

# Some thoughts on The Entrepreneurial State

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Mariana Mazzucato's "The Entrepreneurial State" has made a tremendous impact on the global debate about innovation.

But **how useful is it as a guide to policy?** 作为政策指南有多大用处?

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In [Government innovation](#), [Innovation policy](#)

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By: Stian Westlake

It's rare for a book about innovation policy to make it big. It happens perhaps once every decade. Michael Porter's *Competitive Advantage of Nations* (1990) sold the world on clusters. Richard Florida's *Rise of the Creative Class* (2002) launched a thousand arts-based regeneration schemes. *The Entrepreneurial State: Debunking Public vs Private Sector Myths*<sup>1</sup> (2013), by University of Sussex professor Mariana Mazzucato, seems to be the next breakthrough success.

*The Entrepreneurial State* has convinced readers from [Martin Wolf](#)<sup>2</sup> to [David Willetts](#)<sup>3</sup> to [Liam Byrne](#)<sup>4</sup> that the **Government has been wrongly written out of the story of how innovation happens.** 书让读者相信, 政府被错误地排除在了创新的故事之外

By reminding us that **public money paid for the research behind the internet, the Web, GPS, fracking and algorithmic search, Mazzucato refutes the libertarian argument that the government should "just get out of the way"**<sup>5</sup> when it comes to innovation.

This is a timely and important argument, especially today when small-government Republicans control the US Congress, when British policymakers are tacking right to counter UKIP, and when [some of the most prominent voices in Silicon Valley](#)<sup>6</sup> have little time for government. It is no wonder the book has provided a rallying point for many, and not just on the left.

But some of these big-hitting innovation books have had a way of being less than they seem. Porter's much-vaunted focus on cluster development proved to be very hard to implement<sup>7</sup>, and conceptually a mess<sup>8</sup>. Florida's creative classes turned out to be impossible to pin down or to do much about<sup>9</sup>. Hundreds of millions were spent on trying to implement both policies, including sizable consulting fees to Porter and Florida, but it's not clear that we're any better off than we were before.

政府的支持新技术方面可以发挥作用的核心论点肯定是正确的

Which brings me to *The Entrepreneurial State*. **The core argument that government has a role to play in backing new technologies is surely correct.** And the book is a superb piece of argumentation: I am sure I am not the only innovation policy wonk who thought, on reading it, that it set out arguments that I ought to have been making, in a far more compelling way than I had ever managed. At a time when government action of any kind is ideologically suspect, and entrepreneurship is unquestioningly lionized, the book's importance cannot be understated.

But some important aspects of the book seem more questionable. While the headline message that you can't write the state out of innovation is unobjectionable, both the conceptual framework that the book sets out and some of the central policy recommendations merit closer scrutiny. Three aspects of the book's argument seem particularly problematic.

## 1. **A narrow view of innovation**

The first is about how *The Entrepreneurial State* defines innovation. This may sounds like a tedious technical point – after all, innovation geeks, myself included, love nothing more than debating the definition of innovation, in a way that sometimes appears to be an end in itself. But in this case definitions are important, **because they affect the question of where innovation happens and who is responsible for it.**

因为它们影响到创新在哪里发生以及谁对创新负责的问题

这本书对创新的描述主要集中在技术上, 特别是技术发明的早期阶段

*The Entrepreneurial State's* description of innovation focuses mostly on technology, and in particular on the early stages of technological invention. Consider for example, the widely cited description of how the technologies behind the iPhone and iPod were the result of public funding. It's certainly striking that touch-screen displays, semiconductors, hard drives and even the MP3 protocol were originally backed by public money, and it is no surprise that this example has become something of a meme.

但如果认为这些技术的发明代表了iPod或iPhone的全部甚至大部分创新, 这似乎是一种误导  
笑死, 诡辩, 第二个材料明确说了公共资金和本身的发展同等重要

But it seems misleading to imply that the invention of these technologies represents all or even most of the innovation inside an iPod or iPhone.

