

International Studies in Entrepreneurship

Magnus Henrekson
Christian Sandström
Mikael Stenkula *Editors*

Moonshots and the New Industrial Policy

Questioning the Mission Economy

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Mikael Stenkula
Editors

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“Proponents of the ‘mission economy’ offer sparse empirical evidence for their ideological agenda. Any evidence offered is either based on extreme outlier success cases, or worse, a misrepresentation or oversimplification of government initiatives in achieving entrepreneurial and innovative solutions. This book adds to the growing body of scientific evidence that critically examines missions and government industrial policy. The compelling evidence of failures in mission definition, coordination, and economic or social outcomes provides a cautionary reminder that government policies are likely to be distorted by political agendas, rent-seeking, lack of relevant information or capabilities, and bureaucratic red tape. Taken together, the theoretical and empirical chapters of ‘government failures’ provide a powerful and rigorous challenge to ideologies that posit ‘market failures’ must and should be solved through government intervention.”

—**Rajshree Agarwal**, *Rudolph Lamone Chair of Strategy and Entrepreneurship and Director of the Ed Snider Center for Enterprise and Markets, University of Maryland*

“In this important and thoughtful new book, Magnus Henrekson, Christian Sandström, and Mikael Stenkula challenge the conventional wisdom prioritizing government directed innovation and entrepreneurship. The well-researched and insightful collection of analyses by a team of leading scholars spanning a broad spectrum of fields and countries across the globe provides compelling evidence that societal faith in government-led innovation and entrepreneurship is no more than a pie in the sky. Thought leaders in business, policy and academia need to carefully and fundamentally rethink their public policy stance towards the role of government in the economy on the basis of this inspiring book.”

—**David B. Audretsch**, *Distinguished Professor, Ameritech Chair of Economic Development and Director, Institute for Development Strategies, Indiana University*

“Since the Global Financial Crisis, enthusiasm about industrial policies has soared among policymakers and academics alike. But despite the optimism of the advocates, the track record of these efforts—particularly when it comes to their frequent goals of promoting innovation and entrepreneurship—has been very mixed. This volume focuses on carefully understanding the barriers to the effective implementation of industrial policies and serves as a healthy corrective to much of the recent literature.”

—**Josh Lerner**, *Jacob H. Schiff Professor of Investment Banking, Harvard Business School*

“This take-down of ‘mission-oriented innovation policy’ is a must read. It shows us what happens when the fine folks who brought you the War on Drugs turn to other ‘wars’ and grand ‘missions.’ The distinguished contributors to the volume dive deep into theory and history to show how the push for mission-oriented policy inevitably becomes a march of folly. Together, the chapters in the volume provide a thoughtful and much needed analysis of what happens when top-down best practices prevent the emergence of bottom-up entrepreneurial solutions to grand challenges. Readers of all persuasions will find the volume informative and enlightening.”

—**Maria Minniti**, *Louis A. Bantle Chair in Entrepreneurship and Public Policy, Director of the Institute for an Entrepreneurial Society, Whitman School of Management, Syracuse University*

“Behaviorally speaking, even the most open advocates of market approaches tend to quickly embrace command economies when big crises hit. Managers of large corporations, for example, tend to hunker down into more predictive approaches to innovation, the more uncertainties and fast-paced changes they get confronted with. The current rise in government-led and mission-oriented innovation is symptomatic of such a paradoxical behavioral response to the global financial crisis and other challenges facing Europe and the world. I endorse the pluralistic approach to innovation incorporated into the various essays in the collection by Henrekson et al. While we need to protect and enhance historically hard-fought institutions, we also need to guard against turning to governments as pioneers of entrepreneurial innovation. Especially in face of big challenges under multiple uncertainties, we simply cannot “leave it” to governments, not even the most benign and well-intentioned ones. The variety, independence and diversity of entrepreneurial actions at individual, small group and community levels are vital to the tasks at hand. This book emphasizes those and points to productive ways forward.”

—**Saras Sarasvathy**, *Paul M. Hamaker Professor of Business Administration, Darden School of Business, University of Virginia*

Preface

Until recently, there was a broad consensus that free trade, domestic deregulation, and the removal of entry barriers and other policies that curtail competition were the keys to stimulating economic growth and societal welfare. In the business realm, the prevailing sentiment was that policy's primary objective was to create a level playing field for companies—regardless of their age, industry, size, or the personal characteristics and nationality of their owners. This perspective significantly influenced the establishment of an internal market within the European Union.

However, this consensus has shifted in recent years. Western governments are now launching expansive programs to not only rejuvenate their economies post-pandemic but also achieve ambitious goals such as sharply reducing and eventually eliminating CO₂ emissions. British-Italian economist Mariana Mazzucato was at the forefront of advocating this renewed policy direction, gaining widespread attention with her 2013 book, *The Entrepreneurial State*. In the United States, eminent scholars, including Harvard professor Dani Rodrik, have championed the resurgence of vertical industrial policies that address specific challenges and cater to select sectors.

Highlighting the purported immediacy of the problems they aim to address, these increasingly interventionist and specialized industrial policies are frequently termed “Missions” or “Moonshots.”

The reemergence of state-driven strategies stems from several powerful dynamics: China's deployment of industrial policy fueling its remarkable growth, the West's perceived stagnation juxtaposed with China's swift technological advancements, the unforeseen disruption of the COVID-19 pandemic, climate change concerns, and growing geopolitical tensions. The ripple effect of imitation is evident: the European Union, observing the recent surge in subsidies and interventions in the United States, has reciprocated with measures of its own. Intriguingly, this trend intensifies even as the inherent limitations of vertical industrial policy seemingly hinder China's economy.

Horizontal policies are universal, applying to companies regardless of their operations, geographic locations, or employed technologies. Such policies encompass measures such as R&D tax credits and accelerated depreciation allowances,

which mitigate capital investment costs. In contrast, vertical policies are tailored to benefit particular sectors or even specific companies. A notable recent instance is the renewable energy tax credits included in the US Inflation Reduction Act.

Mission-driven innovation policies are politically enticing, casting policymakers in the light of visionaries who bravely tackle contemporary grand challenges. Concurrently, major corporations reap the rewards of expansive support schemes and stimulus packages unfolding across Europe and the United States.

These vast interventions carry substantial costs and often introduce distortions, predominantly favoring influential and firmly established interest groups in society. Consequently, there is a pressing need for a rigorous scrutiny of these measures. *Questioning the Entrepreneurial State (QES)* aptly addressed this gap, evident from its impressive download count exceeding 200,000 in just 1.5 years. Nonetheless, with the publication of *QES*, the endorsement for large-scale missions has only broadened. This realization catalyzed our drive to produce a subsequent volume to *QES*, incorporating a more diverse authorship, offering deeper case-study insights, providing enriched theoretical viewpoints on the subject, and suggesting feasible alternative paths.

We wish to express profound gratitude to the chapter authors of this book. Their expertise has been invaluable, with each scholar not only contributing their own narratives but also offering feedback on drafts penned by their peers.

Magnus Henrekson gratefully acknowledges financial support from both the Jan Wallander and Tom Hedelius Foundation and the Kamprad Family Foundation for Entrepreneurship, Research & Charity. Christian Sandström is indebted to the Hamrin Foundation, the Knowledge Foundation, and the Ratio Institute, while Mikael Stenkula extends his gratitude to the Jan Wallander and Tom Hedelius Foundation. The Open Access fee has been generously co-funded by the Marianne and Marcus Wallenberg Foundation and the Knowledge Foundation. Special thanks are also due to Niklas Elert, Kathy Saranpa, Gustav Häggbom, and Mikael Arvidsson Martins for their insightful comments and suggestions on preliminary drafts of the chapters.

