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THE BRIGHT SIDE OF THE COVID WAR

Abstract

Background: The effects of the Covid-19 pandemic are comparable to a medium-size war with 2 million victims and hundreds of millions of people unemployed. The shock of the pandemic has inevitably led to radical solutions, e.g., biotechnology advances occurred in 6–8 months instead of 5 years or more. During the last 20 years, in spite of spectacular innovations, developed countries did not really change how they offer services and produce goods; rather, they created extremely rich multinational monopolies.
Research purpose: The main purpose is to look at the post-Covid-19 world economy. We discuss rather positively different aspects of the post-pandemic reality, especially the accelerated technological progress and innovations pushed by the social and economic crisis, unemployment, and the huge losses of human lives during the pandemic. Pfizer and Moderna have developed a Covid-19 vaccine in months instead of years.
Methods: An academic synthesis of the multitude of reliable data sources. A multidisciplinary overview from the point of view of macroeconomics, political science, and sociology.
Conclusions: We are witnessing the birth of great innovations to treat diseases and to "grow" meat. There are driverless taxis, the best AI natural language algorithm to date, and a significant drop in the prices of renewable energy. In other words, in the dark days of Covid-19, we can see on the horizon a new era of great discoveries leading to faster economic and social development.

Keywords: Covid-19 pandemic, multinational monopolies, vaccines, artificial intelligence, social and economic development.

JEL classification: F23, F60, F62, E66, G28

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1. Introduction

The tragic loss of life due to COVID-19 is irreversible. But like everything in life, there are some positive consequences of what we have lived through. The authors of the article look at the bright side of the Covid-19 war, which we are about to win. Neoliberals wanted to bury the state, but it is alive and indispensable. The natural adaptive power of the labor market needs generous budget spending without fear of inflation. Economists cannot be linear thinkers but social scientists who know that people, regions, and nations tend to specialize. It is just a fact of life, and liberal democracy is the best tool to achieve high productivity whether we like it or not. Long-term predictions are cheap because those who make them will never live to see if they were right. We venture into this art of prediction with the conviction that we are correct. The long-term Earth, if we survive future wars of any kind, will be a melting pot, very much like current North America. We all will be winners in the future if we allow ourselves to make democratic decisions.

The Covid-19 pandemic serves as a reminder to economists that we are actually social scientists, and we need many adjustments to the way we model the economy of the future. The data we are collecting now give us some definite clues about how we will work, create energy, take care of the people, and entertain ourselves in the near future. What are these megatrends or lessons from the second year of the pandemic?

2. We are fighting a war, and the State is needed to restart the economy

The effects of the pandemic are comparable to a World War, with 2 million victims and hundreds of millions of unemployed and under-employed workers. There is, however, good news amidst much bad news. Historically, after each World War, there was at least a decade of economic expansion. The shock of war forces radical new solutions which otherwise would have taken years to occur. Biotechnology advances that were predicted pre-COVID to come to fruition in 5 years, in fact, occurred in about five months. In the first two decades of the 21st century, productivity growth was lackluster, and the most popular new inventions - the smartphone, social media, home delivery, and online shopping – did not bring the predicted revolution in manufacturing. Instead, they just shut down malls across the country. For many people, the information revolution meant more data traffic, faster spread of both true and false political news, and constant social media, however, this is changing.

Thanks to Covid-19, the productivity "great stagnation" documented by top economists is ending.[1] First is the flurry of recent discoveries with transformative potential. Because of the remarkable ability to predict and edit the shapes of proteins through messenger RNA, Pfizer and Moderna developed a COVID-19 vaccine in months instead of years. Soon, biotech companies will be able to treat many diseases, edit genes, or even "grow" meat. Last summer, Open AI unveiled GPT-3, the best natural-language algorithm to date, while driverless taxis maneuver around Phoenix, Arizona. Second, there has been a spectacular drop in the price of renewable energy, providing governments with the option to confidently invest in green energy.

In 2020, the US private sector spent more on computers, software, and research and development (R&D) than on buildings and industrial equipment, contradicting the absurd idea that short-termism is dooming R&D spending in developed market economies. This trend is visible across all 24 OECD countries, with investors spending money on industrial robots and semiconductors, and all car manufacturers declaring the will to abandon the production of diesel and petrol in the next 10–15 years. The battle against climate change and the AI technology competition between the US and China set a fear in the EU countries that they would once again be placed in a new bipolar world and press R&D spending. Decarbonizing economies will boost demand for energy-efficient buildings, households, transportation, and finally, the energy-hungry industry for renewables. These revolutionary megatrends emerged due to the Covid 19 pandemic and will be a part of the post-Covid recovery.

