

Editor's Overview

The 37th issue of the International Productivity Monitor contains seven articles. The topics are a comparison of the productivity growth slowdown between Europe and the United States; firm-level evidence on the impact of digitalization on productivity; the impact of the China shock on innovation and productivity in Canadian manufacturing; productivity dispersion at the firm level in Canada; the role of R&D in productivity improvement; consistency issues on the construction of productivity indices; and the state of productivity research.

Productivity comparisons between countries have the potential to offer significant insight into the explanation of productivity developments. In the lead article, **Robert J. Gordon** from Northwestern University and **Hassan Sayed** from Princeton University provide a detailed examination of productivity trends by industry in the United States and Europe. Their analysis sheds much light on the phenomenon of slower productivity growth. The key finding is that productivity growth in EU-10 countries, at both the aggregate and industry level, has followed that in the United States with a 20 year lag. Indeed, the total economy labour productivity of slowdown of 1.67 percentage points in the United States between 1950-1972 and 2005-2015 was virtually identical to that in Europe between 1972-1995 and 2005-2015 (1.68 points). The authors argue that these transatlantic developments support the view that the productivity slowdown is due to a slowing of the pace of technical change that has affected the same industries, by the same magnitude on both sides of the Atlantic.

The slowdown in productivity growth observed in the world economy has taken place in a period of rapid development of digital technologies. This is paradoxical as many believe the adoption of these tech-

nologies should have a positive impact on productivity. In the second article, **Peter Gal**, **Giuseppe Nicoletti**, **Christina von Rüden** and **Stéphanie Sorge** from the OECD and **Théodore Renault** from the Graduate Institute of International and Development Studies examine the impact of digitalization on productivity in Europe. They find robust evidence that digital adoption is in fact associated with productivity gains at the firm level, especially in manufacturing, and for routine-intensive activities and the more productive firms. They note that compared to earlier waves of innovation, digital technologies appear more difficult to implement for less productive firms because of the increased importance of intangible capital and skills. This has in turn led to a slower pace of diffusion for these firms and increased dispersion of productivity growth among firms and may in part explain slower aggregate productivity growth.

The rise of China has had a major effect on many aspects of the global economy, including productivity. In the third article, **Myeongwan Kim** from the Centre for the Study of Living Standards looks at the impact of the China shock on innovation and productivity in Canadian manufacturing at the firm level. He finds that increased import competition from China reduced prof-

itability, especially in smaller firms, and consequently decreased R&D expenditures and total factor productivity growth within firms. But the exit from the market of many smaller less productive firms because of Chinese imports had a positive reallocation effect on TFP, more than offsetting the negative direct effect. Had there been no increase in Chinese import penetration, TFP growth in Canadian manufacturing would have been 0.2 percentage points per year lower in 2005-2010.

Productivity researchers have greatly benefited from the increased public availability of firm-level data in recent years. These data have provided many new insights, especially on the dispersion of productivity and productivity growth across firms. In the fourth article, **Wulong Gu** from Statistics Canada presents data for the firm time on the productivity of frontier firms, the most productive 10 per cent of all firms, and non-frontier firms in Canada. He finds that labour productivity growth was indeed faster for the former than the latter in the 1991-2015 period. But because non-frontier firms account for 90 per cent of total employment, these firms also accounted for the lion's share of the post-2000 productivity slowdown in Canada.

Research and development (R&D) has long been considered a key driver of technological innovation and productivity growth. But is R&D alone enough to improve productivity or are complementary co-investments also needed for a productivity payoff from R&D? In the fifth article, **Jianmin Tang** from Innovation, Science and Economic Development Canada and **Weimin Wang** from Statistics Canada examine this issue by estimating a stochas-

tic frontier model based on firm-level data for Canadian manufacturing. They find that R&D does improve multifactor productivity, but that the actual impact depends of R&D efficiency. This in turn is related to factors internal to the firm, including management practices, ICT investment, a skilled workforce, firm size and market power, and business strategy.

Many national statistical offices produce both quarterly and annual estimates of productivity in index form based on the same data sources. This raises the question of whether consistency between the two series can be expected. In the sixth article, **Bert M. Balk** from Erasmus University explores this issue from a theoretical perspective, concluding that consistency is in fact unattainable. He then lays out the choices open to statistical offices to deal with the inconsistency, stressing the importance of communicating clearly to data users that there is at best an approximate relationship between annual and sub-annual productivity series.

The literature on productivity topics has burgeoned in recent years, making it increasingly difficult for researchers to keep up with the progress in the field. Fortunately, the publication of the *Oxford Handbook of Productivity Analysis*, edited by Emili Grifell-Tatjé, Knox Lovell, and Robin Sickles, will make keeping abreast of new developments easier. In the final article in the issue, **Marshall Reinsdorf** from the International Monetary Fund provides a review article of the book, concluding that the *Handbook* is an extremely valuable reference as both a general introduction to the productivity field and as a source of authoritative articles on key productivity topics.