

Editor's Overview

THE 23RD ISSUE OF THE *International Productivity Monitor* includes five articles on: business innovation strategies and policies to stimulate innovation in Canada; new direct measures of the use of computer technologies in Canada and the United States and implications for Canadian productivity growth; the reasons behind the large divergence between labour productivity and real median wage growth in the United States over the 1973-2011 period; the relationship between educational attainment, employment rates and productivity in OECD countries; and the treatment in the national accounts of measures of volume output for education and health services.

It is widely recognized that Canada's lagging productivity performance is closely related to weak business innovation. In the lead article **Marcel Côté** and **Roger Miller** from the economic consulting firm Secor put forward a new framework for understanding innovation that they call the six games of innovation. Innovative activity is broken down into six types or games based on the maturity of the market (emerging or mature) and the product architecture (stand alone, open system, and closed system). This framework provides much insight into how firms make strategic decisions related to their innovative activity.

According to Côté and Miller, the games of innovation framework throws into question the effectiveness of the current approach to innovation policy in this country. They point out that the two key features of Canada's innovation policy are generous R&D tax credits for business and substantial support for university research. But these tax credits appear to have little effect on business innovation, other than reducing the cost. While financial support for university research is positive from the perspective of the advancement of knowledge and Canada's international reputation for research, the weak linkages between this research and the private sector means that it has limited direct relevance for business innovation. Côté and Miller argue that industry and project-specific support for inno-

vation and regionally focused innovation assistance would be more effective levers to improve the country's innovation performance.

Technological progress in the computer field is a key driver of productivity growth. The widening gap between the level of labour productivity in Canada and the United States suggests that Canada is trailing its southern neighbour in the implementation of productivity-enhancing computer technologies. But until now direct evidence of the lag in Canada's adoption of computer technologies relative to the United States has been lacking. In the second article, **Michelle Alexopoulos** and **Jon Cohen** from the University of Toronto make an important contribution to the productivity debate by presenting new direct measures of the penetration or presence of computer technologies in the two countries.

The authors have put together estimates of the number of titles of computer books held in Canadian and U.S. libraries over the 1950-2005 period. They show that beginning in the early 1970s a gap in the absolute number of computer titles emerged between the two countries. Given the strong causal relationship they find between these indicators and total factor productivity growth, they conclude that the more limited development and use of computers technologies in Canada has played a key role in the widening of the Canada-U.S. productivity gap since the early 1980s.

Productivity growth makes possible higher levels of living standards for the average worker as the increased output per hour worked can be used to pay higher wages. But this relationship between labour productivity growth and real median wages has broken down in the United States. While output per hour advanced 80 per cent between 1973 and 2011, real median wages were virtually stagnant. In the third article, **Lawrence Mishel** from the Economic Policy Institute and **Kar-Fai Gee** from the Centre for the Study of Living Standards develop a framework to decompose the relationship between productivity and median wages into four mediating factors and provide estimates of the importance of these factors.

They calculate that labour productivity growth outstripped real median wage growth in the United States by 1.46 percentage points per year (1.56 per cent versus 0.10 per cent) between 1973 and 2011. The most important source of this divergence was growing wage inequality, accounting for 41 per cent of the difference. This was followed by deteriorating terms of trade for labour—that is, faster growth in the consumption price index than the GDP deflator—responsible for 30 per cent of the difference. The falling share of labour income and rising worker benefits accounted for the remaining 28 per cent. The authors identify globalization and the declining bargaining power of workers as driving forces behind this alarming and disturbing disconnect between productivity and wages.

Productivity growth is influenced by both the educational attainment of the workforce and employment rates. In the fourth article **Renaud Boulès** from Ecole Centrale Marseille and GREQAM-IDEP, **Gilbert Cette** from the Banque de France and Université de la Méditerranée and **Anastasia Cozarenco** from Université de la Méditerranée and GREQAM attempt to disentangle the effect of employment structure and educational attainment on productivity

in OECD countries using econometric techniques. They find that a one percentage point increase in the employment rate for all three educational groups (less than secondary, secondary, and higher) reduces labour productivity by around 0.6 per cent, as the persons entering employment from non-employment tend to be less productive than those already employed.

In a simulation exercise, the authors identify significant potential gains for OECD countries in terms of productivity and GDP from moving to the education attainment structure of the country with the highest level of educational attainment (Canada) and to the employment rate structure of the country (Denmark) with the highest total employment rate.

The absence of marketed output for most education and health services has meant that volume output of these industries could not be measured independently on inputs. This shortcoming in the estimation of volume output in the non-market sector has long been recognized and is now increasingly the focus of attention, given the need to have accurate measures of overall economic performance and to improve productivity in education and health services. In the fifth and final article of the issue **Aled ab Iorwerth** from Finance Canada examines the recent OECD publication *Towards Measuring the Volume Output of Education and Health Services: A Handbook* which provides the state of the art on the measurement of education and health services.

The author welcomes this OECD initiative to identify and develop best practices for measuring the volume output of education and health services. He recommends that the focus of attention be on the estimation of the value of production of these industries, not the well-being or social valuation arising from these services given the sensitivity of these valuations to different assumptions.