Stockholm, Sweden
Jönköping, Sweden
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Magnus Henrekson
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Contents

Part I Introductory Chapter

Moonshots and the New Industrial Policy: Questioning the Mission Economy	3
Magnus Henrekson, Christian Sandström, and Mikael Stenkula	

Part II Theoretical Perspectives

State and Markets: Not Whether But How	31
Diane Coyle	
Engineering Is Not Entrepreneurship	43
Randall G. Holcombe	
A Behavioral Economics Perspective on the Entrepreneurial State and Mission-Oriented Innovation Policy	61
Jan Schnellenbach	
Innovationism and the New Public Intellectuals	77
Olof Hallonsten	

Part III Empirical Evidence

Analyzing the Effectiveness of State-Guided Innovation	95
Rodney H. Yeger Jr	
A Case Study on DARPA: An Exemplar for Government Strategic Structuring to Foster Innovation?	109
Rodney H. Yeger Jr	
The State of the Entrepreneurial State: Empirical Evidence of Mission-Led Innovation Projects around the Globe	125
Maral Batbaatar, Johan P. Larsson, Christian Sandström, and Karl Wennberg	

When “What Works” Does Not Work: The United States’ Mission to End Homelessness	145
David S. Lucas and Christopher J. Boudreaux	
The Cost of Missions: Lessons from Brazilian Shipbuilding	169
André Cherubini Alves	
You Can’t Develop What You Don’t Know: The Realities and Limitations of Foreign Aid Missions	191
Kathryn Waldron and Christopher J. Coyne	
A Public Choice Perspective on Mission-Oriented Innovation Policies and the Behavior of Government Agencies	213
Rickard Björnemalm, Christian Sandström, and Nelly Åkesson	
Learning from Overrated Mission-Oriented Innovation Policies: Seven Takeaways	235
Magnus Henrekson, Christian Sandström, and Mikael Stenkula	
Part IV Alternative Paths	
The Entrepreneurial State Cannot Deliver Without an Entrepreneurial Society	259
Mark Sanders, Erik Stam, and Roy Thurik	
Overcoming the Siren Song of Central Planning	271
David C. Rose	
R&D Tax Incentives as an Alternative to Targeted R&D Subsidies	289
Roger Svensson	
Bottom-Up Policies Trump Top-Down Missions	309
Magnus Henrekson and Mikael Stenkula	

About the Editors

Magnus Henrekson is Professor of Economics and Senior Research Fellow at the Research Institute of Industrial Economics (IFN) in Stockholm, Sweden. He resigned as CEO of IFN in 2020 after 15 years of service. Until 2009, he held the Jacob Wallenberg Research Chair in the Department of Economics at the Stockholm School of Economics.

He received his PhD in 1990 from Gothenburg University with his dissertation *An Economic Analysis of Swedish Government Expenditure*. Throughout the 1990s, he conducted several projects that aimed to explain cross-country growth differences. Since the turn of the new millennium, his primary research focus has been entrepreneurship economics and the institutional determinants of the business climate. In this area, he has published extensively in scientific journals and contributed several research surveys to *Handbooks* in the field of entrepreneurship.

In addition to his academic qualifications, Henrekson has extensive experience as an advisor, board member, and lecturer in many different contexts, in both the business and public sectors.

Christian Sandström is Senior Associate Professor at Jönköping International Business School and the Ratio Institute in Sweden. His research concerns innovation policy and the interplay between technological and institutional change. Sandström is one of the editors behind *Questioning the Entrepreneurial State* (Springer). He has published more than 30 papers in peer-reviewed academic journals such as *Technological Forecasting and Social Change*, the *Journal of Technology Transfer*, and *Industry and Innovation*.

Sandström wrote his PhD thesis on the topic of disruptive innovation at Chalmers University of Technology (2010). He has been a visiting scholar at the University of Cambridge and ETH Zürich in Switzerland. Sandström has received several awards for his pedagogical skills and is a frequently hired public speaker on the topic of technological change and industrial transformation.

Mikael Stenkula is Associate Professor of Economics and holds a PhD from the School of Economics and Management at Lund University. He received this degree in 2004 with his dissertation *Essays on Network Effects and Money*. After having worked for a year as a lecturer at Lund University, where he taught microeconomics, he joined the Research Institute of Industrial Economics (IFN) in the fall of 2005. His main area of research is entrepreneurship economics.

Stenkula is part of IFN's taxation history project, which has systematically and comprehensively described and analyzed the Swedish tax system from 1862 to the present day. This study is unique in scope—no equally comprehensive investigation of a national tax system has been conducted for any other country. In addition to the meticulous year-to-year documentation of all relevant details of the tax code, the project aims to examine how changes in the tax system affect the economy by guiding people's choices, particularly how the tax system affects entrepreneurial activity and firm behavior.

Stenkula also teaches at the Stockholm School of Economics and serves as the executive secretary of the award committee for the *Global Award for Entrepreneurship Research*, the foremost global award for research on entrepreneurship.

Part I
Introductory Chapter

Moonshots and the New Industrial Policy: Questioning the Mission Economy



Magnus Henrekson, Christian Sandström, and Mikael Stenkula

Abstract The notion that society should be organized around large so-called missions has gained momentum in public debate, and the reemergence of active industrial policy across the world has been inspired by academic scholars promoting the idea of mission-oriented innovation policies (MOIPs). Besides this introductory chapter, this collective volume consists of 16 chapters distributed across 3 overarching themes: theoretical perspectives, empirical evidence, and alternative paths. The volume provides a comprehensive assessment and normative critique of the efficacy of such policies. In addition to summing up the main findings in the 16 chapters, this introduction provides some additional analysis, pins down the most important general conclusions, and suggests future research questions. Today's economies are highly dependent on a well-functioning process of decentralized experimentation, selection, and screening. Instead of large-scale MOIPs, governments should strive to create an institutional framework that levels the playing field for potential entrepreneurs while encouraging productive entrepreneurship.

Keywords Entrepreneurship policy · Innovation policy · Institutions · Public choice

JEL Codes H50 · L26 · L52 · O31 · O38 · P16

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Introduction

We observe how governments in the West are introducing large-scale government programs in their efforts to both reboot their post-pandemic economies and to attain bold targets such as sharply reducing and eventually eliminating CO₂ emissions.

This broad trend toward increasingly interventionist industrial policies is often named missions, moonshots, or mission-oriented innovation policies (MOIPs). An archetypical example is the Cancer Moonshot, a large, government-directed effort to eliminate cancer, initiated by Barack Obama in 2016.¹ President Biden decided to reignite this MOIP in 2022. At the 60th anniversary of President John F. Kennedy's historical speech in which Kennedy had announced the idea of putting a man on the moon "before this decade is out," Biden announced:

I give you my word as a Biden: This Cancer Moonshot is one of the reasons why I ran for President. It's part of my Unity Agenda that I laid out in my State of the Union Address to rally the American people to work together. Because we know this: Cancer does not discriminate red and blue; it doesn't care if you're a Republican or a Democrat.²

The renaissance of moonshot policies is interesting, especially bearing in mind that the first Cancer Moonshot was put in place over 50 years prior. In his 1971 State of the Union speech, President Richard Nixon declared:

The time has come in America when the same kind of concentrated effort that split the atom and took man to the moon should be turned toward conquering this dread disease. Let us make a total national commitment to achieve this goal.

Unfortunately, as is widely recognized, this first Cancer Moonshot, known as the War on Cancer, fell far short of its aspirations (e.g., Faguet 2005). Rostand (1990) summarizes the War on Cancer in the following way:

What is surprising, in this affair, is the numbers and qualifications of those gone astray. They were not half-wits, fools, or friends of the wondrous; No, they were true men of science, unbiased and honest men familiar with the scientific method: Men with cool and solid heads who, before and after their escapade, proved themselves worthy researchers.

The EU Green Deal is an example of a new MOIP, amounting to EUR 1000 billion over a 10-year period. Several of the main reports that lay the foundations for the EU Green Deal were written by a comparatively small group of scholars who have popularized the idea of MOIPs. In the United States, the Biden presidency has put in place the Inflation Reduction Act (IRA), which is a combination of debt repayment (USD 306 billion) and funds specifically targeting cleantech. The design and implementation of these policies is influenced by the advice of scholars such as Mariana Mazzucato and colleagues. Economists such as Dani Rodrik at Harvard

¹ White House (2022a).

² White House (2022b).

University have also been instrumental in advocating the renaissance of industrial policies (Juhasz et al. 2023; Tagliapietra and Veugelers 2023; Rodrik 2022).³

Despite many historical examples of failed moonshot policies, policymakers and scholars who engage in these large-scale programs which aim to accomplish industrial and environmental renewal are rarely questioned. Often, it appears that these policies are put in place with little scrutiny and prior analysis. This trend is in many ways a manifestation of renewed belief in the efficacy of government interventions, formulated by Mazzucato (2022, p. 93) as follows:

Governments are the only actors capable of underwriting the scale of investments required; of coordinating multiple actors around the common goal of decarbonization; and of ensuring the costs and benefits of a green transition are distributed equitably across society so that social injustices are tackled alongside environmental crises.

