessary. It is not a question of fiscal dumping, but of upgrading with its European partners in particular. The case of production taxes, a French anomaly, is eloquent. In 2018, the level of production taxes reached 4.5% of GDP in France, compared to an average of 2.2% in the euro zone (2.9% in Italy, 1.7% in Spain, 0.6% in Germany). A major handicap for companies based in the national territory compared to their competitors in Europe. This cost handicap has two consequences: either it is passed on to prices, and it then penalises the price competitiveness of

production in the territory, or it is taken from the margins of companies, especially for those which must align with a global or European price. It is therefore a real "tax on made in France" which has the particularity of weighing on the operating account even before the slightest income, or even the least economic activity. France recently decided to reduce production taxes by 10 Bn, but there is still a long way to go to return to European standards, and in particular to industrial and competing countries.

- It is also necessary to promote funded scheme retirement systems, in funds co-managed with the unions, in addition to the pay-as-you-go retirement because these funds are used to invest massively in the equity of companies.
- States must equip themselves with a strategic investment fund to quickly influence the service of industrial and scientific renewal.
- The development of industrial platforms is necessary to accelerate the reindustrialisation of the country. Networking of industrial production units, on shared platforms or in a cluster organisation, is decisive in terms of industrial efficiency, development of innovations and competitiveness. It is essential to put in place a regulatory context leading to the pooling of services in a single place. Tax incentives could encourage companies to group together on platforms

Some industries (Pharma, food, IT, digital, energy, defence) are analysed in the article, and different issues adaptable to each corresponding sector are discussed.

– DEFENCE. If there is one sector to which the principle of sovereignty has been strongly attached, and for a long time, it is the defence sector. But Europe is now lagging behind the US, and regulation plays a crucial role. To strengthen its defence strategy, the United States has equipped itself with a massive arsenal of legal and economic weapons. The extraterritoriality of US laws can sometimes stifle its competitors. Among these instruments, one can for example mention the ITAR standards which allow the United States to block any sale of arms made abroad containing American components. This applies to any kind of arms, including drones, but it has also blocked sales of French Rafales to Egypt, the Rafale comprising an electronic chip subject to the ITAR standard. It is therefore now a question of developing "ITAR free" products … but this obviously requires the implementation of a real "Made in Europe" strategy. In other words, new investments in research, possibly the buyout of strategic companies, and the development of European cooperation programs. The EU has clearly taken this path, with the increase in dedicated budgets, and the creation in 2018, at the initiative of France and Germany, of the European foundation JEDI (Joint European Disruptive Initiative) which seeks to bring together research and entrepreneurs … JEDI is the European equivalent of the American DARPA which facilitated the emergence of GPS and the autonomous car, to name just two examples. France is doing the same, with the signing in June 2020 of a partnership between the French Defence Innovation Agency (Ministry of the Armed Forces) and the industrial groups GICAN (naval activities) and GICAT (Land and air-land activities).

Another important regulatory measure is the Clarifying Lawful Overseas Use of Data Act (Cloud Act), which obliges US service providers and digital operators to disclose the personal information of their users at the request of authorities, without having to go through the courts or informing users... a real blow to corporate trade secrets, which could also expose them to the risks of industrial espionage. The purchasing policy is another major factor for independence and sovereignty. The latest generation **fighter planes** are platforms connected to other players in the battlefield. European states are equipped with European planes, but also American planes. This is the case of Denmark (27 F-35 planes), Norway (53), Italy (90), the United Kingdom (138), the Netherlands (46), Belgium (34) and Poland (32). **These countries have actually bought American sovereignty in Europe.** In terms of European defence, we can do better, especially since the dependence on the United States is total: the Pentagon has the power to remotely neutralise the source codes of planes sold abroad, if the intended use by the customer does not correspond to Washington policy. Without the agreement of the United States, these planes are therefore unusable.

- SPACE is a sector where sovereignty is also evident, for long. The launch of satellites, a crucial activity in our information economy, is a market in total mutation. The European initiative had made it possible to take leadership in this area via the different generations of Ariane rockets. But the last few years have turned everything upside down. As satellite launches are very expensive, and launchers heavier and heavier, new players have appeared, at a lower cost in so-called emerging countries, or at a lower price and with different approaches led by private companies. SpaceX is the best example: development of reusable rockets in particular, a rocket around March in 2024, and very soon a rocket (Starship) that can go up to 12,000 km/h to deliver weapons anywhere in the world when necessary (to be compared to the 950 km/h of the Boeing C-17s used so far ... We will not go into details here, but a new European impetus is necessary to gain in independence and power.

- PHARMA has emerged as a "new" sector to be protected. Different ways to do it: a stronger political will, neutral tax conditions (e.g. removing a large part of production taxes in France), a clearer vaccine policy (France has sold its expertise in animal vaccines to the Germans (Laboratoires Mérial sold to Boehringer), how to put the Pasteur and Mérieux institutes at the centre?), a clearer management of the conflict between blockbuster research (potential "financial jackpots" but huge budgets and sometimes decades of research) vs. management of existing molecules, to encourage risk-taking, especially for newcomers who need financing and who emigrate overseas

- IT. As regards this sector, the difficulties are even worse. Computing is the basis of the 3rd industrial revolution, and the lag of Europe to the US and China is very large. In fact, Europe is not highly active in this sector. Oligopolies have the power. The computer industry, including telecommunications services that have been fully computerised for more than a decade and semiconductors, for which it is the main outlet, is the world's largest industry with a turnover of 4,218 Bn dollars (estimate by the Gartner firm), compared with 2,500 Bn in the automotive industry, and

2,925 Bn in French GDP in 2018. IT is growing at a rate of 7% per year (turnover doubles therefore every 10 years), while the automobile has been declining since 2018 and the year 2020 is proving to be very bad. One of the peculiarities of the IT sector is that i) it depends on a very small number of companies and factories worldwide, ii) the fixed costs are considerable there, and iii) the marginal costs are close to zero. As a result, fierce monopolistic competition develops in every segment of this market, with each company struggling to gain or maintain a temporary monopoly position that can last for a few years or decades. Acquiring a significant position and maintaining it in this universe of complex technologies resulting from scientific research requires sustained R&D efforts.

Microprocessors manufacturing is a very limited oligopoly: ARM (born British, then Japanese and American since September 2020) dominates the connected objects market, with over 20 Bn ARM processors are sold per year. Today, only Intel performs all of the manufacturing operations for its microprocessors: design, manufacture, marketing. But their sales have been declining since 2011. Qualcomm and Apple buy plans from ARM, complete them and have them produced by the Taiwanese foundry TSMC. Samsung and the Franco-Italian STMicro electronics are developing their own systems around an ARM processor and manufacturing them in their factories. Mobile phone manufacturers have all chosen ARM processors because of their low power consumption, due to their more modern design than Intel's. Another dependence to a US tech giant. **Computer manufacturing is an Asian specialty:** the added value is very low (they are now quite cheap items). The complexity of computers comes from their microprocessors and softwares. Assembly is fully automated, and it takes less than 3 minutes to assemble a Dell computer. The repatriation of this type of activity in Europe is impossible due to differences in production costs and the low added value associated with it. **Manufacturing operating systems is a 100% American oligopoly** There are only 4 suppliers of operating systems (the software at the heart of the computer that coordinates its various components as well as the application software, and ensures the communications with the peripheral organs such as the disk, the keyboard, the screen, the network…): IBM (z/OS – 1st version of the operating system launched in 1964), Microsoft (Windows - 1996), Apple (iOS and macOS - 1998), and Google (Android - 2007), the world leader. Europe and China are absent from this segment.

In total, a country or a group of countries which does not produce its micro-processors does not remain at the forefront of the development of operating systems and becomes totally dependent. Europe does not exist in the field of micro-processes: it is even disinterested in it, contrary to China or the United States, which invest heavily in these activities. Getting back in the race in the IT sector seems a very difficult task for Europe in view of the market situation (oligopolies on all elements of the sector) and the exorbitant entry costs. However, it can continue to play an important role in applications for the IT sector, but also for other industrial and commercial sectors.

- DIGITAL. **Is Europe able to achieve a Digital sovereignty? Digital technology and robotics have long been essential for the distribution sector, but the Covid-19 crisis has shown that some sectors and companies can operate with fewer employees with equal or even more productivity.** Many companies will carry out Human Resources studies after the crisis, and their use of digital technology, robotics, and automation will rise. This will aggravate the economic and social situation of lesser skilled or unskilled workers. **Electronic commerce has developed strongly in recent years and the trend has accelerated due the pandemic,** since many people became accustomed to using it and because it could supply essential products. Many businesses developed new services during the crisis and will maintain them. Covid also showed us that e-commerce no longer means just sourcing from far away, but also purchasing nearby, and that it requires good logistics, inventory management, and supply chains.

Being resilient is one thing, being independent is another. The Covid crisis has shown that Europeans are very dependent on technology (most often non-European), not only to support the economy while millions of people were working from home during the lockdown, but also to fight the virus itself. The crisis made the digital transformation of Europe a matter of existential importance. The disagreements between China and the United States, the digital giants, amplified this sense of urgency. If there were still doubts in Europe about the need for greater independence and greater digital sovereignty, the Covid pandemic has overcome them.

As a recent report from the European Council on Foreign Relations (2020) recommends, **Europe needs to evolve from a regulatory superpower to a technological superpower if it truly hopes to safeguard its values and interests in the digital space, reap the economic benefits of emerging digital technologies and protect Europeans against disinformation and cyber attacks.** Until now, Europe has been more concerned with writing the rules of the game than playing it, continuing to follow China and the United States in the development of leading technology solutions and companies. But **the referees, no more than the spectators, never win games:** the EU must complement its regulatory influence with investments in digital infrastructure, skills and industry in order to become a fully-fledged digital player.

Can Europe fight against the digital giants? A complete IT sovereignty is an impossible task. Europe abandoned this industry a long time ago. It left the monopoly of data processing on the web to GAFAM. These companies rely on the effectiveness of digital tools, define their own rules (sometimes bypassing common law), increase their activities, open up to services outside their own offers. Clearly, they create specific ecosystems, and even promote addictive behaviour. In short, in the space of a few years the GAFAs have become competitors of states in the geopolitics of the 21st century. Their dominance is based in part on the quality of their services, their competence in innovation and development, but also on their ability to weaken the dynamics of competition and appropriate innovations likely to destabilise them. Certain studies (commissioned by the British (Furman report (2019)), European (Cremer - de Montjoyer - Schweitzer (2019)) governments show that they now slow

down the development of innovation. They play a bit the role of "rentiers" (D. Ricardo) who, by their monopoly or quasi-monopoly position, no longer bring competition and progress into play. Responsible for anti-competition practices, the 4 companies of the GAFA group are all facing parliamentary inquiries, both in terms of Europe than the United States. No institution in charge of competition has actually been able to prevent the markets from being ultra-dominated by these economic empires, and despite three condemnations by the European Commission in 2017, 2018 and 2019, and a total sanction of 8 Bn euros, Google retained its position in the European market. Ditto for Apple ordered to pay 13 Bn euros to Ireland ...

Recent experience shows that condemning these companies is not enough. **So, what to do?**

- **Adopt stronger regulations:** the EU must also continue to shape the digital environment by exercising its regulatory power through, for example, the creation of a European cloud federation which obliges admission applicants to adhere to standards of the EU.
- **Banking on closer collaboration between European countries** is absolutely essential to bring the behaviour of these giants into compliance, but also to allow the emergence of European digital giants, competing with GAFAM, BATHX, or NATU. But for that to happen, it will first be necessary to be collectively able to outlaw discriminatory practices favouring one's own services or those of one's own economic partners.
- **Europe may have missed the first generation of digital transformation, but it must position itself to compete in the next wave of technology,** such as advanced computing, in which European companies have several competitive advantages.
- Finally, **Europe could export its model (regulations, values, etc.) to like-minded democracies** around the world and build an alliance with them to increase their strike power.

Introduction

Among the forces that destabilise economies and populations, we identify **compelling forces,** trends whose effects are already observable, such as the growth of cities, capitalism, technology, the distribution of income, the growth of populations, the rise of the middle classes. And there are also **insidious forces,** which take us by surprise, such as floods, earthquakes or other natural disasters, but also AIDS, SARS, MERS, H1N1 or Covid-19. Climate change is part of both compelling and insidious forces (it generates natural disasters, for example).

Three major events have impacted all countries in the past 15 years: the 2008 Great financial crisis, the **massive development of entrepreneurial iconomics** (with an "i" for intelligence, IT, internet, innovation, integration) and the **Covid-19 crisis.** These major events have emphasised some issues, of which globalisation (or de-globalisation), sovereignty (or excessive dependence), state interventionism, re-industrialisation …

Entrepreneurial iconomics is the result of three new forms of innovation, production, distribution and consumption (Saint-Etienne (2020)):

- The economics of computers, the Internet and networked software, which is based on the lightning progress of microelectronics and systems integration, a real capital and entrepreneurial transformation;
- The entrepreneurial economy of innovation, which is a capital and entrepreneurial transformation, has been accelerating since the beginning of the 20th century;
- The service-based economy, real-time management using new computer and communication technologies. The entrepreneurial iconomics is the engine of future growth, intensive productivity and above all the main factor explaining the growth differences between countries. The hierarchy of nations will be upset. Without a systemic and strategic reaction, the European Union could well find itself reduced to a market that buys American or Chinese products at first, then underdeveloped afterwards. No sovereignty without industry, it's that simple. In addition, the strategic, political and cultural dimensions of an industrial revolution are as important as its technical and scientific dimensions. Without industry, given its current geopolitical place, France would undoubtedly be the most downgraded country in terms of power.

More than other insidious disasters, **Covid-19 represents a rupture:** it affects all countries, all populations, it causes the same fear in everyone, and because of the measures taken by the various governments, it has severely paralysed production equipment and led to recession. This rupture is also lasting, and it will lead to transformations: a desire for greater independence (in particular vis-à-vis China, with incentives of relocation of activities and a need for reindustrialisation), increased interventionism by States (in particular in the health and food sectors), the search for greater national sovereignty (pharmacy, energy, digital, etc.), the return of borders, etc.

It will also strongly contribute to the acceleration of ongoing transformations, like de-globalisation.

