

This economist has a plan to fix capitalism. It's time we all listened

 wired.co.uk/article/mariana-mazzucato

João Medeiros, *Wired*, 8 October 2019



The idea that made Mariana Mazzucato one of the most influential economists in the world came to her in early 2011. It had been three years since the financial crisis of 2008 and, in the UK, the coalition government of Conservatives and Liberal Democrats had chosen to pursue a fiscal policy of austerity that was forcing councils to cut back public services and leading to a rise of homelessness and crime. "In my neighbourhood after-school clubs, youth centres, public libraries, policing and mental health budgets were all cut, affecting the most vulnerable people in society," she recalls. "It was very sad."

What particularly infuriated Mazzucato was the prevailing narrative that such cuts were necessary to boost competitiveness and innovation. In March 2011, Prime Minister David Cameron gave a speech excoriating civil servants working in government, labelling them "enemies of enterprise". Later that year, in November, he visited the Truman Brewery in east London to announce his plans for a new technology cluster called Tech City. "They were hyping up entrepreneurs and dismissing everyone else," Mazzucato says. "There was this belief that we didn't have European Googles and Facebooks because we didn't subscribe to Silicon Valley's free market approach. It was just ideology: there was no free market in Silicon Valley."

It was then that Mazzucato, an Italian-American economist who had spent decades researching the economics of innovation and the high tech industry, decided to look deeper into the early history of some of the world's most innovative companies. The development of Google's search algorithm, for instance, had been supported by a grant from the National Science Foundation, a US public grant-awarding body. Electric car company Tesla initially struggled to secure investment until it received a \$465 million (£380 million) loan from the US Department of Energy. In fact, three companies founded

by Elon Musk — Tesla, SolarCity and SpaceX — had jointly benefited from nearly \$4.9 billion (£3.9bn) in public support of various kinds. Many other well-known US startups had been funded by the Small Business Innovation Research programme, a public venture capital fund. “It wasn’t just early research, it was also applied research, early stage finance, strategic procurement,” she says. “The more I looked, the more I realised: state investment is everywhere.”

Mazzucato included her findings in a 150-page pamphlet she submitted to UK policy think tank Demos. It was distributed to thousands of policymakers, and received coverage in daily newspapers. “It was obvious that it had touched a nerve,” she says. “The more I thought about it, the more I wanted to go straight to the core of the myths about innovation.” She decided to dissect the product that symbolised Silicon Valley’s engineering prowess: the iPhone.

Mazzucato traced the provenance of every technology that made the iPhone. The HTTP protocol, of course, had been developed by British scientist Tim Berners-Lee and implemented on the computers at CERN, in Geneva. The internet began as a network of computers called Arpanet, funded by the US Department of Defense (DoD) in the 60s to solve the problem of satellite communication. The DoD was also behind the development of GPS during the 70s, initially to determine the location of military equipment. The hard disk drive, microprocessors, memory chips and LCD display had also been funded by the DoD. Siri was the outcome of a Stanford Research Institute project to develop a virtual assistant for military staff, commissioned by the Defense Advanced Research Projects Agency (DARPA). The touchscreen was the result of graduate research at the University of Delaware, funded by the National Science Foundation and the CIA.

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How Nike broke running

“Steve Jobs has rightly been called a genius for the visionary products he conceived and marketed, [but] this story creates a myth about the origin of Apple’s success,” Mazzucato writes in her 2013 book *The Entrepreneurial State*. “Without the massive amount of public investment behind the computer and internet revolutions, such attributes might have led only to the invention of a new toy.”

But a narrative of innovation that omitted the role of the state was exactly what corporations had been deploying as they lobbied for lax regulation and low taxation. According to a study by Mazzucato and economist Bill Lazonick, between 2003 and 2013 publicly listed companies in the S&P 500 index used more than half of their earnings to buy back their shares to boost stock prices, rather than reinvesting it back into further research and development. Pharmaceutical company Pfizer, for example, spent \$139bn

(£112bn) on share buybacks. Apple, which had never engaged in this type of financial engineering under Jobs, started doing so in 2012. By 2018, it had spent nearly one trillion dollars on share buybacks. “Those profits could be used to fund research and training for workers,” Mazzucato says. “Instead they are often used on share buybacks and golfing.”