We have witnessed a growing number of scholars questioning the entrepreneurial state and the idea of a mission economy (Wennberg and Sandström 2022; Muldoon and Yonai 2023; Kantor and Whalley 2023; Kirchherr et al. 2023), but this trend toward critical examination of such policies is still in its infancy. In the collective volume *Questioning the Entrepreneurial State* (Wennberg and Sandström 2022), 32 scholars offered a combination of theoretical and empirical contributions on the topic of industrial policy. Critical praise of the volume has emphasized the importance of both more grounded theoretical perspectives and further empirical studies of MOIPs (Muldoon and Yonai 2023). Moreover, the accelerating trend toward more proactive industrial policies, under labels such as Inflation Reduction or Green Deals, has spawned a need for continued inquiry into the workings of industrial policy in general and MOIPs in particular.

We begin this introductory chapter with an overview of the ongoing debate concerning the role of the entrepreneurial state and industrial policy. Then, we review and summarize the different contributions to this volume. It consists of three parts: (i) theoretical perspectives on MOIPs; (ii) empirical examinations of MOIPs, including in-depth case studies and reviews of previous studies; and (iii) contributions pointing to alternative ways to accomplish economic and social development.

Throughout this volume, we rely on the OECD's (2021, p. 15) definition of a MOIP as

a co-ordinated package of policy and regulatory measures tailored specifically to mobilise science, technology and innovation in order to address well-defined objectives related to a societal challenge, in a defined timeframe.

³Tagliapietra and Veugelers (2023) is an ambitious volume published by Bruegel. It consists of 12 chapters by a total of 18 authors including world-leading scholars Philippe Aghion, Dani Rodrik, and Laura Tyson. The volume asks whether industrial policies can be designed "that strengthen green growth and economic security without hurting competition, economic openness and cohesion in the EU" and whether it is "possible to do so without stronger EU-level governance, backed by financial resources" (p. 12). In his Foreword, Bruegel Director Jeromin Zettelmeyer asserts that the answer to the first question is Yes and that this cannot be achieved unless the EU assumes a stronger governance and financing role.

Relatedly, the OECD specifies a set of criteria for a MOIP, adding that these policies ideally also (i) involve different actors from different fields and sectors; (ii) address a grand challenge or wicked problem; (iii) have a defined deadline that is medium- or long-term with (iv) clear, measurable milestones along the way; and (v) involves an element of risk.

Questioning the Entrepreneurial State

In some respects, this volume is a sequel to *Questioning the Entrepreneurial State: Status-quo, Pitfalls, and the Need for Credible Innovation Policy* (Wennberg and Sandström 2022), which was published in 2022 as an open access book available for free download. In its first year, the book was downloaded more than 180,000 times, and in September 2023, the number of downloads surpassed 200,000. The book has been presented at numerous academic seminars and conferences as well as to policymakers across the globe.

The volume received positive reviews in, e.g., the *Journal of Evolutionary Economics* (Boudreaux 2022), the *Journal of Economic Literature* (2022),⁴ *International Small Business Journal* (Stam and Vogelaar 2023), and the *Review of Austrian Economics* (Holcombe 2022), and was endorsed by scholars and policymakers. Josh Lerner of Harvard Business School, David Audretsch of Indiana University (the most cited scholar in entrepreneurship economics), and former Swedish Minister of Finance, Anders Borg, have all endorsed the book (see endorsements in Wennberg and Sandström 2022).

Despite having engaged so many well-reputed authors and receiving widespread attention and praise from both scholars and policymakers, the response from Mariana Mazzucato and her colleagues was meager. On April 27, 2022, Mazzucato posted this response on X (then *Twitter*):

Critical thinking on innovation policy is key but using a book to attack a strawman of an idea is just another distortion. Response to be followed by longer article.

When asked 4 months later about this longer response, no answer came from Mazzucato. However, the following comment was made on the third of September 2022 on X (then *Twitter*) by Rainer Kattel, professor and deputy director of the Institute for Innovation and Public Purpose at University College London (UCL):⁵

The collection is intellectually embarrassing, arguments in most articles have no legs to stand on. And I am not sure most authors even realize they are serving the agenda of Cato-wannabes.

⁴Unsigned review in Vol. 60, No. 4, p. 1545.

⁵On the initiative of Mariana Mazzucato, the Institute for Innovation and Public Purpose was founded in 2017 with herself as its director. It is fair to say that the institute was founded with the express purpose of providing a platform for Mazzucato and her ideas.

When professors with elevated positions at prestigious universities such as UCL respond in this way to fellow scholars seeking to engage in a discussion, it is a signal that the topic warrants further examination.

There are several other examples of policymakers and scholars who have tried to initiate an open discussion about MOIPs and the renaissance of industrial policy. For more information, see Olof Hallonsten's chapter in this volume about innovationism and the new public intellectuals. Such attempts have usually received little attention and been ignored by proponents of MOIPs (Hallonsten 2024).

The Critique

Questioning the Entrepreneurial State gathered a group of scholars who brought forward different theoretical angles to the limitations and challenges related to MOIPs and the notion of an entrepreneurial state. Several insights emerged from this combined effort. Governments cannot act as entrepreneurs because they face no real market or risk and can therefore not be evaluated (Larsson 2022). For similar reasons, they are less able to act entrepreneurially (Sarasvathy 2022). Relatedly, they are likely to lack ownership competence (Murtinu et al. 2022). Other critical work has been of a more empirical nature, pointing to the lack of information and knowledge among policymakers who are in the position of enacting these initiatives (e.g., Sandström and Alm 2022) and that missions tend to favor vested interests rather than new entrants or institutional entrepreneurs (Bergkvist et al. 2022).

Beyond Wennberg and Sandström (2022), we see increasing scholarly interest in the actual workings of MOIPs. Some of this critique has been of a more theoretical nature such as Lucas et al. (2018). Richard Nelson and co-authors argued that MOIPs “are not the right models for new programs aimed at the challenges we now face” (Foray et al. 2012, p. 1697). Grand societal challenges cannot be solved using a mission-oriented approach because such challenges

are all very different than the challenges faced and met by Manhattan and Apollo. These programs were aimed to develop a particular technological capability, and the achievement of their technological objective signaled the end of the program. (p. 1698)

Other scholars have applied public choice perspectives on policymaking, suggesting that incentives may diverge among policymakers, government officials, and interest groups in society. This renders the possibility of a societally beneficial outcome less likely (Muldoon and Yonai 2023).

The Rationale Behind This Volume

The rationale behind this volume is threefold. First and arguably most important, larger and more ambitious government programs continue to be initiated across the

European Union and in the United States. For example, the EU program Horizon Europe is structured to address five mission areas regarded as “grand social challenges.”⁶ Running from 2021 to 2027, the program has a total budget of EUR 95.5 billion. The EU’s Green Deal is committed to spending EUR 1000 billion over 10 years in order to attain climate neutrality by 2050.⁷ More than 40 percent of these resources (EUR 430 billion) are earmarked for hydrogen-based technologies.⁸ The US equivalent is the Inflation Reduction Act of 2022, which will “provide more than USD 369 billion for climate solutions and environmental justice and put the United States on a path to cut carbon emission by an estimated 40% by 2030.”⁹ These new programs—initiated on both sides of the Atlantic Ocean—are inspired by Mazzucato’s books and by the broader literature on innovation systems. Mazzucato (2021) describes how congresswoman Alexandria Ocasio-Cortez and senator Ed Markey in the United States as well as the president of the European Commission, Ursula von der Leyen, were inspired by her work. Mazzucato recalls in her book that she advised the European Commission regarding the design and implementation of the Green Deal, which covers various subsidies and guaranteed loans related to a range of missions including the reduction of CO₂ emissions.

Second, many programs are put in place without significant prior analysis of the risks and problems related to large-scale government missions. Past examples of underperformance or outright failure are often disregarded. Research on innovation policy more generally pays little attention to failure, and there are few studies aiming to explain how and why innovation policies fail (Kärnä et al. 2022). As noted by Josh Lerner in *Boulevard of Broken Dreams* (2009, p. 5), “for each effective government intervention, there have been dozens, even hundreds, of failures, where substantial public expenditures bore no fruit.” Kärnä et al. (2022) document that these dozens, or hundreds, of failures are largely absent in the literature on innovation policy. In order to develop sound policies, it is important to look at both successes and failures; we therefore see a need for more explicit attention focused on how and why MOIPs may fail. Relatedly, we see a need for additional theories that

⁶https://research-and-innovation.ec.europa.eu/system/files/2022-06/ec_rtd_he-investing-to-shape-our-future_0.pdf.

⁷The proposed financing of the EU Green Deal is set out in the EU Green Deal Investment Plan (European Commission 2020). It comprises two principal financing streams totaling EUR 1 trillion. Over half of the budget, EUR 528 billion, will come directly from the EU budget and the EU Emissions Trading System. The remainder will be sourced through the InvestEU program, which combines EUR 279 billion from the public and private sectors to 2030 and EUR 114 billion from national co-financing. It will provide an EU budget guarantee to allow the EIB Group and others to invest in higher-risk projects, enabling private investment. The European Innovation Council has also set aside a EUR 300 million budget to invest in market-creating innovations that contribute to the goals of the EU Green Deal.

