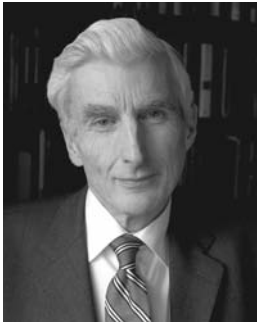


SCIENCE: OUT OF THE ECONOMIC DOWNTURN



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Ever since the Industrial revolution, science has been driving the global economy. As a scientific nation, the UK is, by most indicators, second only to the US. But this is not fully reflected in our economic strength, so where have we gone wrong?

In these tough economic times, we are refocusing on how best to harness this strength to our national advantage. Political responsibility for nurturing our academic talent and for unlocking the economic benefit now rests with a single 'super ministry', the Department for Business, Innovation and Skills, and particularly in the hands of Lords Mandelson and Drayson.

It seems clear in retrospect that this country was precariously over-dependent on its financial sector; the new ministry's aim should be to ensure that our science and engineering strength enables us to emerge from the downturn with a more diversified economy. There should plainly be special boosts for topics ripe for exploitation – via

procurement policy, and via the Technology Strategy Board and other bodies. It is nonetheless important that long-term prospects – and the strength and breadth of the UK's underlying academic base – shouldn't be jeopardised.

There have been concerns about this balance, especially from those in the university sector – after all, 'business' comes first in the new department's name; neither science nor universities is mentioned.

If the new department were to analyse the UK's 'assets' most relevant to the recovery, what would they find? High among them would be our universities. We are the only country outside the US with several universities in the top international league, and research excellence is spread throughout the sector.

The most readily measurable economic benefit of academic research is direct knowledge transfer from university labs to industry. But that is only a small part of the total. Research universities fulfil other key roles that are harder to quantify. They are networked with the whole world's research. Their graduates spread expertise throughout the private and public sectors. The worry must be that if we do not continue to invest in our graduates and provide them with opportunities they will be tempted to the US or countries such as China where opportunities are increasingly available.

Our leading universities (like Harvard, Stanford and MIT in the US) are not primarily places for

'applied' research. It is within them that transformative discoveries emerge, unpredictably and unplanned. But there is a strong correlation between the research quality of a university and the strength of the commercial cluster that is attracted around it. Talent attracts talent, and big companies, too. In these high-tech communities, success breeds success and – just as important – failure is accepted as a step towards later success. Around Cambridge alone there are over 1000 start-up companies, a number of which have become multibillion dollar international enterprises.

I am fortunate to know many of the leading UK scientists – those who have won Nobel Prizes or the equivalent. They are all individualists, but on one thing they would all agree: they would highlight the long-term nature of their work, the unpredictability of its outcome and the need for a supportive environment. To ensure that our universities stay competitive (and retain top talent despite the blandishments of top research centres in the US and the Far East), it is crucial that they continue to offer this environment.

Lord Mandelson recently offered reassurance that the science budget channelled through the Research Councils is 'safe' and 'ring-fenced'. He confirmed that the funding would continue to be run according to the Haldane principle which dictates that scientists, rather than politicians, are best placed to decide which projects should be supported. He recognised that fundamental

science is essential to maintain our ability to produce pioneering research that will support a sustainable base for our future prosperity. He has also lauded our universities and their contribution to the economy. This is all excellent news.

It's in our interests to support real excellence right across the board – and indeed it's affordable even in these straitened times. One of my predecessors as President of the Royal Society, George Porter, averred that there are two kinds of science: applied and not yet applied.

None of those who worked on the magnetic properties of atomic nuclei had any thought that their work would one day (through the Nobel Prize-winning work of Peter Mansfield at Nottingham) have medical applications via the MRI scanners we find in every hospital. Similarly, the pioneers of lasers had no idea that they would be used in eye surgery or in DVDs.