它忽略了发展的作用

It misses out, for example, the role of development – the D in R&D – in making inventions useful. (By way of example, the University of Sheffield's Richard Jones recently observed<sup>10</sup> that IBM's role in applying the principle of giant magnetoresistance to hard drives was as significant as the publicly funded discovery of the principle itself.) It also omits the non-technological aspects of innovation that form the basis of most technological products.

它还忽略了构成大多数技术产品基础的创新的非技术方面

*The Entrepreneurial State* describes what Apple did when it developed the iPod and iPhone as "integration" (p 93) or "hybridizing" (p 102), and presents Apple's low R&D-to-sales ratio as a sign of free-riding (p 92).

但对技术的关注忽视了苹果的真正成就: 将这些技术相互整合; 改进它们使其可用可靠和便携, 而不是笨重的原型机;

But a focus on technology ignores Apple's real achievement: integrating these technologies with one another; improving them to make them usable, reliable and portable rather than clunky prototypes; brokering deals with cellular carriers and record labels so iPhones could make calls and download songs and be affordable; and even marketing iPhones in a way that people would be willing to buy them. All of these were risky, difficult undertakings.

与手机运营商和唱片公司达成协议, 这样iphone就可以打电话下载歌曲, 而且价格实惠; 甚至以人们愿意购买的方式来营销iphone

Anyone who doubts that commercialising smartphone technologies was *difficult* should try using a pre-iPhone smartphone. As a wag once remarked, they were more PoS than iOS, despite having access to the same government-funded technologies.

Anyone who doubts that commercialising smartphone technologies is *risky* should look at what happened to the share price of companies like Nokia, RIM or Motorola that screwed up, often rather mildly in objective terms, despite having access to the same public technologies Apple did.

公司在一体化项目上投资的 要比他们或政府和技术上投入的资金有多得多

Companies risk a lot more money on these "integrative" undertakings than either they or the government spends on technological R&D. Work by Jonathan Haskel<sup>11</sup> suggests that for every £1 that British businesses spend on R&D, they spend £8 on other intangible investments of the sort that Apple used to make the iPod a success: design, new business models, marketing and software development. The figures in the US are similar. And for every \$1 US companies spend on R&D, the state spends only 55 cents<sup>12</sup>. (*The Entrepreneurial State* acknowledges the importance of intangible investments beyond R&D on page 44, but this is not prominent in its discussion of Apple.)

By focusing on the invention of new technologies, *The Entrepreneurial State* risks understating the role that business plays, and makes it easier to imply that businesses take no innovative risk at all – to use the book's metaphor, to describe them as pussycats, not lions (p7).

低估了企业所扮演的角色, 并且更容易暗示企业根本不承担创新风险

This leads directly to the second concern I have with the book's argument: a mischaracterisation of who gets the returns from innovation.

## 2. Misrepresenting the returns of innovation 歪曲创新的回报

创新的回报与创新游戏中不同参与者所承担的风险严重不符

*The Entrepreneurial State* argues that the returns of innovation are grossly out of line with the risks taken by the different players in the innovation game. It's unfair, the

为iPhone基础技术开发提供资金的政府和公众没有从苹果的成功中得到任何好处, 而股东们却带走了价值4530亿美元的市值

book suggests, that the government and the public who bankrolled the development of the underlying technologies that make the iPhone work gets no upside from Apple's success, while shareholders walk off with \$453 billion worth of market cap.

专注于苹果业务利润的分配, 忽视了创新带来的一些回报

There are two objections to this. First of all, focusing on the division of the profits from Apple's business overlooks some of the rewards that arise from innovation.

它忽略了消费者从更好的技术中获得的好处, 经济学家称之为消费者剩余. 直观, 功能强大的智能手机让购买它们的人的生活更美好

In particular, it overlooks the benefit than consumers get from better technology, what economists call consumer surplus. Intuitive, powerful smartphones make life better for people who buy them. (This isn't just the elite: 56 per cent of Americans and 72 per cent of British people now own smartphones.) Consumer benefits are not, as I

将 "风险 - 回报关系" 框架用于追踪创新的收益, 而消费者的利益并不包括在其中

understand it, included in the "risk-reward nexus" framework that *The Entrepreneurial State* uses to trace the benefits of innovation, drawing on research Professor Mazzucato conducted with William Lazonick (p 186). The risk-reward nexus focuses on the "the distribution of financial rewards from the innovation process".

