

# The technological revolution: between hopes and concerns

1st prize-winning blog in the 2019 Eco Notepad Challenge

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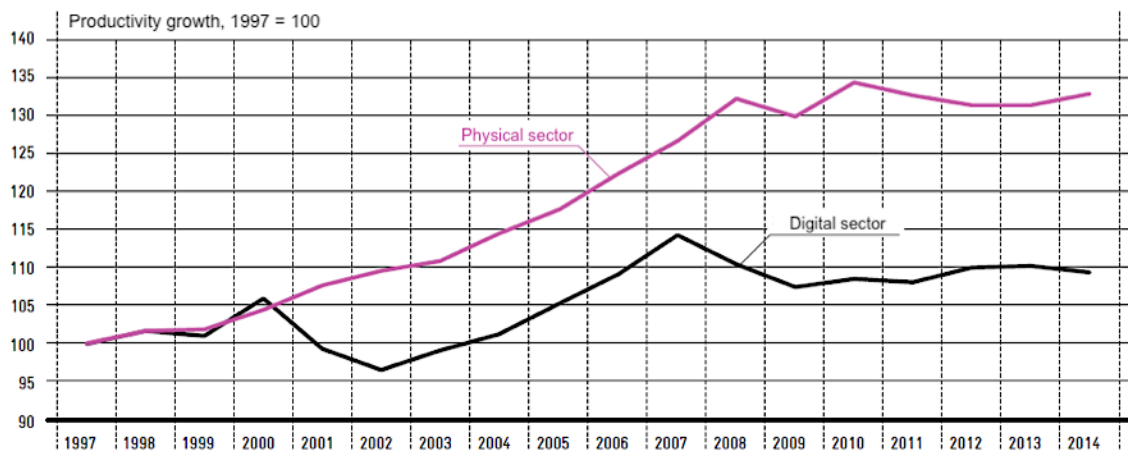
*The technological revolution raises numerous questions as it permeates every aspect of our daily lives. Real hopes or legitimate concerns? To separate true from false, let's take a look at this conversation between two friends, overheard in rue Croix des Petits Champs...*



*Source: author, with the help of Ariane Mostamandy (drawings)*

Jeremiah Naysayer, watching his daughter with an appalled expression as she frantically tweets on her mobile phone, turns to his friend, Rosie Brightside, and says:

- Look at that. We wanted flying cars, instead we got 140 characters!<sup>i</sup>...
- You never change, Jeremiah Naysayer. The truth is that the technological revolution has many advantages, particularly in terms of productivity gains.
- Really?! But in the last twenty years, productivity in the physical sector has increased four times more quickly than in the digital sector. And that's despite all the money being invested in information and communication technologies (ICT).



*Source: ADLER (TIBÈRE), SALVI (MARCO), 2017. Quand les robots arrivent. Préparer le marché du travail à la numérisation*

*Note: Physical sector productivity has increased by 33% since 1997, whereas productivity in the digital sector has only improved by 9% over the same period.*

- You know Rosie, I get the impression that you can see computers everywhere except in the productivity statistics.<sup>ii</sup> Take big data, for example. It's only useful for companies' marketing strategies, so that they can just pilfer market shares from each other. It's a zero-sum game!
- Don't forget that first and foremost the market is a process for information transmission, Jerry. By reducing transaction costs, the technological revolution has meant that new organisational structures enhancing productivity have emerged. So the productivity gains are felt in every sector, not just the digital sector.
- Every sector? But in the industrial sector we need twice as much capital today as we did 50 years ago to produce the same amount of goods.<sup>iii</sup> Now we've got to drill for oil under the ocean floor! That's one hell of a loss of efficiency, and your technological revolution won't change a thing!