The Royal Society has convened a group with wide ranging expertise (it contains two former science ministers, two Nobel Prize-winners, and others with commercial experience) to study the long-term value of science to the economy. Its report will be entitled 'The Fruits of Curiosity' – a phrase that captures the value of science. Most great breakthroughs do start with the curiosity of the scientist but in science, engineering and medicine the payoff for research and development can take

decades rather than years.

It clearly makes sense also to look at where we have been successful and where we might do better. The pharmaceutical industry has flourished in synergy with the UK's research base in biomedical science. And that base is strong because public support for biomedical sciences has been massively supplemented by charities, and by the industry itself. There are many examples of financial success in the medical sector – the winner of this year's Royal Society Mullard Award, Shankar Balasubramanian, received a £200,000 Research Council grant in the 1990s to study rapid DNA sequencing, and within a decade this led to a business worth about \$2 billion.

But what about other sectors? The earlier ministerial stint of Lord Drayson, at the MoD, where he oversaw procurement of high-tech equipment (a responsibility that is once again in his remit) will have convinced him that our manufacturing sector in physics-based industry is patchy. There is a paucity of major high-tech manufacturing companies in the UK. Indeed the weakness of our electronics industry stems from short-sighted policies and lost opportunities in the 1970s and 1980s, from which lessons can surely be learnt. We had the science but we failed to capitalise on it.

At a time when we need to rebalance our economy towards high-tech manufacturing and services, we should build on the momentum developed during the last 12 years of sustained government support and invest in efforts to recover our strength in the industries based on the physical sciences.

Indeed, to retain our international competitiveness, we must raise our game. That's

because the pull of the US is now much stronger. Lord Mandelson has asked that the Government be judged on their policies and that is fair, but the policies must not only be judged against previous measures but must be seen in the light of the efforts in other countries. The Obama administration has given America's scientific community a massive boost – in morale and in substance – promising to

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move science to the heart of government and the economy. Our success in attracting and retaining mobile talent will be at risk unless we respond – and unless we can deploy our

limited resources even more cost-effectively than the US does.

This article first appeared in The Times on 23 June 2009.

The Royal Society celebrates its 350th anniversary in 2010, with a programme that begins on the 30th November 2009 (known in the Society as Anniversary Day from the date of its founding) and running until November 2010.

In the run up to its anniversary, the Society is establishing a Science Policy Centre. We want to strengthen the voice of science in UK, European and international policy. We want to champion the contribution that science can make to economic prosperity, quality of life and environmental sustainability. And we want to be a hub for global debate about science, society, policy and politics.

More information about the Science Policy Centre is available at royalsociety.org/policy.

The anniversary will be celebrated with a year-long series of events, exhibitions, and publications to increase both the public's involvement in and the profile of science, promoting a spirit of enquiry, excitement and engagement with science.

The Society will be working with organisations across the country to raise the profile of science and bring scientific activities to a new audience. This will include:

- A unique nine-day science festival in the summer of 2010, held at the Southbank Centre in London. There will be collaborations with artists and performers, debates, broadcasting and the participation of audiences. In particular, it will include an enhanced version of the Society's annual summer science exhibition, which gives visitors the opportunity to meet the scientists and engineers at the forefront of the UK's research activities and to explore their work through interactive exhibits.
- The Local Heroes programme – the Society will be working with fifty museums and galleries around the UK to celebrate their local scientific heroes, whether they are pioneers of the industrial age, geniuses that changed the way we see the world today or contemporary scientists finding solutions to today's problems.
- The Capital Science programme – the Society will be working in partnership with leading museums and galleries, as well as other organisations in London, to celebrate the Royal Society's anniversary and explore the impact of science within the wider cultural landscape. The programme is wide ranging and includes major keynote events and lectures, as well as fun events and learning activities, which popular London museums will be running for families and younger audiences.
- Public lectures, debates and discussion meetings at the Society's premises in Carlton House Terrace.
- Publication of special editions of the Society's scientific journals and a popular book covering the unique history of science and scientific issues of the last 350 years.

More information about the anniversary year can be found on the back cover of this publication and at seefurther.org.

