

A CRITIQUE OF MAZZUCATO'S ENTREPRENEURIAL STATE

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Mariana Mazzucato's *The Entrepreneurial State* (2013) vigorously argues that industrial policy, rather than market forces, is the key factor in fostering innovation. For Mazzucato, the RM Phillips Professor in the Economics of Innovation at the University of Sussex, profit-seeking companies do little more than free-ride on government-funded research and development activities.

Though Mazzucato claims she is building on existing evidence of the effectiveness of government research and development spending, in actual fact her evidence is shaky. She adopts a very extensive definition of industrial policy that includes the unintended consequences of government intervention, and focuses only on 20th century America in making her case for what she deems to be a general law. Moreover, she ultimately fails to prove that the specific government interventions that she hails as beneficial were purposefully directed to achieve the particular outcome in question.

This article shows why Mazzucato's claims for the necessary role of government in promoting an innovation-oriented economy are unconvincing. The fundamental problem is that her work is based on a peculiar line of economic thinking that does not consider the inevitability of tradeoffs while dealing with scarce resources, and does not acknowledge the role of demand and of consumers in a modern market economy.

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The Idea of the Entrepreneurial State

Books tell stories, and stories do not necessarily need to be well crafted or carefully told to become immensely popular. Sometimes it is enough that they resonate with deeply rooted preconceptions. This might be the case with *The Entrepreneurial State*. Mazzucato's influential and award-winning work has been widely acclaimed as a turning point in scholarship on innovation (e.g., Upbin 2013 and Madrick 2014). Martin Wolf (2013) argued that the book provided a successful justification for the role of government in promoting innovation, which he claimed had unduly "been written out of the story." Based on *The Entrepreneurial State*, Wolf deduced that our "failure to recognize the role of the government in driving innovation may well be the greatest threat to rising prosperity." Lack of adequate government funding for research and development (R&D), he suggested, could slow the pace of innovation.¹

Mazzucato is an effective public speaker and an accomplished writer, and her reputation rests on debunking the alleged myth of innovation emerging from market interactions. She argues that profit-seeking private entrepreneurs get too much credit for innovation, whereas the government is routinely blamed for stifling technological progress by overregulating the private sector.

Mazzucato believes this narrative is highly ideological and lacks empirical grounding. To the contrary, she argues that much path-breaking innovation is due neither to flashy start-ups nor to farsighted venture capital investors. In fact, she maintains, government is often the most farsighted and the least risk-averse of investors. Industrial policy, rather than free markets, deserves to be credited with the development of some of the most exciting contemporary technologies—from life-saving drugs to the iPhone.

In singing the praises of industrial policy, Mazzucato focuses on the United States. This is a strategic decision: The United States embodies the idea of a free-market economy to many people, so proving that its industrial success owes more than is commonly acknowledged to government policy would, in Mazzucato's eyes, show that we need government to provide "mission-oriented directionality" to R&D activities. By contrast, Mazzucato shies

¹For a critical reaction to Wolf's review, see Kealey (2015).

away from confronting the numerous cases of self-styled industrial policy experienced in Europe.

The supposed success of American-style industrial policy is meant to prove that it is government that bets heavily on new technologies, thereby shaping the markets of the future. This thesis, strictly speaking, is far from new. Others have argued that “the Federal government has encouraged innovations and their diffusion throughout the private market economy throughout most of our history” (Uselding 1993: 163). But Mazzucato’s work is distinguished by her stated belief that government intervention is not only propitious, but actually necessary for innovation to emerge.

Given the publishing success of, and critical acclaim for, Mazzucato’s work, it is worth examining her arguments closely. Do they hold up to scrutiny? Does she succeed in making the case for industrial policy as the engine driving innovation? Or is she simply telling a story that resonates with ingrained prejudices?

In 2012, President Barack Obama claimed that the private sector owed government more gratitude than it typically grants, in what came to be known as his “you didn’t build that” speech (Obama 2012). Indeed, it could be argued that none of us, not even the most creative individuals, would come to much without the cooperation of others. Nevertheless, to assert that every innovation owes its existence to the government is a very bold claim, and in this article I will contend that Mazzucato’s book may inadvertently demonstrate its absurdity.

I will argue that Mazzucato’s work is filled with self-contradictory statements. She presents an idyllic vision of industrial policy, yet she refuses to claim success for industrial policy where it was proudly implemented—that is, in most European social democracies. Instead, she aims to prove that industrial policy was decisive in the United States, including in cases when there was no openly stated industrial policy being pursued.

I will place her efforts within the context of the “discursive battle” she wants to fight, and subsequently examine her key claims that should—if her core argument is to succeed—prove the providential nature of industrial policy. I will show that she mistakes unintended consequences for intended ones, and will highlight the way her vision of the modern economy unjustifiably excludes any role for the consumer.