- Let's look at the previous steam and electricity-driven industrial revolutions. It's true that in the short term, the contribution that these radical innovations made to growth were offset by the purchasing cost of the technologies, recorded in gross fixed capital formation. But in the longer term, the contribution to total factor productivity increased by leaps and bounds as companies adapted their organisation to enhance productivity.<sup>iv</sup> So be patient! Industry has already changed thanks to today's technological revolution. It facilitates working in networks and outsourcing, meaning that the just-in-time and made-to-order principles that are so important to Toyotism could be more precisely applied and labour productivity could be improved. In fact labour productivity increases by one point for each additional percentage point of GDP spent on ICT.<sup>v</sup>
- People lie, but the numbers don't, Rosie. It's been forty years since the major technological changes began and I don't see your productivity gains reflected in the growth figures.
- Hmm, I see... an invisible contribution, but a very real one, that's what you're saying Rosie... So ICTs are paving the way to indefinite growth?
- You'd either have to be mad or an economist to believe that.<sup>vi</sup> Don't forget that we're bound by physical limitations: Moore's law, by which the processing power of new computers doubles every 18 months, is dying out as transistors are getting closer and closer to the size of atoms.
- But alternatives exist, especially with quantum mechanics, to push back the limits and constantly make machines more powerful and efficient.... and that means that sooner or later my job will disappear!
- Not necessarily. Amazon symbolises the new economy but employs countless warehouse workers that represent the "good old days". Instead, let's say that the nature of work is going to evolve. During the time of Fordism, workers had one precise skill that allowed them to fulfil a Taylorised task. Today, the resurgence of self-employed work as platforms are being developed and the emergence of networked businesses mean that we have to bring a far broader range of skills to bear: autonomy, versatility, know-how...
- That's just what I said: my skills are obsolete...
- Well you could definitely do with a refresher course in optimism, Jerry, that's for sure. Education and ongoing training are going to be crucial for people to remain competitive. In France, the compulsory education period doubled in 30 years,<sup>vii</sup> and the slower rate of productivity in Italy in the mid-1990s can be explained by inadequate investment in education.<sup>viii</sup>

- But Rosie, we can't all become blockchain specialists...
- You're right, Jerry, very few people work in the digital sector – only about 15 million people worldwide, which is 0.002% of the global population.<sup>ix</sup> And they are in very high demand. In the United States, 80% of Google's employees are engineers. That makes 50,000 people in a country that only trains 80,000 engineers a yearx...
- So the labour market's going to split in two: on one side, the "symbol manipulators"<sup>xi</sup> who benefit from the new economy, and on the other side, poor workers performing thankless tasks that can't be automated?
- And that's definitely one of the main challenges that governments will have to address with appropriate public policies. But given the stakes we can understand this need for skilled labour. Let's look at your blockchain example again, as it has one thing in common with economic issues: everyone talks about it, but few people really know what it's all about. By providing access to a transparent and tamper-proof database, technology has suddenly solved the problems of information asymmetry and has finally provided a solution to reduce adverse selection. So we no longer need trusted third parties, which means the banks and, even, the State!
- Greater transparency, lower transaction costs... You've finally convinced me, Rosie. All these new technologies are great for furthering perfect competition and bringing down prices!
- Not really, Jerry... The new economy created by the current technological revolution obeys specific and unprecedented laws, particularly in terms of its cost structure: the first unit of an informational good involves numerous sunk costs, but then the marginal cost of replication is minimal. All in all, barriers to entry are high, particularly as the network effect encourages the development of a monopoly and makes the market less contestable. Ask your daughter if she'd be ready to swap to a social network that none of her friends use...
- I was finally optimistic and now you go and dash all my hopes...
- What you have to understand, Jerry, is that a proactive policy is essential at various levels, including education, regulating monopolies and also protecting those that the current revolution may leave behind.
- I see...  
Jeremiah Naysayer turns back to his daughter... Okay, honey! Stop wasting your time on Twitter and let's go. I'm going to buy you a book to teach you how to use blockchains...

- <sup>i</sup> Original quote from PayPal co-founder, PETER THIEL.
- <sup>ii</sup> A paradox pointed out by the American Nobel Prize winner, ROBERT SOLOW in 1987.
- <sup>iii</sup> ARTUS (PATRICK), VIRARD (MARIE-PAULE), 2017. *Croissance zéro, comment éviter le chaos ?*
- <sup>iv</sup> BRYNJOLFSSON (ERIK), M. HITT (LORIN), 2003. *Computing Productivity: firm-level evidence.*
- <sup>v</sup> GUST (CHRISTOPHER), MARQUEZ (JAIME), 2002. *International comparisons of productivity growth: the role of information technology and regulatory practices.*
- <sup>vi</sup> An observation inspired by the American economist and philosopher, KENNETH E. BOULDING.
- <sup>vii</sup> LÉON (ANTOINE), ROCHE (PIERRE), 1967. *Histoire de l'enseignement en France*
- <sup>viii</sup> Direction Générale du Trésor, 2016. *Comment expliquer la faiblesse de la productivité en Italie ?*
- <sup>ix</sup> BABINET (GILLES), 2017. *La révolution digitale à l'épreuve de l'économie : l'enjeu de la productivité.*
- <sup>x</sup> *ibid*
- <sup>xi</sup> REICH (ROBERT), 1991. *The Work of Nations: Preparing Ourselves for 21st Century Capitalism*