

Chemical Institute of Canada

Responses	
1. Economic Recovery and Growth	<p><i>Given the current climate of federal and global fiscal restraint, what specific federal measures do you feel are needed for a sustained economic recovery and enhanced economic growth in Canada?</i></p> <p>Innovation is one of the most important factors for sustained economic growth. According to a 2008 study on growth and prosperity by the Department of Finance (DoF): "Innovation is fueled by new technologies adopted by firms through their investments..." It is estimated that over 50% of US growth over the past 60 years has come from scientific and technological innovation. The largest gains come from publicly funded research, because such research can be high risk and transformative, generating entirely new industries or sectors. According to the OECD, "economy-wide spillovers from public research have a 40% greater impact than... spillovers from private sector research" (DoF 2008 study). Interestingly, while Canadian university R&D scores at the very top of the G7; Canadian industry is ranked in the bottom half of OECD countries (DoF 2008 study). Closing this gap is necessary to create high value jobs in Canada and provide sustained economic growth. We propose that increased funds be allocated to fundamental purpose-driven research that is high risk and has the potential to be transformative. Canada is ranked in the top 10 out of 139 countries for academic/industrial collaboration, thus numbers alone are not sufficient. Partnership programs already exist at NSERC (Engage, CRD, and Strategic Grants); however, many are driven by applied research needs from industry. With high-risk research comes a high failure rate, which is why government, not industry, needs to be the major investor. The Strategic Grants Program at NSERC is a good example of a program that encourages basic research partnered between academics and industry but the program is underfunded, and it is critical that risk taking be encouraged. Most importantly: (1) projects should not be targeted to pre-assigned areas, so that completely new Canadian industries could arise, (2) significant new funds should be invested in order to have sufficient impact on the economy and (3) matching industry funds should not be required, allowing companies to be fully involved without having to continually seek financial resources.</p>
2. Job Creation	<p><i>As Canadian companies face pressures resulting from such factors as uncertainty about the U.S. economic recovery, a sovereign debt crisis in Europe, and competition from a number of developed and developing countries, what specific federal actions do you believe should be taken to promote job creation in Canada, including that which occurs as a result of enhanced internal and international trade?</i></p> <p>Significant federal investment in applied research has been targeted towards Canadian companies, but we live in a globally competitive marketplace. Decreasing artificial barriers that are currently preventing Canadian researchers from interacting with global companies will have an immediate positive effect on job creation. This is due to the infusion of international funds, and interactions with innovation-intensive international companies. The results of these interactions can benefit Canada in many tangible ways, including: (1) the development of spin-off Canadian companies resulting from international investments, which will then lead to wealth generation and high-tech employment in Canada, (2) international companies setting up operations in Canada to take advantage of contacts made and our significant talent pool, (3) improved international contacts for Canadian researchers and companies and (4) the</p>

development of Canadian-owned intellectual property. Foreign investment in higher education research is less than 1% of the total research dollars spent in this sector (STIC 2010 State of the Nation report). In addition to the benefits realized above, encouraging this investment will significantly leverage Canadian tax dollars. International projects increase internationalization of students and researchers since they often include research exchanges. Studies have also shown that foreign investment in R&D “contributes directly to higher levels of productivity by transferring the best production techniques to the host country and indirectly by putting pressure on the host country’s domestic producers to improve” (Gersbach et al. “Basic Research, Openness and Convergence”, Center of Economic Research white paper, ETH Zurich). We propose that the federal government increase funding for the granting councils, targeted toward collaborations between Canadian researchers and international companies and universities.

3. Demographic Change

What specific federal measures do you think should be implemented to help the country address the consequences of, and challenges associated with, the aging of the Canadian population and of skills shortages?

Compared to other countries, Canada has emerged from the global economic crisis relatively unscathed, resulting in a significant opportunity to recruit top researchers and industrialists from other countries. For example, in the United Kingdom the GERD/GDP ratio is one of the lowest in the G7, and thus British researchers, especially in science and technology, are looking to relocate. In addition, very little funding is available for young people looking for graduate work or industrial jobs in the high tech sector. Spain is another example: with general unemployment at almost 25% and youth unemployment at a staggering 50%, Spanish students and researchers may look to Canada as a positive career opportunity. Programs do exist to bring top graduate students and researchers to Canada, including Vanier, Banting, CRC and CERC programs. However, the costs of these programs permit only very limited numbers of researchers to participate, and only in an academic setting. Thus we propose that significant new funds be allocated for short term (i.e. 1 year or less) research exchange visits to Canada from universities and industries around the world. Limiting the duration of the exchanges will provide for more funds and increase the number of people who can participate. The end goal would be to encourage top international students and researchers to eventually relocate to Canada by providing them the opportunity to see Canadian research in action. Similar research exchanges are funded extensively by the Japanese government to increase internationalization of their students and researchers as part of the Global Centers of Excellence (GCOE) program. This program funds exchanges to bring international researchers to Japan and vice versa. In their 2007 competition, the Japanese government invested \$157.5 Million CDN in this program. The European ERASMUS program enables young researchers to spend 3-12 months abroad, and has had 2 million participants to date. This proposal would go a long way to solving issues related to skill shortages and improving our demographics with respect to our aging population.