⁸The president of the European Commission, Ursula von der Leyen, stated that the European Green Deal would be Europe’s “man on the moon moment” (<https://www.euractiv.com/section/energy-environment/news/eu-commission-unveils-european-green-deal-the-key-points/>).

⁹https://www.c40knowledgehub.org/s/article/Climate-action-and-the-Inflation-Reduction-Act-A-guide-for-local-government-leaders?language=en_US.

highlight both the costs and the benefits of various innovation policies. We note that several scholars have emphasized the importance of articulating political economy perspectives on MOIPs more clearly and challenge these ideas on both theoretical and empirical grounds (Muldoon and Yonai 2023; Holcombe 2022). Several contributions in this volume try to do so explicitly (e.g., Holcombe 2024; Waldron and Coyne 2024; Henrekson and Stenkula 2024; Schnellenbach 2024).

Third, the lack of substantive reactions so far from Mazzucato and colleagues—paired with the fact that other scholars and policymakers have experienced a reluctance to engage in critical debate—indicates that this subject is in great need of further inquiry. If new policies and government programs are established based on information provided by scholars soliciting policymakers to promote their own agendas, it is essential for economic and social progress that such academics engage with and respond to the work of their critics. We continue this introduction with a brief historical and conceptual background to MOIPs.

Historical and Conceptual Background to Mission-Oriented Innovation Policy

The idea of mission-oriented innovation has its roots in the literature on evolutionary economics (Nelson and Winter 1982; Freeman 1987) and innovation systems (Lundvall 1992; Geels 2004; Borrás and Edler 2014; Schot and Steinmueller 2016). It is clearly steeped in the tradition of what could be called third-generation innovation policy, which posits that governments should not only provide basic research and contribute to the commercialization of it but also to guide innovation efforts in specific directions. According to this approach, it is no longer enough for the government to increase positive knowledge externalities by supporting R&D activities, nor is it enough to provide targeted support or platforms strengthening the links between diverse actors such as universities, start-ups, and incumbent firms. The purposeful direction of these activities and proactive intervention in the marketplace is deemed necessary. A critical element distinguishing the mission-oriented approach is therefore *directionality*. This concept is used to underscore the importance of establishing a specific direction for innovation policies:

The key insight of this report is that missions are both a means of setting economic growth in the direction of where we want to be as a society and a vehicle we can use to get there. (Mazzucato 2018, p. 28)

Missions are a way to implement directionality inside an economy. (Mazzucato 2021, p. 124)

While several scholars have proposed more directed innovation policies, no one has been more successful in diffusing such ideas and popularizing them to policymakers than Mariana Mazzucato. Using the Apollo and Manhattan Projects as illustrative examples, she argues that the state should initiate bold efforts into novel, uncharted territory, thereby guiding and driving change to achieve social

and economic progress. The fact that Mazzucato (2018), the study from which the above quote comes, is an official document of the European Commission highlights how popular mission-oriented policies have become among policymakers.

From this perspective, policymakers are given a pronounced role as the primary agents behind desirable changes:

Moving to a greener low carbon economy means redirecting all sectors and all actors – public, private and civil society – towards economic growth in a sustainable and inclusive direction. (Kattel et al. 2021, p. 18)

MOIPs are initiated in order to apply a “moonshot” logic to grand societal challenges. In this sense, MOIPs can be regarded as an attempt to extend Richard Nelson’s work in the 1977 book *The Moon and the Ghetto*, where he discussed why humanity could put a man on the moon but failed to eradicate poverty. The purpose of MOIPs is to mobilize actors from various parts of society to address important challenges. Its proponents claim that missions can be launched in order to transition to green energy, address homelessness, clean up oceans, or increase equality, to name a few examples. Ideally, these missions provide an overarching umbrella where actors can be mobilized and collaborate.

How to Read this Volume

This collective volume contains three distinct parts in addition to the introduction. Part II presents a collection of theoretical perspectives on MOIPs (Coyle 2024; Holcombe 2024; Schnellenbach 2024; Hallonsten 2024). Part III examines the empirical evidence related to MOIPs. It consists of explorations of the empirical evidence used to justify missions (Yerger 2024a, 2024b), three case studies of failed MOIPs (Lucas and Boudreaux 2024; Alves 2024; Waldron and Coyne 2024), an assessment of previously published analyses of MOIPs (Batbaatar et al. 2024), an exploration of government agencies implementing MOIPs (Björnemalm et al. 2024), and a chapter in which the main takeaways from the previous chapters are identified (Henrekson et al. 2024). Part IV presents alternative strategies for policymakers to accomplish innovation and renewal (Sanders et al. 2024; Rose 2024; Svensson 2024; Henrekson and Stenkula 2024). Here we summarize each chapter and seek to integrate them into a more holistic discussion.

Part II: Theoretical Perspectives

In the chapter “State and markets: Not whether but how,” Diane Coyle (2024) situates several of the contributions of this volume. Coyle asserts that MOIPs may help private and public sector actors to coordinate their efforts toward a common objective but underscores that this interaction is much more nuanced than current

accounts of the Apollo or the Manhattan projects, for example. There is a need among policymakers to offer simple solutions and hence to find ways to gain short-term popularity—a need that certain scholars have met by offering oversimplified narratives.

Coyle describes Mazzucato’s overarching argument, summarizing it as “the attribution of intentionality, and the conclusion that if it worked for inventing the Internet, it can work for other societal aims.” She further notes that it is widely acknowledged among economists that governments have a critical role in funding basic research and technology development and that there is by now a large and growing body of literature discussing various forms of public-private interactions and the optimal role of a government in innovation (e.g., Rothwell and Zegveld 1984; Aghion and Tirole 1994; Acemoglu 2002). Covering some of this literature, Coyle suggests that coordination problems between different actors seem to provide the strongest rationale for MOIPs but emphasizes that each mission needs to be specific concerning the problem to be addressed and that not every policy should be “shoehorned into a mission.”

In the next chapter, “Engineering is not entrepreneurship,” Randall G. Holcombe (2024) discusses key differences between engineering and entrepreneurship. He notes that governments may be capable of addressing engineering challenges, which he defines as solving problems, whereas entrepreneurship involves developing solutions that create more value than the cost incurred. From this perspective, Project Apollo was an engineering success, but it is impossible to ascertain whether it was a commercial success. Holcombe argues that in this sense, the Manhattan and Apollo projects cannot be invoked as examples of involvement by entrepreneurial governments. Based on this distinction between engineering and entrepreneurship, Holcombe emphasizes that firms engage in both technological and commercial exploration of new ideas, whereas governments can only develop technology. This argument has been expanded upon by other scholars (e.g., Larsson 2022; Potts 2015).

Next, Holcombe discusses outcomes of entrepreneurial efforts by a government by applying his work to political capitalism (Holcombe 2018), an economic system where profit-maximizing firms extract profits from government connections rather than by producing value for consumers. The decision to pursue one mission over another is inherently a political one, meaning that political popularity will determine what missions to pursue. Once a mission is established, societal resource allocation becomes increasingly political, which means that vested interest groups will entrench their connections and abilities to influence government. Holcombe argues that countries are more likely to end up in a tragedy of the commons where welfare-reducing activities are more incentivized as a result.

To illustrate the underlying mechanisms of MOIPs, Holcombe points to several historical examples of how politicians have formulated grand schemes and gained in popularity by doing so, including Lyndon B. Johnson’s *War on Poverty* and Franklin D. Roosevelt’s *New Deal*. He also describes briefly how the corn lobby managed to influence legislation to increase the amount of ethanol in gasoline. Holcombe’s

chapter thus provides a public choice lens for analyzing MOIPs, providing a useful structure to explain and understand why several historical missions have failed.

In the chapter entitled “A behavioral economics perspective on the entrepreneurial state and mission-oriented innovation policy,” Jan Schnellenbach (2024) develops Holcombe’s political economy analysis further by expanding upon the behavioral aspects of MOIPs. Schnellenbach argues that MOIPs and the idea of an entrepreneurial state are vulnerable to several behavioral biases. These include “rational irrationality” whereby policymakers hold on to objectively untrue beliefs because they may benefit socially and politically from doing so. Policymakers are also susceptible to overconfidence, which (in combination with sunk cost fallacies) implies that more resources are allocated to initiatives with limited potential. Moreover, Schnellenbach shows how Mazzucato herself exploits behavioral biases to prop up her arguments in favor of MOIPs. Among them, a normativity bias where policy measures are justified by virtue of the goals they are supposed to implement rather than good institutions, and a frequent appeal to loss aversion, by depicting catastrophic scenarios, for which mission orientation is advertised as the universal solution.

