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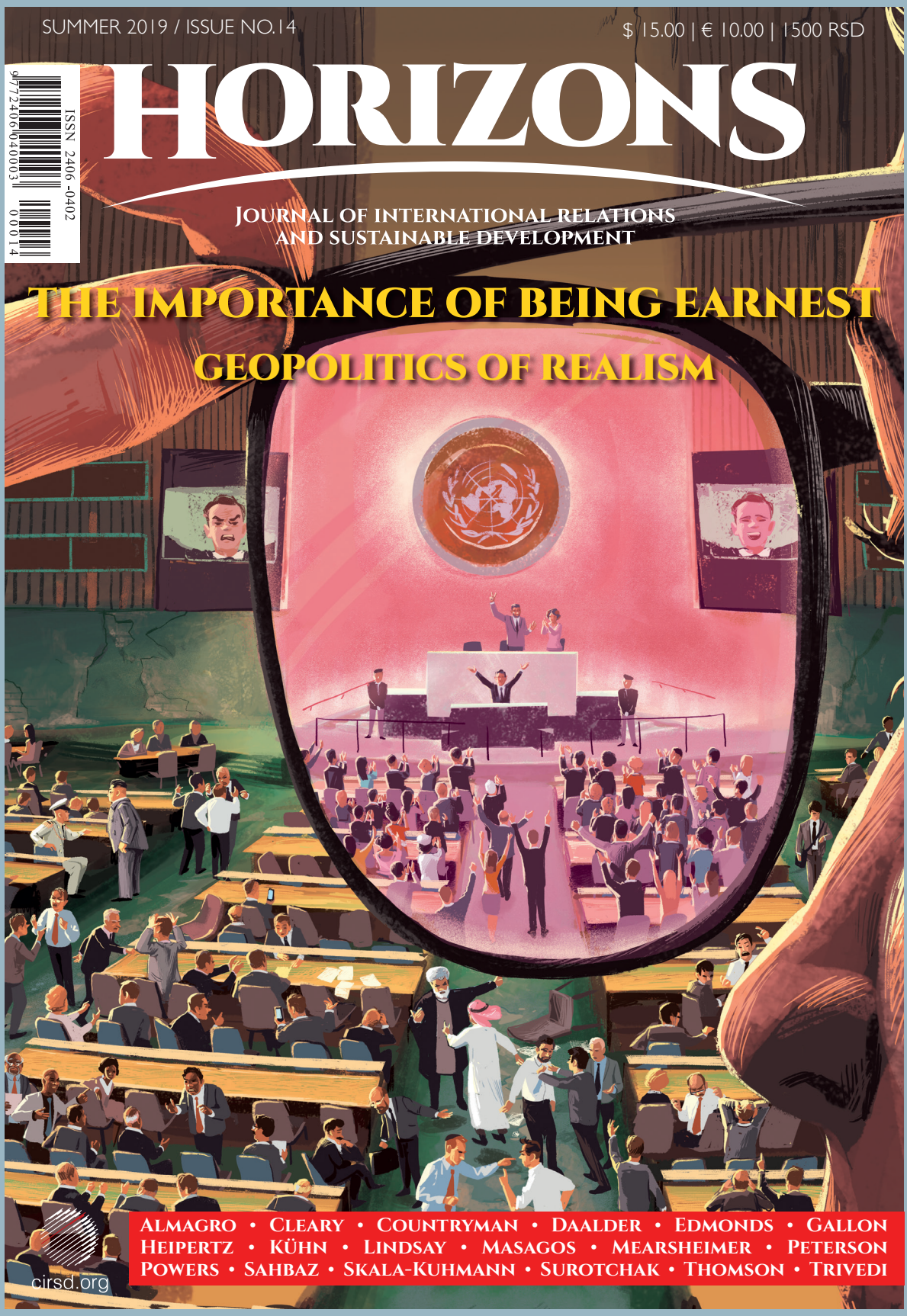

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Artificial Intelligence and the Risk of New Colonialism

Ussal Sahbaz

ARTIFICIAL Intelligence (AI) refers to machines that perform cognitive tasks like thinking, perceiving, learning, problem-solving, and decision-making. There is lively debate around the business and societal opportunities and risks that AI brings to humanity. While massive efficiencies and fantastic new innovations become feasible, the transformative impact of AI on job markets—leaving a massive number of white-collar employees redundant—is a widely discussed risk, especially for advanced economies.