关注的是 创新过程中财务回报的分配

这似乎是一种对创新过程的误导性描述. 毕竟, 经济效益并不是创新带来的唯一效益

This seems like a misleading way to describe the innovation process. After all, financial benefits are not the only benefits that arise from innovation. Consumers receive sizeable non-financial benefits. Erik Brynjolfsson and JooHee Oh estimated the value of free Google searches at \$500 per person per year<sup>13</sup>, which is a big deal. William Nordhaus argued that innovative business captured only two per cent of the values of their innovations<sup>14</sup>, with most of the rest of the benefits going to consumers. Even if this estimate is an order of magnitude too low, it still suggests that the non-financial rewards of innovation are too big to ignore.

创新的非经济回报太大了, 不容忽视

风险回报关系似乎也忽视了创新回报的另一个重要来源: 税收

The risk-reward nexus also seems to overlook the other important source of rewards from innovation: tax. In a 2012 paper setting out the idea of the risk-reward nexus<sup>15</sup>, Profs Mazzucato and Lazonick state "when the State makes early high-risk investments that enable the business sector to enter a new industry, the State does not have a guaranteed return on that investment."

当国家做出早期高风险决定时对于使商业部门能够进入一个新行业的投资, 国家不能保证这种投资的回报

It's true that governments rarely own a slice of an innovative firm's market capitalization. But they certainly have a right to a slice of a company's profits, and of the capital gains made by shareholders, and in some cases to either a share of either value-added or sales.

It's fashionable to scoff at corporate tax and to point out that there is a lot of avoidance (and indeed, later in the book, this is rightly highlighted as a problem). But nevertheless, over 20 per cent of corporate profits in the UK go back to the public purse in the form of corporation tax, to say nothing of VAT and other taxes. **To say that the state gets nothing from innovative businesses simply isn't true:** in fact, it receives many billions of dollars a year.

说国家没有从创新企业中得到任何东西是不正确的

就像认为政府承担创新的所有风险是错误的，说股东获得所有回报也是错误的

**So just as it's wrong to suggest that the state takes all the risks of innovation, it's also wrong to say that shareholders get all the rewards:** the public (as consumers) and the state (as tax-collector) do very well too.

This matters because the idea of an unbalanced risk-reward nexus underlies some of the book's most interesting policy recommendations.

### **3. Questionable policy recommendations**

The bottom line of any book about public policy is what it means for policy-makers. The book's conclusion (p 193-198) offers three broad directions of travel, and an appendix provides a longer list of UK-specific measures taken from the book's earlier incarnation as a Demos pamphlet.

One of the most distinctive and thematic recommendations – the idea that innovation systems should be set up so that the state shares in the gains from innovation – is one that I find particularly problematic.

(NOTE: Before I go on, I should explain why I'm focusing on this recommendation. Several of the recommendations in *The Entrepreneurial State's* Appendix make good sense. The argument that governments should not underinvest in R&D and human capital formation (p 196) is wise, especially (as Professor Mazzucato points out) in the context of ongoing Eurozone austerity. The idea of expanding and reforming the Technology Strategy Board (now Innovate UK), scrapping the Patent Box and taking a hard look both at small business subsidies and the short-termism of British capital markets are sensible ideas that have been advocated by a range<sup>16</sup> of economists<sup>17</sup> and innovation<sup>18</sup> experts<sup>19</sup>.

But the recommendation that the state should be entrepreneurial by participating in the upside of its innovation funding deserves special attention partly because of its originality, partly because of the attention that it has attracted in the sector, and partly because of its prominence both in the book's conclusion and in other summaries of *The Entrepreneurial State's* argument, such as this one from Professor Mazzucato's own department<sup>20</sup>.)

The point of *The Entrepreneurial State's* gain-sharing recommendation is to change the balance of risks and rewards the state faces when it comes to innovation: "reward the wins when they happen so that the returns can cover the losses from the inevitable failures" (p187). Mazzucato suggests three ways of doing this: "golden shares of IPR and a national innovation fund", "income-contingent loans and equity" and "development banks".

