
Introduction:

Economic Growth in Canada and the
United States in the Information Age

1

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THE U.S. ECONOMY HAS UNDERGONE A REMARKABLE RESURGENCE since the mid-1990s with accelerating growth in output, labour productivity, and total factor productivity. Jorgenson (2002) has shown that information technology has been an important driving force in the revival of the American economy. Canadian economic performance has also improved dramatically during the late 1990s. However, there are important differences between the Canadian and U.S. economies, especially in the relative importance of industries producing information technology (IT) equipment and software.

The purpose of this volume is to compare and analyze the sources of economic growth in Canada and the United States over the past two decades. This represents a continuation of the research program initially reported in the Industry Canada monograph, *Industry-level Productivity and International Competitiveness between Canada and the United States*, edited by Jorgenson and Lee (2001). The current volume incorporates important new data on productivity in Canada presented in the Statistics Canada monograph, *Productivity Growth in Canada - 2002*, edited by Baldwin and Harchaoui (2003).

In Chapter 2, Harchaoui, Tarkhani, and Khanam provide a detailed comparison of the forces behind the expansion of the private sectors in the Canadian and U.S. economies between 1981 and 2000. For the period as a whole, U.S. economic growth outstripped that in Canada by nearly a full percentage point. The contribution of capital services was the most important source of growth in both countries, while the contribution of labour services was next in importance. Growth of multifactor productivity was slightly negative for the two decades in Canada, but positive and substantial in the United States during the same period.

Both Canada and the United States experienced a slowdown during the period 1988-1995 and a sharp rebound after 1995. The slowdown in Canada before 1995 was much more severe than in the United States. The recovery in Canada was powered by a strong revival of multifactor productivity growth, a surge in the contribution of non-IT capital services, and rapid growth of the contribution of labour services from non-college educated workers. The contribution of investment in IT rose in both countries, but grew far more rapidly in the United States. The contribution of non-IT investment jumped considerably in both countries.

Harchaoui, Tarkhani, and Khanam present a detailed comparison of data for Canada and the United States. The Canadian data for their study are drawn from the Statistics Canada KLEMS (capital, labour, energy, materials, and services) data base, described in greater detail in the monograph by Baldwin and Harchaoui (2003). The U.S. data are taken from Jorgenson, Ho, and Stiroh (forthcoming). The close similarities between data sources and methodology for the two countries make it possible to trace the differences outlined above to differences in the structure and behaviour of the two economies.

In Chapter 3, Gu and Wang analyze the sources of economic growth for 122 Canadian industries, using the most detailed version of the Statistics Canada KLEMS data base. They divide these industries between 33 IT-intensive industries and 89 non-IT intensive industries. The strong revival of multifactor productivity growth after 1995 is the most important source of the Canadian growth revival; they show that this is pervasive among Canadian industries. Capital deepening due to investment in IT is relatively unimportant in the Canadian revival by contrast with the United States.

The surge in multifactor productivity growth in Canada after 1995 was strongest in IT-intensive industries. Gu and Wang attribute this to IT-induced organizational innovation and network effects. They find that IT-intensive industries made relatively little contribution to multifactor productivity growth before 1995. They also find that industries that had a larger share of university-educated workers made larger productivity gains after 1995. A possible explanation is that these workers are complementary to investments in IT equipment and software.

The Canadian KLEMS data base employed by Gu and Wang incorporates the results of recent research on the impact of changes in the composition of the Canadian labour force by age, sex, and education by Gu, Kaci, Maynard, and Sillamaa (2003). It also includes new estimates of capital inputs for Canadian industries by Harchaoui and Tarkhani (2003). These estimates reflect differences

in the behaviour of investment goods prices, for example, between IT and non-IT investment goods. The estimates also incorporate differences in service lives, depreciation rates, and tax treatments among different types of assets.

In Chapter 4, Ho, Rao, and Tang compare the sources of output growth for 34 industries in Canada and the United States. They show that IT-producing industries were the sources of much of the acceleration in multifactor productivity growth in the United States after 1995. The proportion of university-educated workers in the employed labour force is much smaller in Canada than the United States. Growth in the contribution of these workers to the growth of labour input was another important source of the U.S. growth resurgence in the late 1990s.