There are still many uncertainties surrounding Covid-19, but important trends have already emerged:

- **The desire to reduce excessive external dependence,** especially in vital sectors such as food or medicine … this implies the need to rebuild national sovereignty. Alongside sectors already considered strategic such as Defence, sectors such as health, food, technology, digital, etc. are now mentioned. National sovereignty will inevitably go hand in hand with the protection of sectors and industries.
- **State interventionism** will also be more present, regardless of the type of regime in place, liberal democracy, "illiberal" regime …
- **The return of borders is also inevitable** (the question is still to know where the limits will be), and the need to regain autonomy is obviously played out at European level, but also at national level: what should be entrusted to the Europe and what should we keep at national level? Where is the principle of subsidiarity, so dear to European bodies, limited?
- In certain respects, **the question of autonomy** and of the ability to cope with these crises such as the Covid-19 pandemic also arises at the local level: should we not create regional poles within countries (health centres in particular), and move towards more decentralisation?
- **The pursuit of de-globalisation.** This trend is not new, but Covid-19 will undoubtedly contribute to a further acceleration of this trend. There is no question of letting key sectors obey the logic of the least cost, a fortiori if the least cost is thousands of kilometres away.
- **A collective awareness and a change in behaviour,** with the enhanced role of electronic commerce, the increased role of telecommuting, and the increased role of digital technology and robots.
- **Reindustrialisation** is the result of all of this, and all the more so as many countries have abandoned entire sections of their economy for more than 30 years to foreign companies, or to national companies producing elsewhere: with the search for national sovereignty or even less dependency, the debate on how to reindustrialise cannot be avoided. It has been so far, either because the desire of companies to relocate has neither really analysed, nor contested, nor discouraged, nor sanctioned by the public authorities, or because the observation on the economic world of tomorrow was distorted or misunderstood. And it is much more serious. Contrary to observations made in the 1980s and 1990s, we have not entered a post-work society, but a new phase of the industrial revolution. More than ever, a competitive industry, adapted to today's world is fundamental.

These transformations are major, and putting them in place will probably not be easy. It should be noted that this will undoubtedly be easier for some countries than for

others. When it comes to interventionism and protectionism, France, for example, has a "rich" past (Laine - Feldman (2017)). When it comes to decentralisation, Germany is already more efficient than many of its European counterparts.

No doubt we are living, with the third industrial revolution and the Covid crisis, a period of global transformations. The first shows the need for an industry adapted to the "new world", and the second has shown that national or European sovereignty (in health, food, digital, etc.) is essential. The combination of the two global transformations makes the task even more complicated because i) Covid pleads for de-globalisation, while the digitalisation favours – so far - IT giants and globalisation), and ii) because at the same time it highlights the degree of urgency. Research and development (R&D) and industry (which performs more than 85% of global R&D) are essential to stay at the forefront of the kind of transformations that are shaping this new economic world. This is all the more critical as history recalls that a country that misses an industrial revolution becomes relatively underdeveloped and rapidly impoverished.

This article deals with all of these issues, and we will discuss the different forms of globalisation, the scale of deindustrialisation and the reasons that have led to such a decline in industry, especially in countries like France. We will also present some concrete cases of necessary sovereignty, such as the pharmaceutical sector, the food sector, the energy sector (and in particular electricity against hydrogen), or digital sovereignty, symbol of the third industrial revolution. A number of avenues will thus be presented to encourage reindustrialisation (i.e. facilitating robotisation and digitalisation) and the reconquest of a certain sovereignty.

In short, **the Covid-19 crisis and the entrepreneurial iconomics will reshape, to a certain extent, the economic landscape, but also geopolitics … a real break, no doubt.** The European Union, China and the United States will therefore face many traps with sometimes terrible consequences (see Ithurbide Ph. (2020) "*US, Europe and China: will it be possible to avoid traps?*", Discussion Paper n° 47, November).

I. Globalisation has receded in the past 10 years … but what are we talking about exactly?

In French, there are two kinds of globalisation, the first is the kind known as "globalisation" in most countries when trends become globalised and form a complete system governed by written and unwritten global rules. The second, which does not create a complete system, is called "mondialisation", and features multiple links and interconnections between states, companies, people, and events, with decisions occurring in one place affecting individuals and communities living elsewhere. It is a question of degree and represents a different reality.

Despite this terminological ambiguity and the changes to globalisation over the past ten years, it is not threatened. It is not, strictly speaking, a de-globalisation, but rather a change in the intensity of globalisation. Perhaps it is a shift to the French idea of

"mondialisation". Using the typology of Huntzinger (2019), there are six types of globalisation: political, economic, financial, social, cultural, and legal.

Political globalisation continues. This is about the universalisation of the state - what Kissinger called *"the triumph of the model of the Westphalian state*". World history has seen the multiplication of states and sovereignties (Huntzinger, 2019). The state is considered the only possible political and legal superstructure. In political globalisation, we find all types of societies and states. "Liquid" societies are those that have become inhuman and unstable due to globalisation and individualisation, while "solid" societies have managed to keep a collective spirit and project (Zigmunt Bauman). The types of states include strong states, weak states, rogue states, and even terrorist states, which impose borders or highlight the importance of borders.

Economic globalisation is retreating. This is already observable in global value or production chains. These are measured by the value of the intermediate goods that are inputs for goods that are then exported. For 30 years, China was the key player in this process, before it refocused on domestic demand. In 2004, the value of Chinese imports destined for re-export represented almost 30% of total exports, but this fell to 13% in 2019. Like other countries, China is gradually moving out of global value chains. In other words, it is de-globalising. Another manifestation of this is the growth of intra-Asian and intra-European trade over the past decade to the detriment of inter-regional trade.

Although it may too early for firm conclusions, Covid-19 will accelerate the retreat of economic globalisation. Health investments were more inspired by economic globalisation (based on the attraction of value chains) than by financial globalisation (better risks and prevention risks). The Covid-19 pandemic has emphasised all the dangers of such a logic. Big changes are likely to take place in the coming years in this area.

Financial globalisation has also been impacted over the last decade and is slowing down. Since the 2008 financial crisis, international lending and deposits between banks have fallen by 35% worldwide. The international market for financial products has also fallen by two-thirds, as has the share of debts held by non-residents in both Europe and the US. This is mostly the result of financial repression and central bank asset purchases (quantitative easing).

Social globalisation, on the other hand, continues to progress. It reflects the rise of trans-nationalisation (Nye, Keohane, 1970s). On the one hand, the world is increasingly populated by non-state actors, be they economic, financial, or religious, and on the other hand, global society no longer depends on the coexistence of states but the interdependence of societies. State politics may no longer be guided by the behaviour of another state, but by that of individuals, for example, a September 11 terrorist, a Chinese student in front of a tank in Tien An Men square, or a Tunisian street vendor setting himself on fire before the Arab Spring. In fact, social globalisation is the number one enemy of authoritarian regimes.

Huntzinger posits that along with NGOs and pressure groups, there are now two other main actors in social globalisation - terrorists and migrants. Terrorists seek

to undermine states and have progressed from regional to global action. Migrants represent nomadism, the desire to cross or ignore state borders. Migrant diasporas developed in the 20th century (50 million Chinese, 30 million Indians), and they now constitute important transnational networks, a sort of state within a state. Migrants currently represent 3% of the world population or 200 million people. More than 60% live in developed countries, with three-quarters in thirty of them. More than 50% are in the United States and Europe alone. Migration will remain strong over the next few decades, another indicator that we have entered the post-sovereign world of transnational society.

Cultural globalisation is also progressing, in part through political globalisation. All societies have cultural identities based on common history, language, mythology, religion, and customs. These have often been enhanced by political globalisation, which has given many groups a political existence and identity. However, at the same time, the world is becoming more divided between its many cultures, and their peaceful coexistence is not guaranteed.

This is nothing new. Herodotus had already shown that relations between peoples generated mainly cultural conflicts and not territorial conflicts. Braudel and Huntington came to the same conclusion, and Huntzinger posited that in the 19th century the world was multipolar but uni-civilisational, dominated by European culture. In the 20th century, however, it became bipolar and divided into three ideological worlds, the West, the Soviet world, and the Third World. Today, for the first time in history, the world is multipolar and multicultural, with many dividing lines that sometimes lead to neo-nationalist or populist movements. Cultural globalisation is marked by a paradox: The West is declining politically and new powers and civilisations are emerging, however, these are strongly influenced by western culture, which still dominates globalisation.

Legal globalisation is another major trend, although the obsession with sovereignty of certain states (US, Russia, Turkey, Hungary, etc.) undermines multilateralism and reduces the power of the institutions that symbolise the idea of a global community, like the UN, the G20, and the EU. In addition, migration or religious fundamentalism continues to fuel nationalism. Nonetheless, the desire to preserve "common goods" is growing. States have gradually become aware of the need to jointly combat climate change, deforestation, the decline of biodiversity, the degradation of seas and oceans, and the development of new global pandemics. This trend seems irreversible, with COP 21 in 2015 serving as a landmark. It involved engaging numerous stake-holders, including NGOs, scientists, businesses, and states, to adopt common rules that addressed a problem while adapting to the needs of states according to the principle of «common but differentiated responsibilities». The "One Planet Summit" of 2017, another example, set the commitments for public and private funding of projects. So, global law seems to be emerging, although it is still far from perfect.

De-globalisation was a major trend long before Covid-19, but the pandemic accelerates it, since it upends local, regional and national production and supply

chains. Local shops have grown in importance as people seek comfort and certainty on the origin of products. At the country level, governments will try to lessen dependence on foreign trading partners for essential goods and services. And on the regional level, such as in the EU, trade within trusted blocks will grow. The current situation may exacerbate protectionist behaviour from political leaders, especially but not only the populist parties. The role of borders will be revisited.

In summary, globalisation is changing, and the trends observed over the past ten years should continue. These are a **decline in economic and financial globalisation, and an intensification of cultural, social, legal, and political globalisation.**

II. Economic and political globalisation, the role of borders, the essence of capitalism, allies vs. enemies … a questioning of the usual patterns of thought

The Covid-19 crisis opened the eyes of the blissful optimists of globalisation and free trade (if there were any left), whose economic theory had long ago shown the conditions to benefit from their merits, but also their shortcomings and dangers. But it had become very far from the doxa, and the slayers of excessive liberalism, unlimited free trade and unbridled capitalism were considered as men of the past, defeatists … The comeback of borders is once again a reality that all countries now share, and new paths for globalisation and capitalism are becoming essential. **Naivety and complacency have disappeared, and the search for the lowest costs for the production of all products, whatever they are, can no longer be justified.** We progress with the help of crises, they say. Producing outside the country, synonymous with lower prices for consumers but also with deindustrialisation, had already found its limits in terms of mass unemployment. It is now a question of health (even survival), of stock shortage (especially food), in short of extreme dependence, of loss of national sovereignty. It is therefore also a question of recovery of industry in most European countries, and in particular of France, which is one of the countries that has sacrificed its industry the most for thirty years.

II.1. A questioning on what should / should not be the health system

The health sector has been reassessed by the Covid crisis: from a non-productive sector which was considered to be poorly managed due to a lack of competition, it has become an essential sector in the preservation of public health. As a result, the objective of public policies was amended: while the public authorities had resolved to introduce modern management tools in hospitals to limit administratively the increase in the cost of health care, it is again question henceforth to free the hospital from purely commercial logic and a number of countries, including France, have decided to lift the spending ceiling fixed by the

budget, at least temporarily. It must be said that the consequences of liberalisation have been catastrophic in light of the Covid crisis: reduction in the number of hospital beds, underinvestment in prevention, "Taylorist rationalisation" of the work of medical teams, lack of coordination public / private, difficulty of recruitment (low remuneration, intensification of work, stress, resignations) ... It was therefore necessary to increase in haste the number of intensive care beds, to order essential equipment during this crisis, to reorganise the hospital teams to deal with the emergencies ...

In theory, of course, liberalisation was supposed to allow universal access to the health care system, but in reality, there was more often a "silent" selection by income and social status.

Faced with Covid, and due to insufficient resources, it has also been necessary in some countries to clarify an age criterion as a condition of access to intensive care, which has sparked debate.

In short, revisiting the functioning of the hospital in particular and the health sector in general is necessary in many countries (such as France), just as it is necessary to revisit the logic that underlies its functioning (liberalisation, sometimes excessively).

II.2. A questioning on what should not be globalisation

The globalisation of business (**the economic globalisation**) has become excessive in certain aspects, such as when it is based on artificially created comparative advantages. It can lead to offshoring, dumping, quality reduction, trade disputes, unfair competition, and patent infringements (particularly by China). We must ask ourselves whether it is reasonable to consume Chinese chestnuts in Canada, to eat Norwegian farmed salmon in France that is unfit for consumption in Norway, to produce fruits and vegetables out of season with excessive use of energy and water, or to subsidy, in some countries (with national taxes), electric cars (European and foreign cars) using batteries produced mainly in China ... with rare-earth metals produced with high pollution ...

Financial globalisation, on the other hand, entails greater cooperation between financial systems, which is essential for fighting financial crises and is in everyone's interest. Experience shows that this cooperation has been quite effective.

Unfortunately, health globalisation has followed more the pattern of business globalisation (search for the lowest cost) than financial globalisation (cooperation, regulation). In addition, health regulations are not harmonised and are insufficient in some countries - for example, eco-labelling of foodstuffs and legislation on GMOs. As in the case of financial integration, with its risks of contagion, health issues such as pandemics do not stop at borders. Moreover, while international cooperation is essential, especially for medical research, the health sector remains largely the prerogative of states, with large differences in health systems and levels of crisis preparedness.

A questioning of the very functioning of health policy is inevitable. This has never been multilateral: the WHO (the World Health Organisation), for example, only plays an advisory role and has even been criticised for being too pro-Chinese during the Covid crisis. It should be remembered that even in Europe, health policy is the business of each country: it is a national competence. And we clearly saw the limits of this subsidiarity during the pandemic. While China, for example, could mobilise its resources everywhere on its vast territory, the European States followed their own path (with very varied results, and sometimes even catastrophic). The United States could have furnished its resources, but the political decision, as well as the differences between Washington and the Federal States, did not favour it. **Health policy cannot be at the mercy of the search for profit, of production at the lowest cost thousands of kilometres away ...**

II.3. A questioning on the role of borders

Does it make sense to close borders to non-Europeans while safeguarding free movement within the EU when its members have different plans to contain Covid? If a country thinks its plan is more suitable than that of its neighbours, then its borders with them should be closed. Not closing the common EU border is only suitable if we adopt a common plan, which has proved impossible to date. The reopening of borders is also problematical and may exacerbate protectionist behaviour by political leaders, especially the populists.

The Covid-19 crisis has shown the importance of borders, but also, at times, their ineffectiveness. The difficulty of clearly defining what is local, national and community. This is true for health as for any other productive sector. What should we protect? What should we promote? **How to proceed?**

To raise national and European industries, one should follow the concept of subsidiarity (a concept developed by Johannes Althusius, a German theologian of the 16th century): to do at the scale of the people, and failing that, when this is more efficient, to entrust the realisation to the higher political level. The "industrial rocket" thus comprises three stages: the local, the national and the community (European).

