THE STATE IS AN ENEMY OF SCIENCE:

A REVIEW OF TERENCE KEALEY'S

THE ECONOMIC LAWS OF SCIENTIFIC RESEARCH

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Terence Kealey. *The Economic Laws of Scientific Research*. London: Macmillan, 1996.

SCIENCE IS EASY TO LOVE. After all, claims such as "Having more science at our disposal makes the economy grow faster," and "Science leads to the development of technology that improves our standard of living" have become conventional wisdom. Given these ideas, it might seem that if government must perform some economic function, funding scientific research is a worthy goal.

However, none of these claims are true. In his book, Terence Kealey goes to great lengths to correct major misconceptions about scientific research. First, he deconstructs the popular but oversimplified idea that science leads to technological advancement, which then leads to economic growth. Second, he describes the real relationship between science, technology, and the economy. Finally, he shows how state funding does not benefit science, but instead negatively impacts the scientific progress in a variety of ways.

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While students of Austrian economics might not be surprised by the Kealey's arguments, the details of how the free market produces science in a rational way— and how government destroys this process— are invaluable.[1] From the standpoint of ethics, science and technology might appear to have little to do with libertarianism. However, technological development has such obvious and immediate benefits that, unlike economic policy, most people can understand the connection. Therefore, persuasive utilitarian arguments for libertarianism can be made by showing that a libertarian society produces the most effective technology for improving human welfare.

I. The Prerequisites of Progress

Science may explain how birds fly, but until an engineer builds an airplane and an entrepreneur invests in producing it, there is limited impact on the economy. Kealey explains that science only leads to economic growth indirectly, by supporting new technologies that increase productivity. Greater productivity leads directly to economic growth and higher standards of living.[2]

Yet Kealey goes on to make a more subtle point. It is not enough to simply focus on technology as a driver of productivity because technology is not homogenous. If someone develops a machine that is ideally suited for collecting moon rocks, it will not have the same economic impact as a machine that efficiently converts seawater into potable water. At any particular time an economy can only make technological progress in certain areas, and it is not easy to predict which technologies will have the greatest benefit.

Fortunately, the free market naturally chooses the best technology for satisfying human needs by using the information embedded in the price system.[3] When people want electronics, manufacturing them becomes more profitable. This encourages development in that area. On the other hand, government ignores market signals. Bombs are built instead of bridges, and capital is squandered and destroyed.

In fact, the state can be so destructive towards science that not only can progress be impeded but it can be halted altogether. Kealey describes the disruptive power of ancient Asian states:

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[1] Ibid. pp. 17, 28, 56, 220-221.

[2] Ibid. pp. 100-4.

[3] Ibid. pp. 45, 261-2.

> In India, as in China, tens of thousands of peasants could, for centuries, be regimented into complex collective efforts: dams could be built, as could canals, roads, forts or temples. But for generations, the same dams, canals, roads, forts or temples were built. Designs did not change.
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> Why did technology stagnate? What property did the Bronze Age civilisations share that their neolithic predecessors, the cultures from which they had emerged through the development of new technology, did not?
>
> One major property that the sterile cultures all shared was that they were totalitarian states whose citizens were denied freedom. In no Bronze-Age civilisation did individuals enjoy legal rights, and each person was totally subject to the central authority (generally an emperor and his court). Each civilisation, moreover, elaborated an all-powerful religion which froze all intellectual or cultural development.[4]

So, just as economic growth depends on science and technology, science and technology depend on liberty.

II. The Relationship between Science and Technology

From the beginning of government support for scientific research, scientists have pleaded for funding by arguing that more scientific research will inspire new technology to foster economic growth. However, Kealey explains that just because science is more fundamental than technology does not mean that it precedes technology.

For example, it might seem reasonable that a scientist would first discover electrons and then engineers would begin building new technology using electricity. However, it turns out that more often than not the opposite is true[5] and the reasons should not be surprising. It is easy to make use of intuition regarding some scientific phenomenon, but it takes a deeper understanding to tease out related scientific laws. Men were making fires long before the laws of thermodynamics were understood.[6]

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[4] Ibid. pp. 16-7.

[5] Ibid. p. 163.

[6] Carnot, Sadi. *Reflections on the Motive Power of Fire*, ed. E. Mendoza. Mineola, NY: Dover, (1960). Cf. also James, Steven R. (1989) "Hominid Use of Fire in the Lower and Middle Pleistocene. A Review of the Evidence." *Current Anthropology*, vol. 30, pp. 1-26.

Typically, new technology is developed by engineers based on current technology, and scientific discoveries come later to explain what the engineers have done.[7] Science does help inform engineers, but Kealey believes that it has a much smaller relative contribution, of around 10%.[8] So, for the goal of promoting new and better technology, concentrating on basic science will not be effective.

To see what is effective, it is important to understand why technologically advanced economies grow relatively slowly, while undeveloped economies have the potential to grow much faster.[9] One primary reason is that advanced economies have maximized their potential with current technology. They have fully exploited it, and in order to improve they need to do research to develop better technology.[10] This is the real reason science is important.

Undeveloped economies, however, can make huge gains without doing research by merely copying current technology from more advanced economies.[11] (As an aside, it should be noted that entrepreneurial investment must accompany technological change.) This rapid growth will only last until they have caught up with the advanced economies, and then their growth will be limited by the same technological barrier. Then they too will have to join the research efforts in order to maximize their progress.[12]

The amount of scientific research needed in any particular economy is dependent on how advanced that economy is. Less advanced economies need less research or none at all. Yet, even advanced economies have an upper limit on the amount of research that will be useful for improving people's lives. Trying to force more money and labor into research will not necessarily speed up technological development, nor will it necessarily increase economic growth. It will only divert resources from more important uses.