The pandemic moved several trillion dollars of business worldwide to digital platforms, videoconferencing, and industrial automation, while consumers moved to e-commerce, digital payments, and telemedicine. There is no returning to the "pre-war" economy even when the bars re-open and the beer starts flowing.

Here comes good advice for the orthodox monetarists. Do not look for the closing gap between the potential and effective GDP during the post-Covid 19 reconstruction. Productivity and investments in new technologies are our major anti-inflation vaccines. All grand monetary models age quickly.

In the last decade, the central bankers in the rich part of the world pushed the debt to 120–130 percent of GDP and prayed to see merely 2 percent inflation.

[1] **R.J**. **Gordon**, *Why has economic growth slowed when innovation appears to be accelerating?* NBER working paper series, Robert J. Gordon Working Paper 24554, NATIONAL BUREAU OF ECONOMIC RESEARCH 1050 Massachusetts Avenue Cambridge, MA 02138 April 2018, p. 23, http://www.nber.org/papers/w24554; accessed 9.03.2021.

The S&P 500 reached new heights, and nobody seems to have a clear sense of where the inflationary impact of the post-COVID-19 helicopter money really is. American Democrats would like to spend nearly 2 trillion dollars while Republicans warn about monetary prudence. Most economists are silent because their track record of accurate predictions is not strong. In this decade, we should expect a radical rise in productivity in all developed countries, which is likely to offset the loose monetary policy. The grim predictions of 5–10 percent inflation look like politically motivated pessimism. After all, there is always a fiscal policy.

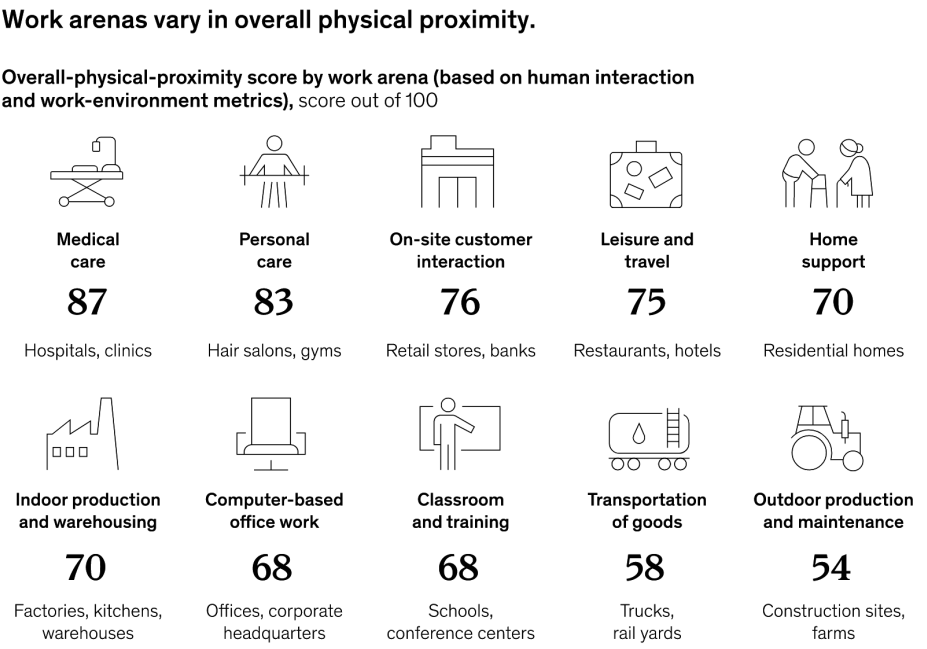
Although private sector investments ultimately determine a developed country's growth, governments will have an important role to play in the near future.

During this technology-led restructuring, the state can offer more and better subsidies for R&D, such as prizes for solving clearly defined problems. It can also influence how fast innovations diffuse through the economy. Governments will be needed to ensure that regulation and lobbying do not slow down disruption, in part by providing an adequate safety net for those whose livelihoods are upended by it. Good governments ensure that the whole economy harnesses new technologies, and they use antitrust enforcement and intellectual-property regimes. If governments rise to the challenge, then faster growth and higher living standards will be within their reach, allowing them to defy the pessimists' warning about inflation.