- ***Rocket stage # 1.*** For the local, **the ecological and health emergency is ringing the hour for short circuits and recycling, and sometimes militant goodwill is not lacking.** This urgency is vital, even if it requires a questioning of the current political logic: Europe before the Nations, the Nations before the regions, the regions before the local ... this also imposes in France a questioning of super-regions without real substance.
- ***Rocket stage # 2.*** On the second floor, the national, it is a question here of national industrial patriotism. Since Colbert, great projects capable of making French hearts vibrate have been mounted jointly with captains of industry, industrious civil servants and brilliant engineers ("*the harmony of the productive forces*" of the German economist Friedrich List). **It is also necessary to invite (encourage) national residents to prefer the national product (the "made in France" in France, the "made in Germany" in Germany ...), to push savers to finance national projects and above all to encourage employers**

to produce on their soil, thanks to undoubtedly to fiscal and regulatory adjustments. Sectors that directly affect national sovereignty (defence, health, energy, food, etc.) will thus emerge at the national level.

- ***Rocket stage # 3.*** Top floor, Europe. In some sectors, projects amount to billions in research and infrastructure while in others, competitors now claim virtual monopolies. In such configurations, only the continental scale seems likely to authorise success. This was the case with aeronautics (Airbus), nuclear energy (CERN), to a lesser extent the automobile (sharing of engines, etc.). This is now the case in the digital industry where the law of large numbers ruthlessly applies. In trade matters too, Europe can be effective on condition that it renounces all or part of its free trade dogmas. Community preference (a strong idea of Maurice Allais, Nobel Prize winner in economics in 1988) is a prerequisite for European industrial rearmament: **multinationals and states must use competition to control their costs, but on condition of doing so at European level and not planetary under penalty of giving a premium to the lowest social, fiscal or environmental located on the other side of the world.**

The notion of border is essential to contain excesses, regain national or community sovereignty in vital sectors and to start a reindustrialisation of Europe. It will not be easy because it is a real questioning of ways of thinking, preconceived ideas and practices followed for several decades.

II.4. A questioning on what should be capitalism

There are many forms of capitalism, even ancient ones. Fernand Braudel, for example, believed that one could find from the Middle Ages, at the beginning of the 14th century, manifestations of "commercial" capitalism in the Netherlands and in Italy (the "medieval capitalism"). In the modern era, capitalism has mutated in different forms, guided by the differences of societies, religious constraints, history ... we can mention some examples, present in this period of Covid crisis:

1. Shareholder or financial capitalism, called "Anglo-Saxon", whose origins date back to the 18th century in the United Kingdom, in line with the ideas of the classic economist Adam Smith. In practice, the Anglo-Saxon capitalist model nevertheless emerged in the 1970s with the Chicago School of Economics. The specificities of Anglo-Saxon capitalism are, in theory: a greater place given to risk taking, as well as a greater acceptance of risk in society, lower levels of regulation and taxes, a public sector providing very little services, strong private property rights, low barriers to free trade, higher inequalities ...

2. Rhine capitalism (or social market economy), characterised by co-management, influenced by ordoliberalism, according to which the State is responsible for creating a legal and institutional framework for the economy, and for maintaining a healthy level of "free and undistorted" competition via measures in accordance with the laws of the market. Indeed, if the state does not take early measures to encourage competition, companies will give rise to monopolies, trusts or oligopolies. This will

have the consequence of diverting the economic advantages offered by the market, and perhaps ultimately undermining democracy, with economic power capable of transforming into political power. The State therefore has the role of authorising officer. This form of capitalism has been less present in recent years.

3. Nordic capitalism: The Scandinavian or Nordic countries, however very different, all have some points in common: they include "universal" support for the welfare state (compared to other developed countries) which specifically aims to improve individual autonomy, the promotion of social mobility and the universal application of human rights, as well as the stabilisation of the economy, while supporting free trade. This model sets itself apart from other types of welfare states by emphasising full employment, the promotion of gender equality, large and egalitarian social benefits, wide redistribution of revenues and an expansionary liberal fiscal policy.

4. Japanese capitalism (which R. Boyer (2020) calls "anthropogenetic" capitalism) pays more attention to education, health, and is based more on the company and the family than on the state. Its operation leads to kinds of "paradoxes": the life expectancy of the Japanese is much higher than that of the Americans (4 years more for men, 6 years more for women), the proportion of the elderly population is much higher (nearly 25% are over 65, compared to around 15% in the United States), but health expenditure is nearly 40% lower than in the United States (where the health care system is limited), but with a higher number of doctors per capita. The share of public spending devoted to education is also lower there (3.5% of GDP against around 5.5%), but access to higher education is better in Japan than in the United States … And if we consider the frequency of crimes and homicides (crime and homicide rate 6 times lower), it appears that the Japanese society is more peaceful than that of the United States. Finally, the inequalities are much lower.

5. Family capitalism, which most often concerns SMEs (most often local or regional) supports the creation of value for all stakeholders, and which is therefore a priori more social, less unequal, less violent …

6. The capitalism of the GAFAM, a centralised, transnational, private capitalism, which bypass borders… The actors of the platform economy, the GAFAM (Google, Apple, Facebook, Amazon and Microsoft) have a large financial strike force compared to other companies, with a perfect control of information and data, sometimes much greater than the States in which they operate, in which they pay little or no taxes. Profitable, always in search of yield, they modify the structures of the labour market, as well as employment contracts, and carry within them an unequal society. They are also intrusive, which explains why some states (and consumer associations) come to rebel. The Covid crisis has shown the value of their model (electronic commerce, ease of teleworking, etc.), but it has also shown its drawbacks in terms of dependency, working conditions in particular.

7. Chinese capitalism is also a centralised capitalism, but it is a national and state capitalism, it controls the citizens and disposes of them in an "abusive" way. It has created, with the blessing of foreign States and foreign companies and their search

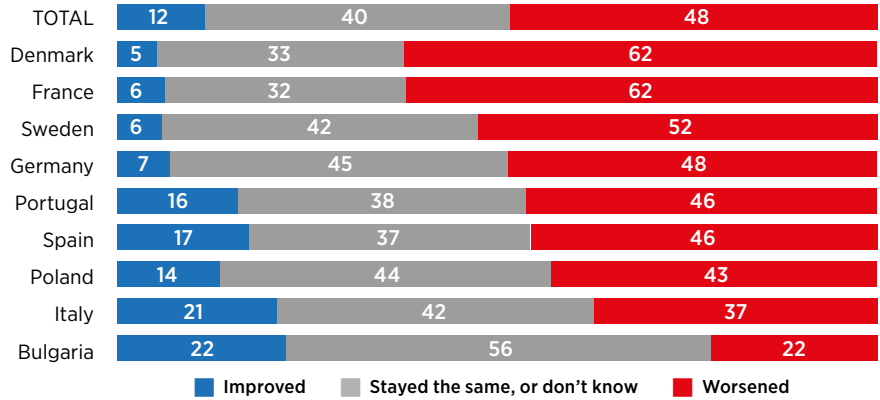
for profitability and lower cost, a situation of dependence for often major sectors (pharmaceuticals, electric cars, etc.), and the Covid crisis has also shown the dangers that this situation now represents. For a long time, capitalism combined private property with the freedom to set prices. We moved away from all that with Chinese capitalism. China defines its capitalism and its economic system as a socialist market economy, not to be confused with the social market economy found in Germany and from which it is considerably distant.

8. In the middle is the European Union and its European States which most often represent a sort of defensive capitalism but free trade, concerned about freedoms but constraining or even interventionist. This capitalism has also in some countries been unable to safeguard its industry, as it has been unable at the global level to bring about the emergence of digital giants, as the United States (GAFAM) or the Chinese (BATHX) have been able to do. This system, in which we find softened forms of both the Nordic model, the Anglo-Saxon model, state capitalism, family capitalism, is adept at control, regulation, and it is not totally effective to cope with the current issues. Europe will therefore have to question the usual ways of thinking and functioning, and descend into the arena. The spectators and the referees never win the matches, and as R. Boyer (2020) points out, "Europe is undoubtedly today in a phase where its existence is at stake".

II.5. A questioning of geopolitics and allies

Another change lies in the perception that individuals, especially European countries, have of the United States and China. **The Covid crisis will leave traces in our memories, and it is very likely that the Chinese origin of the virus has become an original sin** that will weigh on China's reputation, now limiting its geopolitical room for manoeuvre. In any case, one thing is already known: the deterioration of China's image, as a recent survey shows (graph 1).

Graph 1: **The perception of China has deteriorated sharply in Europe during the coronavirus crisis**



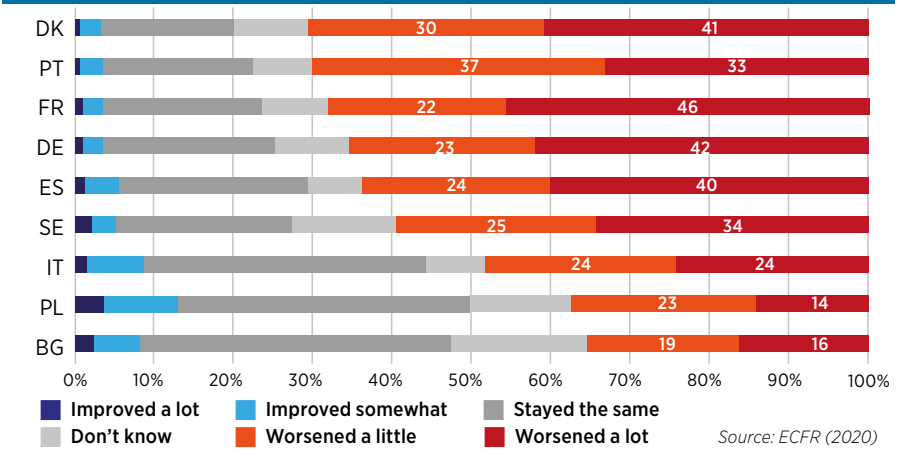
Source: ECFR - ecfr.eu

The Covid crisis has major consequences for China: further de-globalisation, modification of value chains, less dependence on China ... all of this will weigh on its growth ... and therefore potentially on employment, growth prospects, reduction of inequalities, the level of poverty, the debt ... the Chinese response will undoubtedly not be isolationist. When the people are angry, and lacking democratic remedies, an authoritarian regime may be tempted to divert that anger against outside targets. The exacerbated patriotism is part of the "Xi Jinping mindset". An economically and socially challenged China is likely to be an aggressive China.

Americans and Europeans undoubtedly have many common grounds on which they can cultivate their complicity and proximity, historical and cultural in particular, even if the transatlantic alliance[1] between the United States and their European allies has been severely challenged since Trump's election in 2016. However, America's reputation is direr than ever within the European Union itself. Surveys also showed that Trump's attitude during the Covid-19 crisis, which focused more on blaming other countries than willingness to cooperate with them, had greatly amplified an already existing poor sentiment.

An ECFR poll reveals, in the wake of the coronavirus crisis, that more than two-thirds of respondents in Spain, France, Germany, Portugal and Denmark say their opinion of the United States has deteriorated during the crisis. (Graph 2)

Graph 2: **The image of the United States has deteriorated all over Europe**



Source: ECFR (2020)

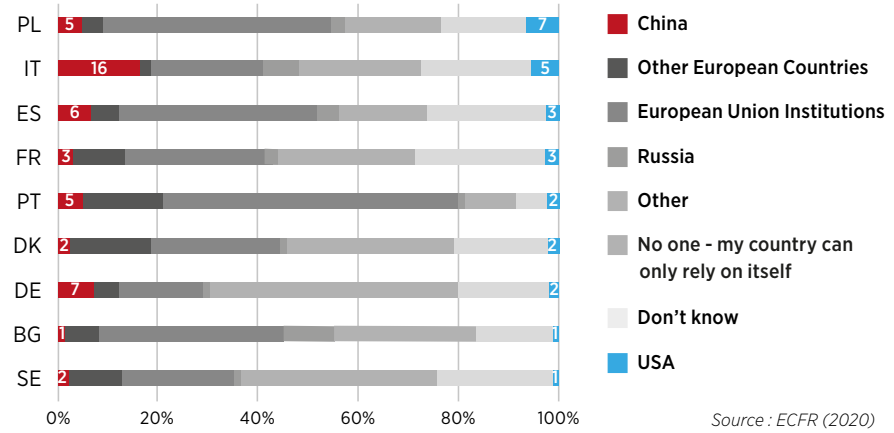
[1] *Atlanticism is the political current which, since the beginning of the Cold War, advocates a military alliance centred on the states adjacent to the North Atlantic Ocean and, by extension, between Europe and North America. This alliance aims to ensure the security of member countries and protect the values that unite them: "democracy, individual freedoms, and the rule of law". It goes hand in hand with cooperation in the political, economic and cultural fields. NATO is one of the expressions of Atlanticism.*

Apart from Poland, not a single country considers that the United States will help their country more than China (3 times more in Italy or Germany, for example). According to Jeremy Shapiro (research director at the European Council on Foreign Relations (ECFR), and adviser to the State Department during the Obama presidency), "*hardly anyone in Europe expects the United States will be a useful ally in the future*". Everything seems to indicate that Europeans are preparing for a future without the America they once knew. Most countries now rely only on themselves, even in European institutions and other European countries (Graph 3).

Two comments:

First of all, the criticism that some may have made against European countries for a form of complacency towards China is no doubt no longer relevant. The contrast between the United States and Europe was certainly startling, but the Covid crisis has changed that.

Graph 3: **Which country can we count on in the post-Covid crisis?**



Source : ECFR (2020)

Second, does the opinion on the United States mean a greater distance to come between the United States and Europe geopolitically and geoeconomically? Biden's notoriety on the Old Continent suggests that mutual trust will be rekindled. Be careful, however: **transatlanticism is now one of the elements of a global world, it is no longer the main issue as in the days of the Cold War.** Biden could be, like Obama before him, the tree that hides the forest of a transatlantic relationship increasingly subject to turbulence and perceptual differences. The Biden presidency will ease tensions exacerbated by Trump's clumsy formulas, but it will not fundamentally change the situation when it comes to China, defence, security … **Like it or not, the transatlantic relationship as it developed in the aftermath of the fall of Nazi Germany is now history.** Europe is well aware of this. "*Europe will have to learn to do without the United States*", announced Angela Merkel in May 2017. More recently, she recalled in an interview with the Guardian

(June 2020): "*We grew up in the certain knowledge that the United States wanted to be a world power. Should the US now wish to withdraw from that role of its own free will, we would have to reflect on that very deeply*". In his opening speech at the annual meeting of the European Council on Foreign Relations (CEFR), German Foreign Minister Heiko Maas said that regardless of the outcome of the US presidential election in November, Europeans " *will have to think about how to better contain the conflicts around Europe, even without the United States* ". This point of view is shared in many countries. And all the more so since the American president should still be protectionist in trade matters, sensitive to the supposed isolationist instincts of the American public and reluctant about the idea of writing checks to defend Europe.

III. The comeback of state interventionism

One of the great certainties of the Covid crisis is the return of state interventionism.

