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# The Myth of Under-provision of Science by the Free Market

January 7, 2011 by Stephan Kinsella



Anita Acavalos has a fascinating post on The Cobden Centre's site:

## The Myth of Under-provision of Science by the Free Market

By Anita Acavalos, on 7 January 11

One of the recurring myths propagated by today's mainstream economists is that scientific research requires government funding in order to give society the maximum contribution possible. They start from the correct argument that scientific research is a fundamental link in the chain leading to development, but arrive at the incorrect conclusion that due to its significance it necessitates government funding. This is due to the incorrect assumption that not enough research will be provided by the free market. However, this conclusion is based on faulty economic theory. The two biggest mistakes economists make when it comes to scientific research is that they assume that it is a so-called 'public good' and base their conclusions and analysis on a theory that neglects the role of the entrepreneur in this field. This paper aims to show that both of these arguments are wrong: not only is scientific research not a public good but also the entrepreneur, guided by profit and loss, is the most effective decision maker when it comes to the crucial questions of how much research is needed and how it should be provided. The fact that the entrepreneur works as a coordinator, guiding resources in their correct uses and making decisions about how scientific research should be carried out, makes the free market a much more efficient and effective provider of scientific research.

Economists widely hold that science is both non-excludable and non-rivalrous thus necessitating government funding. However, Terence Kealey, a scientist specializing in Clinical Biochemistry argues that in practice this is not so. This is because the cost of interpreting the ideas provided by science is not the same as ideas in other fields. Being able to use scientific research is not the same as copying a cooking recipe for instance (although some may argue even that is not perfectly replicable, as it depends on the skill of the cook). People are excluded from the benefits of theoretical science because of the fact that they are not all equipped with the necessary scientific background to understand it and be in a position to use it meaningfully.[1] I would argue this is analogous to wireless internet services which technically are non-excludable but can be made so with the use of a password. In the case of science this metaphorical password is the necessary training and academic achievement to become part of this scientific community. Moreover, in order to make important discoveries and get the benefit of access to other scientists' research, scientists have to be published in order to build a reputation. Therefore, although ideas in science are not always exchanged for money, they are exchanged for other ideas. These ideas need to be provided freely by the scientist in order to increase his likelihood of gaining access to other scientist's ideas that could further his work, thereby creating a pool of knowledge. Therefore, since people have had to incur a cost in order to be able to access this knowledge pool, Kealey defines science as an 'invisible college good.'[2] Under this system scientific knowledge is used and distributed freely among scientists. Most advocates of patents say that this is problematic as scientists may have their ideas 'scooped' by others after publication and may not be able to reap the full profits from it. However, these people ignore that the first person to publish on a topic is the person to gain the academic credentials of this achievement. Also, by being the first person to make the discovery he gets to be the first person to profit from this discovery as it takes time for someone who scooped the idea to get to a point where he can produce something useful from it. However, even if we excluded this first mover advantage and assumed that replication of this person's discovery was instant upon publication, he still benefits from this system. This is because although he incurs the risk of having his research scooped by someone else, he is more likely to in turn scoop someone else's research as this free distribution system of science gives the scientist access to a greater pool of knowledge resources. This means that the speed by which scientists are able to adopt methods or ideas produced by other scientists and improve them in order to make greater profits in the area of applied research or improve their academic record in the area of theoretical research will be increased. After all, "technological progress is a gradual process, a chain of successive steps performed by long lines of men each of whom adds something to the accomplishments of his predecessors."[3] Thus, we see that government funding is not necessary for science, as scientists have large benefits in terms of prestige and increased employment opportunities by publishing. Also there is no need for government protection of scientific discovery as the greater pool of knowledge emerging benefits all scientists alike and speeds up the implementation and

development of new ideas.

