Antoin Bergeaud (Banque de France), Gilbert Cette (Banque de France and Université Aix-Marseille (Aix-Marseille School of Economics), CNRS et EHESS) and Rémy Lecat (Banque de France)

The Role Of Production Factor Quality And Technology Diffusion In 20th Century Productivity Growth[1]

20th century growth has been an exceptional period in the history of mankind, relying mostly on increase in total factor productivity (*TFP*). Using a 1890-2013 17-OECD country database, this paper first improves the measurement of *TFP* by taking into account production factor quality, *i.e.* the education level of the working-age population for labor and the age of equipment for the capital stock. Second, it assesses the contribution of technology diffusion to *TFP* growth through two emblematic general purpose technologies, electricity and information and communication technologies (ICT).

Using both growth decomposition methodology and 2SLS estimates, this paper finds that, among factor quality, education levels have posted the largest contribution to growth, while the age of capital has a significant, although limited, contribution. Quality-adjusted production factors explain less than half of labor productivity growth in the largest countries but Japan, where capital deepening posted a very large contribution. As a consequence, the "*one big wave*" of productivity growth (Gordon, 1999), as well as the ICT productivity wave for the countries which experienced it, remains only partially explained by quality-adjusted factors. Finally, technology diffusion, as captured through our two general purpose technologies, leaves between 0.6 and 1 point of yearly growth, as well as a large share of the two 20th century technology waves, unexplained. These results support a wider view on growth factors, encompassing changes in the production process, management techniques or financing practices.

JEL classifications: N10, O47, E20
Keywords: Productivity, Total factor productivity, Education, Technological Change, Technology diffusion, Global History

[1] The views expressed herein are those of the authors and do not necessarily reflect the views of the institutions they belong to. We wish to thank, without implicating, Thierry Mayer of valuable advice concerning the construction of the instruments, Bas Van Leeuwen for advice on education data and Nicholas Craft for comments.