III.1. The great comeback of the state as master of resources and manager of the economy

The state has always been the master of resources and the manager of the economy throughout the 20th century ... at least until the conservative Reagan - Thatcher revolution, which changed the way people think about it. For the Covid crisis, it was the states, central banks and international financial organisations that were in the process. This role seems a priori easier for China or Russia for example (strongly centralised), and to a lesser extent for the EU (already relatively technocratic). For a country like the United States (whose capitalism is inherently less protective and which has forgotten how to operate in a New Deal situation), this could prove to be more complicated. One area in which this new role will be obvious and unavoidable is that of data, commonly called Big data (processing, monitoring individuals, etc.), which should be more regulated than it currently is. There is no longer any question of blindly relying on US GAFAM or Chinese BATHX.

There will be an inevitable - and accepted - strengthening of the power of the state in its role as protector of society. All countries were affected by the Covid crisis, and it is clear that it represented a great opportunity for "non-liberal democracies" (as V. Orban himself describes them) which have thus become totally unfettered authoritarian powers. All in all, is this a gain for democracies or for illiberal regimes? Paradoxically, this could rather serve the democracies which gained new powers on this occasion, which is not the case for dictatorships or illiberal regimes like China, which already have all the powers.

III.2. The increased health role of governments: nationalisation vs. protection of some services and activities

The Covid-19 health crisis will force governments to intervene more strongly in all matters relating to health and food, and the related logistics. They will get more

involved with private sector players, seeking new forms of cooperation between the public and private sectors to achieve the expected results. Nationalisation of key sectors or companies should be the exception, not the rule.

As regard drugs for example, China and India account for a large share of world production, and it can only be considered to be an extremely dangerous addiction. **Large pharmaceutical companies have realised that they must repatriate the production of certain active ingredients in medicines,** 60-80% of which are now produced outside the EU. In the United States, 80% of drugs are of Chinese origin (95% for ibuprofen, 91% for hydrocortisone, 45% for penicillin). India, the "pharmacy of the world" is 70% dependent on Chinese ingredients and intermediates. **Health and medical security must not obey the laws of commercial globalisation, based on offshoring production or price wars (the price of Chinese drugs is 40% below the world average).** As a consequence, while EU-27 imported €20 Bn of pharmaceutical products in 2000, it imported more than €100 Bn in 2020.

Shortages have occurred during the pandemic when India and China faced production problems. This problem is not completely new. France (the leading producer of drugs 15 years ago, and now in 4th place) has faced shortages like some other European countries. 538 major drugs were out of stock in France in 2017, and 2,044 were running short in the Netherlands in 2019. There were also shortages when 150 Chinese production sites were closed from 2016-2018 while they were being brought up to international standards. Worse, there have been dramatic cases of contamination, such as in 2018 when valsartan, used against hypertension and produced in China, had been contaminated with N-nitrosodimethylamine (NDMA), a carcinogenic product used in the composition of rocket fuel. The problem is therefore not new, but its seriousness has been highlighted during the pandemic. It is time to fix it, and various initiatives have emerged. For example, 900 American hospitals created an association in late 2019 to launch a non-profit generic drug manufacturer. More recently, as the pandemic spread, there were initiatives to retool companies for production of gel, gloves, tests, and masks.

Of course, protection against local or international competition has economic costs such as loss of efficiency, rent seeking, and clientelism. The solution is to tightly target the sub sectors where state action is needed and to reduce the state's presence in the sectors where it is a hindrance.

III.3. Having stocks of necessities is crucial to create an industry of war against the viruses

Good risk managers must equip themselves with protection for so-called "tail risk" events. What is important is not only the probability of the risk materialising, but the damage caused by it if it does. This is known in economics as the "peso problem" - nobody protected themselves against a devaluation of the Mexican peso because of its low probability, but then it materialised. As Armand Jean du Plessis de Richelieu (1585 – 1642, Principal Minister of State of Louis XIII, King of France) used to say, "*we*

don't have to fear everything, but we have to prepare for everything". Preparedness has to be organised in common. It cannot depend on one person, as when a French health minister decided to buy large quantities bird flu vaccines. Fortunately, these proved unnecessary, but she was criticised for incurring useless expenses when, in fact, they corresponded well to the needs and risks of the moment.

We are talking about the precautionary principle, which has been strongly criticised in recent years in some countries. Considered to be a sometimes unnecessary and costly protection decision, it is in fact a principle of action that should be reserved for systemic risks, as N. Taleb and J. Norman (2020) recently and quite rightly recalled.

While hindsight is always easier, it is clear that the risks of a pandemic were known. Not only had we lived through several localised ones such as Ebola, SARS, and MERS, but there was also no shortage of books and studies warning about the danger. For example, **a 2016 report by the National Academy of American Medicine, authored by 17 international specialists, explained that pandemic threat was an overlooked dimension of global security. The WHO had also alerted to such risks, as had reputed virologists. So why were we so unprepared?** Three factors explain the inaction (Chavagneux, 2020):

- The first is **the dominant ideology of reducing the weight of the state,** with reductions in public spending not sparing the health sector.
- The second is **the dominant ideology of the search for zero cost.** First confined to large companies (outsourcing, tax avoidance, etc.), it has spread to public services. It has been decided in some countries (such as France) to shut down unprofitable health services and hospitals, and "optimise" those that survive.
- The third is **inaction linked to distrust of the precautionary principle,** with the apostles of anti-precaution gaining traction in the political and administrative space. We still remember the criticism against a French health minister who had bought 95 million doses of vaccine to fight influenza A (H1N1) that were not used. Instead we glorify, "The heroic vision and clear-cut decisions that the sovereign takes in a situation of uncertainty - and in all ignorance of the cause", rather than evaluating the underlying conditions democratic societies should consider when facing challenges (Callon, Lascoumes and Barthe, 2014).

The creation of stocks, which H.P. Rousseau (2020) calls "granaries", would no longer be disputed today. They have also existed in the past, such as the "grain stores of abundance" in Paris and Lyon in the 18th century, whose purpose was to store grain supplies to prevent famines. The current strategic stocks of petroleum are similar, protecting against supply shocks. If it is believed that one of the major risks of the coming years remains the bacteriological, pandemic epidemiological risk, then it would undoubtedly be wise to have stocks of masks, gloves, hydro-alcoholic gel, tests, basic drugs … Some countries have been more reactive in

ordering from producers or in reassigning companies to the production of these goods, but the main problem has been that they no longer, or never, produced enough themselves.

Developing the medical and paramedical equipment and supply industry is a priority, and logistics infrastructure has to be robust and intelligent.

Having stocks of basic necessities, promoting the production of a national industry of medical and paramedical supplies and equipment, boosting research … would create an *"industry of war against the viruses"* (Rousseau (2020)). **It is also necessary to identify the structures that can be mobilised in times of pandemic:** the army (which one must be able to mobilise more for its experience in medical matters and in phase of extreme tension), the covered stadiums convertible into field hospitals, private companies to guide production processes towards essential goods, private medical research laboratories… The shortage or even, in France, the absence of gel, masks, gloves and tests is quite incomprehensible in comparison with other more agile and better organised countries such as Germany (stronger political power, stronger effective decentralisation, more agile institutions, etc.). **This is dangerous since solidarity between countries is not perfect. Some countries have blocked the products at their borders for their own benefit, while others tried to buy up foreign producers to benefit their nationals.**

Not being prepared is definitely a mistake, being totally dependent is another.

III.4. Creating stronger and more efficient regional ecosystems

Creating stronger and more efficient regional ecosystems would also make sense. This is not just regionalisation, but an assurance that regional ecosystems can function effectively with more autonomy and agility, and better support the regions under viral attack, for example. Covid-19 has highlighted the differences between regions, cities, and rural areas. For example, the under capacity of hospital beds in France was compensated for, albeit too slightly, by regional structures. Already necessary in normal times, more such cooperation could have proved decisive in the current crisis. An ecosystem includes businesses, public institutions, annexes of ministries, universities and educational structures, transport, communication and health infrastructures (maternity hospitals, hospitals, surgical services, etc.). The role of public policy is to promote greater decentralisation of services, particularly health and medical. In addition, **creating stronger and more efficient regional ecosystems would be positive in terms of territory development, to attract business, develop employment… some crucial criteria for a possible reindustrialisation of the regions.** On the contrary, the closure of a production line is the loss of an ability to make a region livable. Once the industry is gone, private services slowly die off. Public services, seen as mere consequences of demographic dynamics, are then dismantled. To give up production, to concentrate on services and R&D, is not only to be incapable of the slightest control of what we consume, of what transports us, shelters us … but also to deliver to the abandonment and desertification the vast French territory to fall back on a few metropolises.

In Germany, the regions are stronger, and this explains why the first wave of Covid was better managed than in other countries, such as France in particular. Not only are the regions stronger, economically and politically, but the support for the region from the public sector in each land the Land is total (for example, the Bavarian police drive a BMW (produced in Bavaria), the Stuttgart police drive a Mercedes (produced in Baden-Württenberg), and the Lower Saxony police drive a Volkswagen (produced in Lower Saxony)).

III.5. A boost for research investments

Certain activities should not be subject to competition. We still remember the competition by researchers on AIDS, which gave the impression that the race for a Nobel Prize was more important than the well-being of the afflicted. An added difficulty for virus research is that militaries are also involved, searching for bacteriological weapons or antidotes to them.

III.6. A safer food industry

To adapt to the new consumer preferences, the food industry will have to be transformed. Once they have restocked essential products, consumers will adopt behaviours marked by caution, moderation, and a search for quality and food safety. This should push governments to impose their standards for food safety and traceability.

To sum up, if capitalism emerges strengthened by the Covid crisis, it will be a capitalism that is both more interventionist and more protective, but also more aware of the need for borders and the drawbacks of free trade in the strict sense.

IV. De-globalisation, relocation of firms, re-industrialisation … Will European countries be able to achieve sovereignty?

On the basic principles, everyone in Europe agrees: we must simultaneously focus on the environment, guarantee less dependence on products from China and elsewhere, develop national infrastructure, and reactivate territories thanks to reindustrialisation and the circular economy. Doing everything is undoubtedly not possible, because the whole requires financial and human resources that few countries have today, but also because belonging to Europe imposes constraints that guide or hinder choices.

But between the deadly international division of labour and productive autarky, we will have to choose. The concept of sovereignty should help make these choices: in short, what are the areas where we (residents of an EU country) want to be independent, autonomous, those that we can share with our European partners and those finally where we can rely on the global market? Answering this question is now essential.

Before a European consensus, each country, because it is specific, must provide its own answers. In the case of France, it seems vital to preserve the few sectors of excellence that still remain, such as aeronautics, automobiles and energy. But it should be noted that these three sectors are victims on the one hand of the upheavals of the energy transition, but also of the Covid crisis. We must continue to support the defence sector, because it is a strategic sector, but also because it irrigates the industrial fabric and supports research and innovation. And then, we must reconquer the agri-food industry, and put an end once and for all with this paradox: because of its diversity and its climate, France is a country blessed by the gods for agriculture, but it is also a country which gradually liquidates, for 40 years, its farmers to import food products (processed or not) and junk food. Finally - and this concerns the whole of the European Union - a relative health sovereignty must be regained.

Whatever Europe's final decision, whether the response is at regional, state or community level, the choices will be based on a healthy dose of business relocation on European soil and reindustrialisation. Some sectors are essential: defence, pharma, food, space, energy, IT, digital.

IV.1. Relocation / Deindustrialisation: where do we stand?

Europe's state of dependence stems from the abandonment of certain productions, even in certain cases of entire sectors and production chain. The search for profit or the lower cost of production has thus reached the limits of unbearable during the Covid crisis. Let us take a closer look at the state of the matter using data from Eurostat, which uses gross value added (ie the value of production minus intermediate consumption).

These data (1995 - 2015) show that Europe is experiencing increasing deindustrialisation (see table 1). This process has even been amplified in recent years due to multiple causes such as the drop in domestic demand for industrial products, relocations, unfavourable taxation or difficulties in recruiting. In addition, the countries of Eastern Europe have specialised in subcontracting by emphasising their cost competitiveness, which has accelerated the deindustrialisation of the large EU countries.

Of course, industry still weighs heavily on EU economic activity in terms of production, but country by country the contrast is sometimes striking. **The countries of Eastern Europe largely dominate the ranking of the most industrial countries, followed by Germany where the sector still accounts for 25% of all the wealth produced in the country. At the bottom of the ranking, we find Cyprus, Luxembourg and Malta, which have economic fabrics that are much more focused on services or financial activities.**

Even though Ireland largely dominates the ranking of the most industrialised countries, the recent increase in wealth produced by industry is one of the consequences of the revision of the national accounts which took place in 2015. The figure of 26.3% does not reflect the dynamics of the national economy.

Many countries are well below the European average when it comes to the share of industry in countries' GDP. We note that France and the United Kingdom are

almost at the same level as Greece, around 14%. It is worth remembering that France is one of the countries that has deindustrialised the most over the past 40 to 50 years. The share of manufacturing industry in value added (in current value) is in continuous decline: 22.5% in 1970, 21% in 1979, 18% in 1989, 16% in 2000, 13% in 2007, 11.5% in 2014, 10.5% in 2019. France's manufacturing value added only represents 37% of Germany's added value. Italy, Portugal and Spain do better than France. The value of industrial production per capita in France is only 4,500 dollars compared to 7,700 in Germany and 8,300 in Sweden. Two effects of this deindustrialisation: mass unemployment (1.6 million industrial jobs lost), and a structural trade deficit. France's share of the world market is only 3.1% (6.3% in 1990), and that is not due to currency effects, contrary to what some claim. France's share in euro zone exports fell by 20% between 2000 and 2019, which precisely corresponds to the loss of the relative weight manufacturing industry within the zone. France went from a manufacturing surplus similar to Germany's to a chronic deficit. After 10 years of trade surplus, the deficit re-appeared in 2004, and since then it has fallen. France accumulated in 15 years a deficit of more than 800 Bn euros, or nearly 60 Bn per year on average. *"France, which was at the forefront of the industrial revolutions from the 1780s to the 1980s, has become in 3 decades a industrial dwarf "*(Ch. Saint-Etienne (2020))

If we look at the development since 1995, we see that the most significant downward variations concern Luxembourg, Malta and Cyprus. The UK's share also fell by 40.1%. Only five countries have experienced an upward variation over the past 20 years (Czech Republic, Hungary, Poland, Bulgaria and Ireland). Germany has retained its industry. These variations make it possible to partially understand the displacement and relocation of industrial activities within Europe.

