A BRIEF to the HOUSE OF COMMONS STANDING COMMITTEE on FINANCE

by the

CANADIAN CONSORTIUM for RESEARCH (CCR)

EXECUTIVE SUMMARY

1. ***CCR recommends that the government augment the funding for basic research by increasing by 5% the base budgets of the three granting councils and of Genome Canada, with any new targeted initiatives being funded separately and in full consultation with the research community. Cost: about $100M p.a.***

2. ***CCR recommends that the funding for the indirect costs of university research rise to represent 40 percent of the direct costs allocated to the granting councils. Cost: about $200M p.a.***

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1. THE CANADIAN CONSORTIUM FOR RESEARCH

The Canadian Consortium for Research (CCR) is the largest organization in Canada whose primary concerns are the funding of research in all sectors and support for post-secondary education. Established in 1976, CCR consists of 18 organizations that represent 50,000 researchers and 400,000 students in all disciplines across Canada. These researchers are based in universities, government laboratories and the private sector, and engage in basic and applied research, study, and practice in the humanities and in the natural, health and social sciences. The Consortium's mission is to communicate the importance to Canada of both basic and applied research and of post-secondary education. CCR and the research community recognize the important improvements that have been made to research funding in Canada over the last decade or so. Significant weaknesses remain, however, and we stress the importance of building on the improvements if Canada is to meet the competitive challenges of the coming years. In the current economic context, we also emphasize the ability of research funding to create rapid stimulus.

2. THE IMPORTANCE OF BASIC AND APPLIED RESEARCH

Research activities across a spectrum of disciplines have contributed enormously to the economic growth and prosperity that the world has enjoyed over much of the last century. While applied research has played an essential role, the key underlying advances have come from basic research. (Such research aims to gain knowledge or understanding of phenomena without immediate specific applications in mind.) For example, inventions based on the very basic understanding of the submicroscopic world (quantum mechanics) alone have been estimated to account for over 25% of the GDP of all the industrial powers. More recently, the World Wide Web is a hugely important consequence of work done in the 1990's for the very basic field of subatomic physics.

> *I think there is hardly any example of 20th century innovation which is not indebted in this way to basic scientific thought.*
>
> H.B.G. Casimir, former Philips Research Director.

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Basic research achieves such impacts by opening-up entirely new and unexpected technological options and capabilities. In turn, these lead to new technologies and ideas that generate new products, processes and production methods, new businesses and jobs, and eventually entirely new industries. As OECD economies have become more knowledge-based, the underlying importance of research is becoming ever more significant.

In addition, the knowledge and the enhanced understanding of the world generated by basic research activities can assist in finding solutions to social or cultural problems, and are critical to educating and inspiring successive generations of university graduates who use their knowledge to contribute to society, to their careers, to their family lives, and to their community.

From time to time, some observers suggest that small economies such as Canada could avoid engaging directly in basic research while still benefiting from the results of such research in other countries. This is true in the very limited sense that nothing prevents a "free-rider" country from reading others' published results. However, it is now widely acknowledged that a critical component of any country's economic growth is the ability to fully understand, internalize and apply the advances of other nations; this essential 'receptor capacity' requires the experience and "tacit" knowledge (the type of hands-on, experiential knowledge that cannot be transferred verbally) that comes from the direct conduct of *all types* of research. Tacit knowledge cannot simply be purchased, but is a vital component in enabling researchers and companies to translate other countries' research results and technology into new made-in-Canada research, applications and benefits. Moreover, because of our small economic size, basic research excellence is Canada's most important 'entry-ticket' into the international R&D networks and social interactions that are essential for nurturing world-leading Canadian researchers and companies. In short, Canadians must be excellent in made-in-Canada research, *both basic and applied*.

It has also been shown that the presence of excellent basic research in a region or country actually stimulates enhanced *industrial* R&D, a key point given the low spending on such R&D in Canada. In addition, and crucially, institutions pursuing basic research generate state-of-the-art graduates, employees, and entrepreneurs, often spawning important spin-off companies and sometimes generating dynamic regional economic clusters like Waterloo, Ontario.