The Myth of the Entrepreneurial State as an Answer to Austerity

Mazzucato's critics must acknowledge, at least, that she does not hide her motives. Her work is intended as a contribution to the battle of ideas on the role of government in society—and, in particular, as intellectual ammunition for the opponents of fiscal austerity. Her key assertion is that the current European crisis is not a fiscal crisis. Contrary to those advocating austerity, she argues there is no need for retrenchment in public spending. Indeed, she holds that the commonly held vision of the European crisis as a fiscal crisis is basically a construct of ideologues interested in fostering a narrative of government “as cumbersome, and only able to correct ‘market failures’” (Mazzucato 2013: 6).

Accordingly, Mazzucato aims to correct this narrative by providing “an exciting vision of the State’s role” (Mazzucato 2013: 4). If the public sees the state as a major source of innovation, it will not support what she considers an unwarranted rollback of public functions. It is noteworthy that Mazzucato sees a government that corrects market failures—a category ample enough to include interventions in health care, education, competition policy, environmental regulation, energy, and much more besides—as tantamount to a minimal state.

The Entrepreneurial State is an expanded version of a monograph originally published by the British think tank Demos (Mazzucato 2011). In her book, Mazzucato sets out “to convince the UK government to change strategy: to not cut State programs in the name of making the economy ‘more competitive’ and ‘more entrepreneurial,’ but to reimagine what the State *can* and must do to ensure a sustainable post-crisis recovery” (Mazzucato 2013: 2). The problem, as she sees it, is that in recent years “the State has not had a good marketing/communications department” (Mazzucato 2013: 20).

In Mazzucato's view, economists tend to adopt an ideological approach that places an excessive emphasis on government failures, while forgetting that state intervention can be motivated by “visions” and “ambitions” that may foster a more innovative economy. These economists, Mazzucato writes, also assume that the legitimate role for government is limited to the correction of market failures. This framework, which she associates with the public choice school,

is deemed to be ill-suited to providing a *historical* account of how innovation developed, or to offering *normative* guidance on how our societies can continue to innovate.²

In a recent article, Mazzucato (2014: 8) neatly summarized her argument:

The market failure framework is problematic for addressing societal challenges because it cannot explain and justify the kinds of transformative mission-oriented investments that in the past “picked” directions, coordinated public and private initiatives, built new networks, and drove the entire techno-economic process, thus resulting in the creation of new markets—not just in the fixing of existing ones.

It is worth noting that the way Mazzucato describes opposing schools of thought is sometimes rather curious. For one thing, she broadly equates the market-failure approach to government policy with free-market economics, which is not obviously an apt comparison.³ Moreover, while it is true that public choice theory does not persuasively explain innovation, that goal is plainly not what public choice theory sets out to achieve. On the other hand, public choice theory offers a very good way of understanding how policymaking actually works.

In order to succeed in her own argument, Mazzucato needs to prove two things: first, that there is a treasure trove of examples showing that government intervention is ubiquitous in the history of modern capitalism (a point that won't be controversial); and second, that a particular kind of government intervention—industrial policy—has, consistently with its own declared goals, been effective in fostering innovation.

Is the historical evidence that Mazzucato provides robust? Or is it just an *ex post* rationalization of a patchwork of policies that were not necessarily put in place to promote a particular research program? The following sections will attempt to answer those questions.

²Mazzucato (2014) seems to base her view of public choice on Tullock, Seldon, and Brady (2000).

³For a survey of “free-market responses” to market failure, see Tabarrok (2002).

Industrial Policy

Mazzucato doesn't just claim that government intervention can stimulate people's ability to innovate. She wants to prove that government intervention is a necessary component of an innovation-fostering economy. Her focus is almost exclusively on technological innovation.⁴

Industrial policy is the hero of Mazzucato's story. But this story is not as straightforward as it appears, since in many respects it suffers from the "is-ought" problem—that is, it makes too many claims about what ought to be based on statements of what is.

Mazzucato asserts that government has already shown its ability to play an entrepreneurial role. She maintains that "most of the radical, revolutionary innovations that have fuelled the dynamics of capitalism—from railroads to the Internet, to modern-day nanotechnology and pharmaceuticals—trace the most courageous, early and capital-intensive 'entrepreneurial' investments back to the State" (Mazzucato 2013: 3).

The reference to railways is astonishing and yet perfectly emblematic of her approach. For while contemporary *grand projets* such as high-speed trains are indeed financed by government, railways as an "innovation"—or, rather, when they were an innovation—were very much the creation of the private sector. At a certain point, railways in Italy, the United States, and England, where they were pioneered, were nationalized. This fact alone should suggest that government was not an early investor in railways companies.

