

of this important, but understudied, Canadian agricultural and consumer product. As there are no comparable studies that cover this time period or this number of aspects of beef production and sale, his book fills a research niche in the examination of Canada's past and "almost present" agricultural history.

This book is divided into three separate yet related parts, with multiple chapters in two parts, that deal with the stages through which cattle go to become food on the plates of Canadian and international consumers. MacLachlan looks at beef and its related products as consumption items and describes how those items are produced, from the farm to the table. Part One of the book analyses the production of cattle, with particular attention to the geographical distribution of that production, to cattle feeding in Alberta, and to the sale of "finished" cattle to the slaughterhouses. Part Two examines beef processing in the meat-packing industry. Details are provided on technological and entrepreneurial changes, the histories of the large Canadian meat-packing firms, government regulations that affected slaughter and packing, and the workers in this industry. Part Three describes the marketing of beef, with particular emphasis on the establishment of packer-owned branch houses, refrigerated rail cars and trucks, the advent of boxed beef, beef grading for consumption, and the retail store, from small grocery stores to the large supermarket. Each chapter presents the history of the industry, which will appeal to the reader who is seeking description, and enough economic analysis to appeal to the reader who is looking for the causal relationships among the variables in this story.

Although MacLachlan writes that this book covers the time period from about 1870 to 2000, the focus seems to be on the years since the 1940s. The earlier decades are included and interesting details about beef production and consumption are provided, but those details appear to be background to the important and interesting developments since about 1950. Some readers may be put off by his use of the post-1950 period as the point of emphasis, especially when he examines recent events and developments first and proceeds back in time only for matters that relate to the near past. But that writing technique is a strength in this book because the antecedents to those more recent histories are made very clear. He also quite successfully brings in other meat and poultry histories where needed so that the place of beef within the production and consumption areas can be clearly seen. MacLachlan writes for the most part about Canada's history of beef, but he includes enough U.S. history of the same industry that we can see where, why, and how Canadian events followed or deviated from events in the United States. The history of Canadian beef processing and consumption cannot be studied in isolation from either other countries or other meat products.

This book is recommended reading for anyone who wants to examine one important commodity in Canada's agricultural history. Beef production provides another illustration of that country's connection to external markets and regional production segmentation.

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*The Computer Revolution in Canada: Building National Technological Competence.* By John N. Vardalas. Cambridge, MA: MIT Press, 2001. Pp. vii, 409. \$45.00.

This is an excellent book. It tells a story that had not been told before, and indeed one which many would not have appreciated was there to be told. It draws on an impressive array of primary sources, as well as interviews with many of the key players involved. It is very well written, with the exception of the hyperbole of the opening paragraphs. John Vardalas displays a mastery of the technical details involved, as well as the social and political influences at work.

Canada emerged from the Second World War with one of the largest economies and industrial establishments in the world. Yet it lacked a strong tradition of Research and Development with which to take advantage of the revolution in information technology that was to drive much of postwar economic development.

There are three key elements in Canada's development of digital electronic technology in the first three postwar decades. The first is the role of Canada's military, which did not dream of becoming completely independent technologically, but wished to develop some areas of expertise that it could trade with allies. Although some Canadian military historians have discussed this attitude, and a couple of case studies have been performed, Vardalas is the first to detail how military funding fueled Canadian research and development in electronics over a period of decades. This is important, for through modern eyes it would be all too easy to dismiss the very idea of any large-scale independent Canadian capacity in military technology.

The second element is the role of Canadian public corporations. The Post Office and Trans Canada Airlines (forerunner of Air Canada) in particular provided erratic but important research funding.

The third, and most surprising, element is the role played by the subsidiaries of foreign firms. It has long been a tenet of Canadian historiography that subsidiaries of foreign firms lacked both independence and research capability. Although this was indeed true for most subsidiaries, Vardalas details a handful of cases where Canadian subsidiaries were able to pursue independent research endeavors. Given the paucity of Canadian-owned firms in the electronics industry, it was these subsidiaries that carried out the bulk of Canadian research.