In a global knowledge economy, then, the nations that successfully weather the challenges of the current economic environment, and that will return to long-term growth quickest, will be those that include world-leading basic *and* applied research and innovation in their efforts to stimulate their economies. The federal government has recognized this need with a variety of measures, but it must build on these accomplishments and correct some notable weaknesses, to ensure that research continues to contribute to Canada's prosperity to the greatest extent possible.

When people consider these kinds of contributions, they often focus on natural science, technology, engineering and mathematics. However, as research has become more interdisciplinary and multidisciplinary, and as the kinds of problems that research is expected to address have become more complex, research in culture, the arts, the social sciences and the humanities has assumed greater prominence as well. Such disciplines help us improve the techniques we use to educate children, to respond to environmental change, to address poverty, crime and the needs of an ageing population, to understand geopolitical change, and more generally to foster better communities and societies. For example, when we face mass disasters,

severe economic dislocations, or the outbreak of a new illness such as H1N1, social scientists help interpret and explain what has happened and can help find solutions for the issues at hand.

3. RESEARCH IN A RECESSION

Despite recent hopeful economic signs, it appears likely that recovery from the current recession will be long and hard. To minimize the effects on the lives of Canadians, the federal government therefore needs to implement further measures to help restore Canada's economic health.

In addition to the previously-explained broad effects of research, and the consequent need to support it in bad times as well as good, it is important to recognize the immediate local impact that research spending itself can have. The funds for the direct costs of research can be used *quickly* to create positions for scientists, students, technicians, analysts and support staff and to buy the materials and equipment they need for their work. Moreover, universities have unusually large economic multiplier effects: new money *quickly* trickles down to the local community as new employees (and the institution itself) purchase a wide range of needed products and services, and the vendors in turn purchase their own supplies and pay their own employees.

Continued government investment in research is especially imperative in a climate of economic uncertainty, both because of the value of research in contributing to an eventual recovery and also because other sources of support for research activities, such as businesses or charities, tend to diminish. Any short-term savings from under-funding research will be outweighed many times over by the cost of limiting the capacity of the economy to emerge strongly from the recession.

Attempts to save money in the short term by under-funding research can have additional serious repercussions that could take years to repair. Reduced funding risks the loss of existing research teams and networks, which may have been built-up over many years and which can be difficult or impossible to reconstruct even if funding is later restored. In the worst cases, researchers may choose to relocate to other countries, meaning the loss of the whole future stream of research generated by the individuals involved. For example, when Dr. Rafick-Pierre Sékaly, a leading HIV/AIDS researcher at the Université de Montréal, accepted a position in Florida earlier this year, he announced that he would take with him as many as 25 of his team of skilled researchers.

4. FIRST RECOMMENDATION

> ***CCR recommends that the government augment the funding for basic research by increasing by 5% the base budgets of the three granting councils and of Genome Canada, with any new targeted initiatives being funded separately and in full consultation with the research community. Cost: about $100M p.a.***

4.1. <u>The need for enhanced support for basic research</u>

The value of basic research lies partly in its ability to make entirely unforeseen advances and discoveries. These create unexpected and truly new opportunities that are the impetus for the production of new applied knowledge, applied science, and technology; these lead to major product, process, and social innovations. The fruits of basic research are thus the building blocks of social and economic progress. Basic research in all disciplines is also necessary to the development of a well-educated citizenry from whom Canadian society can draw the next generation of researchers, innovative business leaders and highly skilled workers. The Obama

Administration proposes to invest at unprecedented levels in research, and the advantages of such investments, as we have seen, accrue chiefly to those countries making the investment.

However, no-one can predict how some particular piece of new knowledge might find itself applied to address social, economic or other issues. The private sector is therefore often loath to pay for basic research. To ensure a *balanced* mix of research, it thus falls to governments to ensure that basic research thrives as a public good. In Canada, the principal vehicles for funding basic research include the granting councils (NSERC, CIHR and SSHRC), which support basic and applied research in post-secondary institutions, as well as Genome Canada, the not-for-profit genomics research organization.

The trend of federal support for research over the last decade has been positive. However, while some recent stimulus measures, such as support for university infrastructure, have been indirectly beneficial by providing relief to the institutional homes of research, these measures do not necessarily lead directly to increased research activity. The absence of an increase in base funding for the granting councils in last year's budget, and the omission of any funding for Genome Canada, amounted to an effective reduction in support because the costs of scientific activities increase at a rate significantly higher than general inflation.

