

Would a digital boost to productivity put an end to low interest rates?

The low interest rate environment in which the major advanced economies currently find themselves reflects deep economic transformations.¹ As we have recently seen,² the bulk of the studies point out that demography is the most important of these forces and, most likely, the ageing of the population will continue to constrain interest rates over the coming decades. In the face of this restriction, **the future of productivity is one of the keys to driving up interest rates.** Let us take a look at how and with what constraints.

Productivity and interest rates

Interest rates and productivity growth have a close relationship: as the main source of long-term economic growth, productivity determines the extent to which new investment opportunities or savings needs arise. As such, lower productivity growth drives interest rates down for two major reasons:

- From the point of view of consumers, the prospect of lower growth in wages and household income induces an increase in savings, which tends to reduce interest rates.
- From the point of view of companies, a reduction in investment opportunities depresses the demand for credit, thus driving down interest rates.

It therefore comes as no surprise that, as can be seen in the first chart, **the slowdown in productivity has gone hand in hand with a sustained decline in interest rates over the past 30 years in the major advanced economies.**

Looking to the future, there is a debate over how productivity will evolve, between those who are pessimistic and optimistic about new technologies. On the one hand, the pessimists emphasise the low productivity growth in recent years and its downward trend over the past few decades. On the other hand, the optimists point out the multitude of technological advances related to automation and the so-called Fourth Industrial Revolution, and suggest that the low growth observed can be explained by measurement problems and the transition time required for these advances to spread to the economy as a whole.

This debate, summarised in the table, is unlikely to be resolved in the immediate future. If it falls in favour of the pessimists, the weakness of productivity will be added to demography as one of the constraints on interest rates. But what would happen if digital technologies were to boost productivity?

The impact of a (digital) boost to productivity

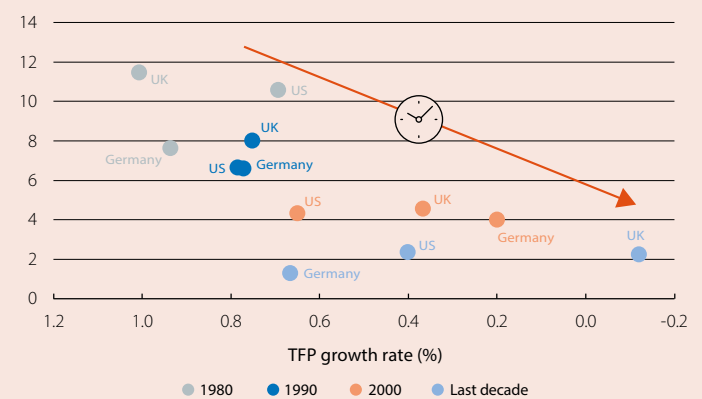
As we have seen, **faster productivity growth would drive interest rates upwards**, to the extent that this translates into:

- Growth in wages and household incomes, which takes pressure off the need to save.
- An increase in investment opportunities for companies, which leads them to increase their demand for credit.

However, **there are various factors related to new technologies that could hold back these dynamics.**

Interest rates and total factor productivity (TFP): averages of recent decades

10-year sovereign interest rates (%)



Note: For Germany, the 1990s exclude the initial years of reunification.

Source: CaixaBank Research, based on data from the Penn World Tables and the OECD.

1. In addition to the cyclical constraints inherited from the Great Recession, such as high indebtedness and less optimism towards future growth.

2. See the article «[Low interest rates: for how much longer?](#)» in the MR02/2019.

Outlooks for the future of productivity

Pessimistic	Optimistic
<p>We return to «normality», following a fading of the impact of three industrial revolutions (IRs) that have led to technological improvements that are difficult to repeat. Examples:</p> <p>1st IR: reduction in transport times (e.g. with steam trains). 2nd IR: urbanisation and heating (e.g. with electrification). 3rd IR: digital communications (e.g. the Internet).</p> <p>The future of innovation faces six major headwinds:</p> <ol style="list-style-type: none"> 1) Population ageing and its negative impact on the labour force. 2) Inequality will hamper the dissemination of inventions. 3) Less scope for globalisation to further its reach. 4) Difficulties in further improving the human capital of the population. 5) Environmental restrictions. 6) The constraint of high levels of indebtedness. <p><i>See R.J. Gordon (2012). «Is US economic growth over? Faltering innovation confronts the six headwinds» National Bureau of Economic Research.</i></p>	<p>Measurement errors: the true growth in productivity is greater than that suggested by the statistics.</p> <p>New technologies are slow to spread: it is possible that, initially, the benefits are concentrated among small groups of the economy.</p> <p>For example, various OECD studies show a divergence in the productivity growth of frontier firms (the top 5% in terms of productivity) and that of the rest.</p> <p>We are in a transition phase:</p> <ul style="list-style-type: none"> – Companies and consumers are learning to use the new technology. – There is a need for follow-up investment. – The institutional framework needs to be adapted. <p>History invites us to be optimistic:</p> <p>Solow (1987): «You can see the computer age everywhere but in the productivity statistics».</p> <p><i>See E. Brynjolfsson, D. Rock and C. Syverson (2018). «Artificial intelligence and the modern productivity paradox: A clash of expectations and statistics». The Economics of Artificial Intelligence: An Agenda. University of Chicago Press.</i></p>

Source: CaixaBank Research, own compilation.

