

Editor's Overview

THIS 27TH ISSUE OF THE *International Productivity Monitor* features a symposium on priorities and directions for future productivity research with five contributions from leading productivity researchers. In addition, the issue includes articles on the impact of the oil boom on Canada's labour productivity performance, the contribution of intangible assets to productivity growth in Ontario, productivity trends in the forest products sector in Canada, and the influence of natural resource inputs on productivity.

The closing session at the international conference "Productivity: Measurement, Drivers and Trends" organized by the International Association for Research in Income and Wealth and the University of New South Wales held in Sydney, Australia in November 2013, was devoted to a panel discussion on priorities and directions for future productivity research. Panelists were asked to identify three priority areas for future productivity research. The first part of this issue of the *International Productivity Monitor* features a symposium based on the presentations of the five panelists, all leading productivity researchers.

In the first contribution to the symposium, **Paul Schreyer**, Deputy Chief Statistician at the OECD, puts forward three priority areas for future productivity research. He first identifies important data gaps related to non-produced, non-financial assets such as land and sub-soil assets, as the exclusion of these assets can lead to biased multifactor productivity growth estimates. He then highlights the health and education sectors as a focus for future productivity research, given the challenges of capturing quality change in these sectors as well as the public provision of much of the output and absence of market prices. Finally, he points out that research is needed on the implications of globalization on productivity measurement, giving the example of intellectual property, which is produced in one country, but used in many.

In the second contribution, **Dennis Fixler**, Chief Statistician at the U.S. Bureau of Economic Analysis, identifies hard-to-measure services, land/natural resources, and factory-less goods manufacturing as his three priority areas for productivity research. He highlights three hard-to-measure sectors for special attention: health, education, and financial services, given the difficulty of measuring prices and output in these sectors. Fixler also argues that with the increased attention to the environment it has become increasingly important to incorporate land and natural resources into the production function. Finally, he points out that the classification issues associated with factory-less goods producers have implications for the measurement of inputs and outputs at the sectoral level and hence for productivity estimates.

In the third contribution, **Dan Sichel**, until recently with the Federal Reserve Board and now at Wellesley College, identifies health care, intangible capital, and the high-tech sector as his priority areas for productivity research. In terms of health care, he highlights the importance of getting prices right and the key role that a satellite account for health care can play for productivity measurement. Regarding intangible capital, he stresses the importance of developing better prices deflators for investment in intangible capital as well as better depreciation rates. Finally, Sichel notes that because of the rapidly changing nature of the high-tech sector,

measurement issues remain, giving as an example how changing market dynamics for micro-processors may be biasing the price index for semiconductors.

In the fourth contribution, **Bart van Ark**, Chief Economist at The Conference Board and Professor of Economics at the University of Groningen, identifies three priorities for future productivity research: intangible assets, a better understanding of the impact of innovation on productivity, and a bridging of the gap between firm-level measures of productivity and industry-level and aggregate measures. Van Ark also makes the case for greater emphasis on historical measurement of productivity performance in the tradition of Angus Maddison.

In the final contribution to the symposium, **Barbara Fraumeni** from the Central University for Economic Research in China highlights intangible capital, management practices, and human capital as areas for future productivity research. She stresses the importance of developing reliable productivity estimates for emerging and developing countries, and of enhancing collaboration between national statistical offices and academic researchers.

The symposium reveals that there exists broad agreement among the contributors on directions for future productivity research. In particular, intangible investments, education and health, and land and natural resources were identified by most contributors as priority areas.

As highlighted by the symposium, intangible capital has been identified as a priority for productivity research. Following the symposium, the first article in this issue by **Tatiana Muntean** from the Ontario Ministry of Finance furthers our knowledge in this area by estimating the contribution of intangible assets to labour productivity growth in Ontario. Intangible capital is defined to include: economic competencies such as spending on brand equity, training and organizational change; innovative

property which includes R&D; and computerized information such as software and computerized databases. The author estimates that the intangible capital totaled \$51.6 billion dollars in the Ontario business sector in 2008 and accounted for slightly over one quarter of labour productivity growth over the 1998-2008 period. Innovative property made the largest contribution, followed by economic competencies and computerized information.

The oil and gas industry has been the leading sector in the Canadian economy in the 2000s. The high oil prices which the sector has enjoyed until recently have contributed substantially to living standards growth. But the effect of the oil boom on Canada's mediocre aggregate productivity performance are complex and poorly understood. This article by **Andrew Sharpe and Bert Waslander** from the Centre for the Study of Living Standards explores the various channels, both direct and indirect, by which the oil and gas sector affects productivity growth.

They find that the large fall in labour productivity in the Canadian oil and gas sector between 2000 and 2012 was offset by a positive reallocation effect, reflecting the high labour productivity level of the sector and the net inflow of workers. These offsetting factors resulted in the oil and gas sector making a very small, but not negative contribution to labour productivity growth. A second key finding is that labour productivity has been very strong in the non-conventional oil and gas industry, that is the oil sands in 2007-2012. This reflects the increasing importance of steam-assisted gravity-drainage (SAGD) technologies and learning-by-doing. It was the recourse to lower-quality, higher-cost conventional oil and gas deposits, made profitable by high prices that accounts for the fall in labour productivity after 2007 in the Canadian oil and gas sector. The most important indirect effect of the oil and gas sector boom on Canada's aggregate productivity performance was its

impact on the exchange rate, which reduced the competitiveness of the manufacturing sector, leading to a fall in output and much slower labour productivity growth.

Multifactor productivity (MFP) growth, often put forward as a measure of technical progress, has been more appropriately labeled a “measure of our ignorance” as it reflects the influence of the many factors not explicitly included in the growth accounting framework. In the third article in this issue following the symposium, **Vernon Topp and Tony Kulps** from the Australian Productivity Commission discuss how unmeasured natural resource inputs have affected measured MFP growth in the Australian context. They show how rainfall is an important unmeasured input for production in agriculture and that MFP growth in the sector falls in years of drought. They also find that a decline in the average quality of resource inputs into mining is responsible for much of the poor MFP growth in the industry and that a shift toward high-cost production technologies has dampened MFP growth in utilities. Despite difficulties related to the lack of market transactions on natural resource inputs, they conclude it is important for productivity researchers to attempt to adjust for natural resources inputs in computing MFP, especially in sectors where natural resources represent important inputs.

The Canadian forest products sector has experienced major economic turbulence in

recent years. From 2000 to 2012 real output fell 1.7 per cent per year while hours worked plummeted 4.2 per cent per year, resulting in a 2.5 per cent annual increase in labour productivity. This is well above the business sector annual average of 0.7 per cent for output per hour. Declining sectors often experience lagging productivity as they fail to adjust employment for falling output. The forest productivity sector clearly is not an example of this type of behaviour.

In the final article in the issue **Ricardo de Avillez** provides a detailed analysis of the productivity trends and drivers in the Canadian forest products sector from 2000 to 2012. He points out that the sector was hit by a perfect storm in the mid- and late-2000s. The U.S. financial crisis and housing bust, combined with a structural shift away from paper to electronic media, as well as the appreciation of the Canadian dollar and the emergence of low-cost producers rendered the economic environment for forest product firms extremely challenging. Survival required cost reductions to maintain competitiveness. Firms responded by cutting workers so that by 2012 only around half of the employees in the industry still had jobs, relative to the 2000 employment level. This case study suggests that, in the medium term at least, positive, and even robust productivity growth can be consistent with rapidly falling output and employment.