In practice they all involve the government retaining a financial interest in companies developing innovations based on public funding. But this proposal looks deeply problematic, both from the point of view of public administration and politics.

First of all, it presumes a clear link between specific IP and business performance. This may be straightforward for, say, a biotech company developing a single drug based on



a molecule discovered with an NIH grant: the research is a significant cause of most or all of the firm's business.

But it rapidly becomes hard to measure. Rolls-Royce plc relies on hundreds of pieces of research, many of which have been funded by public funds. Some may be vital to Rolls-Royce's profitability, some may be marginal. What will Rolls-Royce owe the taxpayer? Will it be agreed when the IP is handed over, or *ex post*? Will we employ civil servants to work it out? How will they know? It's hard to see how this would not cause huge uncertainty to companies considering commercialising public research while at the same time entail a prodigious, possibly impossible bureaucratic challenge.

What's more, recouping innovation spending from companies that make direct use of publicly funded research would be a tough political sell. It helps to think through how this would look: the government would be charging a special levy on businesses like ARM, Rolls-Royce or GSK, while exempting Tesco, Provident Financial and Betfair, all in the name of promoting innovation. Whether or not the money went to fund further research, it would be, as civil servants like to say, a presentational nightmare, and the government would be accused of privileging low-R&D companies over high-R&D ones, exacerbated many of the widely-voiced critiques of the UK's economy.

And what about procurement? A clear lesson from the American government's support for technology companies is the importance of procurement schemes like SBIR in providing money to growing businesses. Would these companies have to offer the government equity or repayments in return for contracts?

*The Entrepreneurial State* briefly considers why these arrangements are preferable to simply funding public innovation out of general taxation (which it describes as "naïve"). It gives three reasons, each of which seems problematic.



The first is that “the tax system was not conceived to support innovation systems, which are disproportionately driven by actors who are willing to invest decades before returns appear”. It is not clear why this is a problem: the tax system was also not conceived to fund healthcare, foreign aid or unemployment insurance, but modern states use it for all those things. And states fund plenty of long-term investments already: education, for example, and infrastructure. Funding innovation does not seem different.

The second argument given is that people and companies avoid taxes. This is sometimes true, and it is a bad thing. But although some taxes are avoided, some aren't. Corporation tax still raises over £40 billion a year in the UK, against a science budget of about £5 billion; in the US the Corporate Income Tax raises over \$250 billion. This isn't the Late Roman Empire. The tax system raises a lot of money, enough to fund generous innovation investment, even if we might like it to work even better.

The real question to ask is whether it's easier for an amoral, innovative company (a) to avoid taxes or (b) to manipulate a novel system of golden shares and royalty arrangements. As many small shareholders in start-ups have discovered, there are plenty of ways that an unscrupulous majority owner can dilute out or marginalize a minority partner. The government has virtually no experience of being a large-scale minority owner, and perhaps a few dozen staff with any experience of this. But it has thousands of tax inspectors, and, according to anti-avoidance campaigners<sup>21</sup>, could get much better at collecting the tax it's owed if it chose to.

*The Entrepreneurial State* offers three institutions as exemplars of how to promote innovation through direct investment: BNDES, Brazil's national development bank; SITRA, Finland's national innovation agency; and the China Development Bank. But at least two of these examples are not all they seem.

BNDES's success as an investor is evinced by the fact that it reported a 21 per cent return on equity in 2010 (p190). But it's worth reflecting on what a bank's return on equity actually means: it is different from the internal rate of return of its investments (a 21 per cent IRR would indeed be impressive): it is, as far as I can tell, the return on the bank's own equity. Banks make money by borrowing money at rate  $R\%$  and lending it out at rate  $R+x\%$ . BNDES has an ace up its sleeve in this respect, since it turns out the Brazilian state lends to it at bargain basement prices<sup>22</sup>, lower even than the state's own cost of borrowing. BNDES may be doing a great job of promoting innovation or it may not, but its high return on equity is not evidence either way.