Market failures

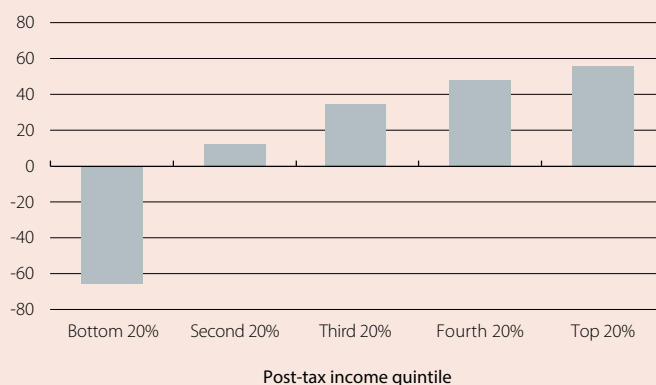
On the one hand, there may be factors that prevent the full potential of new technologies from being harnessed and that limit the boost to productivity and, therefore, to interest rates. In this regard, **the presence of «market failures» can prevent the full potential of new technologies from materialising:**

- Digitisation generates network effects (forces that make consumer interest in a product increase as its user base grows), and this could lead to winner-takes-all situations. If this reduces competition, it could hinder the improvement in productivity.³
- Digital products are essentially «non-rival»⁴ in nature (i.e. their use by one person does not limit others' use of them). The economic literature has shown that non-rivalry leads to market failures and that, when non-rival products are involved, market mechanisms can operate at a sub-optimal level. That is to say, the full production potential of new technologies is not harnessed.

The distribution of productivity improvements

One of the most frequently repeated concerns regarding new technologies is that they cause an increase in inequality, especially in the short term (over the long term, if the technology has spread throughout the economy, it is more plausible that it will benefit society as a whole). This is particularly relevant for interest rates, given that **various studies also name the rise in inequality in recent decades as one of the phenomena that has contributed to the reduction in rates:**⁵ as shown in the third chart, savings rates increase with income levels,⁶ so an increase in inequality raises the supply of savings by shifting resources towards those who save more.

US: household savings by income quintile
(% of post-tax annual income)



Notes: Data for 2017. Savings are calculated as the difference between after-tax income and consumption. As pointed out by K.E. Dynan et al. (2004), «Do the rich save more?», *Journal of Political Economy*, consumption is calculated as total expenditure + income allocated to housing - mortgage payments - capital improvements for housing - insurance (health, personal and pensions) - expenditure on vehicles.
Source: CaixaBank Research, based on data from the Consumer Expenditure Survey, conducted by the US Bureau of Labor Statistics.

3. See the Dossier «[Supercompanies: a global phenomenon](#)» in the MR03/2019.

4. See C. Jones and C. Tonetti (2018). «Nonrivalry and the Economics of Data». 2018 Meeting Papers (vol. 477). Society for Economic Dynamics.

5. See L. Rachel and T.D. Smith (2017). «Are low real interest rates here to stay?». *International Journal of Central Banking*, 13(3), 1-42.

6. See K.E. Dynan, J. Skinner and S.P. Zeldes (2004). «Do the rich save more?». *Journal of Political Economy*, 112(2), 397-444.

In order to analyse the relationship between productivity, inequality and interest rates, three factors must be taken into consideration.

1. *Winner-takes-all dynamics.* As well as (potentially) reducing competition, these dynamics facilitate **the emergence of «superstar» firms and professionals** and, therefore, can increase inequality.
2. *Complementarity or substitution.*⁷ An improvement in productivity due to new technologies leads to these technologies receiving a greater volume of investment. When digital technologies and automation substitute all other productive factors (such as labour),⁸ this greater volume of investment in these technologies occurs to the detriment of all other factors and, therefore, can lead to an increase in inequality. If, on the other hand, **new technologies complement labour**,⁹ then an improvement in the productivity of robots translates into an increase in the demand for both robots and all other factors. This, in turn, results in **income growth for all productive factors**, including labour. Furthermore, as Acemoglu and Restrepo remind us (2018),¹⁰ although the automation of tasks can depress employment and increase wage inequality (as it benefits workers with skills that are complementary to robots and harms those who have been replaced), we must not forget that **new tasks continue to be created, in a process that stimulates the demand for labour and wages**. Indeed, this process can cause improvements in the productivity of robots to translate into higher incomes for all the productive factors.
3. *«Scarce» productive factors.*¹¹ **If new technologies are complemented with scarce productive factors that are essential in the production process, these factors can «capture» the bulk of the improvements in productivity.** Thus, various researchers argue that, in a Fourth Industrial Revolution dominated by digital technologies, productive factors such as «superstar workers» and intangible assets (like a company's organisational capital or intellectual property) would gain importance and could become those scarce factors that are essential in the production process. In fact, several current studies indicate that intangible assets are already receiving a growing fraction of national income.¹² This would explain the apparent contradiction between the significant technological advances and the containment of interest rates.

7. See J.D. Sachs, S.G. Benzell and G. LaGarda (2015). «Robots: Curse or blessing? A basic framework». National Bureau of Economic Research n° w21091.

8. For example, when an industrial robot substitutes tasks that were previously carried out by a worker, such as the assembly of parts.

9. Either directly in the same production process (think of a computer and a computer engineer), or indirectly, since the products developed by «robots» can be complemented with products produced by workers: such as in the case of a TV and a film starring people.

10. D. Acemoglu and P. Restrepo (2018). «The race between man and machine: Implications of technology for growth, factor shares, and employment». American Economic Review, 108(6), 1488-1542.

11. See S.G. Benzell and E. Brynjolfsson (2019). «Digital Abundance and Scarce Genius: Implications for Wages, Interest Rates, and Growth». National Bureau of Economic Research n° w25585.

12. See D. Koh, R. Santaaulalia-Llopis and Y. Zheng (2016). «Labor share decline and intellectual property products capital». Barcelona GSE Working Paper.