This digression points to one of the major problems with Mazzucato's book. She claims to have found a new regularity, a ubiquitous generalization: it takes a strong government to produce an innovative economy. However, it is difficult to claim the status of a regularity with evidence from only the last 50 years.

To put it bluntly, government expenditure expanded at such a pace during the 20th century (from about 10 percent of GDP to more than 40 percent in virtually all Western democracies) that it would be surprising if it didn't happen to produce some innovative ventures along the way.⁵ With such extraordinary growth, it is

⁴When she briefly touches upon the Japanese case, however, Mazzucato also mentions organizational innovation (Mazzucato 2013: 37).

⁵On the growth of government and its pace, see Tanzi and Schuknecht (1999).

improbable that public spending wouldn't end up in the neighborhood of innovation-producing business at one point or another.

But what about the 19th century? Wasn't industrialization fueled by innovations and discoveries, and yet largely independent of huge public investments in R&D? The Industrial Revolution took hold in Britain first, and there government spending was basically centered on providing national defense and on servicing the debt contracted to wage wars (Hartwell 1981). Indeed, as Mokyr (1999: 46) notes, "Any policy objective aimed deliberately at promoting long-run economic growth would be hard to document in Britain before and during the Industrial Revolution. . . . In Britain the public sector by and large eschewed any entrepreneurial activity."

Whatever the merits of the generalization that public spending is needed to foster innovation, Mazzucato cannot convincingly draw such a conclusion by referring only to a tiny bit of history—least of all that bit of history which is, perhaps not by chance, the one in which public spending overflowed society in general.

Moreover, to prove her point, Mazzucato should persuasively show that the innovations she claims are due to government intervention are the result of "intelligent design." It is clear that she believes this to be the case, as she argues against the opposite view: "We are constantly told that the State should have a limited role in the economy due to its inability to 'pick winners,' whether the 'winners' are new technologies, economic sectors or specific firms" (Mazzucato 2013: 18). In her perspective, however, the role government should exercise is precisely "directionality (choosing areas of change, rather than just 'facilitating' it)" (Mazzucato 2014: 4) in R&D investments. Her narrative is one of "a confident state that was able and willing to courageously envision the *direction* of change-defining missions and to organise institutional structures across public agencies and departments" (Mazzucato 2014: 7).

Her book offers many examples of the role public policies played in promoting innovation. And yet, these innovations may often be considered as positive externalities of public intervention, as opposed to carefully designed outcomes of such industrial policies. This is problematic if you are eager to defend a government that picks winners: Surely you should first demonstrate that it did actually pick winners, because this is the "mission-oriented directionality" on which Mazzucato's case hinges.

The heart of Mazzucato's work lies in the fourth and fifth chapters of her book, devoted respectively to "The U.S. Entrepreneurial State" and to "The State Behind the iPhone." To properly assess Mazzucato's work, one must confront the examples she provides in those chapters.

Did Government Invent the Internet?

In order to argue that the United States has an entrepreneurial state, Mazzucato presents four supposed government success stories: the Defense Advanced Research Projects Agency (DARPA), the Small Business Innovation Research (SBIR) program, orphan drugs regulation, and nanotechnologies. What these examples share, according to Mazzucato, is "a proactive approach by the State to shape a market in order to drive innovation" (Mazzucato 2013: 73). The idea is that government agencies envisioned innovation, and then pursued it. Private companies, at best, grabbed the low-hanging fruit later on.

It is a fact that, after World War II, basic research in the United States was largely nationalized, in a manner consistent with the "permanent war efforts" that absorbed the country's attention during the Cold War. For Mazzucato, after the Manhattan Project "it became the government's business to understand which technologies provided possible applications for military purposes as well as commercial use" (Mazzucato 2013: 75). In that regard, DARPA not only funded research, it "funded the formation of computer science departments, provided start-up firms with early research support, contributed to semiconductor research and support to human-computer interface research, and oversaw the early stages of the Internet" (Mazzucato 2013: 76). Mazzucato sees DARPA as a model of efficiency. It had a "dynamic and flexible structure, . . . increased the flow of knowledge across competing research groups, . . . [and] DARPA officers engaged in business and technological brokering" (Mazzucato 2013: 77). But how did those remarkable successes come about?

Mazzucato is rather parsimonious with administrative and organizational details and doesn't explain what the criteria for distributing grants were, what DARPA's assistance really entailed, or how offices were organized. She aims to convince us that "the key is that the

government serves as a leader” (Mazzucato 2013: 79), but this is stated, rather than explained.