The SITRA story is also a curious one. *The Entrepreneurial State* argues that SITRA is a good example of the state "retaining equity in the companies it supports", noting that SITRA "retained equity in its early stage investments in Nokia" (an observation that has made its way into pieces by Seumas Milne<sup>23</sup>, among others). SITRA *has* made VC investments, but the Nokia story is not an example of these.

Depending on how you define it, Nokia was founded<sup>24</sup> in either 1871, nearly a century before SITRA; or in 1967, the same year as SITRA. SITRA received Nokia shares not because it invested in Nokia's move into the telecoms industry, but as a subvention from the Finnish government in 1991. (The Finnish government owned the shares because Televa, a state-owned electronics company that had once been the Finnish military radio lab, had set up an R&D joint venture with Nokia in 1977<sup>25</sup>, which Nokia bought out in the eighties, leaving the Finnish government with Nokia shares in return.) This is not to say that the Finnish government didn't support its emerging mobile sector, nor that SITRA has not over the years been a great supporter of innovation in Finland. But when we look at the detail, SITRA's Nokia stake looks much less programmatic than *The Entrepreneurial State* implies.

Even if we look beyond these countries, examples of gain-sharing from government innovation investment are so much less ambitious that *The Entrepreneurial State's* vision

as to constitute a different thing altogether. Israel's Office of the Chief Scientist, one of the world's most effective development bodies, claims a royalty from companies whose innovations it back – but only up the original amount of the grant plus interest<sup>26</sup>, which by definition does not represent real participation in the upside of the technology. TEKES, Finland's technology funding body, makes soft loans for technological development<sup>27</sup>, but again, these are only repaid up to the original value of the grant.

Several countries have followed the example of Israel's Yozma programme<sup>28</sup> and invested government money into tech companies through venture capital funds: but again the government's upside in these schemes is usually tightly capped. In Yozma, private limited partners had the right to buy the government out for a small fee, keeping all the upside to themselves. More recent equivalents like Singapore's Early Stage Venture Fund<sup>29</sup> follow the same model. It seems that the actually-existing entrepreneurial state is not much like the book's vision for it.

What we do see is that when the state has fostered innovation, it tends to do so in curious, oblique<sup>30</sup>, and rather messy ways. The defining general-purpose technology of the last 50 years arose from scientists' desire to make better use of publicly funded research computers<sup>31</sup>. A mobile phone revolution was started by a timber and rubber-boot conglomerate<sup>32</sup>. A British government education scheme<sup>33</sup> led, by turns, to a revolutionary chipset for energy-efficient computing. The hidden development state is nothing if not weird and wonderful.

Copying policies that have worked in the past doesn't help much either. Consider the procurement practices of the US defence establishment. As Professor Mazzucato points out, the prodigious impact of US defence spending on the IT revolution is the *locus classicus* of the Entrepreneurial State. They gave rise to the Internet, to GPS, to the semiconductor revolution, the graphical user interface and self-driving cars.

But some attempts to drive innovation through defence procurement failed. Generous spending on pressurised water reactors didn't result in ubiquitous cheap nuclear power, even though the US submarine fleet was a patient and technologically sophisticated customer. Attempts by the US Air Force to develop its own CNC machine tools in the 1970s and 1980s didn't succeed. Nixon's War on Cancer failed in part because it took a prematurely programmatic approach to a poorly understood research challenge. Just suggesting governments take an entrepreneurial approach to backing innovation leaves a lot of important questions unanswered.

Institutional diversity seems to matter too. Various parts of the US government were funding hydraulic fracking, and touch-screens, and graphical user interfaces, and photovoltaics, and a thousand other projects all at the same time. For all the attention that commentators have paid to DARPA, it was just one of many semi-autonomous institutions competing for attention and discovery. DARPA may have had technological vision, but it was not a vision shared by the whole US state. Indeed, Dan Breznitz has argued that innovation policy is best made by institutions somewhat distant from the state's control<sup>34</sup>, while Andrew Orlowski has argued that group-think by elites<sup>35</sup> leads to bad technology policy.