In contrast to government policies where direct support is allocated through formal application processes, broad generic reforms such as tax deductions for R&D or lower corporate taxation would not be subject to such behavioral biases. Schnellenbach presents several illustrative examples such as the Concorde supersonic airliner project, where “it was clear from relatively early on that. . .the project was most likely to be economically unsuccessful.”

In the chapter, “Innovationism and the new public intellectuals,” Olof Hallonsten (2024) expands on the analysis in his book *Empty Innovation* (Hallonsten 2023) by discussing the role of public intellectuals. Drawing on Valaskivi’s (2012) concept *innovationism*, which affirms that innovation has been elevated to the status of a cure-all in Western societies, Hallonsten applies a sociological perspective when exploring the roots of innovationism and the role played by public intellectuals.

He compares three different public intellectuals who have had significant influence on policymakers over the past decades: Michael Porter and his work on the competitive advantage of nations, Richard Florida and his concept of the “creative class,” and Mariana Mazzucato and her work on the entrepreneurial state and the mission economy.

Hallonsten describes how public intellectuals throughout the nineteenth and twentieth centuries were often contrarian as they leveraged their status and elevated positions in academia to criticize established consensus in different areas. According to Hallonsten, the new public intellectuals rather resemble high priests who (p. 82)

command the efficacious but essentially empty ‘innovation-speak’ that simultaneously proclaims the crucial importance of innovation for everything and everyone and dilutes the term beyond any operational significance.

As these public intellectuals are put on pedestals, they are able to monetize their role as professors by selling “airport literature,” giving speeches and offering various consultancy services dressed up as research. Hallonsten provides illustrative data

concerning Porter, Florida, and Mazzucato. For example, more than 245,000 people follow Mazzucato on *X/Twitter*, and her speaking fee is in the range of USD 50,000–100,000.¹⁰ According to Hallonsten, such business opportunities for professors constitute a “vanity trap” (Mulgan 2016) by offering an opportunity to set aside the tedious toil of academic research to become celebrities while still enjoying the status of their academic titles and affiliations. Interestingly, Hallonsten concludes that the transition away from academic norms and into the institutional logic of media and politics seems to be associated with little academic cost. Scholars such as Porter, Florida, and Mazzucato receive many citations despite their primary focus on nonacademic audiences. At times, the research community seems to cite and take these scholars even more seriously when they become public intellectuals. Hallonsten decries this trend toward fame begetting academic influence. This is at odds with how best practices are traditionally arrived at in academia: the vetting of information through scholarly discourse.

Part III: Empirical Evidence

Exaggerated Claims Regarding the Role of the State

In the first chapter in Part III, “Analyzing the effectiveness of state-guided innovation,” Rodney H. Yerger Jr (2024a) takes a closer look at some of the key technologies behind smartphones and Mazzucato’s (2021, p. 29) assertion that these were related to visionary investments by state officials rather than the product of development taking place in the market. Reviewing the history of both GPS and touchscreen technology, Yerger argues that labelling these two innovations as products of state efforts is an oversimplification and potentially a misrepresentation of history. While early explorations of touchscreen technology were made at Bell Labs, the greatest leaps of development were taken by Wayne Westerman in his doctoral dissertation at the University of Delaware (Westerman 1999). Westerman co-founded the company FingerWorks to commercialize his invention. The firm was acquired by Apple in 2005. Here, Yerger suggests that Mazzucato’s argument becomes a supply chain fallacy as she effectively labels everything that has ever been involved with any government initiative a product of government efforts.

Many of the research efforts that preceded the breakthrough of touchscreen technology can therefore be regarded as basic research in its more conventional sense. To express this differently, research that was partly public and partly private was conducted and resulted in positive spillovers that were subsequently commercialized through private entrepreneurship and the strategic acquisition of this firm by a leading actor such as Apple—a company that also spent substantial resources to

¹⁰<https://www.aespeakers.com/keynote-speakers/mariana-mazzucato>.

further develop the technology. There was no visible hand of government guiding these efforts through visionary, overarching goals.

Yerger's chapter is an important contribution as it questions the evidence originally brought forward both in *The Entrepreneurial State* and *Mission Economy*. It is somewhat surprising that anecdotes invoked to justify MOIPs have been so widely accepted despite the lack of proper scrutiny. A quick glance at the technological advances in computing is enough to realize that Mazzucato's statements about the state's role is exaggerated. Entrepreneurial ventures played key roles in the development of the integrated circuit, for example, which was co-invented by Jack Kilby at Texas Instruments (Kilby 2001) and Robert Noyce at Fairchild in 1959–1960 (Lojek 2007). The microprocessor was developed by Intel in collaboration with Japanese firms (Noyce and Hoff 1981), and mobile telephony was invented by Martin Cooper and his team of engineers at Motorola in 1973 (Cooper 2001). Moreover, Hiltzik (1999) documents how a decade of research at Xerox Palo Alto Research Center (PARC) resulted in many of the breakthrough technologies that were pivotal to the advances of the information age: personal computers, emails, ATMs, the first version of the Internet, user-friendly word-processing programs, graphical user interfaces, and object-oriented programming.

To be sure, the state has played an important role—not only as a funder of research but also as a demanding customer for R&D. It would be strange if that were not the case; the state is involved in nearly all activities in the economy, either as a customer, sponsor, or regulator. However, given the numerous accomplishments by both large companies and entrepreneurial ventures, Mazzucato's claims regarding the state's pivotal role in developing digital technology seem overly simplistic.

In the next chapter, "A case study on DARPA: An exemplar for government strategic structuring to foster innovation?", Yerger (2024b) investigates DARPA, another empirical example of crucial importance for the MOIP case. While Yerger's examination of DARPA underscores that this agency has at times been very innovative and is in several ways an exemplar of how R&D can be organized to make considerable advances, he also shows that many of these traits are difficult to transfer to other settings. Applying economic theory related to political transaction costs, Yerger identifies a set of DARPA's key success factors including autonomy, small size, and limited tenure of its program managers. While DARPA certainly has made important contributions to technological development and national defense, Yerger argues that it cannot be regarded as a sustainable and scalable way to organize government efforts in a consistent manner over time. Gradually, DARPA has become more bureaucratic and more controlled by policymakers, which indicates that this model is difficult to sustain over time due to political pressure.

In the chapter entitled, "The state of the entrepreneurial state: Empirical evidence of mission-led innovation projects around the globe," Maral Batbaatar et al. (2024) delve deeper into the literature discussing MOIPs. They identify 28 academic papers and reports that describe one or more missions, yielding a dataset of 49 MOIPs. Fifty-nine percent of the cases were still ongoing, 33 percent were described as "successful" by the originators, and 8 percent were described as failures. Not a single

one of the 49 cases was evaluated by means of a cost-benefit approach or estimated/discussed opportunity costs.

Moreover, Batbaatar et al. find that most missions do not satisfy the OECD's (2021) defining criteria for a mission such as an integrated and coherent vision; clear, measurable goals; and milestones that make it possible to evaluate them. For instance, a mere 51 percent of the missions had set deadlines for completion, and many goals were so vague that it was impossible to assess whether they had been achieved. Examples include "Establish a vital and innovative biotechnology landscape" (Prochaska and Schiller 2021), "Develop new forms of flexible automation in the footwear industry for the region to be a leading producer in the world" (Foray 2018), "Bring transformative effects from science and research in Finland," and missions aimed to "Support Finland's growth and expertise in the transport and mobility sector and get international attention" (Kivimaa and Rogge 2020).

Three Case Studies of Failed MOIPs

In the chapter "When 'what works' does not work: The United States' mission to end homelessness," David S. Lucas and Christopher J. Boudreaux (2024) analyze a recent and still ongoing mission that has failed to achieve its intended goals. Lucas and Boudreaux document the United States' efforts to combat homelessness during the years 2010–2022 and show that despite a doubling of the federal budget, the number of homeless people remained largely unchanged. The case of homelessness is referred to by Mazzucato (2021, p. 92) as an example of an area where it would be desirable to implement a MOIP. Other scholars have referred to homelessness as a "wicked problem" (Brown et al. 2013) and as a "grand challenge" (Henwood et al. 2015), also making the case suitable for study.

