Research Policy in Canada

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The following text is an expanded version of remarks given on December 4 at a conference hosted by the University of Toronto on the Future of Post-Secondary Education in Canada.

The past decade has seen an extraordinary increase in support for university research by the federal and provincial governments in Canada. Those who remember the dark days of the early 1990s, when Canadian universities saw their best researchers, new and established, discouraged by a sustained fall in public support for research, can only celebrate the new government dollars and programs that have revitalized university research in recent years.

Keeping that positive trend going will not be easy. My focus here will be that of universities in Ontario. With relatively new governments in Ottawa and Queen's Park, there is a tendency for some to assume that we've done our duty by university research, now let's do something else. There is clearly no shortage of alternative purposes for public spending. We in the universities need to make the case that to realize the benefits of the great investments of the last decade, governments must continue that support and increase it, to provide funding for the large numbers of new faculty appointments in Canadian universities as well as for the outstanding faculty who are well established in their research programs.

A key issue for the Province and the federal government, as they consider future research spending, is the evaluation of the benefits which flow to society and the economy from the public funding of university research. There is general agreement that those benefits, in order of importance, are as follows:

1. *The role of university graduates* when they leave university and enter employment, as purveyors of new knowledge and new ideas for companies and public sector institutions. Mike Lazaridis, founder and president of Research in Motion, one of Canada's great advanced technology companies, made this point convincingly in a paper entitled, *The Importance of Basic Research*, presented last month at a conference in Ottawa. He said that the contribution of universities to his company's growth has been based not on patents or licenses, but on the people who have come from a university education to work for RIM. In his words, "If you really want to understand commercialization, all you have to do is attend convocation at your local university." It is that simple: university research is distinctive in that it involves a heavy joint investment in education, and when they enter the labour force those graduates represent the fundamental contribution of university research to the economy. This central importance of university graduates to the economy has also been underlined by the work of Ontario's Task Force on Competitiveness, Productivity, and Economic Progress, and its Chairman, Roger Martin.

2. *The advance of knowledge*—in science, social science, and the humanities—which spreads through society and affects social policy and economic change in ways that are impossible to predict when the research is undertaken. The classic example is the work done at universities in North America and Europe on quantum mechanics during the first four decades of the 20th century, which had profound impacts from telecommunications to energy, in ways not foreseen

when the work was done. Work at Ontario universities in medical ethics, immigration policy, and environmental management may have profound effects on our society's well-being, although the universities involved are generally unlikely to receive royalties for that work. Quite apart from the immediate impact of university graduates in the economy, support for fundamental university research can have an enormous long-term benefit for society.

On the issue of the advance of knowledge through academic research and publication, it is sometimes asserted that the publications arising from university research are fine for academic purposes, but are just not "relevant" for private industry. Faced with such assertions a decade ago, the National Science Foundation commissioned a study of patents issued to US companies, to determine the role played by academic work in the citations used by the companies to justify the granting of a patent. The findings were striking on the *relevance* of academic research to private industry: of the 2,841 patents issued to US private industry in 1993 and 1994, 73% of the citations to science papers were to papers written at publicly funded institutions. Only 20% were from US private industry, with 6% from foreign industry. Even IBM cited its own work only 21% of the time. Dr. Francis Narin, lead author of the patent study, declared: "Look at the things that are coming out of the research pipeline. We'd be fools to shut it down." His words ring true in Canada, whether we look at science, social science, or the humanities.

3. *Knowledge transfer*, involving the direct interaction of faculty with leaders and decision makers in the public and private sectors. University faculty provide invaluable advice to government ministries, school boards, hospitals, cities, and other public institutions on matters such as the improvement of aboriginal education, the prevention of child abuse, the ethical issues which arise in treating terminal patients, the economic effects of immigration and emigration, and the likely impact of an aging population on government expenditures and revenues. University faculty and graduates students also work in collaboration with Canadian companies, through research contracts, industrial chairs, and collaborative agreements which help industry solve problems with cutting edge research, and give our faculty and graduate students access to modern research equipment and challenging opportunities to advance applied knowledge.

4. *The commercialization of university research*, which is currently assessed by the federal and provincial governments with such measures as licensing revenue and spin-off companies. Ontario's universities, including Western, are investing in this area and making progress. At Western we have built up our capacity to generate disclosures and evaluate them for possible commercial significance. We are helped with a technology transfer advisory committee which includes leaders from the private sector who provide advice as volunteers to the University. While we have made real progress in this area, we know there is still much room for improvement, and we are committed to continuing to strengthen our efforts in commercialization.

All four of these mechanisms linking research to the public good are important, and Western faculty and staff are working in all these areas to contribute to economic and social development in London, in Ontario, and in Canada. However, my view, and I think it is widely shared by those who study these issues, is that items 1 and 2 above are much more important as generators of social benefit than 3, and that 3 is much more important that 4. This ranking is important, because 1 and 2 lead public policy to focus on promoting excellence in research as

judged by one's scholarly peers, and this has been the road to success in North America for decades. Focusing solely on 4 can produce a vision that reduces the importance of peer review, and downplays the social sciences and humanities, which are key contributors to the benefits in 1, 2, and 3. A recent survey of 165 of the most research-intensive universities in the US found that the median licensing revenue in 2003 was slightly less than $1 million. This is a small fraction of the contribution of these same universities to the US economy through their graduates and the generalized advance of knowledge, and Ontario and Canada are no different.

One way to summarize this view is to distinguish the *front end* and the *back end* of well-conceived university research policy. At the front end governments distribute research funding largely on the basis of peer-reviewed excellence, in support of the advance of knowledge and the building of outstanding graduate programs. At the back end, as research projects are completed, faculty, tech transfer staff, and volunteer advisors work together to see if there are discoveries which merit patent protection and possible commercial development. This system has served Canada and the US extremely well in recent decades. We would, however, lose much of benefit of university research, not to mention our ability to attract and retain the best researchers, if the back end suddenly began to drive the front end, and someone's prediction of which research was most likely to lead to commercialization started to drive the initial allocation of most public research funding.

The model of front end allocation of funding on the basis of peer review, and back end evaluation of technology transfer, is the road to maximizing the social benefits from university research in all branches of science, social science, and the humanities. Faculty at Canadian universities have performed well with this model, and the recent improvements in the Canadian research climate have gained attention in the international research community. In its November 8, 2004 edition, *The Scientist* magazine published its annual review of the best places to work in academic science. The review was based on survey results from thousands of academic researchers worldwide, and the overwhelmingly positive results given to Canadian universities led the editors to publish an article on the positive research climate created by the Canada Foundation for Innovation and its provincial counterparts such as the Ontario Innovation Trust. Canada is poised to become a destination of choice for the world's best and brightest if we can sustain the momentum which has been building for the past several years.

We live in a knowledge-based society, in which university research is an essential driver of social and economic progress. Given that context, there is real cause for hope that the decisions in upcoming budgets for Canada and Ontario will continue strong support for fundamental research. To achieve that goal, however, all of us who believe in the importance of university research, and especially those outside the university world, must continue to make the case.