Table # 1: **Industrialisation rate in Europe (share of industry in gross value added [(1)] of EU countries between 1995 and 2015)**

Countries	2015	1995	Variation in % 1995/2015
Ireland	**39.10**	26.20	+49.20%
Czech Republic	**32.10**	31.40	+2.20%
Hungary	**27.80**	25.40	+9.40%
Slovenia	**27.30**	28.90	-5.50%
Slovakia	**27.00**	31.60	-14.60%
Romania	**26.40**	31.70	-16.70%
Poland	**26.30**	24.30	+8.20%
Germany	**25.90**	26.10	-0.80%
Bulgaria	**23.50**	21.20	+10.80%
Lithuania	**22.60**	24.40	-7.40%
Austria	**21.90**	24.10	-9.10%

Table # 1: **Industrialisation rate in Europe (share of industry in gross value added [1] of EU countries between 1995 and 2015)**			
Countries	**2015**	**1995**	**Variation in % 1995/2015**
Croatia	**21.40**	26.40	-18.90%
Estonia	**21.20**	25.30	-16.20%
Finland	**20.60**	28.80	-28.50%
Sweden	**20.40**	26.40	-22.70%
European Union (28)	**19.30**	**23.30**	**-17.20%**
Italy	**18.80**	23.90	-21.30%
Denmark	**18.70**	20.90	-10.50%
Portugal	**18.20**	21.60	-15.70%
Spain	**18.00**	21.40	-15.90%
Belgium	**16.70**	23.70	-29.50%
Latvia	**16.70**	25.60	-34.80%
Netherlands	**15.40**	21.70	-29.00%
France	**14.10**	19.20	-26.60%
Greece	**13.30**	16.00	-16.90%
United Kingdom	**13.30**	22.20	-40.10%
Malta	**11.40**	23.10	-50.60%
Cyprus	**7.00**	12.60	-44.40%
Luxembourg	**7.00**	14.80	-52.70%

Source: Eurostat

(1) Gross value added corresponds to the value of production less intermediate consumption.

The fall in the share of industry obviously goes hand in hand with the fall in industrial employment. Unsurprisingly, the same observation is made as for employment as for the weight of industry. Over the past 20 years, the share of industry in total employment has fallen in all Member States, but the largest drops have been recorded in Malta (-54%), Luxembourg (-45%) and United Kingdom (-44%). In France, the share of industrial employment in the total fell by 32% between 1995 and 2015. In Italy, Portugal and Spain, the decreases were 25%, 28% and 36% respectively. Germany, which maintained its industrialisation rate between 1995 and 2015, still saw its employment rate in industry fall by 19%. This decline should be seen as one of the consequences of the robotisation of German industry. The countries least affected by the drop in industrial employment are Latvia (-15%), Poland (-9%) and the Czech Republic (-4%), Romania (-18%) and Germany (-19%).

A word on the United States where the trend is the same. Until the 1980s, manufacturing was still the leading sector in terms of employment (nearly 19% in 1980 according to the Bureau of Labor Statistics). The shift took place in 1990, when the manufacturing industry rose to second place (with 17.70%), behind education, health and recreation

(what R. Boyer calls the "anthropogenetic sector"), which went from 13.80% in 1980 (9.4% in 1970) to more than 20% (it is close to 33% in 2010). In the 2000s, the finance sector in the broad sense fell to second place with nearly 25% of jobs (against less than 9% in 1970) ... when we talk about transformations ...

Table # 2: **Weight of industry in employment in % and variation between 1995 and 2015**

Countries	2015	1995	Variation in % 1995/2015
Czech Republic	28.90	30.10	-3.99%
Slovakia	23.70	29.80	-20.47%
Poland	22.90	25.20	-9.13%
Slovenia	22.50	32.70	-31.19%
Estonia	21.10	28.70	-26.48%
Romania	20.60	25.20	-18.25%
Bulgaria	20.20	26.60	-24.06%
Hungary	19.80	25.70	-22.96%
Germany	18.80	23.20	-18.97%
Lituania	17.20	20.40	-15.69%
Italy	16.90	22.50	-24.89%
Portugal	16.90	23.60	-28.39%
Austria	16.10	20.50	-21.46%
Latvia	15.80	18.70	-15.51%
European Union (28)	15.40	20.90	-26.32%
Finland	14.90	20.70	-28.02%
Sweden	13.40	18.80	-28.72%
Malta	12.60	27.50	-54.18%
Belgium	12.10	18.60	-34.95%
Spain	11.90	18.50	-35.68%
Ireland	11.30	19.90	-43.22%
Denmark	11.20	17.70	-36.72%
France	10.90	16.10	-32.30%
Greece	9.70	13.00	-25.38%
Netherlands	9.50	13.70	-30.66%
United Kingdom	9.40	16.90	-44.38%
Luxembourg	9.10	16.70	-45.51%
Cyprus	9.00	15.80	-43.04%

Source: Eurostat

In 1974, French industry employed 5 million full-time equivalent workers. At the end of 2016, they were down to 2.7 million. During the same period, while industry lost 2.3 million workers, the economy as a whole employed 6 million more workers. In total, the share of industrial employment in total employment fell from 29% to less than 11%. We must see in this the growing weight of services, robotisation, but also and above all deindustrialisation, including offshoring. The example of the automobile is obvious. Companies like Renault and PSA create net jobs worldwide, but have destroyed tens of thousands of jobs nationwide. Buying a French brand car no longer means buying French. For the pharmaceutical industry, it is even worse.

IV.2. How to support relocation / reindustrialisation?

Several tracks at the global level. Ch. Saint-Etienne (2020) provides a summary of these proposals.

1. The state should not replace businesses, but encourage them to increase their research and innovation efforts, invest locally to develop production and exports, equip themselves massively with computer systems and robots to catch up the development of competitive industry, whether European or global.

2. We need to robotise and digitalise our economies while modernising institutional systems. The European Union must powerfully continue to regulate our globalised economy, in which we must combine price competitiveness and product innovation competitiveness. Ch. Saint-Etienne points out that the robotisation of production improves these two forms of competitiveness. He also estimates that if France adopted a rate of growth in its robot fleet comparable to that of South Korea (which was +12% per year until 2019), manufacturing productivity would increase by more than 8%. per year. The German agri-food industry, more robotised than its French counterpart (packaging, logistics, etc.), has now gone ahead.

3. We must develop long-term investors by developing family capitalism and cooperative system having integrated the requirement of competitiveness, and by promoting investment funds with a French reference shareholder, and employee shareholding in order to associate workers with the results of their efforts.

4. The tax system should be reviewed whenever necessary. It is not a question of fiscal dumping, but of upgrading with its European partners in particular. The case of production taxes, a French anomaly, is eloquent (see Insert 1). These production taxes mark a real anomaly compared to other European countries. In 2018, the level of production taxes reached 4.5% of GDP in France, compared to an average of 2.2% in the euro zone (2.9% in Italy, 1.7% in Spain, 0.6% in Germany). A major handicap for companies based in the national territory compared to their competitors in Europe. This cost handicap has two consequences:

- Either it is passed on to prices, and it then penalises the price competitiveness of production in the territory. In fact, the price level of the GDP is 5.7% higher

than that practiced in the euro zone, and 1.6% higher than that practiced in Germany. Taxes on production contribute to this gap.

- Either it is taken from the margins of companies, especially for those which must align with a global or European price. This is the case with companies that cannot pass taxes on to their prices. These costs weigh on their margins, and therefore on the ability to invest, innovate, move upmarket ...

It is therefore a real "tax on made in France" which has the particularity of weighing on the operating account even before the slightest income, or even the least economic activity (Ferrand – Jessua (2020)). This has undoubtedly played a role in the loss of France's share of 4 points in exports (from 17% to 14% since 2000) and in industrial activity in the euro zone. France recently decided to reduce production taxes by 10 Bn, but there is still a long way to go to return to European standards, and in particular to industrial and competing countries.

Insert 1: **Taxation and production taxes: a real tax on "made in France"**

With 46.5% of GDP in 2018, France has the highest level of compulsory levies, in order to finance public expenditure which is also the highest in Europe. Taxes weighing directly on the factors of production (productive capital and labour) are those which are most harmful to employment and investment, and those which precisely will influence the location of the company. There are three:

- Social contributions based on the payroll;
- The corporate tax which taxes the taxable margin;
- Production taxes: these are all deductions excluding social contributions that occur before determining the company's profit. They relate to a wide variety of bases: payroll (payroll tax, transport payment, social package, tax for the benefit of the national housing assistance fund), turnover (social solidarity contribution of companies (C3S), added value (contribution on added value (CVAE)), land (property taxes, corporate property contributions (CFE)), various sector taxes such as the flat-rate tax on network companies (IFER) and the tax on commercial areas (TASCOM). In 2019, they brought in nearly 100 Bn euros. If there are 25 production taxes, 8 of them concentrate nearly 75% of revenue: the property tax (15.8 bn), CVAE (15.2 bn), payroll tax (13.5 bn), transport payment (9.4 bn), CFE (7.1 bn), contribution on vocational training (5.7 bn), social package (5.3 Bn) and the C3S 3.9 Bn). A large part of this revenue is allocated to the financing of local authorities (property tax, CFE, CVAE, etc.) which complicates the political equation that would allow their reduction.

A recent study by CAE shows that the most harmful tax is the C3S, a tax based on the total value of production produced. It taxes not only value added, but also intermediate consumption. These can thus be taxed several times, as many times as they are part of a value chain. A handicap for companies such as those belonging to the automotive or aeronautical sector which use a large number of equipment manufacturers. C3S has thus discouraged the establishment or maintenance of long value chains in the country.

The other problem with production taxes is that some are not counter-cyclical, that is, they are not sensitive to business downturns. This is notably the case with CFE (25 Bn euros in 2019). On these taxes alone, France records by far the highest fiscal pressure in Europe.

5. It is also necessary to promote funded scheme retirement systems, in funds co-managed with the unions, in addition to the pay-as-you-go retirement because these funds are used to invest massively in the equity of companies.

6. States must equip themselves with a strategic investment fund to quickly influence the service of industrial and scientific renewal.

7. The development of industrial platforms is necessary to accelerate the reindustrialisation of the country. Networking of industrial production units, on shared platforms or in a cluster organisation, is decisive in terms of industrial efficiency, development of innovations and competitiveness. It is essential to put in place a regulatory context leading to the pooling of services in a single place. Tax incentives could encourage companies to group together on platforms.

IV.3. Relocation / Reindustrialisation: the case of French pharma

France lives in a paradoxical situation: it spends a lot on its health (11.3% of GDP, 3623 euros per capita, or 25% more than the European average), but it has let its manufacturers and laboratories go. And so, during the first wave of Covid-19, the country found itself in need of ventilators for resuscitation services, masks for the protection of healthcare workers, tests to better understand the spread of the virus, but also of drugs and active ingredients for the daily prescriptions of the French. How did we get into a situation where even the protection of nursing staff could not be ensured properly, with a shortage of beds and resuscitation staff?

We can already mention the fact that French hospitals have 35% of non-medical staff, against 25% in our large European neighbours, but that is not enough to explain the bulk of the crisis.

Sanofi, one of the world leaders, has relocated most of its production over the years[2].

[2] *Fortunately, not all labs have followed the same path. The Pierre Fabre laboratories in particular have maintained its factories in France and 70% of its active ingredients. But with less than a billion in pharma sales, they do not present the same challenges as Sanofi.*

It should also be remembered that the European anti-chemical regulation REACH[3] has also pushed to other countries (particularly to developing countries) numerous production units deemed too polluting. Offshoring to China or India flourished. The German and British administrations were on this point much more flexible (with the law) than the French administration. For some productions, relocation has turned out to be inevitable. And the Asian production sites for pharmaceutical molecules still benefit from extremely low production costs and low environmental and social constraints.

The observation does not end there. France also imports almost all of its medical equipment, equipment that is often developed in many of its hospitals. In 1987, France sold the Compagnie générale de radiologie to the Americans and, since then, it has never succeeded in returning to this sector, and the public sector has never supported the various attempts: no support in equity or in orders to give the necessary boost to reindustrialisation in this sector.

In many cases, the French health sector has found itself initiator of innovations, but dependent in industrial terms. First it was the Germans, then the Japanese, and more recently the Chinese and Koreans. There has been no will to rebuild a medical device industry. Finally, the hospital purchasing policy buried all initiatives, as it ended up eliminating the workshops of masks, gloves, and all accessories, now invaded by Chinese industry.

So much for the observation. **So how to do it?**

1. A political will. First of all, we must assure the still existing industrialists that the political will has returned. The administration must be put at the service of this renewal and not in compliance with sometimes finicky regulations that push to do the opposite. Recreating this culture will no doubt be difficult.

2. Neutral tax conditions. It is then necessary to restore a more constructive tax system, starting by removing a large part of production taxes, which represent 3.6% of the sector's turnover.

3. Similar environmental conditions. We must ensure that the preference plays for French material, at equal quality. Our European partners have applied REACH differently, why not France?

4. A clearer vaccine policy. With France remaining a leader in biological sciences, we absolutely have to think about what we want in terms of vaccines. France has already sold our expertise in animal vaccines to the Germans (Laboratoires Mérial sold to Boehringer), how can we put the Pasteur and Mérieux institutes at the center?

5. Blockbuster research vs. management of existing molecules. The search for blockbusters can lead to the jackpot … but the release requires huge budgets, decades of research sometimes. Do we have to focus so much effort, time and budget

[3] *Created in 2007, the REACH program ("Registration, Evaluation, Authorization and Restrictions on Chemicals") is monitored by a European agency, ECHA (European Chemicals Agency).*

on it only? Couldn't we devote more budgets to redeveloping a number of existing molecules, which would allow the expansion and emergence of smaller laboratories, start-ups ...

6. Encourage risk-taking, especially for newcomers who need financing and who, not finding them in France, emigrate to the United States or Germany in particular. The creation of a sovereign fund dedicated to the health sector, in the hands of health professionals (and not technocrats), is sometimes mentioned (L. Le Floch Prigent (2020)).

It should be noted that almost all French companies that relocated between 2005 and 2013 did so without assistance (this is the case for 94% of them). They did so, either because offshoring has been a failure, or because it no longer brings them anything profitable, or because these companies have decided to switch to more robotisation, and to get closer to their market. Encouraging risk-taking, reducing production taxes, showing real political will... this could be the boost needed for reindustrialisation in the pharma sector. The road is long, but the path is quite well marked. Relocation does not only concern the health sector. European chemicals are also largely affected (the Seveso (Italy) disaster in 1976 and Bhopal (India) in 1984 both extinguished the European chemical industry).

IV.4. Relocation / Reindustrialisation: the case of food

In the space of a few decades, the share of imported food products has risen sharply. In France, for example, the Utopies firm analysed the life cycle of an average meal consumed: 55% of the products that compose it (raw or processed) are imported. This is true all over Europe, to varying degrees, of course. It simply means that a long crisis (health or other) could undermine the resilience of countries, simply because there is a competition between production areas around the world on the sole basis of their competitiveness in terms of costs. **The Covid crisis is a reminder that we must now take into account another risk, the risk of disaster, health today, climate or geopolitics tomorrow. The theme of food sovereignty has therefore resurfaced,** Macron even calling our food addiction "*madness*".