3. The labor market is more flexible than we think

The pandemic accelerated existing trends in remote work, e-commerce, and automation, with up to 25 percent more workers than previously estimated potentially needing to switch jobs. However, a significant structural adjustment is taking place in the labor market. As societies in the USA, the EU, and China get richer and more mature, they spend a greater share of their income on labor-intensive services, such as restaurant meals, medical treatment, education, childcare, retirement services, and home care. Since productivity growth and automation are limited in these areas, a new job market is going to expand for a vast number of people – provided there is an adequate rise in the minimum wage to draw people from welfare.

FIGURE 1: *Work arenas and physical proximity*

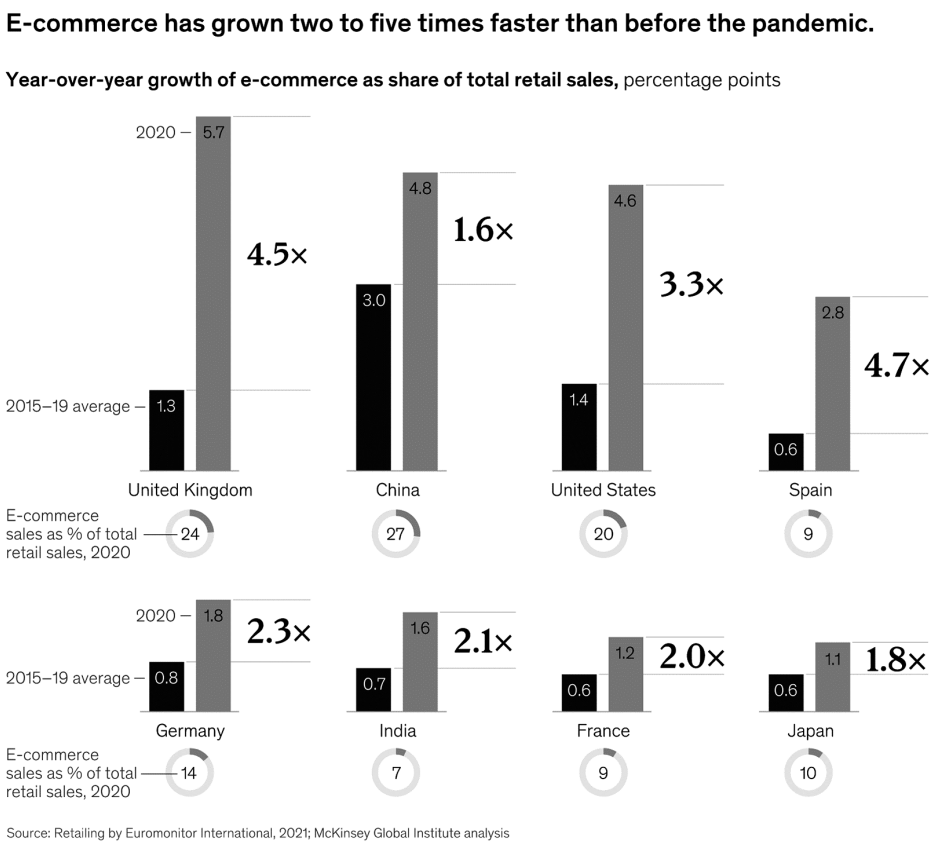


S o u r c e: https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19; accessed 9.03.2021.

Before the pandemic, McKinsey & Co., a management consulting firm, estimated that just 6 percent of workers would need to find jobs in higher-wage occupations. In post-COVID-19 research, they found that not only would a larger share of workers likely need to transition out of the bottom two wage brackets but also that roughly half of them overall would need new, more advanced skills to move to occupations one or even two wage brackets higher.