That posed an urgent, more fundamental problem. If it was the state, not the private sector, which had traditionally assumed the risks of uncertain technological enterprises that led to the development of aviation, nuclear energy, computers, nanotechnology, biotechnology and the internet, how were we going to find the next wave of technologies to tackle urgent challenges such as catastrophic climate change, the epidemic of antibiotic resistance, the rise of dementia? “History tells us that innovation is an outcome of a massive collective effort – not just from a narrow group of young white men in California,” Mazzucato says. “And if we want to solve the world’s biggest problems, we better understand that.”



Matt Holyoak

One of Mazzucato's most enduring memories of her childhood is watching her father Ernesto, a nuclear fusion physicist at Princeton University, yelling at the news. She would say, "Dad, that's just information," to which he would reply: "That's not information, that's just what they're trying to make you believe." "A critical eye was the first thing my dad instilled in me, mainly just from watching him swear at the TV," Mazzucato says. After the publication of *The Entrepreneurial State*, Mazzucato, an effervescent woman in her late forties, became a regular on current affairs programmes, often delivering devastating critiques of commonly held economic beliefs with eloquence. During a debate about the budget deficit on *Newsnight* in 2017, she berated Evan Davis for obsessing about it, explaining with exasperation: "Deficits matter, but what matters is what you're spending it on." When asked about Google's tax avoidance by Jon Snow on Channel 4 News, she retorted: "You know what? That's not the problem. The real problem is that people don't know about the backroom deals that the Googles and the Apples and the Glaxos and the Pfizers have with the treasuries around the world on tax policy."

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That the message at the core of her book had resonated with a general audience didn't necessarily surprise Mazzucato. "Silicon Valley entrepreneurs rarely acknowledged that they were standing on the shoulders of giants. It was a call to arms to innovators to sort of step up and acknowledge that," says Saul Klein, co-founder of venture capital firm LocalGlobe. "There has been a very concerted effort, over the past 40 years, to build this intellectual construct that was sold to government and sold to society about the free market, supported by businessmen who were trying to tell a story that was advantageous to them," says tech mogul Tim O'Reilly. "It's now very clear that there's something wrong with the story. We need a new theory to replace this, and Mariana is one of the economists trying to build a rival narrative."

Mazzucato was surprised to find supporters inside the coalition government. "To be honest, given that I had mainly written academic things, there was no real risk that I sounded like a communist," she says. That support came in the form of Business Secretary Vince Cable, who founded the Catapult centres to promote partnerships between scientists and entrepreneurs; and the "eight great technologies" investment announced by David Willetts, Minister for Universities and Science. "There's been a gap in conservatism in offering a constructive account of the role of the state," Willetts says. "Mariana provided an account of the role of government which was neither one of minimal government nor traditional socialism. I was able to say in government, hang on, this isn't some experiment with left-wing socialism. This is what happens in Republican America."

Soon, she became a regular visitor at Whitehall, advising both Cable and Willetts on policies such as the Small Business Research Initiative, which funded small and medium enterprises, and the patent box, which reduced the rate of corporate tax on income derived from patents (which she calls “the stupidest policy ever”).

Mazzucato knew that to influence politicians she would need to do more than just criticise. “The reason progressives often lose the argument is that they focus too much on wealth redistribution and not enough on wealth creation,” she says. “We need a progressive narrative that's not only about spending, but investing in smarter ways.”

At the time, Mazzucato was increasingly interested in what she called mission-oriented organisations. The prime example was DARPA, the research agency founded by President Eisenhower in 1958 following the Soviet Union’s launch of Sputnik. The agency pumped billions of dollars into the development of prototypes that preceded commercial technology such as Microsoft Windows, videoconferencing, Google Maps, Linux and the cloud. In Israel, Yozma, a government-backed venture capital fund that ran between 1993 and 1998, supported more than 40 companies. In the UK, the Government Digital Service, launched in 2010, was behind the award-winning .gov.uk domain, saving the government £1.7bn in IT procurement. “When I use the word ‘state’ I am talking about a decentralised network of different state agencies,” she says. When such agencies are mission-oriented to solve problems and structured to take risks, they can be an engine of innovation.”

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To Mazzucato, the epitome of the mission-oriented concept was the Apollo programme, the space programme designed to land Americans on the Moon and return them safely to Earth. Between 1960 and 1972, the US government spent \$26bn (£21bn) to achieve precisely that. More than 300 different projects contributed, not only in aeronautics but in areas such as nutrition, textiles, electronics and medicine, resulting in 1,800 spinoff products, from freeze-dried food to cooling suits, spring tyres and digital fly-by-wire flight control systems used in commercial airplanes. The programme was also instrumental in kick-starting an industry for the integrated circuit, an unproven technology at the time, and other space projects such as the Space Shuttle and the International Space Station.