The main argument for such a statement seems to lie in DARPA’s widely acknowledged “invention” of the Internet. The key question, here, lies in the intentionality behind innovations. Did the American government ever envision something similar to what turned out to be the commercial Internet?

It cannot be denied that the federal government supported universities to develop the ideas and the hardware that formed the building blocks of the Internet, such as the FTP (file transfer protocol) and TCP/IP (transmission control protocol/Internet protocol) standards. The fundamental idea behind the Internet is that of “packet switching,” a digital networking communications method in which data is transmitted in suitably sized blocks, called packets. This concept was developed by two MIT researchers, Joseph Carl Robnett Licklider and Leonard Kleinrock, who eventually worked on ARPANET, the network that became the basis for the Internet. With the benefit of hindsight, perhaps DARPA just picked the right guys for the job (Chandler 2005: 170).

It is also worth remembering that the TCP/IP router was developed (for ARPANET) by a private business, Cisco (Chandler 2005: 172), while the optical fibers that made it possible for Internet to reach millions of houses were developed by Corning Glass Works, another private enterprise. Two further points should not be overlooked: the government grants that allegedly led to the invention of the Internet were essentially defense spending, and those grants were channeled through the U.S. university system.

Historian Price Fishback (2007: 516) admits that “no one can deny the vast repercussions of militarily motivated activities” in the development of the Internet. He goes on to say, “The military’s role was clearly sufficient to develop the early technologies, but arguably it was not necessary. The credit for these technologies should go to the actual people performing the research” (521). The relevant question is thus whether the development of the Internet took place as the result of some “mission-oriented directionality” on the part of government, or if it is better seen as merely a positive externality of public intervention.

According to Fishback (2007: 519), “The military funding contributed spillover benefits to the development of the commercial

Internet” by not trying to tightly control the projects, by encouraging wide dissemination of research results, and by funding small firms. This suggests there was little “mission-oriented directionality” behind the creation of the Internet.

Furthermore, in defending DARPA and claiming the government did indeed invent the Internet, Mazzucato gives the impression that she views American universities as homogeneous and ready to march on the government’s orders. This might be closer to the truth insofar as the continental European university system is concerned, but it is not an accurate way to characterize American universities.

Like Mazzucato, Nathan Rosenberg (2000) points out the important role played by American universities in developing prototypes, and more generally in basic research. However, unlike Mazzucato, he acknowledges that they are very responsive to the needs of the economy and of society at large, showing greater flexibility than their European counterparts.

The “competitive environment” in which U.S. universities operate (Rosenberg 2000: 38) could be an explanation for their high research productivity. It certainly is relevant to note that government funding is channeled through institutions that compete with one another to attract capital (either public grants or private donations), as well as to attract the best factors of production (teachers), and also to gain customers (students).

Here, as so often in her book, Mazzucato simply assumes that if something goes right, government must be responsible. But in the real world the mere existence of government money doesn’t account for the different nuances of institutions. Government money channeled through a competitive setting may have very different effects than government money spent following a strictly hierarchical, top-down logic.

Can Industrial Policy Be Decentralized?

While discussing DARPA, Mazzucato speaks of a “decentralized form of industrial policy” (Mazzucato 2013: 78). But this is an oxymoron dressed up as a terminological innovation: in reality, either it is “industrial policy” or it is decentralized. Even if we adopt a very loose definition of industrial policy, we must agree that we have industrial policy only when “the government deliberately attempts to promote industry” (Robinson 2009: 3). Of course, it is possible that,

as with any other human action, a certain policy may have unintended consequences that are considered positive. However, unintended consequences are just that: unintended. And though Mazzucato proclaims the “mission-oriented directionality” behind government-driven innovations, she sometimes confuses unintended consequences, or by-products, with intended ones.

One example Mazzucato provides to demonstrate the efficiency of decentralized industrial policy in an entrepreneurial state is the SBIR program. Launched under President Reagan, SBIR provides “more than \$2 billion per year in direct support to high-tech firms” (Mazzucato 2013: 80). It can be viewed as providing taxpayer-funded venture capital (Wallstein 2001: 8), albeit in a very peculiar way: The federal government simply requires all government agencies with an R&D budget over \$100 million (including the military) to spend 2.8 percent of their budget to promote innovation by small- and medium-sized businesses.⁶

That SBIR has a “unique role” and “has fostered development of new enterprises, and has guided the commercialization of hundreds of new technologies” (Mazzucato 2013: 80) is something Mazzucato’s readers must take on a leap of faith. *The Entrepreneurial State* fails to offer a single example of a new technology that took off because of a SBIR grant. Furthermore, it is difficult to understand how the SBIR program can fit any reasonable definition of industrial policy: Requiring federal agencies with extramural R&D budgets that exceed \$100 million to spend money does not signal “mission-oriented directionality (and ‘routes’ within directions).” In fact, it adds up to little more than forcing some public bodies to sign checks.