However, from an international affairs point of view, this article argues that the most critical risk stems from the fundamentally centralizing and monopolizing characteristics of AI, considering its requirements of scale both for companies and countries. This in turn is likely to create winner-takes-all economics—the principal beneficiaries of which would be data giants like the United States and China—and bring the risk of a new "data colonialism." Middle-sized emerging markets like Brazil, Mexico, Indonesia, Turkey, or South Africa are in danger of losing recently-gained economic power and international standing.

AI Technology and Associated Risks

To understand the reason for the risk posed by AI, it is important to understand the technology. While there are many branches of AI, most of the popular AI applications today involve "machine learning"—so much so that the terms are used interchangeably—which refers to the machines' ability to learn from data without being explicitly programmed.

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Photo: Guliver Image/Getty Images

Huawei's founder and CEO Ren Zhengfei in conversation with China's President Xi Jinping

This is a paradigm shift in computer technology.

Let us go back to eighteenth-century France to understand why. After the French Revolution, Gaspar de Prony, a famous mathematician of his age, was tasked with establishing a land registry to distribute land from nobility to ordinary villagers. It was a tremendous undertaking to calculate the area of many parcels of land all around France. To do so, Prony prepared trigonometry tables that detailed the rules to calculate the area of a parcel of land. Then he hired a few former barbers (who were now unemployed, since there was no nobility to pay them), and they did the calculations based on the rules set by Prony.

Computers as we know them today simply apply ordinary rules, such as Prony's trigonometry tables, to transform an input into an output faster: "If X and Y happens, then Z" is an ordinary computer rule.

With the application of AI, computers do not need these rules. AI enables computers to analyze data and discover patterns, learn from data, and then set the rules—data now tells us if X and Y happens, then Z will happen.

Let me provide a specific example: ordering numbers between one and ten can be done based on an ordinary rule. Putting spam emails into a spam folder cannot be based on a simple rule. Is the email coming from someone who you previously sent an email? If you did not write to the sender before, is it someone from whom you would expect an email? If it is a newsletter, is it on a topic that you are interested in? As opposed to an ordinary rule for sorting numbers, filtering spam email requires a learning rule, which forms the basis of AI. You sometimes receive phone calls about emails to which you did not respond, and you find them in your spam folder. Each time you put them back into your inbox, the AI that runs behind the spam filter learns, i.e., the learning rule changes.

What will really make the difference in the AI application race is the availability of data.

This learning process is generally repetitive and incremental. It is a continuous approximation to the state that you will only receive emails relevant to you in your inbox, and the rest in your spam folder. For this you need more data. The more data you feed into the AI, the better the rules become. No wonder spam filters are getting better year by year, as humanity produces more emails.

Spam filters are just one example. Popular applications of AI include speech and image recognition, natural language processing, targeted advertising, predictive maintenance for machines, driverless cars and drones. AI is a general-purpose technology feeding into a wide range of applications—available and to be innovated in the coming years. In this sense, it is similar to electricity.

A hundred and thirty years ago, Thomas Edison commercialized electricity. With his innovations connecting electricity to the grid, applications in manufacturing, lighting, and home appliances became feasible. All these applications, which in turn changed the way we live around the world, have been led by individual entrepreneurs.

For example, Willis Carrier invented the first commercial air-conditioner in 1902. William C. Durant started the Frigidaire Company for the first commercial application of electric refrigerators in 1918. Electricity transformed life through these innovations, first in the United States, the foremost innovation ecosystem of those times, and then around the world.

When discussing the implications of AI as a general-purpose technology, it is important to understand that we are already at a post-Edison stage. The first AI algorithms were already developed by Alan Turing in 1957. The application was constrained until recently, not because of the unavailability of fundamental technology, but because of the unavailability of the computing power to collect and process data.