There are a few success stories. The Canadian Post Office was able to demonstrate a prototype mail-sorting device years before any other post office. Unfortunately, whereas the United States Postal Service was thus encouraged to develop this technology, the Canadian prototype itself was never commercially manufactured. More impressively, the first-ever computerized airline-reservation system was developed in Canada for Trans Canada Airlines, though international sales of the technology were virtually nonexistent. And the New York Federal Reserve bought one of the first check-sorting devices from Canada; the Canadian banks took several years to show any interest.

Vardalas argues that Canadian research efforts should not be evaluated in terms of the products developed but rather the researchers trained in the process. This makes it hard to judge whether, as Vardalas suggests, the benefits of these research endeavors outweighed the costs. Vardalas could have done more to buttress his case. As each of the research projects studied is eventually closed down, he briefly describes how the researchers moved on to form or work for Canadian consulting or software firms. Yet except for some discussion in the concluding chapter of Canada's later success as a leader in satellite technology, and passing reference to NorTel, Corel, and Newbridge Networks, he gives few details on these spillover effects.

Vardalas argues that the government should have coordinated computer purchases from all government departments in order to encourage Canadian research. He does not discuss the potential cost of forcing departments to eschew the preferred IBM computers for a Canadian product for which maintenance, reliability, and especially ongoing improvement, were more questionable. And the history he tells, with its many tales of ambitious research endeavors being eclipsed by better-funded efforts elsewhere, indicates that success in Canada was far from assured.

Vardalas is favorably disposed to the military funding of Canadian research. But one could argue that the Canadian military can and does simply buy its technology, and need only have independent technological capability in areas related to unique demands on the Canadian military.

While Vardalas celebrates the research efforts of several subsidiaries, he appreciates that the price for independence was often huge. Subsidiaries generally had to rely on domestic revenues to fund their research, and received little help from their head offices in selling their ideas. Without a commitment from the head office, the research efforts of Canadian firms were often shut down, or their ideas licensed to others, with little local input.

If the end result was an enhanced Canadian capacity to adapt foreign technology, then Canada might have been better served by a less ambitious series of research endeavors. Rather than trying to develop all-Canadian computer systems, efforts to adapt foreign computers to Canadian needs might have had greater success, while also training researchers for the sort of research Canada needed. This was the path followed with respect to the transistor: Canadian subsidiaries realized early that they were better off designing circuits than transistors themselves. Vardalas appreciates that many Canadian research efforts failed to ask what market would be served by the ideas being developed.

This book sets the stage for comparative work across countries. Did research endeavors in other countries limp from contract to contract as did those Vardalas details here? How did firms in smaller European countries circumvent the small-market problem that often hindered Canadian research? And did it matter? Vardalas notes that Australian research suffered from a lack of military funding, but did the Australian economy suffer?

The book should be read by anyone interested in Canadian technological or military history, technological history more generally, the role of multinational firms in technology development and transfer, the management of innovation, and government innovation policy.

RICK SZOSTAK, *University of Alberta*

*A Perilous Progress: Economists and Public Purpose in Twentieth-Century America.* By Michael A. Bernstein. Princeton, NJ: Princeton University Press, 2001. Pp. 358. \$39.50.

Reflecting on economists' distinguished record in allocating the economy's scarce military resources during the Second World War, Michael Bernstein writes: "It is one of the great ironies of this history that a discipline renowned for its systematic portrayals of the benefits of unfettered, competitive markets would first demonstrate its unique operability in the completely regulated and controlled economy of total war." Not to let readers miss the point, Bernstein prefaces this remark by noting that it was "statism," not "individualism" that had set the historical context in which "the high hopes . . . of generations of professionalizers could be realized" (p. 89).

Put in general terms, Bernstein argues that the evolution of American economics as a profession took place not simply as a history of intellectual debates, but in the profession's relation to the state—a relationship that changed in the wake of new and unexpected political and social events during the twentieth century. Economists have missed this history, he notes, because they have not acquired "a historical sensibility." Most treat the discipline's evolution in terms of specific intellectual ideas or the arrival of new techniques. That sort of esoteric accounting might tell a story of scholarly "advancement" or might work to "legitimate" a new school of research, but it omits the political context in which the discipline emerged, and as such, effaces the link between the profession and the state (p. 192). For Bernstein, that connection was vital: "events and contingencies in the mid-twentieth century would do more to shape the evolution of American economics than any set of ideas alone" (p. 64). To be sure, American economists felt an uneasy tug to take part in public