As Mazzucato sees it, the fact that the SBIR program is now larger and finances more projects than it did some 20 years ago is due to the retreat of private venture capital, which in her view is “increasingly short-termist, focused on pursuing capital gains” (Mazzucato 2013: 81). This is tantamount to arguing that whenever a public program gets bigger, this is because it is needed and successful in fulfilling

⁶Scott Wallstein (2001) argued that SBIR crowded out private investments in R&D. Mazzucato doesn’t examine the possibility of such a phenomenon because “Keynesians have argued against the idea that State spending crowds out private investment, by emphasizing that this would only hold in a period of full resource utilization” (Mazzucato 2013: 24).

those needs. But this, to put it mildly, is not a very realistic view of how government operates.

Indeed, contrary to Mazzucato, Vito Tanzi (2012: 41–42) has suggested a fundamental law of public expenditure over long periods of time: “Most government programs that are created have a tendency to grow almost continuously and spontaneously over the years and to become more expensive with the passage of time.” What if SBIR funds have increased not because they are needed, and not because they are successful, but rather because that’s just what government programs tend to do?

The Entrepreneurial State endorses a vision of politics and public administration in which the government does what it must, and any suspicion concerning its inefficiency is, at best, a self-fulfilling prophecy. If Mazzucato chastizes the private sector’s short-termism, she seems convinced that decisionmakers that allocate resources for and within government are uniformly intelligent and farsighted.

Nevertheless, it is hard to avoid the impression that this is a post hoc ergo propter hoc farsightedness—that is, one based on the realization of beneficial outcomes, even though those outcomes were not intended by government in the first place. A clear example of this is provided by the chapter in which Mazzucato attempts to convince us that the iPhone is a product of U.S. government intervention. To show how touchscreen devices are something we owe to industrial policy,⁷ Mazzucato argues that it was government funding that allowed a young PhD student at the University of Delaware, Wayne Westerman, to complete his degree and go on to cofound FingerWorks, which “revolutionized the multi-billion dollar mobile electronic devices industry” (Mazzucato 2013: 103).

Can we really argue that if somebody at a certain point transforms his own doctoral thesis (Westerman 1999) into an entrepreneurial idea, the latter is the product of industrial policy? Is this really the case just because his university was government-funded and his PhD was partially funded by a scholarship from the National Science Foundation, like some 2,000 others every year?

Another arrow in Mazzucato’s quiver is the 1983 law on orphan drugs, which allowed small pharmaceutical companies and

⁷Insofar as the evolution of touchscreen devices is concerned, there were actually plenty of developments, both private and government-funded, well before the iPhone was conceived (see Buxton [2007] 2014).

biotechnology firms “to improve their technology platforms and scale up their operations, allowing them to advance to the position of becoming a major player in the biopharmaceutical industry” (Mazzucato 2013: 81).

Once again, we have to ask whether this is actually industrial policy. The idea that inspired the orphan drugs law is that, under normal circumstances, it would be uneconomical to spend the hundreds of millions or billions of dollars to develop, test, and seek approval for a drug to treat conditions that affect a patient population of under 200,000 people. Therefore, the government provides a mix of “incentives” to overcome the very market failure it itself assumes. This is not only the case in the United States; orphan drugs legislation has been implemented, following the U.S. example, in other countries, as well as by the European Union since 1999.

In the United States, the incentives primarily amount to a slight extension of the market exclusivity provisions that apply to all approved drugs and to tax credits for R&D spending. The market exclusivity extension (which is not a patent extension) gives the manufacturer the exclusive right to sell the orphan drug for seven years after FDA approval, even if the patent has expired. This compares to an existing five years of market exclusivity for nonorphan drugs. However, if the remaining patent life of the orphan drug after FDA approval is longer than seven years, the market exclusivity is essentially worth nothing.

On the top of that, there is a relatively small amount of direct research funding from government available. For fiscal year 2014, the U.S. government allocated a mere \$14.1 million for orphan drug research grants, with the typical grant to an individual developer being around \$100,000.⁸

Mazzucato presents her book as a “discursive battle” against a notion that sees the State’s active role limited to the correction of market failures. She contrasts the “‘market failure approach,’ in which the State is simply remedying the wedge between private and social returns” with a “‘systems of innovation’ approach, which looks at R&D spending in a more holistic way” (Mazzucato 2013: 9).