The US program to reduce homelessness seems to fit the definition of a MOIP. The government took an active role, involving the private sector and a wide range of nonprofit organizations to lead the sector toward four tangible goals. The government agency USICH (United States Interagency Council on Homelessness) was put in charge of the mission to eradicate homelessness. As stipulated in the literature on MOIPs, USICH sought to involve many actors, seeking broad collaboration across sectors and applying an evidence-based approach. Its goals were clearly defined: end chronic homelessness in 5 years; prevent and end homelessness among veterans in 5 years; prevent and end homelessness for families, youth, and children in 10 years; and set a path to ending all types of homelessness.

Although funding was doubled, the progress was minor. The annual budget reached USD 7.9 billion in 2022, which amounted to USD 13,500 per homeless person. If each homeless person had received this amount of money instead, it would have been more than enough to secure accommodation and thereby end homelessness. The mission design was justified by invariably referring to it as "evidence based." Such persistent use of a term that signaled objectivity and reliability made it possible for stakeholders and policymakers to ignore the lack of progress. The

chapter provides a contemporary example of a mission where all criteria for a MOIP are fulfilled and federal expenditures were greatly expanded, but the outcome still fell short.

In the next chapter, “The cost of missions: Lessons from Brazilian shipbuilding,” André Cherubini Alves (2024) presents an in-depth case study of the Brazilian shipbuilding industry and the government’s attempt to revive it in the 2000s. The chapter covers various aspects of the political and economic forces that lead up to one of the largest scandals in Brazil’s modern history. Alves notes that industrial policy and innovation policy have often played a more interventionist role in developing countries as attempts have been made to leapfrog economies to a higher level of prosperity. He makes a distinction between old and new MOIPs, stating that the former is more of a technology-driven top-down approach pursued by experts. Here, control is centralized, and participation is more narrowly defined. In contrast, new MOIPs are defined more in terms of grand challenges, and there is more room for various stakeholders to take part in the mission.

Attempts at reviving the country’s shipbuilding sector were triggered by the discovery of vast oil reserves in the deep waters off the Brazilian coast. The government sought to mobilize actors and resources from the entire economy into efforts to reach a globally competitive position in this industry, but the high expectations were not reached in the end. While Brazil already had an established shipbuilding industry in the 1950s, it had declined in the 1970s and 1980s due to mounting competitive pressure. The discovery of deep-sea oil reserves triggered a demand for advanced oil rigs. As Petrobras intended to buy these from foreign firms, labor unions put pressure on President Lula da Silva—eventually resulting in acquisition from domestic sources instead. In the following years, the government put in place a wide range of support policies largely targeting domestic suppliers.

As investments and enthusiasm grew across the Brazilian economy, these efforts were increasingly referred to as the “space race” for Brazil. Large government-led programs were put in place, including the National Program for Mobilizing the Oil & Gas Industry (PROMINP), which sought to maximize the participation of domestic firms. More regulations and programs were implemented to accelerate the process. In 2007, a Program for Growth Acceleration was initiated, giving special priority to the shipbuilding industry. At the same time, the National Oil Regulatory Agency imposed laws requiring certain minimum levels of local content in the goods and services developed. In short, the MOIP drifted into a political and economic context where interest groups demanded protectionist measures that prioritized Brazilian firms and employees, thus barring procurement from the world’s best suppliers. Brazilian firms received support, obtained cheap loans, and were encouraged to participate in the supply chain.

The industry grew rapidly: Employment in shipbuilding increased from 1900 in 2000 to 46,500 in 2009 and peaked at 82,500 in 2014. Following several corruption scandals, the number of employees in the industry fell rapidly to 46,000 by 2016. Alves argues that it takes time and effort to build capabilities in a certain sector and as the country’s shipbuilding industry had deteriorated, the capabilities could not match the massive support the industry received from policymakers.

The fact that the government's mission to revitalize shipbuilding resulted in major corruption scandals related to various contracts and suppliers also highlights the question of how MOIPs affect the initiating country's institutional quality. Large-scale missions, implemented under political and economic pressure to expand and grow rapidly, may create fertile soil for corruption.

In the chapter entitled "You can't develop what you don't know: The realities and limitations of foreign aid missions," Kathryn Waldron and Christopher J. Coyne (2024) apply Mazzucato's seven principles for mission design to foreign aid. Reviewing extant research on this subject, they identify two primary categories of challenges: knowledge problems and political economy problems, i.e., incentive distortions in the economy. The authors illuminate how foreign aid gives rise to several destructive incentives and related behaviors where (p. 200) "individuals and firms choose to compete for political favors, diverting resources better used elsewhere and rewarding corruption for those in positions of power over how foreign assistance is spent."

As MOIPs often contain various elements of soft loans, targeted subsidies, or grants earmarked for specific causes, it is important to discuss in what ways such funds affect incentives and behavior. Previous research has shown how innovation grants trigger the emergence of subsidy entrepreneurs, i.e., companies that systematically exploit such grants. Such firms have been found to have lower productivity and not be more innovative than other businesses (Gustafsson et al. 2020).

Foreign aid results in several other forms of destructive opportunism, and Waldron and Coyne describe how foreign aid funds and disasters result in an "NGO scramble" (Cooley and Ron 2002, p. 26), meaning that NGOs focus on those disasters that receive extensive media coverage and that they exaggerate and act opportunistically to obtain more funds, at times creating "disaster hype." The authors also point out that organizations in charge of implementing foreign aid programs may grow and suffer from poor governance; they quote the former World Bank managing director Jessica Einhorn (2001, p. 22) that the World Bank's "mission has become so complex that it strains credulity to portray the bank as a manageable organization."

Related to these observations, Waldron and Coyne point out that, under these circumstances, outcome-based budgeting faces an inherent risk to (p. 203)

simply grow relatively unchecked regardless of whether the benefit is greater than the cost.

Exacerbating the issue is the fact that government bureaus must spend down their yearly budgets in order to justify receiving additional funding in the next year.

Consequently, decision-makers face few incentives to reduce or remove funding from any projects, even in those cases where costs outweigh benefits by a substantial margin. Policy recommendations from Mazzucato and other scholars to pay little attention to costs may therefore end up legitimizing budget overruns, deficits, and sunk cost fallacies.

Laudatory Self-Evaluations by Government Agencies

In the chapter “A public choice perspective on mission-oriented innovation policies and the behavior of government agencies,” Rickard Björnemalm et al. (2024) open up the black box of government agencies in charge of allocating funds to MOIPs. The authors draw on Muldoon and Yonai’s (2023) work to apply public choice theory to the analysis of industrial policies. According to Muldoon and Yonai (2023, p. 3), Mazzucato’s work on the entrepreneurial state depicts the government as “a dynamic, thoughtful body that makes decisions based on relevant information.”

Björnemalm et al. (2024) set out to explore the behavior of these government agencies that are assumed to be both competent and altruist. This is done by taking a closer look at three government agencies concerned with innovation and renewal in Sweden: Sweden’s Innovation Agency (*Vinnova*), the Swedish Energy Agency (*Energimyndigheten*), and the Swedish Agency for Economic and Regional Growth (*Tillväxtverket*). Tracking all instances when these three government agencies refer to evaluations of their activities in their annual reports over 10 years, the authors identify 654 occasions where an evaluation is mentioned. Among these references to evaluations, 84 percent were positive, 12 percent were neutral, and 4 percent expressed negative or critical views stemming from the evaluations of these agencies’ programs and activities. The Innovation Agency had the highest share of positive statements (92 percent).

At the same time, these agencies ignored and scarcely mentioned evaluations or studies that were critical of their activities. The authors also identified instances where the studied government agencies were making positive statements about projects and programs which had subsequently resulted in failure and scandal. The Sekab case was evaluated by Sandström and Alm (2022); it was financed by the Energy Agency and resulted in controversy surrounding illegal activities and corruption in Africa. Nevertheless, it was referred to in the following way by the Energy Agency (2012, p. 42): “It was an excellent program and a continuation at least on the same level as during the past years is strongly recommended.”

Björnemalm et al. also identify several instances where government agencies refer to evaluations which are so positive that they seem difficult to believe. For instance, the Innovation Agency writes in its annual report for 2013 (Innovation Agency 2014) that recipients of their innovation support “increased their turnover and employment more than twice as much as companies in a control group” (p. 40), that certain “companies granted funds attract more capital (14–15 times), increase their turnover (3 times), and the number of employees (2.5 times) more than a control group” (p. 40). Furthermore, the Agency asserts that its innovation support had “increased their turnover 19 times on average between the year of financing and the measurement point in 2012” (p. 11). The findings are in line with public choice theory, as it shows how government agencies act in their own interest. The three studied agencies use positive evaluations to portray their activities in a good light and, at times, to defend themselves against critique while ignoring critical evaluations. Thus, government entities in charge of implementing MOIPs are not

necessarily altruistic and competent. As MOIPs elevate them to the forefront of the economy, policymakers are likely to favor such initiatives and portray them in a favorable fashion regardless of the true results.

