TECHNOLOGICAL SPECIALISATION AND PRODUCTIVITY DIVERGENCE IN THE AGE OF DIGITALISATION, AUTOMATION AND AI

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Since the 1980s the digital revolution is transforming the world as profoundly as the Industrial Revolution did two centuries ago. Personal computers have completely permeated firms and households, and in the 2000s digitalisation has only gained momentum with the spread of the Internet. No matter how you measure it, growth in the digital sphere is now an order of magnitude faster than that in the global capital stock and GDP: data volume, processing power and bandwidth are doubling every 2-3 years, while global GDP is doubling every 20-30 years. Ever since Bill Gates first topped the list of the world's richest people in 1995, largest fortunes are made in the computer software business, and ever since AlphaGo beat the 18-time world champion at Go, Lee Sedol, in 2016, fastest technological progress is achieved in artificial intelligence (AI).

But to what extent is the digital revolution affecting the global distribution of productivity and economic power? Does it increase or decrease inequality among countries and regions of the world? Does it create new world leaders? Anecdotal evidence suggests that, thanks to the Silicon Valley and the country's top universities, the USA is the world leader in the digital sphere. It is now facing a new ambitious contender, though: China. According to the most recent report of the World Intellectual Property Organisation, the top 20 academic players in AI patenting include 17 Chinese organisations, and 10 of the top 20 in AI-related scientific publications are also Chinese. However, the top places to live according to the United Nations' Human Development Report are still Norway, Switzerland and Australia. An edge in AI or robotics doesn't easily translate into broad-based wealth and standards of living.

In this project we will use country-, industry-, regional- and firm-level data to shed new light on the changes in technological diversification and specialization during the digital revolution. We will pay particular attention to the newest forms of digital technologies, widely known as 4IR (the Fourth Industrial Revolution) – prominently including AI algorithms. We would like to know whether the rapid development of 4IR technologies in a few selected locations around the world contributes to the economic take-off of these places, while other locations are left behind? Do the data confirm the anecdotal knowledge that 4IR technologies tend to be produced in small specialized clusters but adopted and used globally? What are the main characteristics of the global landscape of technological progress at the time of 4IR? How important are these new technologies for national, regional, and industrial growth? And what is more important: production or adoption of these technologies?

Before we answer these questions, though, we must stand up to an important research challenge – to find an adequate measure of production, use, and economic impact of 4IR technologies. The problem is that the new digital technologies are often intangible. Data and computer software can be easily copied and flow freely across national borders. Furthermore, digital goods demanded by users are often available for free or in exchange for our personal data, whose value is even harder to estimate. Fortunately, some first methodological advances in this regard have already been achieved.

In the current project we will also theorize about the potential future of global economic growth as technological progress in 4IR technologies marches on. Can the growing adoption of such technologies, simultaneously in terms of hardware and software, eventually drive economic growth? Can it perhaps one day replace research and development as the chief source of global productivity increase?

Within this project we intend to write research articles addressing the linkage between 4IR technologies, and in particular between technological specialization in 4IR technologies, and productivity growth. This is an important and timely challenge because, while there is a good deal of past research on economic effects of computers and some evidence on the role of industrial robots, productivity implications of the new digital technologies (AI in particular) still need to be examined. Analogously, while the focus of a voluminous past literature was on the effects of the use of digital technologies, the impact of their production has been much less extensively explored – and in this regard our study can push our knowledge ahead.