Another main argument used as to why scientific research needs to be government funded is that in order to be conducted efficiently, large teams are required which are too expensive for individual firms to employ. This is the reason why they argue such teams will not emerge under a free market for science. However, the private sector will not do away with large team based projects, instead what the entrepreneur will do under a system of privately funded science will be to "right-size" his team. Since having a team of an unnecessarily large size will come at high costs to the entrepreneur there will be an in-built disincentive to let team size grow beyond the point to which the cost of the extra scientist outweighs his potential contribution. This disincentive does not exist when a team is being financed by government funds especially since a larger team can secure larger funds with greater ease. The existence of government funds creates a moral hazard problem as the cost of payment and management of a team that is too large is not borne privately. As Terence Kealey argues, "special interests only struggle for government funding if they suspect that the tax load will fall on others."[4] Under a system of privately funded science, firms will hire enough scientists to ensure the project bears fruit but not so many so that the project ends up costing more money than it can earn. Thus profit and loss will guide the entrepreneur to the optimum team size. Most of the advocates of large teams point to the creation of the internet which was a large government funded project and argue that this could not have been created by the private sector. However this is a purely counterfactual assumption. The internet was an unintended consequence of government military spending and its present contribution to society had nothing to do with the government's initial motives. It was the market that converted it into a good that had the ability to benefit society. Crediting the government for the invention of the internet is like crediting the Pharaohs for the modern Egyptian tourist industry. The fact that the pyramids they built enabled the private sector to detect a market opportunity in modern times does not in any way mean they should be given credit for it.[5] Moreover, in his paper Science, Technology and Government, Rothbard references a study by Jewkes et al that took 61 of the most important inventions of the first half of the twentieth century and found that over half of those were achieved by individual scientists at their own expense.[6] Most of the remaining inventions were achieved either by small firms or small teams working as part of larger firms. Thus he successfully debunks the myth that science is *necessarily* a project requiring a large team. In fact having large teams tends to cause large problems and has high administrative costs as it requires a large amount of coordination among its members. Large teams require complicated management structures, but this will inevitably mean that resolution of bureaucratic problems and coordination, as opposed to research will have to become the team's primary focus. Since these coordination problems will not exist in smaller teams managed privately and funded privately, more results will be produced at a lower cost.

Moreover, any project that is led by a committee of people will stifle truly original ideas, which will often be dismissed as impossible. This is because the achievement of the innovator lies in the fact that "he accomplishes what other people believe to be unthinkable and unfeasible."[7] Thus research reviewed by government boards is bound to frequently exclude the most original ideas. Even if these bodies were fully run by scientists and experts as a lot of people who advocate the government funding of science argue today, these bodies will still be characterized by a knowledge deficiency. This is because scientific knowledge is very specific and each individual invention requires a large amount of specialization in the field. Even taking a scientific discipline as established and widely studied as physics, a department of scientists focusing entirely on this subject will have to have a large number of specialists.[8] Even assuming that the department was able to employ specialists in astrophysics, nuclear physics, molecular physics, relativity, biophysics, electronics and all the sub disciplines of physics, their level of specialization would still not be enough. This is because even within those disciplines there are yet still narrower areas of focus that these scientists need to pursue. Therefore it is essential that science is managed on a more micro-scale as small teams of scientists or individuals can focus on the fields of knowledge they know best and it is this specialized knowledge that will render them able to understand which lines of scientific inquiry are worth pursuing and which are not. Thus this planning, especially when it is done on a very large scale inhibits, rather than encourages progress by the frequent adoption of bad projects and rejection of good ones because they fail to appreciate their originality and potential. If, however, individuals are allowed to pursue these ideas with their own resources free from government dictation exercising their entrepreneurial judgment, a system is created whereby the scientists particularly receptive to good ideas are rewarded by profits and those who fail to recognize good ideas are rooted out of the system by suffering losses. This profit and loss system is absent in government directed research, meaning that the government is not punished for its failures and inefficiencies and thus may be over-allocating money to bad projects. A perfect example of this is the case of the Ministry for International Trade and Industry (MITI) in Japan that has not only poured vast funds into wasteful projects but has also been strongly opposed to the developments of cars, electronics and cameras which are precisely the areas in which Japan has proven to be the most efficient. Moreover, just before the market for the small personal computer opened MITI invested in a giant project for the construction of 5th generation supercomputers that generated £400 million in losses by 1992 showing the severe consequences of their lack of entrepreneurial foresight on the taxpayer.[9] Also, having the best scientists in a sector pining for government jobs as opposed to doing research is inherently counter-productive as it causes a brain drain out of research and into bureaucracy. Finally, the need to request government grants for research will bring an end to serendipitous discovery and the hobby scientist which have been credited with discoveries such as the synthesis of water from its elements, evolution, and the construction of the Great Reflecting telescope.[10]