Main Takeaways from Parts II and III

The contributions reviewed above shed new light on the risks associated with implementing mission-oriented innovation policies. In the final chapter of Part III, “Learning from overrated mission-oriented innovation policies: Seven takeaways,” Magnus Henrekson et al. (2024) synthesize the theoretical arguments and empirical observations in the form of seven takeaways that together call into question the usefulness of MOIPs. These seven takeaways are as follows:

1. Wicked problems cannot be solved through missions.
2. Politicians and government agencies are not exempt from self-interest.
3. MOIPs are subject to rent seeking and mission capture.
4. MOIPs distort competition.
5. Policymakers lack information to design MOIPs efficiently.
6. Government support distorts incentives and creates moral hazard.
7. MOIPs ignore opportunity costs.

These takeaways provide a cogent summary of the findings in Parts II and III, and elsewhere in the literature on missions, innovation policy and political economy concerning the likelihood that MOIPs will not live up to expectations.

The results presented so far in this volume therefore support the conclusions by Foray et al. (2012, p. 1697) who, in a special issue on the topic, wrote that mission-oriented innovation policies “are not the right models for new programs aimed at the challenges we now face.” Given the evidence reviewed, and the fact that an increasing number of scholars are becoming critical of MOIPs, it is a cause for concern to watch how MOIPs are being implemented across the world in order to address environmental challenges and health issues such as cancer—particularly given that many of these areas have already been subject to failed missions in the past.

Part IV: Alternative Paths

While Parts II and III of this volume focus on theoretical difficulties and empirical analyses of MOIPs, Part IV is devoted to discussing alternative approaches to innovation and development, showcasing credible alternatives to MOIPS.

Part IV begins with a chapter entitled “The entrepreneurial state cannot deliver without an entrepreneurial society” by Mark Sanders et al. (2024), where they elaborate on Mazzucato’s notion of an entrepreneurial state. The authors do not

dispute the importance of the government sector in mobilizing resources in the economy. Certainly, government interventions may result in a short-term boost to innovation and economic growth. But the full economic potential will only be reaped if the institutional framework in society fosters and rewards experimentation and scaling. A dominant entrepreneurial state may block outside challengers and the experimentation necessary for the economy to prosper. Long-term development requires an entrepreneurial ecosystem that facilitates bottom-up entrepreneurship in the private sector. The primary role of the government in this scenario is to provide and continually update the institutional setup to provide the right incentives for all relevant agents, to produce crucial collective goods such as infrastructure, and to subsidize services with large positive external effects such as education and basic research. This prepares the stage for the emergence of an entrepreneurial society.

As valuable and successful innovations and spin-offs often include a significant element of serendipity and many of the benefits that resulted from historical missions were unintended and provoked by challengers from outside, the conditions for acting on opportunities must be favorable and allow for experimentation and failures. The fallacy of hindsight often misleads policymakers to overlook this point, thus overestimating the potential for successfully designing interventions on the drawing board. Sanders et al. conclude that a well-balanced entrepreneurial ecosystem is needed, one that strikes a balance between the private sector's desire for unbridled autonomy and the public sector's instinct to use its powers to steer and control.

In the next chapter, "Overcoming the siren song of central planning," David C. Rose (2024) discusses the human tendency to believe in authoritarian control and central planning. According to Rose, human evolution has made us inclined to believe in authoritarian ruling in small groups. This belief in central planning is naturally transferred to a belief in similar governance structures for larger groups such as entire cities or countries. Rose further notes that humans have a tendency for *control bias*, i.e., an inclination to call for planning and control as the opposite would appear irresponsible. Rose concludes that (p. 283)

our genes lead us to think that someone or something needs to be in control of society, not just in terms of day-to-day operation, but also in terms of how it evolves. Our genes are right about this for societies that are not much larger than the groups within which they evolved. But now that we live in very large societies, using central planning to efficiently control society is a pipe dream.

Rose develops an alternative to missions and utopian ways of thinking that is ultimately built around morality, primarily moral beliefs that instill duty-based moral restraints. If all individuals in a society are governed by duty-based morals focused on not doing harm to others, we cannot know the outcome of the combined efforts of all individuals, but we can know that it will not be negative. In this sense, morality can help societies overcome genetic biases toward control and central planning.

In the chapter "R&D tax incentives as an alternative to targeted R&D subsidies," Roger Svensson (2024) discusses the advantages of various policy instruments aimed at increasing the rate of innovation. Svensson notes that R&D subsidies are suitable when policymakers want to support a specific industry and when there is a

longer time horizon. However, such support also has downsides: It has administrative costs, distorts competition, and nurtures a culture in which companies expect subsidies. Moreover, the greater share of such subsidies is likely to end up in the hands of large incumbent firms, possibly reinforcing rather than challenging the status quo (Bergkvist et al. 2022). Tax incentives, on the other hand, are neutral regarding both effects on competition and technology. Svensson concludes that MOIPs may distort the competitive process, and because direct subsidies are allocated through an administrative and politicized process, regulatory capture is likely to take place where vested interests end up entrenching their positions and technologies.

In the final chapter, “Bottom-up policies trump top-down missions,” Magnus Henrekson and Mikael Stenkula (2024) discuss what they deem to be a more viable alternative to innovation and progress without relying on an interventionist top-down approach. They maintain that MOIPs are based on an overly mechanistic view of innovation and economic growth, downplaying the problems caused by the lack of an altruistic and omniscient political sector.

Echoing what Sanders et al. show in their chapter, Henrekson and Stenkula conclude that a flourishing economy requires a well-balanced entrepreneurial ecosystem and an institutional framework that levels the playing field for potential entrepreneurs while encouraging productive entrepreneurship. Innovative entrepreneurship also requires many other actors—besides the entrepreneur—who are greatly influenced by the reward structure they encounter. To promote an entrepreneurial ecosystem, Henrekson and Stenkula discuss in more detail eight key areas, including taxation and labor market regulations, where appropriate horizontal or bottom-up policy measures can foster innovation. They end the chapter by pointing out that today’s economies are highly dependent on a well-functioning process of decentralized experimentation, selection, and screening.

Rather than appealing to policymakers to become bold, visionary, inspirational political entrepreneurs, the contributions in Part IV advocate institutions that direct self-interested individuals to make decisions that increase general social welfare. However, since the emotional appeal of top-down missions as solutions to our most urgent problems is likely to persist, we must continue to inform policymakers and the general public about its risks and our collective tendency to be misled by various biases, including a genetic predisposition to call for planning and control as the opposite would appear irresponsible.

Conclusions and Future Research

Large-scale government programs and interventionist industrial policies are implemented in many Western countries without much critical inquiry. We have also witnessed an unwillingness by leading scholars promoting this strategy to debate the pros and cons of mission-oriented policies (MOIPs) (Hallonsten 2024). Moreover, a shortage of academic studies devoted to how and why innovation

policies, and especially MOIPs, may fail points to a need for a volume that takes a critical look at these projects.

The contributions in this volume explore both ongoing MOIPs and historical examples of large government-led efforts to mobilize society toward achieving certain goals. It also seeks to explain under what circumstances MOIPs may fail, which helps us identify a set of factors that, in combination, point to the risks associated with MOIPs. In light of those experiences, the last four contributions present alternative approaches to accomplishing economic and social development.

Government-led, large-scale attempts to achieve industrial renewal or fulfill various desirable goals have often failed. This volume features several case studies of such failed endeavors, including foreign aid, the Brazilian shipbuilding industry and deep-sea drilling for oil, and the large-scale US government effort to eradicate homelessness. Other examples covered in Henrekson et al. (2024) dealing with the most important takeaways from the theoretical and empirical contributions concern the role of Fannie Mae and Freddie Mac in the global financial crisis, the US War on Cancer in the 1970s, and the Swedish Million Program for housing.

While many of these programs and initiatives were put in place prior to the widespread diffusion of ideas around a mission economy, it is still clear that they were inspired by a mission-oriented logic, often with explicit reference to the moonshot. The Brazilian shipbuilding industry MOIP, which led to the most extensive series of arrests of government officials in the country's history and the imprisonment of President Lula in 2018, was at its inception in 2005 compared to the 1960s US-Soviet "space race" (Alves 2024). Likewise, Mazzucato and colleagues (Hill 2022) describe the Swedish Million Program in hindsight as a success story.