4. Productivity

With labour market challenges arising in part as a result of the aging of Canada’s population and an ongoing focus on the actions needed for competitiveness, what specific federal initiatives are needed in order to increase productivity in Canada?

Productivity growth is one of the most important sources of long term economic improvement, but Canada has had a poor record in this area. Reasons proposed for this include: the low proportion of Canadians working in high-tech jobs; and Canada’s poor record on innovation (Bank of Canada backgrounder on productivity, 2010). Although Canada scores extremely well for education at the elementary and high school level, we rank extremely low in the number of PhDs graduating in Canada.

Many studies have shown that people with more advanced degrees are significantly more likely to innovate, which in turn leads to productivity advances. "Well-educated and skilled people make important contributions to business innovation, productivity, and national economic performance. In an interconnected global economy, countries with more highly skilled workers have a distinct competitive advantage." (Conference Board of Canada, 2010) In 2007, Canada was ranked last place for our graduation rate of doctoral students, and in the bottom half of comparator nations for graduates in science and technology. The 2010 STIC State-of-the-Nation report also points to this as an important area for improvement: "Knowledge economies rely on a highly-skilled workforce and a PhD represents the height of academic achievement. The number of doctoral degrees is also an indicator of the labour force potential to engage in cutting-edge research and training the next generation." Thus it is critical for Canada to facilitate graduate studies in science and engineering. High value programs such as the Banting and Vanier scholarships are part of the solution, but regular scholarship programs that are targeted to Canadian students are dramatically under funded. For example NSERC's postdoctoral program, which is open only to Canadian students, has had its success rate fall precipitously, from 34.9% of students in 2002 receiving funding to a shocking 9.3% in 2011. Since these fellowships provide critical funding for students just prior to their entry in the job market, it is essential that more Canadian students are given this opportunity. We propose that the federal government increase its investment in scholarships and fellowships to encourage more young Canadians to carry out advanced studies in science and engineering as a means to increasing productivity in the future.

5. Other Challenges

With some Canadian individuals, businesses and communities facing particular challenges at this time, in your view, who is facing the most challenges, what are the challenges that are being faced and what specific federal actions are needed to address these challenges?

Recent advances in digital technology have made the marketplace truly international. It is no longer sufficient for businesses to have a purely national focus, yet we do very poorly at training our young people to interact and innovate in a global context. Globalization is a reality, and our future scientists, engineers and entrepreneurs need to excel in a global context if Canada is going to improve or even maintain our standard of living. Studies have shown that scientists with international experience are more likely to engage in entrepreneurial activity than those with only domestic expertise (Krabel et al. Jena Economic Research Papers, 2009, 3, 26). This study showed that researchers at the Max Planck Institute in Germany were more likely to participate in entrepreneurial activities if they had carried out some portion of research or studies abroad compared to German-born, German-educated peers without international experience. The authors conclude that scientists working abroad learn to adapt to new work and social environments, which is an important skill for entrepreneurs, since adaptability and risk tolerance are critical for success. Current government initiatives, including those supported by the CREATE program at NSERC address some of these issues by focusing on soft skills of our graduates, including those in science and engineering programs. However investment must be made in programs specifically designed to "internationalize" our students, scientists and researchers. Programs in Europe (ERASMUS and Marie Curie) and Japan (Global COE) provide examples of how other countries have understood the link between internationalization and success in a global marketplace. Canada needs to do the same. This can be accomplished through funding internationally collaborative research at a high level to ensure sufficient numbers of Canadian graduate students and researchers can participate, and by designing targeted programs that have strong international components. We propose that Canada invest in internationalization of our scientists and engineers by funding international collaborations between Canadian researchers and international partners, including university-university, university-industry and industry-industry collaborations. Furthermore, new funds should be invested in fellowships for top Canadian students to spend time abroad in internationally competitive laboratories.

