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Global Investments in Scientific R&D

Tom Price

For scientists around the world, one bright spot in the global economic meltdown is an increase in governments' investment in research and development.

Countries in North America, Europe, Asia and elsewhere have made research and development (R&D) a key component of emergency government spending programs that are designed to stimulate their economies. This comes at a time when many governments were already ramping up their regular appropriations for science and technology.

"Emerging from this economic crisis, successful countries will be those that create a knowledge advantage by supporting research and encouraging new lines of inquiry," said Gary Goodyear, Canada's science minister.

That's because "ideas propel prosperity," Goodyear said during an American Association for the Advancement of Science (AAAS) conference this spring. Knowledge is an endlessly renewable resource that, when shared with others, "makes exponential progress possible," he added.

It's especially important for governments to invest during hard economic

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times, Goodyear said, in part because private and public institutions feel pressure to cut back.

The Austrian government announced a 40-percent cut in this year's science budget, for instance, and then reversed course in April. The government settled on a slight increase that slowed, but did not reverse, previously announced plans for a large increase in science spending over time.

Canada has adopted short-term stimulus measures that support its long-term science and technology strategy, Goodyear said.

The long-term strategy calls for one of Canada's largest-ever investments in science, technology and innovation, Goodyear said. The government boosted the strategy's impact this year by allocating more than \$5.1 billion to science and technology initiatives. That includes \$2 billion to upgrade higher education facilities, \$750 million for other science infrastructure improvements and \$200 million to help small and medium-sized businesses become more innovative. The country's R&D tax credit is worth another \$4 billion annually.

Canada established 2,000 campus-based research professorships. Another 20 scholars will each receive \$10 million annually to perform research in Canada. As many as 500 graduate students will receive \$50,000-a-year stipends to study at Canadian institutions. The programs

are open to scholars from around the world as well as Canadians because, Goodyear said, “Canada wants the best, and we’re willing to do what it takes to get them.”

The United States is also stacking dramatic stimulus spending on top of an already ambitious science budget this year and next, Al Teich, director of AAAS’s Science and Policy Programs, said.

“We’re going to look back at this in future years with our mouths open,” he said. “Future generations are going to look at this as something special.”

Passage of the regular 2009 appropriations bills, which normally would have occurred in 2008, was postponed until Congress convened with larger Democratic majorities this year. That legislation approved higher appropriations than former President Bush requested and hiked spending in every major federal R&D agency, Teich said.

Combined with the American Recovery and Reinvestment Act, which Congress passed in February and is designed to stimulate economic growth in the United States, the 2009 appropriations legislation set federal R&D spending at \$172 billion for this year, up from about \$140 billion in 2008, Teich said. Because of the emergency nature of the stimulus legislation, he warned, it will be difficult to sustain R&D spending approved for this year and expected for 2010.

Nevertheless, President Obama has called on businesses to join the government in raising R&D investments to at least 3 percent of the gross domestic product in the near future. Currently it’s approximately 2.6 percent, with two-thirds financed by the private sector, Teich said.

Such goals are easier to set than to meet, however. In 2000, the European Council called on the European Union to hit the 3-percent mark by 2010, but it’s still below 2 percent.

Finland, Sweden and Japan already spend more than 3 percent on R&D, according to Nicholas Vonortas, professor of economics and international affairs at George Washington University. Vonortas heads the school’s International



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Science and Technology Program. At the other extreme, Poland invests just more than half a percent, Vonortas said.

Vonortas, who examined investments in nine countries, found similarities in Europe, Asia and Latin America. Entrepreneurship, innovation and competitiveness are popular buzzwords, he said. All the countries have policies designed to boost innovation. Universities tend to be seen as economic forces. Well-trained and critically thinking students, researchers and entrepreneurs are widely desired.

Some of the differences in countries’ spending for R&D are due to their varying histories and cultures, Vonortas said.

In Japan—which trails only the United States in total R&D spending

—governments, businesses, the public and the media share a broad consensus about the importance of science, technology and innovation, for instance. Companies make nearly three-quarters of Japan’s R&D investments.

Finland’s high 3.45-percent R&D rate is concentrated in a few industries, with Nokia performing almost half of the nation’s private R&D.

Germany boasts Europe’s largest R&D enterprise and accounts for a quarter of the EU’s R&D spending. There are what Vonortas termed an “institutionally entrenched recognition” of R&D’s benefits, vigorous economic exploitation of innovations, and solid private R&D funding. But German higher education can be too rigid, he said, and R&D “silos” can hinder German investments across disciplines.

Poland suffers from its communist legacy, Vonortas said. In Brazil, industries developed under strong protectionism and have a limited understanding of the need for private R&D, he added.

Leaders of developing nations are coming to understand the importance of science, said Alfred Watkins, the World Bank’s science and technology program coordinator. He cited Ghana’s newly elected president, John Atta Mills, as an example.

As in the developed world, poorer countries have different approaches and different needs, said Cathleen Campbell, president and chief executive officer of the U.S. Civilian Research and Development Foundation, which promotes international scientific collaboration.

“You need to adapt programs to meet local needs,” she said. “There’s no one-size-fits-all here.”

The World Bank is helping developing countries to build scientific infrastructure. Campbell’s foundation is teaching proper scientific procedures, such as the appropriate treatment of human research subjects, research ethics and research management. ▲

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