The issue of working conditions for scientists is extremely important, as scientific research is a field that requires immense amounts of focus. An unpleasant working environment or one not well suited to the scientist's needs and plagued by bureaucracy will render him less productive which, especially in this sector, may mean that in the conduct of an experiment he may fail to make an observation that could lead to a large scientific discovery. This means that any government-directed and thereby non-individualized working environment will cause impediments to scientific research. However, if government stopped funding science and trying to create a formula for successful scientific research, what would emerge in the free market would be a variety of firms of different sizes conducting research in the manner that is best suited to the nature of the problem thus offering scientists working conditions tailored to the nature of the work they are doing. On the other hand, it is in the nature of any form of government funding to create barriers to entry for new smaller firms. This means that the firms that will remain in the market will be the few large firms able to obtain government grants. It is this absence of diversity in working environments that renders a lot of scientists unproductive as they are unable to work under the current system and have no other options. The existence of

government conducted research will create a large barrier to entry for small scale untrained researchers. The fact that the only way to obtain funds and be able to assemble a team in order to conduct experiments will be exclusively through the government, will exacerbate the shortage and discourage people even more from becoming scientists. If the sole (or primary) employer is the government, this will lead to an increased difficulty to obtain a job as a scientist. This is because the government has to set a budget that is not flexible enough to change with market conditions. As a result instead of quality rationing, which will be the method of the free market, they will have to engage in quantity rationing. The high likelihood of unemployment coupled with the inevitably low government wages will cause fewer people to want to become scientists. People who are only interested in specific fields that the government underfunds will have a disincentive to put their own funds in their projects and compete with the government funded companies. This will mean that smaller scale projects enabled by the free entry into the sector are less likely to occur. These innovators will instead be pushed to overcrowded mainstream lines of research that receive large government grants instead. Another issue related to working conditions is the issue of the type of competition emerging between scientists under a government funded system. Under laissez-faire the expenditure on science is determined by the marketability and projected significance of a project. Under a government funded system where there is a limited budget, a government may be offered 100 great projects and only be able to fund 50. Thus the emerging type of competition is not competition to create ideas but essentially competition to sabotage those who potentially have better ideas than you. This creates an environment in which scientists do not cooperate and become increasingly preoccupied with secrecy instead of the promotion of knowledge as their success necessitates another scientist's failure.

Furthermore, government research frequently gets caught up in existing research initiatives and tries to find applications for them even if these applications are not of any great importance. In a research system where decision making is done privately and risk is borne privately, entrepreneurs will ignore the importance of current scientific developments *if* their foresight indicates that this knowledge cannot be used any further, and will not divert resources away from other more urgently needed innovations. An example of the government making this fallacy lies in the exorbitant amount of funds governments have placed on space exploration. Although space exploration is an area of great intellectual interest, it has few if any applications to most peoples' everyday life. As a result, even though people may be interested in space exploration, given the exorbitant costs the majority of people would not be willing to foot the bill out of sheer intellectual curiosity. This is because space exploration at this point in time has no track record of being able to make any tangible difference to the average person's daily life. The government system, however, is rarely bothered with the public's willingness to pay because when it comes to the funding of science it is a system that is "obsessed with supply, and … ignores[s] actual demand."[11] That said, it is entirely possible that under a private system, wealthy entrepreneurs such as Richard Branson who have demonstrated a high intellectual interest in space travel, may fund it out of personal interest. There is, however, no justification for coercing every citizen of a state to pay for research and projects he has no interest in and will never use. Funding for space exploration started as a result of a western panic when the USSR were able to launch Sputnik, creating fears that they could destroy America from space. Given the fact that the project has had no further applications, the private sector would have aborted or downscaled this project and saved the public billions of dollars.

Overall, we have seen the significance of the profit and loss mechanism in allocating funding for science projects and deciding on a micro scale how these projects should be managed. The elimination of this profit and loss mechanism is bound to lead to inefficiency as government bodies will not be able to use it as a guide to determine exactly which research projects can bear the most fruit. Finally, we have seen how the public funding of science tends to distort its results because "science is nothing if it is not truth, and truth is hard to reconcile with politics."[12]

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[1] This lack of knowledge does not, however, exclude people from benefiting from the commercial products of this science.

[2] He explains this concept further in his speech at the 2010 Property and Freedom Society conference in Bodrum, Turkey.

[3] Von Mises, L., Theory and History, 1985, USA, page 193

[4] Kealey, T., The Economic Laws of Scientific Research, 1996, Cambridge, page 53

[5] Von Mises, L., Theory and History, 1985, USA, page 196

[6] http://mises.org/rothbard/science.asp

[7] Von Mises, L., Theory and History, 1985, USA, page 194

[8] The problem becomes greater with newer areas of science such as cloning, artificial intelligence, and neuroscience, where there are even fewer specialists.

[9] Kealey, T., The Economic Laws of Scientific Research, 1996, Cambridge, page 111

[10] Kealey, T., The Economic Laws of Scientific Research, 1996, Cambridge, page 75

[11] Kealey, T., The Economic Laws of Scientific Research, 1996, Cambridge, page 261

[12] Kealey, T., The Economic Laws of Scientific Research, 1996, Cambridge, page 301

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