At the moment, both computing power and AI algorithms are widely available through cloud computing. The most difficult academic talent needed is not the engineering or data science required to develop the algorithms, but the skills involved in application—and this is also available in many places. What will really make the difference in the AI application race is the availability of data.

In the age of AI, it is the companies and countries that produce and have access to big data that will set the rules. This transformation is likely to happen much faster than the transformation brought about by electricity, given the rapidly evolving nature of digital technologies.

The question is which countries will benefit the most from the development of AI applications. In the case of the development of applications for electricity, one critical element was the capital needed to build the grid. Another was a strong intellectual property rule for innovators to develop applications and receive funding. The United States enjoyed both.

As for AI, the critical element is the abundance of data. More data leads to better products, which in turn attracts more users, who generate more data to improve the product further. The scale of data required to develop advanced AI applications is the basis of the centralization and monopolization impact of AI.

In the first application of computing without computers for the post-revolution land registry in France, mathematician Gasper de Prony set the rules. In the age of AI, it is the companies and countries that produce and have access to big data that will set the rules. This transformation is likely to happen much faster than the transformation brought about by electricity, given the rapidly evolving nature of digital technologies.

America is Winning

It is not difficult to understand why the United States and China are pioneers in AI today. Both have access to abundant data. The United States is the world's largest economy and third most populous nation, and has traditionally been the most connected—given that the internet was "invented" in America.

American big-tech companies lead the world in AI applications. It is no

coincidence that Google, Amazon, Facebook, Microsoft, and Apple have overtook traditional energy and finance companies as the largest five corporations in the United States by market capitalization in the last 10 years, if we keep in mind the AI revolution. Google search brings you the most relevant results based on its learning rules driven by AI. Facebook's newsfeed provides users with the stories they will click the most, based on a more aware AI from a wide set of information that users provide to Facebook, including most of their web activities. Amazon's first AI-based application was to replace human editors with computer-generated recommendations for further purchases, which proved to function much better. All these companies utilize AI for many other applications as well, including self-driving cars (Google) and drones for package delivery (Amazon).

China's Sputnik moment regarding AI came in May 2017, when AlphaGo, a computer owned by Google, defeated Ke Jie, the leading grandmaster of Go, a traditional Chinese board game that has an order of magnitude higher number of possible positions than chess.

Many other American startups became some of the world's most valued companies in the last decade mainly by developing AI-based algorithms in the United States and then scaling them globally. Reid Hoffman, the founder of LinkedIn, calls this "blitzscaling"—scaling to many markets around the world to dominate those markets, collect more data, improve your AI applications with abundant data, and strengthen your market power.

Examples include Uber, which turns private cars into taxis, Airbnb, which turns private apartments into hotels, and Netflix, which turns your computer screen into a private theater room. None of these companies are profitable, but they enjoy extreme valuations based on the global reach of their user basis, i.e., the data they collect from around the world.

China is Winning

China is an up and coming AI giant. It is the world's most populous country, and its second largest economy. However, given the fast adoption of digital technologies in China, the level of data produced by the Chinese population is disproportionately high compared to its size.

Compared to the United States, China has three times as many mobile devices, 10 times as many online food deliveries, and 50 times as many mobile payments.

As argued by Kai-Fu Lee in his recent book *AI Superpowers: China, Silicon Valley, and the New Work Order* (2018), China's Sputnik moment regarding AI came in May 2017, when AlphaGo, a computer owned by Google, defeated Ke Jie, the leading grandmaster of Go, a traditional Chinese board game that has an order of magnitude higher number of possible positions than chess. With this, the Chinese Communist Party announced its focus on AI, catalyzing local governments, incubators, and universities to support AI-based businesses.

When Chinese AI companies start to globalize at scale, guided and supported by government policies, their impact and market power are likely to increase exponentially.

Chinese big-tech companies Baidu (the Google of China), Tencent (the Facebook of China) and Alibaba (the Amazon of China) are still mostly local. The same applies to emerging Chinese startups: Bytedance, which uses AI to aggregate online news, is now the most valued private company globally, with a $75 billion valuation.

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At the global level, venture capital funds and entrepreneurial talent follow where data is produced. According to CB Insights, in 2017, of the $10.7 billion venture capital investment in AI startups globally, $4.9 billion was in China-based startups, $4.4 billion was in American startups, and only 1.4 billion was in the rest of the world.