And yet one of the success stories Mazzucato presents to make her case, the Orphan Drug Act, is actually a very clear case of an attempt

⁸See www.federalregister.gov/articles/2012/08/06/2012-19086/clinical-studies-of-safety-and-effectiveness-of-orphan-products-research-project-grant-r01.

to overcome a market failure: lawmakers thought that a certain good was provided in a suboptimal quantity by free enterprise, and thus intervened to realign the incentives.⁹

What About Entrepreneurs?

Mazzucato's work can be understood as an attempt to solve the great riddle of the modern capitalist economy: where does innovation come from? McCloskey ([2010] 2011: 52) has argued that "the path to the modern" economic world "was . . . about discovery, and a creativity supported by novel words." Entrepreneurship played a central role in the development of the modern economy. According to Kirzner (2000: 96), a certain "propensity for entrepreneurial discovery and innovation" finds fertile grounds in a market economy, where proper incentives, a certain set of institutions, and a welcoming culture allow it to develop.

Mazzucato has her own explanation for the tremendous success of modern innovation: government investment in R&D of new technologies. But such an all-encompassing explanation seems to be extremely economical with details.

Consider, for example, the comparison she draws between the experience of Japan and that of the United States in the 1970s and 1980s, building on a paper by Freeman (1995). Japan's economic rise is explained "as new knowledge flowing through a more horizontal economic structure, consisting of the Ministry of International Trade and Industry (MITI), academia and business R&D" (Mazzucato 2013: 37). In the 1970s, Japan invested 2.5 percent of its GDP in R&D while the Soviet Union invested 4 percent. Yet Japan "grew much faster . . . because R&D funding was spread across a wider variety of economic sectors, not just those focused on the military and space as was the case in the Soviet Union" (Mazzucato 2013: 37). Although Mazzucato recognizes that "the Soviet Union did not have, or permit, business enterprises to commercialize the technologies developed by the State" and that "Japan had strong user–producer linkages" (Mazzucato 2013: 37)—which is to say, it had a market economy in which the supply of goods and services responds to

⁹Given the "regulatory intensity" of the pharmaceutical sector, it could be argued that the special privileges given to producers of orphan drugs merely offset sources of hindrance to production that were manufactured by government itself. However, this is not the proper place to develop such an argument.

demand—she considers this “structural” difference of little importance when compared with the “directionality” that strong coordination by government authority impressed on the Japanese economy. Can the existence of private businesses, seeking profits and market shares, really be considered an irrelevant detail?

It may also be worth noting that, until 1991, the Japanese government “was funding less than 20 percent of its R&D and, remarkably, less than half of its country’s academic science—an extraordinary exception to the average OECD government, which was funding around 50 percent of its R&D and 85 percent of its country’s academic science” (Kealey 2008: 287).

Perhaps Mazzucato should have paid more attention to the different ways in which government money was allocated in the two countries, which she herself reports. In the Soviet Union, over 70 percent of R&D spending was allocated to the military and space sectors. In Japan, those two business sectors accounted for less than 2 percent of R&D (Mazzucato 2013: 39). Such a radically different proportion may have something to do with the fact that the recipients of government grants in Japan were private enterprises that depended more on consumers buying their products than on specific subsidies from the state. It hardly needs to be stated that this was not the case in the Soviet Union.

Paradoxically, Mazzucato’s emphasis on breakthrough innovation is conducive to a minimization of the role of private enterprises. Instead of proving the institutions of a market economy socially beneficial, innovation to her proves their irrelevance. In her perspective, the private sector at best repackages and markets innovations that were already developed by government. This is basically her view of Apple, and also the main reason she advocates higher corporate taxes: so that private enterprise can “give back” what it obtained from government intervention. What is most striking, however, is that Mazzucato apparently considers this “last mile” of innovation extremely banal.

The Entrepreneurial State points out a number of instances in which innovations that ultimately ended up being used by Apple in its devices crossed the great river of public spending. Mazzucato asks, “Did the U.S. Government ‘Pick’ the iPod?” (Mazzucato 2013: 109), and answers in the affirmative.

But this is hard to accept. On the one hand, the technologies behind those products may have benefited from public spending, but

they were at best an unintentional consequence of government-funded research and development. “Luck” and “design” are not synonyms, and they do not become synonyms just because we are talking about industrial policy. On the other hand, Mazzucato does not and could not demonstrate that the development of some particular technologies (like GPS) happened because government planners forecast their eventual point of arrival.

What private business does, in a market economy, is order factors of production in a way consistent with its attempt to meet and anticipate consumer demand. Breakthrough innovation doesn’t happen in a vacuum and is seldom realised just because of brilliant ideas and new technological achievements. “Gadgets” alone are not the be-all and end-all of innovation. To be successful, they must also create excitement among buying customers, meet a demand, and thus cause a readjustment of the factors of production. Technological progress doesn’t add new products to the shelves by itself.