III. Government Funding

If investing in science is good, or at least, better than some of the other things government might do, then why not let government fund *some* science?

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[7] Id. p. 163, note 2.

[8] Ibid. pp. 216, 219, 290.

[9] Ibid. pp. 104, 245.

[10] Ibid. p. 238.

[11] Ibid. p. 109.

[12] Ibid. pp. 113, 126.

Well, not all science is equally useful, and Kealey explains how government funded science tends to focus on pet projects, useless questions, or other special interests.[13] Compare this to private funding, which typically goes to pressing social needs, like cancer research, and corporate funding, which goes to satisfy market demand, as in the case of new computer technology.

Companies respond to consumer demand by making products that people want and technology to make their jobs easier. This technology is directly relevant to satisfying consumers because in a free market companies have no other option for survival. When a company reaches a certain level of technical sophistication, it finds that in order to improve its technology it needs to do basic scientific research.[14] This is one example of the productive scientific research that occurs in the free market.

While private companies can discover what kind of research they need to do in order to improve their products, governments do not know what type of research should take priority. Through this lens, it is easy to see how government influence derails productive efforts in favor of funding unproductive companies, political boondoggles, and useless research programs.

Yet, even if government could properly prioritize research projects, it still could not rationally decide on the amount of research to do. With limited access to economic calculation, as well as limited quantities of capital and labor, there is no way for the government to know which projects will be a net gain for the economy and which will be a net loss. If no research is done, technological progress will stagnate. If too much research is done, other areas of the economy will suffer. This happened in Russia during the reign of communism.

> [T]he USSR, before its collapse, possessed about a quarter of all the research scientists in the world (1.5 million researchers) and about a half of all the qualified engineers in the world. So huge were its science budgets, and so honoured were its scientists, that the highest paid official in the whole Soviet Union was the president of the Soviet Academy of Sciences. Researchers were so well paid, and were held in such esteem, and had access to such privileges, that even government ministers would urge their children to become scientists. But it was all wasted money. The Soviets would have done

[13] Ibid. pp. 247-8.

[14] Ibid. p. 115.

> better to have simply copied the imperialist lackeys and running dogs of bourgeois oppression.[15]

As with any industry, government intervention in the field of scientific research suffers from the problem of misallocating scarce resources.[16] It cannot rationally allocate funding like the market, so it degenerates into the funding of cronies and waste of capital. Just as government disrupts the capital structure of the economy at large, it distorts the scientific community, encouraging politically correct work rather than scientifically important work.[17] Not to mention the ways in which government inhibits good research with regulations, intellectual property, and outright research bans.[18]

Yet, even if it is assumed that the amount of funding available for science is the only thing that matters, then Kealey's book has one last surprise in store. There are two sources of funding for scientific research. The first is the market, including private companies, charitable organizations, and enthusiasts. The second is the state. It turns out that for every dollar the government provides for scientific research, more than a dollar of private funding is withdrawn.[19] This might be due to the increased tax burdens required to collect the government funds or the perception that private individuals need not fund science if the government is taking care of it. So, regardless of one's perspective, in some sense every friend of science and technology should view the government as an enemy.

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[15] Ibid. p. 261.

[16] Id. note 1. Cf. also Rothbard, Murray N. *Man, Economy, and State with Power and Market*. Auburn, AL: The Ludwig von Mises Institute, 2004 (esp. chapters 2 and 3 of *Power and Market*).

[17] Butos, William N., and Thomas J. McQuade (2006) "Government and Science: A Dangerous Liasion?" *Independent Review*, 11(2): 177-208.

[18] While it is legitimate to ban research that violates the non-aggression principle, the state has banned useful and voluntary research, for example, on life-saving medical treatments.

Andrews, Lori B. (1998) "Is There a Right to Clone? Constitutional Challenges to Bans on Human Cloning." *Harvard Journal of Law & Technology*, 11: 643.

Rod Plotnik, Haig Kouyoumdjian, *Introduction to Psychology*, 9th edition. Wadsworth Publishing, 2010. "The U.S. government banned research on MDMA in 1985, and only recently have researchers received permission to study its effects."

[19] Ibid. p. 245.

Conclusion

If there is one criticism to make of this book, it is that this important work would likely be a libertarian classic if Kealey had started from first principles. Rather than saying that government is monstrous when it comes to science, he could have begun by explaining that government is monstrous, and then shown how this idea applies to science and technology. Such an approach would have prevented some awkward moments where Kealey espouses self-contradictory ideas like minarchism,[20] and avoided his confusing ambiguity towards intellectual property.[21]

Thanks to praxeology, we know ahead of time that government action leads to degradation of any market,[22] including the market for science and technology. The main contribution of Kealey's work is that it shows precisely how this degradation plays out in practice. He has exposed the State in a way that can help those who love science and technology begin to appreciate libertarian ethics and Austrian economics. Not only can we have a peaceful society that fosters scientific and technological progress without the state, but it will in fact be the optimal solution to the equation.

[20] Ibid. pp. 193, 206-7, 344.

[21] Ibid. pp. 42, 76.

[22] Mises, Ludwig von. *Human Action: A Treatise on Economics*. New Haven, CT: Yale University Press, 1949, Section XXVII.