Science in Time of Crisis

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Abstract

A crisis usually poses novel challenges that cannot be met with existing knowledge. To confront the unexpected, we need scientific inquisitiveness and long-term basic research. Narrowly focused research programs cater to short-term thinking and are rarely an effective way to spend precious public funds.

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On January 23, 2008, the annual World Economic Forum convened, gathering the world's leaders at Davos and briefly transforming this alpine resort into a global knowledge center. Rubbing shoulders in a luxurious, yet informal setting, heads of state, central bankers, business tycoons and Nobel laureates pondered the state of the international financial system and, after several days of intense brainstorming, concluded that everything was in the best of order. Condoleezza Rice, the then US Secretary of State, had already set this upbeat tone in her opening address: 'The US economy is resilient, its structure is sound, and its long-term economic fundamentals are healthy.' But only a few months later, disaster struck. By mid-October, 15 large financial institutions in the

United States slid into bankruptcy and many others only survived as a result of last-minute government rescue or mergers with other banks. When Europe's financial system started to falter soon thereafter, the crisis threatened to spin out of control. On October 11, 2008, the head of the International Monetary Fund warned that the world's financial system was on the 'brink of systemic meltdown'.

How could this happen – and could it happen again? While a massive international containment effort prevented the worst, it remains to be seen what, if anything, we have learned from this crisis. It is the general consensus that its main causes were unbridled greed and a grotesquely 'liberalized' financial system. Many also blame the influential theories of US academics who had espoused the unfailing wisdom of free enterprise.

The tragically confident message of the 'experts' at Davos has also laid bare the inherent limits of knowledge. We scientists have always acknowledged these limits: contrary to public opinion, our day-to-day business is not knowledge, but ignorance. We try to convert it into knowledge, but then distrust this knowledge. We are incurable skeptics and stubborn enemies of 'eternal truths'. When I was still doing biochemical research, I considered the knowledge emerging from my research almost like a by-product, which others would store, catalogue and perhaps incorporate into textbooks. My major agenda was not to *own* knowledge, but to *create* it. A textbook of biochemistry was not 'Biochemistry', but the 'History of Bio-

chemistry'. 'Biochemistry' was looking at a new biochemical result, or discussing a puzzling finding with students and colleagues. And my greatest – and usually unrequited – dream was to create new ignorance: to discover something of which we had not known that we did not know. When Sigmund Freud discovered the subconscious or Max Planck the energy quantum, they offered us magic new continents of ignorance waiting to be explored.

Knowledge reflects the past and has limited power to deal with the present or the future. For solving present or future problems, we need to 'see, what everybody sees, but to think, what nobody has thought before'. We need innovative scientific minds. We put too much trust in 'secure' knowledge and too little in risky exploration. We should heed John A. Shed's advice: 'A ship in harbor is safe; but this is not what ships are made for'. If the evolution of life had shied away from risky exploration, we would all still be bacteria.

Has the 2008 World Economic Forum meeting told us anything about how best to harvest science's benefits for society? I believe it has. First, the collective misjudgment of 'knowledgeable experts' has highlighted the need to challenge existing knowledge continuously with the critical eye of science. Psychologists at the University of Gießen have recently found that financiers base their everyday decisions less on logic, and more on 'gut feelings', than most other people. No wonder that some of the most

successful private investors prefer to hire mathematicians, theoretical physicists or other scientists rather than business graduates. Davos 2008 should caution our educational systems against focusing too much on conveying knowledge and narrow professional training at the expense of independent and analytical thinking. Second, our governments should stop telling scientists what they ought to find. The current trend to finance scientific research through 'program grants' to groups rather than through grants to individual researchers is a sure way to cripple innovation. Many of these programs prescribe a short-term and fashionable goal and demand that it be pursued by organized research teams which necessarily curtail those who have the courage to swim against the stream. And third, our most powerful weapon against future crises is not the quick 'fix', but innovative basic research. Even though this type of research usually lacks well-defined time frames or precise goals, it has always been the main driving force for cutting-edge innovation. The United States and Germany have had the technological foresight and political acumen to meet the current crisis by strengthening their commitment to basic research; what a shame that Austria, Italy and other countries have chosen the opposite direction and decreased their funding for basic research. Basic research fosters bold scientific minds. We now need such minds more than ever. In times of crisis, innovative minds and long-term research are our best allies.