Two questions emerge: **How to do it? How long will it take?**

To succeed in restoring food independence, it is necessary to regain control of supplies, reintroduce crops locally, rebuild a sustainable sector ..., and all of this can take a long time. Concrete examples show that it takes between 10 and 20 years. Because we must not only relocate production, but we should be able to produce at similar costs. The European industry cannot necessarily compete with production abroad: higher labour costs, higher taxes, more stringent regulatory standards than elsewhere (pesticides, fertilisers, etc.).

If the price war seems lost for many industries and production, it is possible to win the quality war. Since the Covid crisis, consumers have become more sensitive to better traceability, greater respect for labor law, the creation of local jobs ... But what price difference is the consumer ready to accept in order to be closer to these values? That's the big question. During the Covid, the French consumed local,

or French. The Germans, the Spaniards, the Italians did the same ... But will it last? A survey carried out this summer by the Kantar firm indicated that more than 50% of French people now want to pay more attention to prices. The loss of jobs or income, the feeling of inequality or insecurity, the desire to save, all this justifies this caution. **We must also avoid ending up with a "France d'en haut" (the richest people) which consumes local (French) and would teach patriotism to the "France d'en bas" (the poorest people) which, sensitive to prices, and for some even more sensitive than before the Covid crisis does not always have the means to spend more.**

IV.5. Relocation / Reindustrialisation: the case of electricity and hydrogen

If there is a second sector (along with health) for which dependence on China in particular is extreme, it is in electric motorisation. And in some ways, it's catastrophic. In the example of electric cars, subsidised for ecological reasons, it is obvious: **national taxes and state subsidies for ecological purposes ultimately serve to finance polluting Chinese companies producing electric batteries** (Table 3) **and foreign auto companies, especially Japanese.** A pure non-sense?

In the field of electric vehicles, France is ultimately largely the loser. The battery concentrates a large part of the added value and it is not manufactured in France (in South Korea with LG Cham and Samsung, in China with CATL, BYD, OptimumNano, Guoxuan High Tech, Beijing National Battery, BAK and Farasis, in Japan with Panasonic). Of course, the Europeans are trying to become autonomous ... but the raw materials for batteries, lithium and especially cobalt are under the full control of China (see table 3). Cobalt is also extracted from mines in the Democratic Republic of Congo where young children are exploited. The ore is then recovered by neighbouring Rwanda, which organises its market in close liaison with China. Going into "all electric batteries" therefore means dependence on Rwanda and China. Not to mention the recycling of electric batteries, which is still highly problematic.

Table 3: **Top 10 automotive battery manufacturers in 2018**

Country	Production (in GWh)	Market share among the top 10
China	217 GWh	69.11%
United States	50 GWh	15.92%
South Korea	23 GWh	7.32%
Japan	14 GWh	4.46%
Poland	5 GWh	1.59%
Hungary	1.7 GWh	0.54%
United Kingdom	1.4 GWh	0.45%
France	1.1 GWh	0.35%
Czech Republic	1 GWh	0.32%

Source: Bloomberg New Energy Finance

Without slipping into protectionism, one can still question the advisability of leaving this policy as it is, especially for environmental and labour law reasons. In addition, and this adds to the problem, alternatives to electricity have fallen behind due to the subsidy policy, which has never been unanimously supported. Carlos Tavarez, boss of PSA, has always contested this policy, regretting that research into hydrogen energy is not further promoted.

As a reminder, **"gray" hydrogen** is obtained from fossil fuels, natural gas, by the steam reforming process ("cracking" of Nh4). It is used in industries such as pharmaceuticals and agriculture. But with the objectives of reducing greenhouse gas emissions and the desire for energy independence (France imports 84% of fossil fuels, and the European Union 91%), it has become essential to develop the production of **"green" hydrogen,** obtained by electrolysis of water (redox of H2O) from carbon-free energy such as dams, solar panels, wind turbines and nuclear power. Dihydrogen (molecular hydrogen H2, which therefore contains two hydrogen atoms) can be produced by decomposing water, methane or wood (gasifier), thermally or electrochemically (electrolysis of water). It can be stored and transported by gas (hydrogen gas, compressed in bottles or tanks), by solid route (combined in metal hydrides), by liquid (liquefied or chemically combined in the form of methanol or methane then transformed to release hydrogen (S. Aver (2020)).

Note that the hydrogen-dioxygen batteries are particularly clean because they only consume gas and produce only water. Two obstacles, however:

- The price. The production of one kilo of gray hydrogen costs 2 euros, compared to 5 euros for green hydrogen. The goal is to halve it by 2030.
- The availability of fuel. Making a gas station profitable depends on the number of vehicles in circulation.

Green hydrogen has many advantages: it makes it possible in particular to decarbonise industries that have few options to lower their CO2 emissions, such as the steel industry, refining, chemicals, (fertilisers) or collective transportation (city bus in Pau or Montpellier). You can store the excess electricity produced and save energy.

When it comes to battery recycling, it should be noted that the use of hydrogen is much better than electricity. There is now a form of solid storage in the form of refillable cartridges to generate electricity. There is no recharging time, it is a matter of replacing an empty cartridge. These 100% green cartridges have a lifespan of 10 years, are completely recyclable and use only green hydrogen. This French standard (pressureless STOR-H green hydrogen cartridge), which offers autonomy and safety, is becoming a standard in Europe and elsewhere. The hydrogen sector is therefore already very active in France, laboratories, electrolysers, innovation, distribution infrastructure, fuel cells, storage cartridges, etc.).

Massive deployment of production would significantly reduce CO2 emissions. But for that, we must develop the sector, which implies a strong involvement of governments and massive investments to develop infrastructures and

applications[4]. The challenge now is therefore to manufacture this energy vector from renewable energies or in the most carbon-free manner possible. All that is needed is the political will to make hydrogen a key element in the energy equation of the 21st century. France has set itself this objective, by 2030, for 20% to 40% of total hydrogen consumption, including industrial hydrogen.

Insert 2: **Digital economy, energy transition and rare-earth metals: a component of the power of China**

Even though the Chinese economic model has evolved and demand for raw materials has slowed - for example, demand for steel is growing at less than 5% a year rather than in double-digits - it remains considerable. China imports half of its oil and growing quantities of natural gas. Rising incomes have also stoked demand for better quality food products. However, while China is the main consumer of traditional commodities, it is also the main exporter of an increasingly important "new" commodity - rare earths.

The first rare metals were discovered at the end of the 18th century and the beginning of the 19th century. There are about forty kinds, including better-known ones such as cobalt, tungsten, lithium, and mercury. Seventeen that are lesser known are in the family of "rare earth elements (REE) or rare-earth metals (REM). They are: Cerium, Dysprosium, Erbium, Europium, Gadolinium, Holmium, Lanthanum, Lutecium, Neodymium, Praseodymium, Promethium, Samarium, Scandium, Terbium, Thulium, Ytterbium, and Yttrium.

Since it is difficult to isolate them because they have similar chemical properties, they are often taken in rocky amalgams, and were not used much until the 1940s, when they could be purified on an industrial level. There are two main techniques to separate them: flotation, based on hydrophobic or hydrophilic reactions of mineral particles with water, and chemical processes, such as treatment with cyanide or mercury. While the first technique is generally not polluting, the second is.

The widespread use of REMs really started in the 1970s, with yttrium used in cathode ray tubes for colour televisions. Since then, and especially over the past twenty years, their use has taken off. Some REMs, such as those used in smartphones are abundant. Others, such as terbium, yttrium, and europium, are no longer useful since they were mainly used for fluorescent lamps, which are being replaced by LED lamps. Others that are exceedingly rare, such as dysprosium and neodymium, are required for magnets in wind turbines, hard disks, or green car batteries. This is also the case for lanthanum, neodymium, dysprosium, and samarium, which is used for some electric vehicles. Overall, with their crucial role in the digital and green economies, procuring rare earths has become a strategic economic imperative.

[4] *It should be mentioned that the storage of pressurised hydrogen used for cars and trucks is not suitable for light vehicles such as motorcycles and scooters (expensive and specific distribution infrastructures, safety problems, etc.).*

It is more difficult to estimate the remaining reserves of REMs than those of petroleum or other raw materials. We do know, however, that our dependence on China is enormous. Brazil, India, and South Africa have long been major producers, but their production is now dwarfed by that of China, which in the early 2010s supplied 90% to 95% of REMs. This near monopoly is dangerous and begs the question of how to be lessen this dependence.

There are three options.

- **One is to diversify supply by producing more elsewhere,** although supplies could quickly be exhausted and refining REMs is very polluting. Refining REMs produces toxic and radioactive elements responsible for livestock mortality and human cancers (Pitron, 2019).
- **Explore the space is another solution.** This may sound odd, but it should be remembered that in 2015 Barack Obama authorised American citizens to become owners of asteroids to exploit (in the future) REM. Not a solution considering the urgency.
- **The third solution is to reduce the use of rare-earth metals or find alternatives through new technologies.** The only real way to get rid of dependence on China is to bypass the use of REM, and therefore Chinese exports. New technologies using little or no REM appear too. One can for example mention that certain electric engines (Tesla, Renault…) use less REM than before.

China is well aware of the power this dependency gives it, leveraging it in conflicts with its trade partners. Sometimes it layers its political goals in economic terms. For example, in 2009, China announced that it was reducing its exports of REMs to safeguard reserves, promote its energy transition, and protect the environment. Although it is true that green technologies and the digital economy booming in China, the US, EU, and Japan filed a complaint with the WTO in 2012 because of the export restrictions. China ended them in 2015. However, in 2019, amid the escalation of the Sino-US trade tensions, it threatened to cut off all supplies of REMs to the US, for which it furnishes 80% of imports.

In summary, rare-earth metals are at once a geopolitical issue between China and the rest of the world, especially the US, an economic necessity because of their role in the digital economy and energy transition, and an environmental and health threat, due the pollution their refining causes. The hunger for them is reminiscent of the oil boom days or the gold rush and will extend exploration deep into the oceans and possible into space.

IV.6. Relocation / Reindustrialisation: the case of IT

Computing is the basis of the 3rd industrial revolution. A number to start with: the computer industry, including telecommunications services that have been fully computerised for more than a decade and semiconductors, for which it is the main

outlet, is the world's largest industry with a turnover of 4,218 Bn dollars (estimate by the Gartner firm), compared with 2,500 Bn in the automotive industry, and 2,925 Bn in French GDP in 2018. IT is growing at a rate of 7% per year (turnover doubles therefore every 10 years), while the automobile has been declining since 2018 and the year 2020 is proving to be very bad. One of the peculiarities of the IT sector is that it depends on a very small number of companies and factories worldwide. The latest iPhone was created by Apple around a processor designed by ARM (then a British subsidiary of Japanese investment fund Softbank), and manufactured by TSMC (Taiwan Semiconductor Manufacturing Company) in Taiwan, all assembled in factories of Taiwanese Foxcon in mainland China. China is not (yet) in a position to manufacture state-of-the-art microprocessors, and the United States was in decline until Nvidia took over the leader ARM for $ 40 Bn in September 2020.

Let us underline a specific trait of the IT industry and those that derive from it, identified by the Institute of Economics and Michel Volle: the fixed costs are considerable there, and the marginal costs are close to zero. The marginal cost of software is practically zero: once written, it can be reproduced millions of times at no significant additional cost, simply by downloading or printing discs. Transporting a byte or document over the internet also costs next to nothing either. As a result, fierce monopolistic competition develops in every segment of this market, with each company struggling to gain or maintain a temporary monopoly position that can last for a few years or decades.

When we analyse a sector, and this also applies in particular to the IT sector, it is useful to identify where the maximum added value is created. For IT, these are the most capital intensive and require the most investment. Having productive capacities in these areas is an essential factor of economic independence, and therefore of political sovereignty.

Acquiring a significant position and maintaining it in this universe of complex technologies resulting from scientific research requires sustained R&D efforts. The table below shows the preponderance of digital (American), pharmaceutical and automotive (German, Japanese and American) giants. Few Germans, only one French, no Italian, no Dutch, no Spanish ...

Table # 4: **R&D table in 2018 (in billion dollars)**

Companies	R&D in bn USD
Amazon	22.6
Alphabet (Google)	16.2
Volkswagen	15.8
Samsung	15.3
Microsoft	14.7
Huawei	13.6
Intel	13.1
Apple	11.6

Table # 4: **R&D table in 2018 (in billion dollars)**	
Companies	**R&D in bn USD**
Roche	10.8
Johnson & Johnson	10.6
Daimler	10.4
Merck US	10.2
Toyota	10.0
Novartis	8.5
Ford	8.0
Facebook	7.8
Pfizer	7.7
BMW	7.3
General Motors	7.3
Robert Bosch	7.1
Honda	7.1
Sanofi	6.6
Bayer	6.2
Siemens	6.1

Source : L. Bloch (2020)

One question: Can Europe come back to the race? Let's look at the main elements of the industry one by one (source: L. Bloch (2020))

Manufacture of microelectronic manufacturing equipment: a very limited oligopoly

The manufacture of microprocessors is based on photolithographic processes carried out by machines called scanners, the cost of which is in the tens of millions of dollars. Three companies in the world manufacture this type of scanners: the Japanese Canon and Nikon, and the Dutch ASML. The latter is the leader, and holds two-thirds of a global market of around $ 12 Bn.

In a scanner, the most expensive part is a lens, similar to that of a huge camera. There are three manufacturers in the world: the Japanese Canon and Nikon, and the German Zeiss. It takes a few dozen scanners to start a production line. A factory costs between 10 and 15 Bn dollars. China and the United States are absent from this area.

Manufacture of microprocessors: a very limited oligopoly

Today, only Intel performs all of the manufacturing operations for its microprocessors: design, manufacture, marketing. But their sales have been declining since 2011. The new American ARM does not manufacture anything, but it designs microprocessor plans for which it grants the manufacturing license to companies which can add to this plan (electronic) other circuits (telephony, audio, video, network) to manufacture

the complete circuit themselves, or to entrust the manufacture to a microprocessor foundry. Qualcomm and Apple buy plans from ARM, complete them and have them produced by the Taiwanese foundry TSMC. Samsung and the Franco-Italian STMicro electronics are developing their own systems around an ARM processor and manufacturing them in their factories. Mobile phone manufacturers have all chosen ARM processors because of their low power consumption, due to their more modern design than Intel's. For the same reason, ARM dominates the connected objects market. Over 20 Bn ARM processors are sold per year.