The skill mix required among workers who need to shift occupations has changed. The share of time German workers spend using basic cognitive skills, for example, may shrink by 3.4 percentage points, while time spent using social and emotional skills will increase by 3.2 percentage points. In India, the share of total work hours expended using physical and manual skills will decline by 2.2 percentage points, while time devoted to technological skills will rise 3.3 percentage points. Workers in occupations in the lowest wage bracket use basic cognitive skills and physical and manual skills 68 percent of the time, while

FIGURE 2: *E-commerce growth since the pandemic*



S o u r c e: https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19; accessed 9.03.2021.

in the middle wage bracket, the use of these skills occupies 48 percent of time spent. In the highest two brackets, those skills account for less than 20 percent of the time spent. The most disadvantaged workers may have the biggest job transitions ahead, in part because of their disproportionate employment in areas most affected by COVID-19. In Europe and the United States, workers with less than a college degree, members of ethnic minority groups, and women are more likely to need to change occupations after COVID-19 than before. In the United States, people without a college degree are 1.3 times more likely to need to make

transitions compared to those with a college degree, and Black and Hispanic workers are 1.1 times more likely to have to transition between occupations than white workers. In France, Germany, and Spain, the increase in job transitions required due to trends influenced by COVID-19 is 3.9 times higher for women than for men. Similarly, the need for occupational changes will hit younger workers more than older workers and individuals not born in the European Union more than native-born workers.[2]

4. Global specialization and a single market are coming

The idea that specialization is good is 250 years old. Besides Ricardian comparative advantage and Hecksher-Ohlin and Stopler-Samuelson theorems, there is empirical evidence about the advancing global specialization because of two fundamental reasons capital is more mobile than people, and trade barriers are weakening.

Globalization was the last stage of the industrial revolution, and specialization of the world is the first stage of the new post-Covid War economy. Very populous parts of the world must produce more to satisfy needs; the rich world will have to raise the quality of human capital and technology, or they will not be rich anymore.

Functional world regions and specialization between research, production, labor-intensive, education-intensive regions on Earth are an extension of specialization within the countries. We are at the stage when countries' economic borders will matter less and less. The EU has annulled economic borders, and Brexiters are learning the hard lesson that leaving a single market was a very misguided decision.

What propels the Earth's regions to greater specialization? Since capital today is far more mobile than people, capital reaches the people (labor) where it is less expensive to do specialized tasks. Capital is reaching iPhone manufacturing specialists and design specialists in the US. It reached Shenzhen and Guangdong, and also Palo Alto, Silicon Valley, and Route 128 in Massachusetts. What is most important, however, is that these regions are creating a positive feedback effect in the accumulation of skills, motivational

[2] **McKinsey**, *The Future of Work after Covid-19*, https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19?cid=other-eml-alt-mgi-mck&hdpid=ef77708e-97cb-4375-abe3-bc174c2f6edf&hctky=12236565&hlkid=2098c121ea1e4b799a5c83d8ecadf9dd#; accessed 8.03.2021.

psychology, individual characteristics, values, and family structures, making them more productive than other regions. Special Economic Zones in China or Hyderabad and Bangalore, India are a better place to manufacture or program than New York or Austin because of the cost of labor. The USA is a better place to design the product, just as much as some other regions of the world are better suited for one task than another.

A small example: in 2012, Tim Cook, Apple CEO, proudly announced on prime-time television that a new computer would be manufactured in the USA. It would be the first Apple product in many years labelled "Assembled in the USA". However, the plan to manufacture Macs in Austin, Texas, was delayed for several months. The problem was tiny – a custom-made screw that American manufacturers could not produce in the necessary quantities, it had to be ordered from China. That is why we do not produce iPhones in Austin, but we can design new products in there because it is close to better schools that can educate talented designers. Meanwhile, Shenzhen has the Chinese labor and the screws, the material engineers, the die makers, the tooling engineers, and the skilled assembly workers. Because of the shortage of supplies during the pandemic, Apple moved some of its production to Vietnam and India while the team of design engineers in Palo Alto's Apple "Flying Saucer" is working on designing a new Apple iPhone 14 and 15and a self-driving Apple electric car, while SpaceX is making the Falcon Heavy rocket in the USA.[3]

World trade is transitioning towards a single global market. Since 1947, when the General Agreement in Tariffs and Trade (GATT) was formed, the "trade openness index," which looks at all exports and imports as a share of the total world economy (GDP), rose from a mere 10% to around 60% today after temporary drops due to the 2008, 2019, and 2020 crises. In the last few years, we have seen the revised Trans-Pacific Partnership (TPP – minus the USA because of Donald Trump, The EU-Canada deal, The EU-Japan deal, The EU-China deal, and the African Continental Free Trade Area. It is true that since 2008 there have been hundreds of small new protectionist measures, but their net effect is moderate. The average tariff in the industrialized world in the 1960s stood at 15%. In 2017, the global average – even including traditional trade – skeptical developing countries – was under 3%.