This leads to a duopoly of AI innovation: the United States and China, and their companies, accumulate more data and talent in a virtuous cycle of innovation based on the big data they generate.

Other Winners

Only a few small countries can position themselves as global AI innovation hubs *vis-à-vis* the aforementioned two giants. Examples include Israel, Singapore, and Estonia (and possibly the UAE, as a regional hub). These countries are so small that their startups never target the local market and are born global from day zero. They are also relatively stable rich economies that can grow or attract entrepreneurial talent.

As it is extremely difficult for AI-based startups from these countries to survive once they scale to the global market, they are generally sold to big-tech companies from the United States or China. This is a great way to create value not only for these startups, but

also these countries with small populations. For instance, Mobileye, an Israeli startup with key technologies for self-driving cars, was sold to Intel for $15 billion in 2017. The Israeli government received $1 billion in tax revenue—$125 per capita—from the Mobileye deal.

Mid-sized emerging countries, like Brazil, Mexico, Indonesia, Turkey, or South Africa, are stuck in the middle. These countries are not a natural home for global business models, because their local markets are not small. Yet those local markets do not produce enough data for AI companies to reach to scale at home and then "blitzscale" globally. The fact that the local markets are large (but not that large) becomes a curse.

These countries are able to grow unicorn companies, but they are largely focused on local markets with little potential for global expansion. For instance, Indonesia has four unicorns: two local marketplaces for goods and services, one for motorcycle hailing, and one for local travel booking. In comparison, Israel has 18 unicorns, all with global business models. None of these countries have been able to become global hubs for entrepreneurial talent or venture capital.

Without a single unified "data market" large enough to compete with the United States and China, it is difficult for individual EU countries to compete in the international AI race.

It is important to note that middle-income emerging market countries, unlike small countries, have large populations that cannot be sustained only AI-based innovations. So far, their economic development has been based on manufacturing, which can create mass employment for relatively unskilled workers. However, as AI impacts manufacturing by reducing the need for labor through automation, there is a significant risk of manufacturing moving to locations closer to large markets, such as the United States and China, since the emerging markets will also lose their labor cost advantage to automation.

What about the European Union? The EU is theoretically the largest economy in the world. However, especially from a digital market perspective, it is still fragmented into 28 different markets, with different regulations and languages. While some EU member states, especially France and—if it stays—the UK, are great centers for AI research, with world-class academic institutions, what matters most in the race for implementation of AI is not academic talent for inventions, but application-oriented engineering talent.

Without a single unified "data market" large enough to compete with the United States and China, it is difficult for individual EU countries to compete in the international AI race. In particular, emerging countries in the EU, such as Poland and Hungary, that have witnessed a high level of convergence with EU income levels over the last decade, are at risk of losing their competitive edge—as well as their talent pool, which is free to move within the EU.

Five American companies (namely Google, Amazon, Facebook, Microsoft, and Apple) and three Chinese companies (Baidu, Tencent, and Alibaba) lead not only the market applications, but also a significant portion of the research being conducted on AI.

This is why the Digital Single Market might be the single most important EU economic policy—however, its implementation has been slowed down by competing interests and the EU's bureaucracy.

Countries vs. Companies

The development of AI is mostly led by big tech companies. As noted previously, five American companies (namely Google, Amazon, Facebook, Microsoft, and Apple) and three Chinese companies (Baidu, Tencent, and Alibaba) lead not only the market applications, but also a significant portion of the research being conducted on AI.

When discussing "data colonialism," the positioning of these big tech companies *vis-à-vis* emerging market countries is also critical. In a 2017 speech, Microsoft Chairman Brad Smith referred to the American tech companies as "Digital Switzerlands." Embedded in this claim are two suggestions. First, these companies are on par with, and not subordinates to, countries that want to regulate them; and second, they somehow have a neutral status.

In turn, tech companies position themselves as equal players within a triangular relationship between governments, companies, and their users. Indeed, these companies mostly regulate relationships with their users themselves, through their terms of service agreements, in many cases governed under the rule of third countries. China is the only exception in this relationship, as it has effectively banned Google, Facebook, and Amazon for many years. No other (mid-sized) emerging market was able to develop a strategy to regulate these companies effectively.

