

Opinion

Obama's stimulus plan must include science

By David Gross and Eric Kandel

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In 1933, in the depths of the Great Depression, the economist John Maynard Keynes wrote an open letter to President Franklin Roosevelt. In it, he described in terms that resonate today the requirements for an economic recovery package: "Speed and quick results are essential ... I put in the forefront ... a large volume of ... expenditures under government auspices ... Preference should be given to those which can be made to mature quickly on a large scale."

As president-elect Barack Obama's team designs an economic stimulus programme involving large expenditures, it may seem to others that administration priorities, such as strongly increased federal investment in the sciences, must wait for better times. We believe, with Mr Obama, to the contrary. The stimulus provides a great opportunity to begin rebuilding US science, because increased science funding is an ideal stimulus: it creates good jobs across the economy; there is large pent-up need so that money can be spent immediately; and it represents an investment in the infrastructures of scientific research and higher education that are vital to the future.

Basic science research in the US is largely funded by grants to individual investigators or national laboratories from the National Institutes of Health, National Science Foundation, the Department of Energy and other agencies. Federal money that science agencies invest in research grants, scientific infrastructure or national laboratories can be spent immediately to support research programmes already approved, salaries for laboratory scientists, purchases of supplies and equipment (most from small US businesses) and institutional expenses of the colleges, universities and medical schools where researchers work.

Scientific funding creates good jobs. For example, Families USA has estimated that each \$1bn (€742m, £660m) of NIH research grant funding creates more than 15,000 jobs with an average wage of \$52,000 a year and generates \$2.21bn of new business activity, a much better "multiplier" than many proposed parts of the stimulus package.

Federal funding for non-defence research in the life sciences has fallen in real dollars every year since 2004 and for far longer in the physical sciences. As a result, the health of the US scientific enterprise is seriously threatened. Success rates for investigator-initiated research grants are dangerously low, a situation that not only threatens established productive investigators but endangers even more the emerging careers of young investigators on which our research future depends.

Money could be spent within weeks of passage of a stimulus to fund the many highly rated applications that have been waiting for support in 2008 and to restore dollars cut from funded grants in recent years. NIH alone could spend up to \$5bn immediately on grants for highly rated projects and a similar amount over the next year. The NSF, DOE Office of Science and the National Institute of Science and Technology can be equally effective in applying funding immediately to backlogs of approved research proposals and to research facilities. Many national laboratories have been operating on inadequate budgets, with projects delayed, staff cut or forced to work reduced hours; projects are in danger of being terminated and facilities closed without additional funding.

Investing in scientific research serves a dual purpose: it is an immediate stimulus to the economy and an investment in US leadership in science, engineering, technology and education. This leadership is vital to the US's economy and prestige, as well as to success in such goals as achieving energy independence, mitigating global warming and treating

and curing disease. In addition to the immediate multiplier effect of research spending, the intellectual property created by publicly funded research leads to the creation of innumerable small companies and, ultimately, many large companies in biotechnology, energy, computer technology and other scientific and engineering fields. Federal seed money is multiplied by inflows of private capital. Federal funds also support virtually all research training and much of the academic training of those earning their PhDs in science and engineering in US institutions and so train the personnel who staff, as well as create, US scientific and engineering companies.

Spending on science, engineering and technology would be only a relatively small part of a larger stimulus package, yet it would make a vital contribution to the US's future. Increases in science spending provide an excellent stimulus at a time when the economy needs one. But to rebuild US science, spending must be sustained even when the economy returns to health. Mr. Obama has made a commitment to restore scientific funding to the levels needed to maintain the vitality and leadership of US scientific research. We believe that the forthcoming economic stimulus package provides a remarkable opportunity to initiate this effort immediately, forcefully and productively.

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