

Digitalisation and automation: what will we produce tomorrow?

Digitalisation and advances in automation have the potential to change countries' productive specialisation: what and how we produce. As an example, the huge leap in information and communication technologies (ICTs) since the 1990s paved the way for the fragmentation of production processes, allowing companies to carry them out in multiple countries – taking advantage of their various expertise. This process led to the well-known phenomenon of global value chains (GVCs), linked to the offshoring of numerous manufacturing processes from advanced economies to emerging ones.

Some of the latest technological advances have the ability to reverse this trend. For instance, in this article we will see that new forms of automation (such as robots) could favour the return of some manufacturing to advanced countries. On the other hand, it seems that the continuing evolution of ICTs and the growing importance of digitalisation will continue to favour the «servitisation» of developed countries, a point which we will also address in detail in this article. In addition to new technologies, other factors such as the pandemic or the technology and trade conflict between the US and China have the potential to impact production specialisation.

Given such a multiplicity of forces, it is difficult to forecast changes in what and how economies (advanced ones in particular) will produce in years to come, but this is what we will endeavour to do in this article.

New automation and new consumers: the return of factories to advanced economies?

Today's robots – which are equipped with artificial intelligence, are more digitally connected, and are available at prices that have declined substantially over the last few decades – represent a veritable revolution.¹ The improved productivity of these new robots could lead to some manufacturing processes, which had previously been relocated to emerging countries in the last three decades to take advantage of low labour costs, returning to advanced countries. In other words, we would shift from a trend dominated by offshoring to one of reshoring.

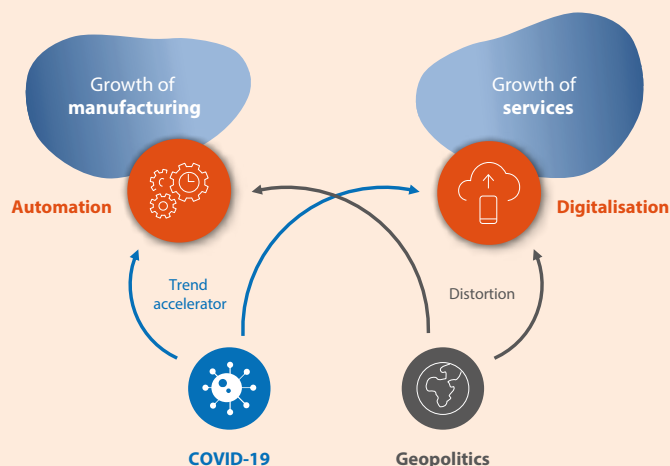
But just how much manufacturing activity could we be talking about? Recent analyses suggest that manufacturing could increase by around 10% in advanced countries thanks to new forms of automation over the next decade.²

One factor that boosts this trend of the reshoring of manufacturing to advanced countries is the change that has occurred among consumers in these countries, having developed more varied tastes as a result of greater global connectivity. Consumers are also more aware of their impact on the environment. Both characteristics favour GVCs that are shorter and closer to the end consumer, since such production chains facilitate a quicker response to changing tastes and are more environmentally friendly given their proximity.³

ICTs and digitalisation: advanced countries' advantage in services

The continued evolution of ICTs (through 5G, to name an example) will favour the international trade of a greater number of services: while in essence most services are non-tradable digital technologies are making it possible for some of them to become tradable. At the end of the 1980s, services (excluding tourism) accounted for just under 6% of total international trade, whereas today this percentage exceeds 13%. Indeed, engineering projects, consultancy services or even clinical diagnostics through

Trends and their impact on the productive specialisation of advanced countries



Source: CaixaBank Research.

1. The price of robots in real terms has halved in the last 30 years (McKinsey, 2017).

2. Figure based on Krenz *et al.* (2020), who estimate that an increase of 1 robot per 1,000 workers results in a 3.5% reshoring of manufacturing activity that had previously been offshored, and also based on estimates by Boston Consulting Group of the increase in automation in the manufacturing sector: amounting to 50% over the next decade.

3. Prudence is essential when estimating changes driven by reshoring. One of the main reasons for this is that offshoring is relatively stable over time, since establishing global outsourcing strategies involves the company incurring significant sunk costs. See P. Antràs (2020). «De-Globalisation? Global Value Chains in the Post-COVID-19 Age». NBER Working Paper (w28115).

imaging have become increasingly prevalent services within international trade, and this trend will only continue with better global connections. An example would be the possibility to perform remote surgery thanks to the speed, immediacy and security of 5G connections. In this regard, advanced countries, with a more qualified workforce and more experience in the production of many services, have a clear advantage over emerging ones.

On the other hand, huge digital advances have opened the door to a world in which data and their use have become a product and/or service in themselves, with the potential to substantially improve many companies' and industries' competitiveness. Once again, as in the case of more classic services, advanced countries, with their better-trained and more experienced workforce, have the upper hand when it comes to exploiting these data flows.

At this point, however, we must not forget that countries such as India and especially China are emerging as clear competitors in this novel business of data flows and their utilisation. As an example, in China, enrolment in higher education stood at around 3% in the early 1990s, compared to 25% in 2010 and more than 50% today.⁴ Moreover, some 45 million university students graduate in the country every year, and in 2018 the number of scientific, technical, and medical articles published by Chinese researchers exceeded those published by Americans for the first time.⁵

COVID-19 and geopolitics: disruptive elements

Beyond the automation and digitalisation of economies themselves, elements such as the current coronavirus crisis or geopolitics play an important role in production specialisation worldwide.

Specifically, the COVID-19 pandemic has the potential to accelerate some technological trends. The health crisis has highlighted the greater resilience of the most digitalised and automated companies in disruptive contexts such as the present. We can therefore expect companies to increase their investment in automation and digitalisation in the medium term. As we have already said, this will favour the reshoring of manufacturing towards advanced countries,⁶ although it also has the potential to increase the amount and range of services offered by advanced countries worldwide.⁷

On the other hand, besides the other factors already mentioned, the current trade and technology conflict between the US and China represents a geopolitical factor that also has the potential to alter advanced countries' production specialisation. The process of the US' decoupling from China, with a broad bipartisan consensus in the country, could have an impact not only on the US economy but also on the various European economies. If Europe sides with the US in the fight against China's technological rise, it is at risk of suffering a delay in its transition towards greater digitalisation and automation, since the so-called old continent is highly dependent on Chinese equipment for deploying its 5G network, which is key to the new Industry 4.0.

In short, after decades in which the hyper-globalisation of production chains has led to a significant disparity in production specialisation between advanced and emerging countries, these specialisations will change with the rise of new technologies. While we do not anticipate a radical and sudden transformation, we could see a shift in the trend at the global level over the coming years.

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4. According to data from the World Bank.

5. World Education News and Reviews.

6. See Chernoff, W. Alex and C. Warman (2020). «COVID-19 and Implications for Automation». National Bureau of Economic Research (w27249).

7. Furthermore, the COVID-19 crisis could also encourage a strategic shift towards more robust GVCs (see the article «[How COVID-19 will change the way we produce](#)» in the Dossier of the MR05/2020).