The EU is putting pressure on the "Digital Switzerlands" through its competition and privacy policies. For instance, the EU Commission recently

fined Google €4.34 billion for competition law violations. However, both competition and data privacy policy fines are computed as ratios of turnovers, which is mostly a legacy of the pre-digital area.

The margins enjoyed by global big-tech companies are too large to be seriously impacted by these fines. An example is offered by Azeem Azhar, curator of Exponential View, a weekly newsletter on the societal impact of new technologies: Facebook has a 38 percent profit margin on its EBITDA (a measure of turnover). For the sake of comparison, Goldman Sachs, one of the world's most profitable finance companies, has a 32 percent margin. If Facebook was fined 4 percent of its turnover, the upper limit imposed by the EU's main privacy regulation General Data Protections Directive, each and every year, its profit margin would still be higher than Goldman Sachs. It is important to note that, unlike U.S. law, the EU's competition legal framework does not enable authorities to break up monopolistic companies.

If Facebook was fined 4 percent of its turnover, the upper limit imposed by the EU's main privacy regulation General Data Protections Directive, each and every year, its profit margin would still be higher than Goldman Sachs.

We should also distinguish between the types of relationships that American and Chinese tech companies have with their own governments. For the American companies, there is a more arms-length relationship. For instance, when the American government asked Apple to break the encryption of iPhones for terror suspects involved in the San Bernardino attacks in 2015, Apple refused to do so given its security and privacy concerns. In 2018, after a reaction from its employees, Google abandoned military AI projects with the U.S. Army.

In contrast, Chinese companies have an embedded relationship with their government. The government not only directs companies through its national strategies, but it is also a direct shareholder in some, including Tencent. Many AI-based technologies developed by Chinese companies are integral parts of government applications.

The tech companies are trusted by the wider population, given the customer-centric, high-level service they are able to provide, enabled by a wide-range of AI applications. In a recent survey by Georgetown University, Amazon was ranked the second most trusted institution in the United States, after the military, and far above Congress and the media.

Yet, the trust granted to tech companies does not necessarily bode well for a healthy democracy. Fake news and misinformation impact the results of elections not only in the United States, but also in many emerging democracies. The struggle with fake news and misinformation is even harder when tech companies do not employ enough local sources and are not held accountable by regulations. In addition, there have been many instances in which social media has been utilized to amplify hate speech (e.g. Myanmar) and impact of terrorist attakcs (e.g. New Zealand) or recruit terrorists (e.g. ISIS).

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While the issues with American tech companies are mostly related to their lack of accountability toward the authorities, the embedded relationship of Chinese tech companies with its own government, as well as others, also creates risks.

The first risk is being used for surveillance by the Chinese government in other countries, as exemplified by the recent discussions around Huawei. The second and possibly more profound risk is Chinese companies making surveillance technologies available to authoritarian regimes around the world.

The social scoring system, piloted with millions in China, is a case in point. Under social scoring, many Chinese, whose traffic rule violations are detected with facial recognition AI, are banned from other activities, such as purchasing flight tickets.

The dominance of the AI race by the United States and China will also have national security implications for medium-sized countries. The role of government in the development of AI technology is different from many technological developments of the last century, where military applications, notably nuclear and space, preceded commercial applications.

Unlike the traditional model, military AI research actually follows the lead of business. For instance, a sensing algorithm for a package delivery service with drones can be quickly modified for battlefield surveillance; a predictive maintenance application for civil aviation can be utilized for military aircraft. Needless to say, military applications are heavier on encryption and security, but this does not change the fact that, when it comes to AI, the military follows business capabilities.

Many of the technologies relevant to military AI applications, such as robotics,

self-driving cars, and mini drones, are developed mostly by American and Chinese tech companies. Besides falling behind in the race for commercial applications of AI, medium-sized emerging markets are also getting into a national security risk.

HOW TO SURVIVE?

For a medium-sized emerging market economy, there are two main ways of battling AI dominance: (1) increase the amount of your data; and (2) limit the impact of powers with large amounts of data.

