Canadian Productivity, Secular Stagnation and Technological Change

Michelle Alexopoulos
(University of Toronto)

Jon Cohen
(University of Toronto)

Since the early 2000s Canada's productivity growth has been poor relative to historical and international levels. While there is not uniform consensus as to the causes, in the last few years, a number of prominent economists, among them Robert Gordon, have noted a marked decline in trend rates of economic growth in developed economics such as Canada and the US. They regard this as sign that we have entered a new period of secular stagnation that, they contend, is likely to hang on for the foreseeable future. Specifically, they argue that technological advancement, which has for the last 150 or so years, through good times and bad, been the handmaiden of rising productivity and output growth is no longer up to the task. Gordon (2015,2016), in particular, contends that the great inventions and innovations of the second industrial revolution, are spent forces and nothing evenly remotely comparable to their transformative impact, with the possible exception of the ICT revolution, also over, is conceivable for the foreseeable future.

In an attempt to advance our understanding of Canada's post-2000 productivity performance, and whether Canada has indeed entered a period of secular stagnation, we will use text analysis and book metadata to investigate the relationship between technical change and productivity growth in the past, present, and future in Canada and the US. Our objective is to answer the following questions: How does the recent post-2000 productivity slowdown in Canada relate to the pace of technical change both in Canada and in the US? and If the pace of technical change/innovation did slow during this period, what does that imply for the future of Canadian productivity? To address these questions, we will utilize book metadata to create measures of Canadian and US technical change, and establish the relationship between them and productivity growth. These measures will then be employed together with a text analysis of digitized collections to track the spread and assess the influence of major innovations in the recent past.

We will start with a review of the evidence on the recent slump in productivity and present our measures of innovative activity. Building on our past work in the area, our metrics will be based on three sources of information – books held in Canadian libraries in the different fields of technology (based on an analysis of OCLC holdings and WorldCat data), technology books in print available from major publishers in Canada (e.g., from R.R. Bowker's Global Books in Print database), and technology related books available for purchase from Amazon. A preliminary analysis of our data shows that our technology measures confirm a slowdown in the pace of innovative activity in the early years of the 21th century in Canada, and a similar slowdown is seen in the US using comparable US measures. Moreover, the dating of the innovation slowdown appears coincident with the timing of the falloff in the rate of productivity growth during this time. To address the relationship between productivity and innovation further, we will run a series of regressions to explore how much of the slowdown can be attributed to the innovation

slowdown documented. In addition, we will dig deeper into the data in an attempt to shed light on which areas of innovation appear to be most linked to the slowdown (e.g., mining, manufacturing/machinery, IT, etc.)

While this analysis should shed some light on the factors that potentially caused the slowdown in productivity, our preliminary analysis has uncovered another interesting fact - the same indicators that show a slowdown in the early 2000s, are now indicating a more recent turnaround in the rate of innovation on both sides of the boarder. This might suggest that the near-term prospects for the development of new technologies and associated productivity growth are more encouraging. An analysis of the meta-data associated with the publications will help identify which types of innovation drivers of the turnaround and should be beneficial to policymakers who seek to develop effective public policies to boost productivity growth.

Our initial investigation reveals that this upswing (on both sides of the border) is associated with computer-related innovations such as robotics, AI, and 3-D printing. However, to further understand how these innovations will likely impact the Canadian economy, we will examine available data on the diffusion of these technologies, and do a text analysis on Canadian news articles, to uncover their current spread and use. Finally, we will discuss whether the spread and use of these new innovation compares to previous GPT technologies that have boosted productivity in the past, and we will present a series of forecasts to examine possible paths for Canadian productivity given the recent patterns in innovation growth.