The modus operandi of these mission-oriented institutions provided Mazzucato with an alternative vocabulary that told a different story about the role of the state. “Economics is full of stories,” she says. “Words like ‘enabling’, ‘facilitating’, ‘spending’, ‘regulating’ – they create a story of the state as boring and inertial. It becomes a self-fulfilling prophecy. We need a new narrative to guide better policies.” These mission-oriented institutions were

actively creating and shaping markets, rather than merely fixing them. They were ambitiously seeking high-risk directions for research and investment, rather than outsourcing and avoiding uncertainty.

Mazzucato's collaboration with Whitehall was put on hold after the 2015 general election: Willetts stood down from his seat, and Cable lost his. By then, however, she had gone global – working with US Democrat Elizabeth Warren on public funding for health innovation, and advising Scottish First Minister Nicola Sturgeon on the development of a Scottish national investment bank. Mazzucato also launched a new type of economics department at University College London, the Institute for Innovation and Public Purpose (IIPP) – with the mission of training the next generation of civil servants in the theory of mission-oriented policies. “We want them to think strategically and ambitiously for the public good and, in the words of Steve Jobs, to ‘stay hungry and stay foolish,’” she says.

In early 2017, Carlos Moedas, the European Commissioner for Research, Science and Innovation, offered her a position as special adviser, which she accepted. “I wanted the work to have an impact,” she says. “Otherwise it’s champagne socialism: you go in, talk every now and then, and nothing happens.” She suggested reframing the European research and innovation programme as Horizon Europe, a €100bn (£90bn) mission-oriented initiative due to start in 2020. Moedas gave her carte blanche to pursue the project.

The European Commission had traditionally framed its policies in terms of grand challenges, but Mazzucato's concept of missions translates these into concrete projects: the Cold War was a challenge; landing on the moon was a mission. In February 2018, she published a report — titled Mission-Oriented Research & Innovation in the European Union — that defined five criteria missions should obey: they must be bold and inspire citizens; be ambitious and risky; have a clear target and deadline (you have to be able to unambiguously answer whether the mission was accomplished to deadline or not, Mazzucato says); be cross-disciplinary and cross-sectorial (eradicating cancer, for example, would require innovation in healthcare, nutrition, artificial intelligence and pharmaceuticals); and allow for experimentation and multiple attempts at a solution, rather than be micromanaged top-down by a government.

In the report, she illustrated what missions could look like with three hypothetical examples: a plastic-free ocean, 100 carbon-neutral cities by 2030, and cutting dementia by 50 per cent. The clean oceans mission could involve removing half of the plastic already polluting the oceans and reducing by 90 per cent the quantity of plastics entering them before 2025, through projects such as autonomous plastic collection stations or distributed nets. The solution would require inventing alternatives to plastic, designing novel forms of food packaging, and creating AI systems that could separate waste automatically. “These were just examples to tease out the difficulties,” Mazzucato

says. "When people talk about missions, I always warn them: if this is something that makes you feel comfortable and happy and cosy, then you haven't understood it, because it's actually about fundamentally changing how we think about innovation."

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In March 2018, Mazzucato was contacted by two members of a progressive political movement in the US called Justice Democrats. She had no idea who Saikat Chakrabarti and Zack Exley were. "They were saying that they were trying to bring in a new wave of young politicians," she recalls. "It was more curiosity from my side of hearing what's going on in the US, because I had sort of lost touch."

Chakrabarti and Exley had previously worked for Bernie Sanders' 2016 presidential campaign. Chakrabarti then co-founded a political action committee with the aim of recruiting 400 working class candidates to run for Congress. "The idea was to create a

new caucus within the Democratic Party,” Chakrabarti says. “We have people like Donald Trump in the White House, the Democratic Party leadership is acting as if it's still 1995. The real divide is not between left and right. It's between ambition and not ambition. We wanted an alternative vision of society that's revolutionary. What was exciting about meeting Mariana is that there weren't a lot of people in the US talking about those kinds of ideas.”

In London, at Mazzucato's home in Camden, they told her that, in three months, they were hoping to have elected officials in Congress who would be willing to talk about big policy ideas, particularly around environmental change. One of their most promising candidates was a young bartender from New York. Her name was Alexandria Ocasio-Cortez.

In June 2018, Ocasio-Cortez defeated 10-term incumbent Joe Crowley in the Democratic primary, shocking the political establishment and in effect guaranteeing herself a place in Congress.