The improvement of a microelectronic manufacturing process depends on its miniaturisation. To date, TSMC, the world leader, is the only one to produce at 7 nanometers (Samsung produces at 10 and Intel at 14). It costs more than $ 10 Bn to build a modern microprocessor plant, and its steady operation requires the presence of several thousand engineers and technicians. Developing a manufacturing process and setting up machines takes time and skill. It is only after several years that the manufacturing reaches a success rate close to 100%.

Computer manufacturing: an Asian specialty

The complexity of computers comes from their microprocessors and softwares. Assembly is fully automated, and it takes less than 3 minutes to assemble a Dell computer. Most of it is done in Asia. The added value is very low (they are now quite cheap items). The main issues to be addressed are the supply chain, logistics, purchasing policy and distribution. In addition, the screen market is totally controlled by Asian manufacturers. The repatriation of this type of activity in Europe is impossible due to differences in production costs and the low added value associated with it.

Manufacturing operating systems: a 100% American oligopoly

It is the software at the heart of the computer that coordinates its various components as well as the application software. It ensures the communications with the peripheral organs such as the disk, the keyboard, the screen, the network... There are only 4 suppliers of operating systems: IBM (z/OS – 1st version of the operating system launched in 1964), Microsoft (Windows - 1996), Apple (iOS and macOS - 1998), and Google (Android - 2007), the world leader. Europe and China are absent from this segment.

In total, a country or a group of countries which does not produce its micro-processors does not remain at the forefront of the development of operating systems and becomes totally dependent, as we could in the past for raw materials, with countries which imported all the energy necessary for their economy. However, it is clear that **Europe does not exist in the field of micro-processes: it is even disinterested in it, contrary to China or the United States, which invest heavily in these activities. Getting back in the race in the IT sector seems a very difficult task for Europe in view of the market situation (oligopolies on all elements of the sector) and the exorbitant entry costs. However, it can continue to play an important role in applications for the IT sector, but also for other industrial and commercial sectors.**

IV.7. Relocation / Reindustrialisation: Digital technology and robots, intelligent logistics infrastructure accompanied the deglobalisation - Will European countries achieve a Digital sovereignty?

IV.7.1. Digital technology, robotics ad electronic commerce: two sustainable trends that testify to the dependence on digital technology

Economic resilience has been strongly linked to the technological level acquired by companies, households and States.

Digital technology and robotics have long been essential for the distribution sector, but the Covid-19 crisis has shown that some sectors and companies can operate with fewer employees with equal or even more productivity. Many companies will carry out HR analyses after the crisis, and their use of digital technology, robotics, and automation will rise. This will aggravate the economic and social situation of lesser skilled or unskilled workers.

Electronic commerce has developed strongly in recent years and the trend has accelerated due the pandemic, since many people became accustomed to using it and because it could supply essential products. Many businesses developed new services during the crisis and will maintain them. Covid also showed us that e-commerce no longer means just sourcing from far away, but also purchasing nearby, and that it requires good logistics, inventory management, and supply chains.

Being resilient is one thing, being independent is another. However, the Covid crisis has shown that Europeans are very dependent on technology (most often non-European), not only to support the economy while millions of people were working from home during the lockdown, but also to fight the virus itself. The crisis made the digital transformation of Europe a matter of existential importance. The disagreements between China and the United States, the digital giants, amplified this sense of urgency. If there were still doubts in Europe about the need for greater independence and greater digital sovereignty, the Covid pandemic has overcome them. This does not mean that the digital transformation of Europe was not a priority before the pandemic ("*Making Europe suitable for the digital age*" was already one of the main objectives of the European Commission for 2019-2024), it simply means that there is now an emergency.

Reindustrialisation means also robotisation. To compete with China, for example, or with major developed countries, labour costs need compensation through productivity gains, robotisation, digitalisation … As regard robotisation and number of robots in use, the bulk of European countries are lagging behind South Korea, Japan, Germany, Sweden and the US (table 5). In terms of production of robots, Switzerland, Germany and China are leading the race (table 6).

Table # 5: **Robotisation in 2018 – number of industrial robots per 10,000 employees**		
Ranking	**Country**	**Number of robots per 10,000 employees**
1	Singapore	831
2	South Korea	774
3	Germany	338
4	Japan	327
5	Sweden	247
6	Denmark	240
7	Taiwan	221
8	United States	217
9	Italy	200
10	Belgium	188
11	Netherlands	182
12	Austria	175
13	Slovenia	174
14	Canada	172
15	Spain	168
16	Slovakia	165
17	France	154
18	Switzerland	146
19	China	140
20	Czech Republic	135
	World average	99

Source: International Federation of Robotics

Table #6: **Top producers of robots in 2019**			
Company name	**Country**	**Number of robots produced**	**Market share**
ABB group	Switzerland	400k industrial robots	13.50%
Yaskawa Electric Corp.	Japan	40k industrial robots 26 mlns servomotors 15 mlns variators	12%
Midea Group (Kuka)	China and Germany	100k industrial robots	13.50%
FANUC corp.	Japan	4,2 mlns digital controllers 60k industrial robots	17.50%
Kawasaaki Robotics	Japan	21k of industrial robots	-
Epson Robots	Japan	30k industrial robots	-

Source: Statista, Natixis

The potential for robotisation is an inevitable means of business relocation and reindustrialisation. According to a McKinsey Institute study of 46 countries, accounting for 80% of world employment, this potential varies greatly from country to country (table 7). The study looks at unique activities, jobs that offer only one task, and the data allows us to infer the percentage of activities affected by automation.

Table # 7: **The countries where the potential for automation is the highest (% of work activities that could be automated by adapting current technology)**

Africa Middle East		Asia Australia		Europe		North America		South America	
Kenya	51.9	Japan	55.7	Czech Rep	52.2	Mexico	51.8	Peru	53.2
Morocco	50.5	Thailand	54.6	Turkey	50.4	Costa Rica	51.7	Colombia	53.0
Egypt	48.7	Qatar	52.0	Italy	50.3	Barbados	48.7	Brazil	50.1
Nigeria	45.7	South Korea	51.9	Russia	50.3	Canada	47.0	Chile	48.9
South Africa	41.0	Indonesia	51.8	Poland	49.5	US	45.8	Argentina	48.2
U.A.E.	47.3	India	51.8	Spain	48.5				
Oman	46.8	Malaysia	51.4	Germany	47.9				
Bahrein	46.1	China	51.2	Greece	47.8				
Saudi Arabia	46.0	Philippines	47.9	Austria	47.4				
Kuwait	41.1	Australia	44.9	Switzerland	46.7				
		Singapore	44.2	Sweden	46.0				
				Netherlands	45.4				
				France	43.1				
				UK	42.8				
				Norway	42.4				

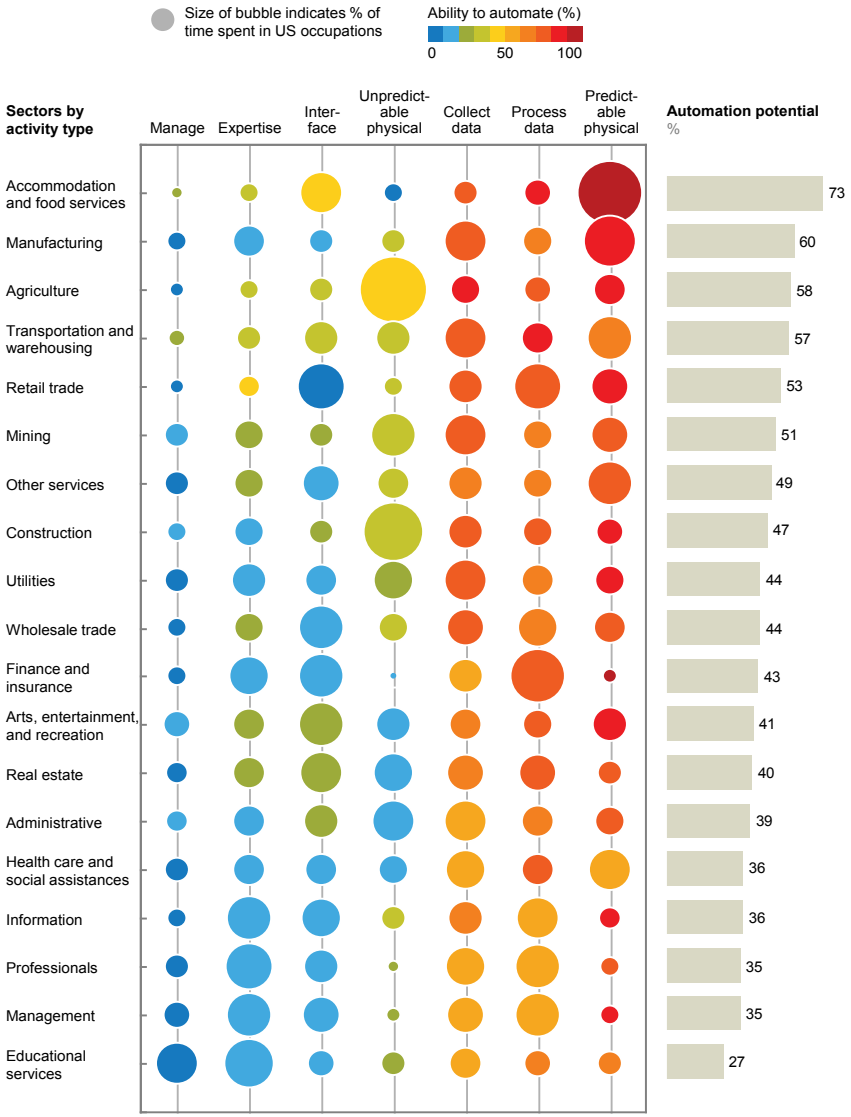
Source: McKinsey Institute

Some key points emerge from this study:

- The differences between countries can be huge. This is the case for Japan (55.7%) and the United States (45.8%). Japan spends more hours in production and administrative jobs than the United States. These two sectors have a strong potential for automation. In contrast, the United States has a higher hourly rate for management or engineering jobs, which are jobs with lower automation potential (they require expertise that robots or computers cannot achieve) .
- In countries with aging demographics (Europe, Japan, etc.), automation can be seen as a way to compensate for the lower productivity associated with an aging population.
- With the United Kingdom (42.8%) and Norway (42.4%), France has a lower robotisation potential than its European peers (43.1%), much lower than that of the Czech Republic (52.2%) o Italy (50.3%) or Germany, yet already heavily using robotisation (47.9%). This is linked to the structure of his jobs.
- McKinsey (2017) estimates that in the United States, 5% of jobs are fully automatable while 60% of all occupations have at least 30% of technically automatable activities.

- All sectors are concerned, but to varying degrees. Details for the US are presented in Graph 4. Automation will therefore change many professions - partially automating them, for example - rather than replacing them.

Graph # 4: **Technical potential for automation across sectors varies depending on mix of activity types**



Source: US Bureau of Labor Statistics; McKinsey Global Institute analysis

IV.7.2. Europe must, however, evolve from a regulatory superpower to a technological superpower.

In recent years, Europe has understood that it needs to protect its values, interests and citizens in a digital space that is gradually becoming a geopolitical and geoeconomic battleground. Lacking the technological skills to compete with China and the US as a digital player, the EU has instead started to shape the digital ecosystem by exercising its regulatory power to introduce extraterritorial rules binding on all those who wanted to interact with its single market and consumers. **Europe has thus become the world's leading digital regulatory power,** *"a global pioneer in digital policymaking, actively intervening to raise privacy standards, impose historic antitrust fines on technology companies and shape the debate on issues such as online harm and ethical artificial intelligence"*(C. Hobbs (2020). And this is arguably just the beginning.

The question is whether there is sufficient regulatory power to protect Europe's interests and vision for the internet and digital technologies. Nothing is less sure.

As a recent report from the European Council on Foreign Relations (2020) recommends, **Europe needs to evolve from a regulatory superpower to a technological superpower if it truly hopes to safeguard its values and interests in the digital space, reap the economic benefits of emerging digital technologies and protect Europeans against disinformation and cyber attacks.** Until now, Europe has been more concerned with writing the rules of the game than playing it, continuing to follow China and the United States in the development of leading technology solutions and companies. But **the referees, no more than the spectators, never win games: the EU must complement its regulatory influence with investments in digital infrastructure, skills and industry in order to become a fully-fledged digital player.** All is said.

IV.7.3. Can we fight against the digital giants?

A complete IT sovereignty is an impossible task. Europe abandoned this industry a long time ago. It left the monopoly of data processing on the web to GAFAM. Europe was even preparing to leave the Chinese Huawei for 5G. Europe preferred to focus on applications, and not on fundamental technologies which are their main resource. However, **Europe has strengths: leading industrial companies (SAP, Dassault Systèmes, STMicro, etc.), a large number of startups, a network of universities and research centres unparalleled in the world, and it represents the first world market.**

But the gap is enormous now. The economic, financial, technological and media and political power of the digital giants has reached levels unmatched in economic history. The GAFAMs alone (Google, Amazon, Facebook, Apple and Microsoft) weigh almost $ 7,000 Bn in market capitalisation (1,900 Bn for Apple, 1,600 Bn for Amazon and Microsoft, 1,000 Bn for Google and 700 Bn for Facebook, while the CAC 40, for example, represents only 1,800 Bn dollars. Alongside the American GAFAM or FAANG (Facebook, Apple, Amazon, Netflix, Google), we also find the Chinese BATHX (Baidu, AliBaba, Tencent, Huawei and Xiaomi), which have a similar

economic weight in Asia. Netflix, Airbnb, Paypal, Twitter, Uber, Booking … represent the new generation of digital companies, which is in the process of reconfiguring sectors such as television, hotels, services payment… They are often called NATUs (Netflix, Airbnb, Tesla, Uber).

These companies rely on the effectiveness of digital tools, define their own rules (sometimes bypassing common law), increase their activities, open up to services outside their own offers. Clearly, they create specific ecosystems, and even promote addictive behaviour (J. Toledano (2020)). In short, in the space of a few years the GAFAs have become competitors of states in the geopolitics of the 21st century. Their dominance is based in part on the quality of their services, their competence in innovation and development, but also on their ability to weaken the dynamics of competition and appropriate innovations likely to destabilise them. Certain studies (commissioned by the British (Furman report (2019)), European (Cremer - de Montjoyer - Schweitzer (2019)) governments show that **they now slow down the development of innovation.** They play a bit the role of "rentiers" (D. Ricardo) who, by their monopoly or quasi-monopoly position, no longer bring competition and progress into play. Responsible for anti-competition practices, the 4 companies of the GAFA group are all facing parliamentary inquiries, both in terms of Europe than the United States. No institution in charge of competition has actually been able to prevent the markets from being ultra-dominated by these economic empires, and despite three condemnations by the European Commission in 2017, 2018 and 2019, and a total sanction of 8 Bn euros, Google retained its position in the European market. Ditto for Apple ordered to pay 13 Bn euros to Ireland …

Recent experience shows that condemning these companies is not enough. **So, what to do?**

- **Adopt stronger regulations:** the EU must also continue to shape the digital environment by exercising its regulatory power through, for example, the creation of a European cloud federation which obliges admission applicants to adhere to standards of the EU.
- **Banking on closer collaboration between European countries** is absolutely essential to bring the behaviour of these giants into compliance, but also to allow the emergence of European digital giants, competing with GAFAM, BATHX, or NATU. But for that to happen, it will first be necessary to be collectively able to outlaw discriminatory practices favouring one's own services or those of one's own economic partners.
- **Europe may have missed the first generation of digital transformation, but it must position itself to compete in the next wave of technology,** such as advanced computing, in which European companies have several competitive advantages.
- Finally, **Europe could export its model (regulations, values, etc.) to like-minded democracies** around the world and build an alliance with them to increase their strike power.