While the increases in support in earlier years were welcomed in the research community, recent initiatives have tended to focus on targeted activities, reducing the resources available for basic research. For example, adjusting only for general inflation, average annual grants in NSERC's core Discovery Program over the last 3 years are 10% lower than they were 20 years ago! Recommendation 1 would redress these problems.

4.2 The need for balance in new funding

We recognize, of course, that targeted initiatives in university funding can play an important role in enhancing specific efforts in areas of national priorities. However, it is critical to ensure that funding for new targeted initiatives (within or outside universities) does not damage the support for basic research. To do otherwise is to 'eat our seed corn' with potentially serious consequences. As Industry Canada's Expert Panel on Commercialization (obviously mindful of the importance of targeted research) put it in 2006:

> *The recommendations in this report are based on one key premise: continuing government commitment to publicly funded research carried out with little or no expectation of commercial application……. Added investments in research outside of universities must be complemented by continued increases in the public funding of research in Canada's universities.*

At times it may seem appealing to focus funding on more applied work, either because of an expectation of reaping rewards in the nearer term or because it is generally more feasible to identify specific goals and outcomes with applied research. It is therefore important to remember the great value of basic research, as discussed previously, and to balance the funding accordingly. It is also vital to recall that the unpredictable nature of basic research renders it unattractive to most industrial firms, leaving governments to fund it as an essential public good.

It has been demonstrated conclusively that some avenues of basic research will yield extremely important benefits, as described earlier. What is impossible to determine in advance is *which* of these avenues will be fruitful. For example, a major U.S. report in the 1930s undertook extensive

efforts to identify promising areas of research for the next several decades. It identified plant breeding and synthetic gasoline, but missed antibiotics, nuclear power, radar, jet engines, space exploration, transistors, computers, lasers, and biotechnology, the most exciting advances of the next few decades! This presents a challenge to those who seek to impose direction on basic research by demanding specific priorities or targets. Basic research outcomes cannot be dictated, whether to meet government policy objectives or short-term business needs.

New money for targeted efforts, then, should not be allowed to damage support for basic research. But *how* should targeted funding be targeted? For basic research, the granting councils utilize the research community itself to make the funding recommendations, recognizing that researchers, who often work closely with business, industry, and policy-makers, are in the best position to identify emerging opportunities and to judge the most promising research and researchers. With targeted research, other inputs (including the government's) are obviously essential to represent societal, economic, and other interests. Even here, however, it is still the researcher community itself that is most qualified to advise on what approaches are most likely to be fruitful, to set directions for the actual research, and to help the government ensure that research funds are allocated as efficiently and as wisely as possible. It is therefore extremely important to engage the research community fully at an early stage when targeting is planned.

5. SECOND RECOMMENDATION

> ***CCR recommends that the funding for the indirect costs of university research rise to represent 40 percent of the direct costs allocated to the granting councils. Cost: about $200M p.a.***

Grants to researchers, basic and applied, do not cover all the costs of their work. Their institutions provide buildings and laboratories, including specialized equipment or other facilities; power, information networks and other consumables; archives, libraries and other knowledge resources; and a variety of support services. The federal Indirect Costs Program, introduced in 2003, underscores the government's commitment to addressing this problem. It helps postsecondary research institutions cover a portion of the institutional costs of research, currently at a rate of about $330M p.a., or 25 percent of eligible direct costs. But the balance of costs continues to be borne by the institutions themselves.

The support has been indispensable to Canada's post-secondary research community, but studies demonstrate that the indirect costs of research are typically at least 40 percent of the direct costs represented by grants to researchers. AUCC reported in 2009 that competing jurisdictions, such as the United States, Britain and the European Union, now reimburse these costs at rates of 50 percent or more. By increasing support for the indirect costs of basic and applied post-secondary research, the federal government would (1) help to ensure that the health of the Canadian research enterprise is not compromised by infrastructure or maintenance challenges unrelated to the specific research activities themselves, and (2) help research institutions to direct their internal resources to other important functions, such as providing a high quality educational experience to students. Moreover, in a globally competitive research environment, offering state-of-the-art facilities helps Canadian institutions to attract and retain the most talented researchers.