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A month later, Mazzucato and Ocasio-Cortez spoke over Skype for the first time. Their conversation revolved around a new, ambitious industrial policy that the Justice Democrats were calling the Green New Deal. Mazzucato had been one of the originators, in collaboration with the economist Carlota Perez. “The most important thing is to stop thinking that we should sacrifice our way of life in order to solve our environmental problems,” Perez says. “We always thought of it as an opportunity to transform our society in a way that is also fairer and socially sustainable.”

To Mazzucato, a Green New Deal could be as bold as the 1969 moonshot. “When my book came out, Bill Gates invited me to come to Seattle,” she says. “He told me that he had followed the lead of the public sector when it came to IT. And now he was concerned that he couldn't see the public leading in green in the same way.” A Green New Deal would involve, as she puts it, “greening the entire economy”, transforming not only the renewable energy industry but every single aspect of manufacturing. It would require tax incentives and disincentives to tackle high polluters and to encourage innovation around areas like waste and durability. It would require patient, long-term finance.

On September 11, Mazzucato and Ocasio-Cortez met face to face at the Firefly restaurant, the latter's local hangout in Sunnyside, New York. They spoke about everything from the issue of public return for public investment to the notion of market co-creation versus market fixing. “She's quite academic,” Mazzucato says. “It was much

easier to talk to her about these things than it normally is with a politician who just wants the slogans, but doesn't really get the details behind the message."

Ocasio-Cortez also asked the economist for advice on how to get her message across to voters. In 2009, when Obama was proposing his healthcare reform, he had to assure people that government bureaucrats weren't meddling. That was fine, but it didn't capture the imagination of the public, Mazzucato said. He should have said that, actually, public-funded agencies were not just regulating – they were financing most of the innovation in the healthcare system. The pharmaceutical industry gets \$32bn (£25bn) a year of innovation financing from the a state agency – the National Institutes of Health – condition free, and yet taxpayers still had to pay extortionate prices for life-saving drugs. It made no sense. "Get the language right," Mazzucato told Ocasio-Cortez. "Otherwise, you're just going to be a nice social democratic, boring lefty politician."

In February 2019, Ocasio-Cortez released her first piece of legislation as a congresswoman: a 14-page resolution on the Green New Deal, which she called the "moonshot of our generation". A few weeks later, during a congressional hearing on the drug industry, she asked Aaron Kesselheim, a professor of medicine from Harvard: "Would it be correct, Dr Kesselheim, to characterize the NIH money that is being used in development and research as an early investment? The public is acting as an early investor in the production of these drugs. Is the public receiving any sort of direct return on that investment from the highly profitable drugs that are developed from that research?" "No," Kesselheim replied.

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One afternoon in May 2019, Mazzucato sat alongside David Willets in a packed lecture theatre at University College London. She stood up and introduced herself to the audience. Then she pointed towards a stack of 100-page yellow reports on the desk. The cover read “A Mission-Oriented UK Industrial Strategy”. “This is what we’ve been doing for the past year,” she reflected. “We’ve been working really hard and this is the outcome.”

Almost exactly a year before, then British Prime Minister Theresa May had delivered a speech at Jodrell Bank Observatory about the government’s new industrial strategy, which was centered around four grand challenges: clean growth, mobility, healthy ageing and AI. May announced one mission for each challenge: halving the energy use in new buildings by 2030; using AI to transform treatment of chronic disease; extending healthy, independent life to five extra years; being at the forefront of zero-emission vehicle manufacturing by 2040. These had already been a direct outcome of Mazzucato’s influence with the then business secretary, Greg Clark. Months before, Clark had contacted Mazzucato to learn more about mission-oriented policies. He later asked her to co-chair a commission with Willets and coordinate cross-departmental mission teams in Whitehall, inspired by DARPA.

Over a year, the commission met every month. “We found that putting into practice Mariana’s five criteria for what missions should be a lot harder than expected,” Rainer Kattel, IIPP’s deputy director, says.

For instance, the commission deemed the mission for the future of mobility as unambitious and too siloed within the Department of Transport. “That target was going to happen anyway,” Kattel says. “We went back to them and said that it was too low-hanging. The biggest surprise was that they were very open to our criticism.”

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Regarding the healthy ageing mission, they struggled with the definition of “healthiness” “How do you even measure that?” Mazzucato asks. Initially, they considered the scenario of an Alzheimer’s patient who is completely independent in the home and assisted by cutting-edge technologies. But the mission leader didn’t like the idea. “Why obsess about independence?” She said. “How about nurturing co-dependency instead?”