IV.8. Defence: a typical example of sovereignty for Europe

If there is one sector to which the principle of sovereignty has been strongly attached, and for a long time, it is the defence sector. Vital for every country, and for the American, the British and the French industry in particular. It is the subject of fierce competition. And for European countries, there are two other questions:

- On the one hand, the desired level of dependence on the United States, via the trans-Atlantic alliance of which NATO is arguably the most representative body.
- On the other hand, the necessary pooling with other European countries of certain projects, certain expenses, research, tools ... What should be transferred to the European Union and what should be kept at national level? Herein lies the usual debate between national sovereignty and EU sovereignty.

We are not going to develop here all the challenges of this sector, immense, complex and extremely varied (they concern fighter planes as well as drones, weaponry, space ...). A complete follow-up would require going into details which would be far from the object of this study. We will focus on some aspects only.

Autonomy from the United States: what future for the Transatlantic Alliance? We mentioned above that the transatlantic alliance, essential at the end of the Second World War and at the dawn of the United States - Russia Cold War, had been the cornerstone of almost all diplomatic relations between the United States and Europe. But times have changed, and the United States now challenges the functioning of this alliance, and in particular the attitude of Europe. Considered as "parasites" by D. Trump, protecting himself cheaply under the umbrella of American protection. The American president, as well as B. Obama before him (and others before him, like J.F. Kennedy, who considered himself "frustrated" by the fact that the European allies are living "at the back of the country" while they- even guaranteed the freedom and security of Europe), reproach Europeans in particular for not devoting the equivalent of 2% of their GDP to defence, the NATO framework amount[5]. This also applied to the UK, which was much criticised under the Obama administration for the same reasons. Many surveys also show that in several European countries, people (and their governments) are very attached to a possible intervention by the United States to come to their aid, but less enthusiastic at the idea of intervening themselves in the event of a threat to an ally. This lack of reciprocity is a real problem.

Despite very harsh comments on how it works, the Trump Administration has repeatedly demonstrated its commitment to the Alliance, considering that the Alliance must now focus its attention on the multifaceted threat from China on the common values to the Alliance, ie Europe and the United States. Maintaining this alliance is important for both parties, but building greater autonomy / sovereignty is nevertheless essential.

[5] *In 2019, only 9 of the 30 members met this commitment. As a whole, the defence budget of NATO countries represents 2.51% of its GDP, with significant differences between countries: the United States devotes 3.42% of their GDP to it, the United Kingdom 2.13%, France 1.84%, Europe 1.58%, Germany 1.36%, Italy 1.22%, Spain 0.92%... (Source: NATO).*

Three examples of dependency deserve our attention: regulation, fighter aviation, space.

Regulation plays a crucial role, and the fight is fierce. To strengthen its defence strategy, the United States has equipped itself with a massive arsenal of legal and economic weapons. The extraterritoriality of US laws can sometimes stifle its competitors. Among these instruments, one can for example mention the ITAR standards which allow the United States to block any sale of arms made abroad containing American components. This applies to any kind of arms, including drones, but it has also blocked sales of French Rafales to Egypt, the Rafale comprising an electronic chip subject to the ITAR standard. It is therefore now a question of developing "ITAR free" products … but this obviously requires the implementation of a real "Made in Europe" strategy. In other words, new investments in research, possibly the buyout of strategic companies, and the development of European cooperation programs. The EU has clearly taken this path, with the increase in dedicated budgets, and the creation in 2018, at the initiative of France and Germany, of the European foundation JEDI (Joint European Disruptive Initiative) which seeks to bring together research and entrepreneurs… JEDI is the European equivalent of the American DARPA which facilitated the emergence of GPS and the autonomous car, to name just two examples. France is doing the same, with the signing in June 2020 of a partnership between the French Defence Innovation Agency (Ministry of the Armed Forces) and the industrial groups GICAN (naval activities) and GICAT (Land and air-land activities).

…. Another important regulatory measure is the Clarifying Lawful Overseas Use of Data Act (Cloud Act), which obliges US service providers and digital operators to disclose the personal information of their users at the request of authorities, without having to go through the courts or informing users… a real blow to corporate trade secrets, which could also expose them to the risks of industrial espionage.

The latest generation **fighter planes** are platforms connected to other players in the battlefield. We know that European states are equipped with European planes, but also American planes. This is the case of Denmark (27 F-35 planes), Norway (53), Italy (90), the United Kingdom (138), the Netherlands (46), Belgium (34) and Poland (32). **These countries have actually bought American sovereignty in Europe.** In terms of European defence, we can do better, especially since the dependence on the United States is total: the Pentagon has the power to remotely neutralise the source codes of planes sold abroad, if the intended use by the customer does not correspond to Washington policy. Without the agreement of the United States, these planes are therefore unusable. We can see the danger of this situation given the tensions with the United States or the erosion of the interest of the Transatlantic Alliance.

Space. The launch of satellites, a crucial activity in our information economy, is a market in total mutation. The European initiative had made it possible to take leadership in this area via the different generations of Ariane rockets. But the last few years have turned everything upside down. As satellite launches are very expensive, and launchers heavier and heavier, new players have appeared, at a lower cost in so-called emerging countries,

or at a lower price and with different approaches led by private companies. SpaceX is the best example: development of reusable rockets in particular, a rocket around March in 2024, and very soon a rocket (Starship) that can go up to 12,000 km/h to deliver weapons anywhere in the world when necessary (to be compared to the 950 km/h of the Boeing C-17s used so far ... We will not go into details here, but a new European impetus is necessary to gain in independence and power.

Conclusion: Reindustrialising means facilitating robotisation and digitalisation

More than other insidious disasters, **Covid-19 represents a rupture:** it has affected all countries, all populations, it has caused the same fear in everyone, and because of the measures taken by the various governments, it has heavily paralysed production equipment. **This rupture is also lasting, and it will lead to transformations (desire for greater independence, in particular from China), increased interventionism by States, search for greater national sovereignty, return of borders, etc.) or greatly contribute to the acceleration of ongoing transformations, such as de-globalisation.**

With the **third industrial revolution** and the **Covid-19 crisis,** the world has entered into a period of global transformations. The current industrial revolution shows the need for an industry adapted to the "new world", while the Covid-19 crisis has shown that national or European sovereignty (in health and medicine, food, digital, etc.) is essential. The combination of the two global transformations makes the task even more complicated because i) Covid pleads for de-globalisation, while the digitalisation favours – so far - IT giants and globalisation, and ii) because at the same time it highlights the degree of urgency. Research and development (R&D) and industry (which performs more than 85% of global R&D) are essential to stay at the forefront of the kind of transformations that are shaping this new economic world. This is all the more critical as history recalls that a country that misses an industrial revolution becomes relatively underdeveloped and rapidly impoverished.

Generally speaking, **the globalisation of business (the economic globalisation) has certainly become excessive in certain aspects, such as when it is based on artificially created comparative advantages.** It can lead to offshoring, dumping, quality reduction, trade disputes, unfair competition, and patent infringements (particularly by China).

One of the great certainties of the Covid crisis is the return of state interventionism, i.e. the great comeback of the state as master of resources and manager of the economy. In that sense, the health sector has been reassessed by this crisis. In the recent past, health investments were more inspired by economic globalisation (based on the attraction of value chains, search for the lowest cost) than by financial globalisation (better risks and prevention risks, cooperation and regulation). The Covid-19 pandemic has emphasised all the dangers of such a logic. Big changes - such as relocations of industry, creation of more efficient regional

ecosystems, a clearer vaccine policy, the creation of an industry of war against the viruses, state interventionism … - are to take place in the coming years in this area. More generally, the Covid crisis represents a collective awareness and a change in behaviour, with the enhanced role of electronic commerce, the increased role of telecommuting, and the increased role of digital technology and robots.

Research and development (R&D) and industry (which performs more than 85% of global R&D) **are essential to stay at the forefront of the kind of transformations that are shaping this new economic world.** This is all the more critical as **history recalls that a country that misses an industrial revolution becomes relatively underdeveloped and rapidly impoverished**.

The third industrial revolution, which began in the 1980s, is based on computer science and technology, including digital. It is mainly about robotisation and digitalisation as regarding industry.

Entrepreneurial iconomics[6], with an "i" for intelligence, IT, internet, innovation, integration, is the result of three new forms of innovation, production, distribution and consumption:

- **The economics of computers, the Internet and networked software,** which is based on the lightning progress of microelectronics and systems integration, a real capital and entrepreneurial transformation.
- **The entrepreneurial economy of innovation,** which is a capital and entrepreneurial transformation, has been accelerating since the beginning of the 20th century.
- **The service-based economy,** real-time management using new computer and communication technologies.

History has accelerated since the 1990s. Ch. Saint-Etienne detects 4 accelerations of the economic revolution:

- The first acceleration took place in the 1990s as a result of the networking of hundreds of millions of microcomputers (thanks to the internet);
- The second acceleration came in 2007 with the release of the first smartphone, Apple iPhone;
- The third acceleration began in 2015 with the rise of artificial intelligence and 5G, which will develop massively in the coming years;

[6] *"iconomy" (from the Greek eikon, image, and nomos, organization) is a neologism coined in 2006 by the Brazilian economist Gilson Schwartz to designate "the economy of icons, information and knowledge." In France, Jean-Michel Quatrepoint used the same term to designate the society that the "third industrial revolution" brought about, that of computerisation. Michel Volle gives the definition: "ICONOMY - A society whose economy, institutions and lifestyles are based on the synergy of microelectronics, software and the Internet". The economy is the subject of the work of the "Institut de l'iconomie", an association created in 2011.*

- A fourth acceleration will take place in the 2020s, leading to the creation of a medical double for man, gradually affordable for all, which will simulate interventions on the human body. Virtual duplicates of factories will undoubtedly be created to simulate expansions, breakdowns, interactions between equipment … virtual duplicates of entire cities like Singapore are already being produced on a large scale to optimise transport networks and anticipate the impact of the works, imagine new neighbourhoods and their interaction with the rest of the city …

As regard IT, the lag of Europe (compared to the US or China, e.g.) is unfortunately quite big. Oligopolies are ruling all elements of the sector, with US companies mainly. Note that a country or a group of countries which does not produce its micro-processors does not remain at the forefront of the development of operating systems and becomes totally dependent, as we could in the past for raw materials, with countries which imported all the energy necessary for their economy. Europe does not exist in the field of micro-processes: it is even disinterested in it, contrary to China or the United States, which invest heavily in these activities. **Getting back in the race in the IT sector seems a very difficult task for Europe in view of the market situation (oligopolies) and the exorbitant entry costs.** However, it can continue to play an important role in applications for the IT sector, but also for other industrial and commercial sectors.

As regard digital sovereignty, radical changes seem necessary. Europe needs to evolve from a regulatory superpower to a technological superpower if it truly hopes to safeguard its values and interests in the digital space, reap the economic benefits of emerging digital technologies and protect Europeans against disinformation and cyber attacks. Until now, Europe has been more concerned with writing the rules of the game than playing it, continuing to follow China and the United States in the development of leading technology solutions and companies. But **the referees - no more than the spectators - never win games:** the EU must complement its regulatory influence with investments in digital infrastructure, skills and industry in order to become a fully-fledged digital player. **Europe has missed the first generation of digital transformation, but it must position itself to compete in the next wave of technology,** such as advanced computing, in which European companies have several competitive advantages.

A good combination of positive regulation and strong industry can be found in the US defence sector. **To strengthen its defence strategy, the United States has equipped itself with a massive arsenal of legal and economic weapons.** The extraterritoriality of US laws can sometimes stifle its competitors … and allies. These laws play a crucial role, and the fight is fierce. The EU has clearly taken this path, with the increase in dedicated budgets, and the creation in 2018, at the initiative of France and Germany, of the European foundation JEDI (Joint European Disruptive Initiative), the European equivalent of the American DARPA which seeks to bring together research and entrepreneurs. A solution for other sectors ?

Ch. Saint-Etienne notes that **the entrepreneurial economy is the engine of future growth, intensive productivity and above all the main factor explaining the growth differences between countries. The hierarchy of nations will be upset due to the current industrial revolution.**

Two major questions to conclude:

- **What does reindustrialisation mean in today's world?** It is certainly not about going back to old industries or saving outmoded businesses at all costs, or letting our economies shift into essentially service economies. It is about fostering the structural changes underway in the industrial sectors. It is therefore mainly a question of facilitating robotisation and digitalisation.
- **Which sectors should be prioritised?** The American (or even Chinese) example is instructive: the United States have never ceased to ensure efficiency, power and sovereignty in five strategic sectors: defence (being ready for an eventual confrontation), pharma (being ready to face pandemics and treating the population), finance (being able to finance possible conflicts in particular), agri-food (being able to feed its population) and energy (being able to any situation to operate the industrial tool in particular). At their disposal, new weapons of economic war such as the extraterritoriality of laws (which stifles competitors and allies), but also agencies such as DARPA (the Defense Advanced Reearch Projects Agency), which finances and promotes innovation, and seeks to bring together research and entrepreneurs and BARDA (Biomedical Advanced Research and Development Authority), the office responsible for the purveyance and the development of medical solutions against bioterrorism, pandemic influenza and emerging diseases. It is therefore a question of financing, but also and above all of long-term industrial strategy. Europe would do well to learn more from it. The EU has clearly taken this path, with the increase in dedicated budgets, and the creation in 2018, at the initiative of France and Germany, of the European foundation JEDI (Joint European Disruptive Initiative), the European equivalent of the American DARPA. A solution for other sectors?

Without a systemic and strategic reaction, the European Union could well find itself reduced to a market that continues to lose sovereignty, buys American or Chinese products at first, then underdeveloped afterwards. **No sovereignty without industry, it's that simple.** In addition, the strategic, political and cultural dimensions of an industrial revolution are as important as its technical and scientific dimensions. Without industry, given its current geopolitical place, Europe could continue to lose ground, with France being undoubtedly the most downgraded country in terms of power, considering its current political status.

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