Free trade is better than protectionism, and multilateral agreements are better than bilateral agreements; a single market with "four freedoms" (trade, services, capital, and people) is better than a collection of single economies. The

[3] **F. Zakaria**, *Ten Lessons for a Post-Pandemic World*, W.W. Norton & Company, 2020.

trade creation effect of a single market is larger than the trade diversion effect of bordered economies. An economic union with a single currency is better than a single market, and a common currency is better than multi-currency systems. There is solid research that proves all the above and more.[4]

National tariffs will slowly be phased out by multilateral trade agreements, regional single markets like the EU, and regional trade areas, which will connect single markets to free trade zones. Capital movement across the world is not taxed and never will be because there is no chance for the world government – but there is a chance to create a global single market with visible regional specialization. And it is coming.

5. Successful nations must fight the demographic decline

The nations that have capital and technology must either allow more people to immigrate or move capital to more populous areas. The nation-state concept could survive only if there is a balance between the desire to maintain its identity, i.e., "cultural or racial purity", and the raw forces of the global market.

Global specialization centrifugal forces are stronger than the nation-state centripetal forces. Therefore, deeper global specialization outside the nation-state preferences is to be expected until we start running out of easily available resources. Closed production cycle economies are still more expensive to run.

People' s desire to migrate because of uneven income, climate disasters, pandemics, or escaping from war zones will put even more pressure on rich countries to open their borders. In the long run, rich countries must reach out to the markets and consumers in Asia, Latin America, and Africa. Moving populations to richer and more comfortable regions of the Earth is not doable in a material, physical sense. The local nation-states populations will slow the process for a long time.

Globalization was just a prelude of things to come in terms of blending ethnicities. To maintain their leadership and wealth, developed countries must accept more immigration and escape to a labor-saving technological future, or they will not be rich anymore.

Human ethnicities are blending faster on Earth than we think. The richer part of the world will change demographically to reflect the general ethnic composition of the world. Demographers and ethnographers have observed this

[4] **R. Sharma**, *The 10 Rules of Successful Nations*, Penguin Press, 2020.

process many times in the US and in the EU. Immigrants in the richer countries are far more dynamic than the already settled population, despite their initial cultural handicap. They are the risk-takers, more individualistic, and they are able to survive outside their birth kinship. They are also more likely to have more children than the "older settlers". The immigrant workers, no matter what level they achieve in the first generation, pass on their values to their children. However, the grandchildren may start losing the characteristics of their grandparents. This process occurs for several generations until they, in turn, become more complacent and less dynamic "old settlers". In this melting process, the protected population of the nation-states will be very similar to the rest of the world. The melting pot, or the "Americanization" of the world in a cultural and ethnic sense, will accelerate.

6. Liberal democracy needs to prove its efficacy to survive

This is not what the rich and free world would like to see. The People's Republic of China (PRC), the source of the pandemic, stopped the spread at home because of its authoritarianism and secrecy. It was able to restart its economy, whereas much of the rest of the world is paying the steep price.

Is liberal democracy doomed because it will take a longer time to react in future pandemics and climatic disasters? The truth is that all governments and political systems test their viability and legitimacy only if they provide protection and economic welfare to their people. Liberal-democratic nation-states need to have efficient responses to massive disasters and stop the concentration of capital. The alternative to distributive power of the state and capital concentration, i.e., charity instead of taxes on the richest oligopolies, will not work in the future because it has not worked in the past.

Autocratic China excluded 1.4 billion people from voting and freedom of information. The Chinese communists operate in total secrecy, which leads to the pandemic even in the relatively wealthy urban population. Secrecy can also give birth to nationalism that is used as justification for the elite' s continued centralization of unchecked power.

Democracies and autocracies must provide protection against pandemics and climate disasters. It is reasonable to believe that the gap in people's thinking in both China and the West between local and global has narrowed because of the pandemic. However, what is the difference between the rich in China, Russia, and the West?

Generally, we assume they think alike. However, they are different: Russian oligarchs take their money out of Russia to keep it safe from the mafia state that allowed them to become rich. Meanwhile, the super-rich Americans want to save the world, not only the USA. Many top Chinese communist princelings and their families became the county's supper rich and resettled their families in Singapore and Canada.

On balance, Western culture appeals to more people than the Han culture because of the latter's very inefficient language and anti-individualism forced by the Chinese party-state.