F.A. Hayek (1955: 98) once commented that “compared with the work of the engineer that of the merchant is in a sense much more ‘social,’ i.e., interwoven with the free activities of other people.” The entrepreneur’s role is not to create new inventions but to anticipate and meet consumers’ demands. Innovations, in turn, are useful because of the needs and desires they may satisfy. Government is typically a bad entrepreneur not because some economists or political philosophers deem it to be, but because the conditions under which it operates are radically different from those facing private entrepreneurs. Market-driven economies are dynamic; they have to be to survive. State-driven economies, or what Nobel laureate economist Edmund Phelps (2013: 127) calls “social economies,” are “fatally lacking in dynamism.”

Occasionally, Mazzucato seems to be concerned with a slightly different—and perhaps more serious—problem: the alleged stagnation of innovation in our times. She remarks that “long-term basic and applied research is not part of the strategy of ‘Big Business’ anymore” (Mazzucato 2013: 178). But she doesn’t seem concerned with the specific problems that may have slowed down dynamism. Investor and writer Peter Thiel, for example, suggests that relatively recent technological innovation came from “the world of bits” rather than the “world of things,” because overregulation hinders the latter more than the former (Thiel 2014).

Mazzucato tries to dismantle the very idea that government activity can be an obstacle to innovation. However, to persuasively demonstrate that government is key to innovation, Mazzucato should discuss how government planners and engineers are selected and appointed, as well as the incentives that enable a government bureaucracy to “crowd in” innovation in the economic process. Unfortunately, she doesn’t touch upon these problems at all.

It should be clear by now that Mazzucato’s state is not really “entrepreneurial” in the way we normally use the word. Entrepreneurial activity entails discovering not just new technologies, but new needs, new consumer preferences, and better ways to coordinate the factors of production in order to satisfy them. Mazzucato claims that the government is better at picking winners than the market, but she doesn’t quite explain what race these so-called winners are competing in. She does not consider at all the fact that entrepreneurs need to respond to feedback mechanisms, whereas public spending, typically, does not. Her view of progress is one in which demand has no role whatsoever.

The Missing Consumer

In her “discursive battle,” Mazzucato carefully avoids looking into any counterargument or potential falsification of her thesis. In her view, “We just haven’t developed the accurate metrics needed to judge its [the State’s] investments fairly” (Mazzucato 2013: 19). Moreover,

What is ignored is that, in many of the cases that the State “failed,” it was trying to do something much more difficult than what many private businesses do: either trying to extend the period of glory of a mature industry (the Concorde experiment or the American Supersonic Transport project), or actively trying to launch a new technology sector (the Internet, or the IT revolution) [Mazzucato 2013: 18].

The implication of this becomes clearer when Mazzucato confronts the case of two solar energy businesses, Solyndra in the United States and Suntech in China:

Shifts in global solar markets prevented Solyndra from capitalizing on its investments. Before Solyndra could exploit the economies of scale provided by its increasing manufacturing

capacity, the cost of raw silicon collapsed. The cost of competing C-Si PV technology also fell even more drastically than predicted as a result of Chinese development and investment in the technology. Despite the government's support and \$1.1 billion obtained from its business investors, Solyndra declared bankruptcy in the fall of 2011 [2013: 129–30].

Many commentators have seen in the Solyndra bankruptcy a spectacular demonstration of government's inability to make complex investments in new technologies by picking winners—that is, a dismal failure of industrial policy (Jenkins 2011, Taylor and Van Doren 2011). By contrast, Mazzucato is convinced that the fault lies with the rats escaping the sinking ship: the problem appears “when the business community [runs] out of patience or tolerance for risk” (Mazzucato 2013: 130).

Mazzucato's reasoning is as follows: “Real” innovation needs years to develop and—under conditions of fundamental uncertainty—the time innovation needs to come to fruition can't be precisely defined. Therefore, an investor with a limited time horizon will be inclined to withdraw too early and in so doing jeopardize the possibility of true innovation. Mazzucato accepts that some people interpret the inability of a business to score profit as proof that a technology “can't compete,” but regards such a perspective as “against the historical record, which suggests that all energy technologies have needed and benefited from lengthy development periods and long-term government support” (Mazzucato 2013: 159).

If impatient investors are the bogeyman of Mazzucato's story, the hero is the Chinese government, which nationalized Suntech's assets, aiming “to protect the interest of thousands of workers, the public banks backing the firm, and the State” (Mazzucato 2013: 154). Here, finally, Mazzucato sides with something we can unambiguously recognize as industrial policy. Such an industrial policy implies a defense of the way factors of production are employed today, thereby picturing it is the best possible way, against traumatic reallocation due to bankruptcy.