## Conclusion

Where does all this leave us? The core point of *The Entrepreneurial State*, that government can't be written out of the innovation story, is undoubtedly true, and deserves to be written in letters ten foot high. It's a valuable counterblast to the vocal group of libertarians who think innovation is the work of heroic entrepreneurs alone, and of the misdirected policies that this can lead to. This is no small achievement, since the voice of market libertarians remains loud in economic policy debates.

But the book's more detailed arguments - that the private sector takes little risk, that it bags all the rewards, and that government should introduce novel clawback

arrangements to right this wrong – don't stack up. This in turn makes *The Entrepreneurial State* an unreliable guide for any policymaker convinced by its high-level argument.

## Appendix of Links

1. <http://www.amazon.co.uk/The-Entrepreneurial-State-Debunking-Economics/dp/0857282522>
2. <http://www.ft.com/cms/s/2/32ba9b92-efd4-11e2-a237-00144feabdc0.html>
3. <http://www.timeshighereducation.co.uk/tablet/1DAAAE7E/2009922.shared>
4. <http://liambyrne.co.uk/my-interview-with-research-fortnight/>
5. <http://www.ft.com/cms/s/2/ad7dd9c0-069a-11e3-ba04-00144feab7de.html#axzz2s0TOhTZe>
6. <http://pando.com/2012/10/24/travis-shrugged/>
7. <http://oxrep.oxfordjournals.org/content/29/2/383.abstract>
8. <http://joeg.oxfordjournals.org/content/3/1/5>
9. <http://www.nesta.org.uk/blog/there-creative-class>
10. <http://www.softmachines.org/wordpress/?p=1517#more-1517>
11. <http://www.nesta.org.uk/publications/innovation-index-2009>
12. [http://stats.oecd.org/Index.aspx?DataSetCode=GERD\\_FUNDS](http://stats.oecd.org/Index.aspx?DataSetCode=GERD_FUNDS)
13. <http://mitsloan.mit.edu/ide/research/>
14. <http://www.nber.org/papers/w11948>
15. [http://www.policy-network.net/publications\\_download.aspx?ID=8162](http://www.policy-network.net/publications_download.aspx?ID=8162)
16. <http://www.ifs.org.uk/publications/5362>
17. <http://www.bankofengland.co.uk/publications/Documents/speeches/2011/speech495.pdf>
18. <http://www.finnov-fp7.eu/publications/finnov-discussion-papers/muppets-and-gazelles-rooting-out-ideological-and-methodologica>
19. <http://www.theguardian.com/commentisfree/2012/oct/14/will-hutton-britain-innovation-hub>
20. <http://www.sussex.ac.uk/research/impact/publicpolicy/industrialpolicy>
21. <http://www.taxresearch.org.uk/Documents/Manifesto.pdf>
22. <http://www.breakingviews.com/brazils-state-bank-needs-diet-not-more-feeding/21107244.article>
23. <http://www.theguardian.com/commentisfree/2012/mar/20/budget-2012-osborne-failed-model-1979>
24. [https://www.nokia.com/en\\_int/about-us/who-we-are/our-history](https://www.nokia.com/en_int/about-us/who-we-are/our-history)
25. <http://www.sitra.fi/julkaisut/raportti80.pdf>
26. <http://www.moital.gov.il/NR/exeres/5243BC40-EAB3-44E4-88ED-3763D0DCA05A.htm>
27. <http://www.tekes.fi/en/funding/companies/>
28. <http://www.yozma.com/overview/>

29. <http://www.nrf.gov.sg/innovation-enterprise/national-framework-for-research-innovation-and-enterprise/early-stage-venture-fund>
30. <http://www.johnkay.com/tag/obliquity>
31. [http://en.wikipedia.org/wiki/ARPANET#Misconceptions\\_of\\_design\\_goals](http://en.wikipedia.org/wiki/ARPANET#Misconceptions_of_design_goals)
32. <http://www.nokia.com/global/about-nokia/about-us/the-nokia-story/>
33. <http://www.nesta.org.uk/publications/legacy-bbc-micro>
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