Apparently, the strongest argument for the validity of the nation-state is the control of the borders, and the unique cultural identity, which is a form of kinship that must be preserved. If the borders are not protected, people will feel uprooted, displaced, and deeply frustrated by the essential lack of a sense of belonging to some place. This kinship is fundamental to human consciousness; thus, it will never disappear, so the argument goes. People want to keep their religion, customs, language, symbols to love and protect, history to teach, and heritage to pass on to future generations.

7. The American experiment still looks like the best alternative

The American experiment of European aristocrats, the United States of America, was a very novel concept of the state. The demographic fabric of the USA is the melting pot of races bound by representative democracy and free markets. American pragmatism allowed the settlers in the New World to form almost instantly an American national identity, constitution, and protect borders at a higher cost than any other nation-state on Earth. Today, the US controls its demographic influx, applies complex rules to obtain citizenship, and disallows any foreign-born citizen from holding the highest political office, the Presidency. Nobody wants to emigrate to China, and perhaps 9 out of 10 immigrants would like to become an American, not a Chinese citizen.[5]

The US created a very appealing model for all those who did not inherit privileges and are animated by the prospect of possible fabulous financial and social success within one generation. This model created a country that, within two centuries, had become the single most powerful multiethnic nation-state on the globe. The reason for border protection is obvious. Uncontrolled immigration

[5] **R. Hass**, *The World: A Brief Introduction*, Penguin Press, 2020.

would dilute the wealth of the country, and create social and political chaos. A similar self-preservation model is applied by the EU, Japan, and South Korea, however, in significantly different variants. The EU, and Germany in particular, let in about 1 million immigrants in 2015 dispersing them into small towns and communities to speed up cultural and linguistic assimilation. Japan practically closed its border, allowing only one Muslim family to immigrate since 2015. South Korea let in 1.3 million agricultural workers from Asia, releasing an almost equal number of native Korean- speaking workers to the manufacturing sector where verbal communication was fundamental for production in their chaebols.

Comparing long-term growth in these countries has been very revealing. The EU's growth has been slower than in the USA, although the German economy is generally growing faster than the rest of the EU. Japan has not grown since 1990, primarily because Japanese corporations, which suffer from a lack of workers, moved their investments abroad. Meanwhile, South Korea has had 40 years of growth above 5%. Great Britain after Brexit (caused by mostly anti-immigrant sentiments) is projected to be below the EU averages for the next decade, according to a study by the Bank of England.[6] What are the conclusions from the above for the survival of the nation-state? Will it survive in the face of the centripetal forces of the supra market? The best answer, in the opinion of the authors, is to believe that over this century or so, many nations will become more like the USA – whatever the USA will be in a century. It will be multiethnic and governed by the markets.

8. Instead of a conclusion: a look into the future

One possible alternative for the future is that in the next 40–50 years, we will continue living in a gradual demise of the economic nation-states altogether. A supra market would be a higher level of global economic organization in which market forces, or supra commercialization, would lead to higher world specialization and productivity.

The present division of the world into nation-states and national (or regional) currencies was born on the ruins of the old empires and lasted millennia. However, we did not have internet and blockchain and quantum computers for almost the equivalent amount of time, save the last 30 or so years.

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[6] **T. Marshall**, *Prisoners of Geography*, Elliot & Thompson, 2019.

It is possible that we will live in **a supra market** among **global oligopolies**. Game theory and the laws of entropy tell us that we, the world, must gravitate to a new model of world organization. In the new modus operandi, the nation-states' economic borders will simply become a political and economic illusion.

In the first stage, lasting about 40–50 years, the governments will continue to open their markets to a freer flow of goods, services, and capital, and then imitate each other's moves, de facto following the same path and acting in unison. As **supra corporations** take over control of the central government's surveillance and security functions, we may also see a deeper production specialization of people working in dispersed manufacturing and research centers and also in space. Also, supra corporations will determine the rules of the game and perhaps replace the lobbying of governments by putting oligopolistic game theory into practice.[7]

The good news is that as the economies become more complex and interconnected globally, social global responsibility will become **a must** as the Earth's resources become scarcer and more expensive. Fighting wars for resources is definitely the most inefficient way of solving the problem of scarcity and global warming. Wars may still happen, but they will last 15 minutes and will be fought in space – virtual and real.