This, ultimately, is why Mazzucato assumes that government can “create new products and new markets.” Essentially, government can stay put, regardless of returns on investments. But don't tradeoffs exist for government too? Plainly, if government is supporting a certain innovation or a certain company, it won't be able to use the

same resources to support other activities or companies—nor will the private sector, where those resources inevitably originate. Mazzucato’s arguments float around in a rarefied atmosphere in which private investors allocate scarcities in an imperfect way, while government doesn’t care about the existence of scarcity at all. But this is just another sense in which Mazzucato’s entrepreneurial state is not really entrepreneurial at all.

Of course, it is possible that private investors will misallocate their resources, but private misallocation has the obvious advantage for society at large of being *private*. In stark contrast, government resources are taken out of everybody’s pocket. Mazzucato doesn’t even consider this simple fact.

Mazzucato is not blind to the existence of opportunistic behavior, but she sees it only when it supports her personal preference for government intervention. Taking an unacknowledged public choice perspective, she shows great suspicion of corporate interests. In particular, she dismisses Big Pharma’s protest against hyperregulation as cheap talk, on the grounds that, in her view, the industry tends to relocate not where taxes are lower and rules easier, but to places where it can receive subsidies of some sort.

Mazzucato also claims that “only Apple’s shareholders are allowed to benefit financially from the company’s recent and current success, even though many at the base directly contribute to it” (Mazzucato 2013: 171). Once again, this echoes President Obama’s “you didn’t build that” speech. The suggestion is that those who somehow didn’t manage to innovate in a vacuum should pay higher taxes as recompense.

If government is actually behind so many innovations that are eventually brought to market by private business, then it is intolerable, in Mazzucato’s view, that those private companies make money, and then decide to relocate here or there, finding the most favorable tax jurisdiction, without “giving back” to the authorities resources that could go to fuel government R&D and propel a virtuous circle. This is why Mazzucato proposes a familiar set of policy solutions: direct government investment in innovative businesses, a bigger role for government banks, and a “golden share” over patents that come out of research financed by the public sector.

According to Mazzucato (2013: 156), “One of the biggest challenges for the future, in both cleantech and whatever tech follows it,

will be to make sure that in building collaborative ecosystems, we do not only socialize the risks but also the rewards. It is only in this way that the innovation cycle will be sustainable over time, both economically and politically.”

Mazzucato gives little consideration to the impact the taxes needed to support these “collaborative ecosystems” might have on private enterprise or consumer demand. Yet taxes are a production cost for business. Can we assume that the price of a certain good is completely independent from its production costs? If not, higher taxes may eventually become higher prices for consumers, with a dampening effect on the consumer demand that drives private innovation. Similarly, is it realistic to imagine that private businesses will continue to fulfill their central role in innovation, even as their profits are squeezed by higher taxes? Incentives matter, in innovation as in everything else.

Mazzucato does not tackle this problem, but she seems to believe that the costs of her proposals should be sustained because the lack of a proper government R&D infrastructure might have *higher* costs, substantially undermining our ability to innovate. This assertion is as convenient as it is unclear. Mazzucato does not attempt to quantify the social cost of any deficiency in government R&D. In this sense, Mazzucato belongs to that group of thinkers who, to quote McCloskey (2014: 77), never think it necessary to offer evidence that their “proposed state intervention will work as it is supposed to” or that “the imperfectly attained necessary condition for perfection before intervention is large enough to have much reduced the performance of the economy in aggregate.”

Conclusion

Mazzucato doesn’t really explain how government bureaucracy can lead innovation with “mission-oriented directionality.” Furthermore, she doesn’t appear to see innovation as anything other than technological progress per se. The fact that innovations should become “products,” available to benefit flesh-and-blood human beings, doesn’t seem to be particularly relevant to her argument.

Of course, if we assume that we can pay for all possible research projects, then we can safely assume too that financing everything will lead, at some point, to some results. But the U.S. Treasury does not

work like Mary Poppins' bag. So how does this all fit into a world of scarce resources and inevitable tradeoffs?

In such a world, the dreary judgments of investors help at least in figuring out which kind of technological advancements promise to be of use to consumers, and which do not. Consumers are not mere passive subjects: their preferences and needs influence production too. In this respect, Mazzucato's construction of the almighty entrepreneurial state seems to miss something fundamental. Her lack of consideration of the role consumers play in a market economy points to a conception of economic life similar to the race between the United States and the Soviet Union to send the first man into space. Like those cold warriors before her, Mazzucato overlooks the fact that innovation is not just about technological progress for its own sake, but rather about making people's lives better and easier. In the end, Mazzucato's entrepreneurial state, for all its progressive zeal, seems ill-suited to that important task.

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