Book Review

Science for Sale: The Perils, Rewards, and Delusions of Campus Capitalism
by Daniel S. Greenberg
Chicago, IL: University of Chicago Press, 2007

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> In a field that has produced jeremiads from the critics of science for sale, and many fairy tales from the enthusiasts, what follows is an explorer's report (p. 8).

The above quote conveys the core inspiration of Daniel Greenberg's book. In a captivating, thought-provoking read, Greenberg distinguishes both the jeremiads from the critics and the fairy tales from the enthusiasts of academy–industry interactions. The outcomes of academy–industry engagement are increasingly observed as a potential contributor to the economic growth of a country and there have been significant increases in university patenting and licensing activity during the last three decades. The ideological beginning of these relationships can be traced back to post-war United States (US) government science policy, which encouraged interactions between universities and industry. While the general topic of technology transfer has a distinctive contemporary relevance and importance, Greenberg's investigation into the complexity of academy–industry interactions delivers an understanding and appreciation of the competing schools of thought on the matter. On one hand, there are strong concerns regarding the burgeoning academic scientist and industry romance as critics fear 'commercialism's power to chip away at the sacred pillars of academic culture' (p. 56). In contrast, the enthusiasts argue 'the academic–industrial research system produces beneficial results' (p. 56). Greenberg presents a balanced view of both the jeremiads and fairy tales and argues that neither ideology, in its purest form, is inherently right or wrong.

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OVERVIEW OF BOOK

Science for Sale is divided into three parts. The first section, 'The Setting and the System', evaluates the transformation that has occurred in US universities as they embrace the 'third mission' of technology transfer from academy to industry. Greenberg outlines the history and current situation of research spending in universities, and declares funding is always a problem for universities as they aspire for growth. He describes the persistent 'academic cup-rattling endeavors' (p. 17). Increased government spending facilitated the growth of the entrepreneurial universities in the late 1970s and early 1980s as reflected by the establishment of technology transfer offices and entrepreneurship courses on campus. The chapter proceeds by outlining the contrasting jeremiads and fairy-tale accounts of the effect of increasing levels of entrepreneurial activity on campus.

FAIRY TALE: TECHNOLOGY TRANSFER OFFICES MAKE MONEY

Greenberg disputes the enthusiasts' fairy-tale claim that technology transfer efforts reap huge financial successes all of the time. There is no denying that there have been some successes, such as at the University of Wisconsin Alumni Research Foundation, which had profits related to Vitamin D. Also, the success of Gatorade patents has provided more than $80 million to the University of Florida. However, Greenberg argues that the costs of the majority of technology transfer efforts are greater than the returns from the licensing of the patents produced. The obvious question is whether the unit responsible for the commercialisation – the technology transfer office – should be run as a for-profit entity. This brings Greenberg to the debate on what one should expect from the commercialisation of research and he devotes two chapters to discussing the conflicts of interest that emerge from the commercialisation of research amongst academic scientists, government agencies and industry.

JEREMIAD: CORPORATIONS WILL TAINT SCIENCE FOREVER

In spite of some dangers of commercialisation, Greenberg does refute the critics who bitterly lament the state of science and argues the future is hopeful:

> …the changes and trends are hopeful … shame and embarrassment exercise great force in academic and scientific affairs. Pride plays a big role, too. Scientists, their managers, and their institutions normally care deeply about their reputations (p. 258).

Although Greenberg's arguments, at times, lean towards cutting the ties between academic science and industry, he does accept that this is not feasible and academy–industry interactions can accelerate the transfer of knowledge from embryonic scientific discovery to application, thus advancing knowledge and contributing to economic and social benefit.

The second section, 'As Seen from the Inside—Six Conversations', adds further insight into the academy–industry engagement with a selection of interviews conducted with researchers, administrators and technology transfer specialists from over twenty large and middle-size universities and research centres. As each interviewee evokes their positive

and negative experiences of engaging with industry, it becomes clear to the reader that there is little consistency in their accounts, thus reinforcing the complex nature of the academy–industry relationship as no one experience can be deemed identical. In the last section, 'Fixing the System', Greenberg provides recommendations and calls for higher levels of transparency in academy–industry relationships.

WHAT GREENBERG DOES WELL

The account of Greenberg's extensive research is an interesting read. He offers a balanced account of the gains and losses, both economic and social, in regard to the nascent relationship between academia and industry. He acknowledges at the beginning of the book that:

> The subject is too big and too varied from university to university, and even within universities, to capture the whole story, which is rich in nuances, misleading appearances, hyper-polemics, self-delusions, deliberate evasions, and overlooked realities sitting in plain sight (p. 8).

In spite of this caveat, his knowledge of the past and present academy–industry technology transfer actors and activities is impressive. Greenberg's journalistic writing style makes this an enjoyable read as the reader is entertained and educated with vivid, authentic stories. This story-telling helps capture the nuances and complexity of the academy–industry relationship as Greenberg captures the embryonic journey that academic science is undergoing as industry becomes a more significant presence on campuses in the US and worldwide.

WHAT GREENBERG DOES NOT DO WELL

While Greenberg does an excellent job of presenting the story of academy–industry relations, the final section, 'What's Right and Wrong, and How to Make It Better', is somewhat disappointing. After setting out the ethical dilemmas of academy–industry relationships in the preceding chapters, there is an expectation that Greenberg would outline concrete recommendations on how to solve such dilemmas. He discusses the need for transparency in order to 'maximise the benefits of collaboration and minimise the risks and liabilities' (p. 284). He calls for academic individuals, institutions and commentators such as the press and bloggers to advocate open access to the intricacies of commercial contracts and to be vigilant for suspicious deals and acts. However, the chapter lacks depth and specificity, giving no revolutionary advice. He briefly mentions the Kauffman Foundation's suggestions for reforms, however he does not examine whether their policies of open science, encouraging faculty to own intellectual property and introducing competition among technology transfer offices might encourage and create more transparency. Unfortunately, from my perspective, Greenberg missed some obvious solutions to this conundrum. He failed to situate his recommendations for greater transparency within a practical framework.

WHO WOULD HAVE AN INTEREST IN THIS BOOK?

This book would be of interest to all actors involved in academy–industry interactions, be they policy makers, academic entrepreneurs, venture capitalists or university management teams. Greenberg successfully presents a number of moral questions for the aforementioned participants to contemplate as they progress with the 'third mission' of the universities. Such questions as:

> Have today's commercial values contaminated academic research, diverting it from socially beneficial goals to mercenary service on behalf of profit-seeking corporate interests? (p. 2)

and

> Can academic institutions, with their insatiable appetite for money, reap financial profits from their production of valuable knowledge without damage to the soul of science and the public? (p. 2)

encourage reflection of the process. In spite of not offering any significant suggestions for change, the book is most definitely worth a read to understand the present and recent past of how academy is entwined with industry. Although the interviews are held with American universities and there is copious discussion around the role of the federal US Bayh–Dole Act, the book is of interest and relevance to Irish policy makers, university management, researchers, administrators and technology transfer professionals, and those who have an interest in the changing role of the university. As university–industry technology transfer is on the strategic agenda of Irish universities and policy makers this book is of key importance as it chronicles the complex yet intriguing interactions between academia and industry.