Short of becoming too speculative, let us look at just two current examples of things to come to illustrate the alignment of corporate interests and social responsibility: 1. Twitter deleted incendiary tweets by Donald Trump, which it felt endangered the state, and it did so without a political mandate from Congress. 2. Delta Airlines has banned hundreds of passengers for life for their refusal to wear a mask on its flights. Global enterprises tend to act on behalf of the larger market (or the public in this case) and long-term profits rather than smaller markets and short-term profits.

What does this corporate behavior tell us? Over time, global oligopolies may try to optimize themselves by representing the interests of the majority of the market participants. Optimizing a global corporation means that it is rational to benefit more people than only the inhabitants of one nation-state. Also, the no peace, no war equilibrium may become a norm in the next 40–50 years.

Every hypothesis needs verification by applying historical data. As we know, one cannot obtain data relating to the future, so we are bound to project observable megatrends that may reveal very probable, if not absolute, truths about the future.

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[7] **J. Attali**, *A Brief History of the Future*, First published: 25 July 2007, https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1540-5842.2007.00911.x; accessed 8.03.2021.

We tend to think in short terms: inflation, budgets, and political parties' preferences for income redistribution. We all need to think about what is important in the longer term and base current advice on the long-term survival of the people on Earth.

In the global context, the survival of the great American experiment of a multiethnic, liberal-democratic western civilization cannot be underestimated.

The future of "myths of America" is very important for many people in the world who will never become a citizen of the USA until they create replicas of the US in their own regions, with all its shortcomings and success.[8]

North America will be the first region to evolve in the future and will be followed elsewhere just because it is closest to the intrinsic human spirit of individualism, competition, and democracy. What has happened in the US is not the product of abstract guesswork, but American experience, pragmatism, and the laws that were created in the country, not imported. Elon Musk came to the US from South Africa without capital. It took 18 seemingly long years for Tesla to turn a profit and Elon Musk to become the richest man on Earth. The majority of cars driven by the end of this decade in the developed world will be electric. This pretty much explains it all.

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[8] **R. Hass**, *The World: A Brief Introduction*, Penguin Press, 2020.

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POZYTYWNE ASPEKTY WALKI Z PANDEMIĄ COVID-19

Abstrakt

Przedmiot badań: Efekty pandemii COVID-19 są porównywalne do średnich rozmiarów wojny światowej z dwoma milionami ofiar i milionami bezrobotnych. Szok pandemii nieuchronnie prowadzi do radykalnych rozwiązań w zakresie biotechnologii, która odnotowała ogromne postępy w ciągu 6–8 miesięcy zamiast 5 lat. W ciągu ostatnich 20 lat, pomimo spektakularnych innowacji, kraje wysoko rozwinięte nie zmieniły zasadniczo sposobów produkcji i świadczenia usług, a zamiast tego stworzyły niezwykle bogate międzynarodowe monopole.
Cel badawczy: Głównym celem badawczym jest wyciągnięcie wniosków z pandemii Covid-19 w zakresie jej wpływu na gospodarkę światową. Analizujemy różne, raczej pozytywne aspekty postpandemicznej rzeczywistości, zwłaszcza w odniesieniu do przyspieszonego postępu technicznego i innowacji powodowanych przez kryzys społeczno-gospodarczy, bezrobocie i ogromne straty istnień ludzkich w trakcie pandemii.
Metoda badawcza: Zastosowano metodę syntezy wielu wiarygodnych źródeł statystycznych. Dokonano interdyscyplinarnej analizy z punktu widzenia makroekonomii, nauk politycznych i socjologii.
Wyniki: Dzisiaj stagnacja w zakresie wzrostu wydajności lat 2000. powoli dobiega końca. Jesteśmy świadkami narodzin wielkich wynalazków w dziedzinie zwalczania chorób, „produkcji" mięsa, taksówek bez kierowcy, algorytmów sztucznej inteligencji (AI), drastycznych spadków cen wytwarzania odnawialnej energii. Innymi słowy, w czasie mrocznych dni pandemii Covid-19 na horyzoncie widzimy wielkie odkrycia prowadzące do szybkiego społecznego i gospodarczego rozwoju. Stagnacja wydajności pracy w latach 2000. zbliża się do końca. Pfizer i Moderna opracowały szczepionki przeciw Covid-19 w ciągu kilku miesięcy zamiast wielu lat.

Słowa kluczowe: pandemia Covid-19, wielonarodowe monopole, szczepionki, sztuczna inteligencja, rozwój społeczno-gospodarczy.