On the future of mobility, the musician Brian Eno, one of the Institute’s advisors, questioned the assumption that getting from A to B quicker was the goal. “How about going slower and appreciating life?”

The year-long collaboration between the IIPP and Whitehall included a series of workshops around the theory of mission-oriented policies, delivered by Mazzucato and her team to civil servants in Whitehall. “These were, after all, people that had been constantly told to get out of the way and stop stifling innovation. It can get depressing,” Mazzucato says. “Going in and giving them a different narrative about ambitious missions and dreaming the big thing, their eyes would just light up. Sometimes I felt like a life coach.”

Some of those conversations, however, were challenging — particularly regarding the policy appraisals conducted by the Treasury. “As the Chancellor of the Exchequer, all across government 20 people come to you with different policy proposals that you can spend the money on. How do you decide which one will have the biggest impact or is the most worthy?” says George Dibbs, the head of industrial strategy at IIPP. The standard method of appraisal, used by governments around the world, is cost-benefit analysis, in which a simplistic quantitative estimate is made about how much a policy will cost and how much money it will generate. “It’s like the old mentality from the Vietnam war: as long as the enemy’s body count is higher, we can ignore all other variables.” Kattel says. “That’s why, for instance, some new drugs are not paid for by the NHS because not enough people can benefit from them. Bureaucrats have really lost that idea that they are somehow responsible for the people on the street.”

Cost-benefit analysis is not suitable to evaluate mission-oriented policies, which are inherently risky and uncertain, and aimed at creating new markets rather than fixing existing ones. As Mazzucato likes to point out, we would never have walked on the Moon if the Apollo Program had been evaluated via cost-benefit analysis.

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At the launch of the report, Mazzucato told the audience a story to illustrate her point: in the 1500s, the Jesuits had a system that involved opening a cash box by turning two keys simultaneously — one belonged to the accountant, the second to the rector. This meant that, to open the coffer, “you had to have a vision but you also had to think about the budget,” she concluded. “I know it sounds strange, but that’s what’s missing.”



Matt Holyoak

One afternoon in late June, Mazzucato sat pensively at her office in central London. A neon sign spelling “the value of everything” — a present from her husband in celebration of her second book, which has this phrase as its title — adorns one of the walls. Large posters hang on the walls depicting Mazzucato’s complex mission diagrams. Two days after the launch of the industrial strategy report, Theresa May had resigned as prime minister, potentially derailing the entire industry strategy policy and putting Mazzucato’s work with the government, once again, on hold. “Sometimes you either just want to go crawl back in bed or you fight back harder,” she says. “I tend to always do the latter.”

Mazzucato sees her work as a battle of ideas. “So much bullshit happens in the name of innovation,” she says. “As an advisor, it’s critical to follow up and put in the time and make the whole argument again and help people get the details right.” Sometimes, when she’s addressing an audience, she thinks to herself, ‘Oh my god, I’ve said this so many times.’ “My dad makes fun of me,” she says. “He tells me ‘Don’t people realise that you keep telling them the same thing?’ But the audience is different and the message reminds heretics in many circles.”

She laughs, because she does realise – but it's a necessity. Recently, at the European Investment Bank, she had to tell an audience of economists: "Please never write the word 'de-risking' again in any of your reports, because that's not what you're doing. You took risks and you should be able to say it openly – kind of coming out of the closet about it."

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The return of the night train

At a talk at Nasa, where Mazzucato has been working as part of a group studying the low-Earth orbit economy, she urged them to recover the ambition befitting an agency of its calibre. "I don't think many people realize that Novartis, one of the richest pharmaceutical companies in the world, is working for free on the International Space Station," she says. "Who thought that up? Charge them. Or make sure the relationship is symbiotic, not parasitic."

In May, the European Parliament voted and approved Mazzucato's mission-oriented proposal for the Horizon Europe programme. After a lengthy consultation period, five mission areas were chosen: adaptation to climate change; cancer; healthy oceans, seas, coastal and inland waters; climate-neutral and smart cities; and soil health and food. The European Commission will now appoint a mission board of 15 experts for each area. They will be responsible for identifying the first specific missions, following Mazzucato's criteria. "Moedas jokingly offered me the role of chief muse of missions," she laughs. "That report was the most important thing I've written. It's now a legal instrument, it can't be undone unless another vote is had." She pauses. "I've influenced politicians, but having a parliament vote on something I wrote is just fantastic," she continues. "That's what I want: to bring about change."

Mariana Mazzucato is speaking at WIRED Smarter at King's Place in London on October 30, 2019. [Click here to find out more](#)

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