The main tools for limiting the impact of powers with large amounts of data are antitrust (competition) and regulatory policies.

There is also a third way—one that requires cooperation of a sort that has not yet been proposed. Medium-sized economies could leverage their data in order to make it accessible to many companies under open access policies. While AI firms may not wish to work with midsize countries, they ought to be happy to work with a group of them if their data is accessible using a standardized data network. There are only a few industries where international data standards have been established, like finance and telecommunications. If a data framework that allows easy access to information was to become available, many startups could become interested in creating AI applications for other industries and small- to medium-sized economies. Otherwise, the tendency towards dominance of the few is likely to continue unabated.

However that may be, a politically popular way for increasing the amount of national data is enforcing data localization. More than eight G20 countries now have some form of forced data localization policy. However, data localization only creates local data centers that employ a few security guards and cleaning staff. What is critical is localizing value creation from data. Data gains value when different data sets, usually under institutional silos, are merged. These silos are generally created under governmental departments or incorporates. Governments can actively catalyze the merging of these silos to create more value from national data.

For instance, India developed an open code platform, India Stack, to utilize government-controlled data built on its new universal ID and payments platforms. The EU will force banks to open their data to financial technology companies with its new Payment Services Directive II. Many countries establish interfaces, such as the UK's Catapult, Taiwan's ITRI, ETRI in South Korea, and TNO in the Netherlands, to bring government, business, and academics, which own different data sets, to work together and diffuse AI applications through different industries.

The main tools for limiting the impact of powers with large amounts of data are antitrust (competition) and regulatory policies. Again, many politicians like handing out money to startups and cutting ribbons at conventions to bring them together in efforts to market their countries as new startup hubs. This support is, in turn, spent by startups on digital advertisements, if they are to take their products to the global markets.

Without effective antitrust enforcement, efforts to develop local AI companies are bound to remain futile.

Consider that Google and Facebook have a 63 percent total share of the global digital advertisement market. With this level of monopolization, most startup support will stay as a value transfer to global big tech companies. In some industries, global monopolies evolve through a web of local startups. For instance, in ride-hailing, Uber owns 17 percent of Didi, its equivalent in China, which in turn owns shares in Ola and Grab, equivalents in India and ASEAN; and the Softbank Vision Fund is the major investor in all these companies.

Without effective antitrust enforcement, efforts to develop local AI companies are bound to remain futile. Since antitrust enforcement in the United States has effectively stopped for over a decade, and is not likely to continue under the Trump Administration, and the EU's competition or privacy fine enforcement is not a large enough deterrent, as discussed above, it is time for emerging market countries to discuss action items.

No country other than the United States has the power to break up the big tech companies, but local interventions matter. For example, on February 1st, 2019, India banned Amazon from owning a product and having the same product in its marketplace at the same time, in order to avoid price manipulation against small local merchants.

Emerging markets can also establish regulatory sandboxes to invite AI-based startups to experiment with their data and develop applications. A regulatory sandbox is a popular framework for financial technology regulators. They have now been established in more than 20 countries. Nevertheless, it is possible to establish sandboxes for other emerging technologies. Enabling controlled regulatory experimentation is independent of the development level of a country—while the Netherlands has one of the most welcoming

regulations for self-driving cars, Rwanda has enacted cutting-edge regulations for drone technology.

Lastly, emerging market countries should adopt their respective international economic relations strategies in accordance with the rules of the new AI world. Trade agreements are one area of consideration. The new NAFTA agreement, known as the United States-Mexico-Canada Agreement, or USMCA, for example, has clauses against data localization. While these agreements may be seen as problematic from a data-domination perspective, they may also create opportunities for some medium-sized emerging economies to bandwagon on the most proximate data block and enjoy a larger scale (e.g. Mexico to the United States, Turkey to the EU). Furthermore, it is imperative for medium-sized emerging markets to reach consensus and bring discussions around the dominance of global big tech companies into global economic governance forums, such as the G20. It is better if they set the agenda urgently against data colonialism, while they still enjoy the economic standing they have gained in the last few decades. Soon, it may be too late.

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