In order to isolate the differences in the behaviour of individual industries in Canada and the United States, Ho, Rao, and Tang have separated the 34 industries into three groups – IT-producing industries, IT-intensive industries, and industries that are not IT-intensive. They classify 3 industries – computers; communication and electronic equipment; and communications – as IT-producing industries, 9 other industries as IT-intensive industries, and the remaining 22 industries as non-IT-intensive industries.

The IT-producing industries grew at phenomenal rates in both Canada and the United States during the period 1981-2000, far exceeding the average of other industries. These industries contributed substantially more to U.S. than Canadian economic growth because of their greater relative importance in the U.S. economy. All three groups of industries contributed to the acceleration of economic growth in Canada and the United States after 1995. However, most of the acceleration in Canada was due to the non-IT-intensive industries, while in the United States, the acceleration took place mainly in the IT-intensive industries.

The results of this study are critically important in evaluating the prospects for future growth in Canada and the United States. Jorgenson, Ho, and Stiroh (2003) have shown that the rapid pace of economic growth in the United States during the late 1990s was not sustainable. This involved an expansion of hours worked at twice the rate of the growth of the working age population. The unemployment rate plummeted and the rate of participation in the labour force increased. Nonetheless, prospects for potential growth at sustainable rates have improved.

Jorgenson, Ho, and Stiroh (2003) have undertaken a similar, but less detailed, analysis of prospects for future Canadian economic growth. They project more rapid growth for the Canadian labour force than the United States. Labour quality, defined as labour input per hour worked, is also projected to grow more rapidly in Canada than in the United States as Canadian levels of educational attainment approach U.S. levels. However, multifactor productivity growth is projected to be slower in Canada than in the United States, mainly due to the greater relative importance of IT-producing industries in the United States.

Growth rates for the two countries are gradually converging, but the growth potential for Canada remains about half a percentage point below the United States. In both countries, projections of future growth are characterized by substantial uncertainties. For the United States, these arise from the role of IT investment and the future growth of multifactor productivity in the IT-producing industries. For Canada, the growth rate of multifactor productivity outside these industries and the rate at which IT equipment and software can be substituted for other types of capital inputs are associated with important uncertainties.

Bibliography

- Baldwin, J.R., and T.M. Harchaoui, eds. *Productivity Growth in Canada - 2002*. Ottawa: Statistics Canada Catalogue No. 15-204-XPE, 2003.
- Gu, W., M. Kaci, J.-P. Maynard, and M. Sillamaa. "The Changing Composition of the Canadian Workforce and its Impact on Productivity Growth." In *Productivity Growth in Canada - 2002*. Edited by J.R. Baldwin, and T.M. Harchaoui. Ottawa: Statistics Canada Catalogue No. 15-204-XPE, 2003.
- Harchaoui T.M., and F. Tarkhani. "A Comprehensive Revision of the Capital Input Methodology for Statistics Canada Multifactor Productivity." In *Productivity Growth in Canada - 2002*. Edited by J.R. Baldwin, and T.M. Harchaoui. Ottawa: Statistics Canada Catalogue No. 15-204-XPE, 2003.
- Jorgenson, D.W., ed. "Information Technology and the U.S. Economy." In *Economic Growth in the Information Age*. Cambridge: MIT Press, 2002, pp. 1-42.
- Jorgenson, D.W., M.S. Ho, and K.J. Stiroh. "Growth in U.S. Industries and Investments in Information Technology and Higher Education." In *Measuring Capital in the New Economy*. Edited by C. Corrado, J.C. Haltiwanger, and D. Sichel. Chicago: University of Chicago Press. Forthcoming.

———. “Lessons for Canada from the U.S. Growth Resurgence.” *International Productivity Monitor* 6 (Spring 2003): pp. 3-18.

Jorgenson, D.W., and F.C. Lee, eds. *Industry-level Productivity and International Competitiveness between Canada and the United States*. Research Monograph. Ottawa: Industry Canada, 2001.