Our findings point to the risks of missions being captured by vested interests. We also observe that such large-scale government initiatives distort incentives and give rise to unproductive entrepreneurship. Subsidies, soft loans, and various targeted support programs aimed at objectives such as homeownership, building inexpensive housing, reducing homelessness, or nation-building provide an opportunity for companies and policymakers to engage in opportunistic behavior as someone else is footing the bill. Several chapters also emphasize that governments cannot set goals and design a credible plan for their accomplishment, as they have neither the ability to aggregate and process the required information nor the know-how to accomplish these goals. The success bias in the broader literature on innovation policy (Kärnä et al. 2022) also seems to characterize the literature on MOIPs (Batbaatar et al. 2024). This volume provides a corrective by taking a closer look at failures and the mechanisms that lead to failure, but it also outlines alternative approaches to accomplishing growth and renewal.

Proponents of MOIPs may criticize our suggested alternative approaches on the grounds that they deny the existence of grand challenges, such as climate change and global health inequality, that can only be solved through MOIPs. We do not deny that those challenges are formidable, but the evidence and theoretical arguments provided in this collective volume suggest that MOIPs are plagued by so many

problems that they even may prove to be counterproductive. Instead, the solutions provided in this volume consist of stepwise, bottom-up improvements and innovations guided by an institutional setup providing “rules of the game” that incentivize the relevant agents to work toward solving the most pressing issues. In effect, the “bottom-up” premise is really the foundational alternative to the “top-down” mission.

We welcome future work that takes a rigorous look at MOIPs in both theory and practice. In addition to the areas for future research highlighted in each chapter, we conclude this introductory chapter by pointing to two broad directions for further work that we deem particularly valuable.

First, several chapters in this collective volume have, to varying degrees, applied a public choice perspective to the study of MOIPs and innovation policy. As noted by Muldoon and Yonai (2023), scholars in entrepreneurship and management have often lacked a coherent body of theory that enables the study of industries and business strategies vis-à-vis the political sphere. Future research on innovation policy and MOIPs could benefit from the application of insights from public choice, robust political economy (Pennington 2011; Lucas 2019), and behavioral political economy (Schnellenbach 2024).

Second, the empirical studies in this volume have not covered MOIPs concerned with transitions to sustainability, notably the so-called “green deals” of various types. The primary reason for not studying such initiatives or attempts at green industrial transformation is that this area is so vast and has grown so quickly over the past decade that it deserves full attention in books or special issues explicitly focused on that topic. Following the publication of this volume, we will invite scholars to contribute to a new collective volume focused on exploring the effects of green deals on firms, industries, and environmental outcomes.

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in scope—no equally comprehensive investigation of a national tax system has been conducted for any other country. In addition to the meticulous year-to-year documentation of all relevant details of the tax code, the project aims to examine how changes in the tax system affect the economy by guiding people’s choices, particularly how the tax system affects entrepreneurial activity and firm behavior.

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Part II
Theoretical Perspectives

State and Markets: Not Whether But How



Diane Coyle

Abstract The public and political demand for simple answers to complex economic problems generates its own supply. Moreover, policy narratives or “missions” can play a useful role in aligning expectations and coordinating private sector actions. However, the standard historical examples of successful missions (such as the Apollo program or the smartphone) involve nuanced and contingent interaction between the state and the market. In the current context of a revival of strategic industrial policies, governments must avoid oversimplified rhetoric that obscures the need for an analytical framework assigning policy instruments to specific identified elements of the strategy. Without such a framework, responsibility and accountability for policy delivery are impossible to allocate.

Keywords Industrial policy · Levelling up · Technology · Market failure

JEL Codes L50 · L52 · O31 · O38 · P00

Introduction

“There is nothing a government hates more than to be well-informed; for it makes the process of arriving at decisions much more complicated and difficult” (J. M. Keynes, quoted in Skidelsky 1992). Keynes, as ever, provides an apt quotation. Policymakers make decisions under the pressures of time and political and media scrutiny. This decision-making context generates the demand for simple answers to problems that are often complex; the demand then creates its own supply.

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31

There is therefore no shortage of external advice to governments about how they should tackle long-standing, intractable, and multidimensional challenges such as inequality, regional economic development, or low productivity growth. Such advice often interacts with both political and intellectual trends and is crystallized in a particular form that captures the imagination of politicians. One recent example is the idea of a creative class of young creative and tech sector workers as a dynamo of urban growth, with Richard Florida's (2002) observation of the sociodemographic changes in some cities combining with the resurgence of economic geography and agglomeration economics and the political ambition for urban renewal in many postindustrial cities. Florida founded a successful consultancy advising many urban authorities around the world. However, his academic research tended to reach the policy world in simplistic form, such as creating a "gay village" or appointing a "nighttime economy" advocate, as key urban renewal policies.

The same fate is befalling the idea of a "mission economy." Mariana Mazzucato's bestseller (2013) echoed the renewal of academic interest, noted above, in industrial policies and a purposive or strategic role for government. This interest has coincided with, and been stimulated by, the political challenge from "left behind" people and places whose dissatisfaction has played a part in the emergence of populist votes in many countries (Rodriguez-Pose et al. 2023). Many policymakers use the device of "missions" to give apparent coherence to a set of measures that in general may have an unclear economic rationale and are unlikely to solve the complex underlying problems. The policy fashion for devising missions may at the same time obscure well-founded economic rationales for specific government intervention in the supply side of the economy, for there are good reasons for such policies, and more so now than in previous decades.

This is not to argue that policy narratives are unnecessary or even detrimental. On the contrary, successful policies need to align expectations and coordinate many different actors to bring about policy success. A recent formulation of the need is the case for "narrative economics" made by Robert Shiller and others (Shiller 2017; Akerlof and Snower 2016), or the much older advocacy for a "guiding hand" by development economist Albert Hirschman (1967). In many contexts, and particularly where there are increasing returns or network effects (either in time or—as with agglomeration—in space), positive feedbacks are more likely to occur if encouraged by some framing device or policy rhetoric. However, as will be described in the following sections, some of the popular examples of past missions oversimplify important aspects of the historical experience, while the practice of devising policy missions can diverge considerably from effective coordination narratives. This essay concludes by setting out some principles for government intervention in the supply side of the economy that will help avoid the pitfall of oversimple answers to complex policy challenges.

The Case for a Strategic Supply Side Policy Framework

State activism in the form of industrial policy went out of fashion in the 1980s, at least in policy rhetoric and in economic research, although many countries continued to implement a variety of industrial policies in practice. The experience of economic crises in the 1970s had decisively tilted received wisdom away from government intervention and in favor of market forces. In academic economics the era of demand management gave way to real business cycle theory and the efficient markets hypothesis (Coyle 2009). In policy practice, the UK, the USA, and New Zealand introduced deregulation of many sectors and the privatization of public utilities, paving the way for other western economies to follow. By the time of the 2008 financial crisis, the “markets-first” approach combined with an expanded financial sector had taken shape as the political economy framework often described as neoliberal.

This broad consensus is crumbling rapidly. One reason is simply the succession of major economic shocks, the financial crisis followed by the pandemic followed by Russia’s invasion of Ukraine, and subsequent energy/inflation shock. Shocks on this scale always lead to a questioning of standard practice, no matter how successfully they are navigated in the moment. A majority of people—and particularly those on low incomes or living in depressed places—are experiencing a substantial erosion of their living standards. In any case, productivity growth has slowed since the mid-2000s, leading to almost a decade during which living standards for most people had failed to improve much.

A second factor is that a consequence of the recent economic shocks and increasing geopolitical tensions has been a new awareness of supply chain vulnerabilities. Initially due to the inherent lack of tolerance in tightly optimized just-in-time logistics, subsequent shortages occurred for several reasons—including labor shortages and energy price hikes—all serving to underline a lack of economic “resilience” and the presences of unanticipated supply chain fragilities. Advanced computer chips have been a particular political focus, with extreme dependence on Asian and particularly Taiwanese production (Miller 2022) leading both the EU and the USA to subsidize new domestic production. The uncertainties seem unlikely to diminish quickly, for reasons both of geopolitics and an increasing number of extreme weather events affecting production in some countries. In economic research, recent experience has prompted a new interest in a production network approach (Carvalho and Tahbaz-Salehi 2019; Acemoglu and Azar 2020).

Thirdly, the policy priority of speeding up the energy transition away from fossil fuels toward renewables has—along with awareness of continuing digital restructuring of the economy—raised questions about the role of the state in financing and incentivizing investment in the new infrastructure, built environment and consumer durables; in setting standards; and in coordinating switchovers in products such as electric vehicles. General purpose technologies—those that transform not just one sector but the whole economy—usually involve either energy or communications; steam, electricity, and printing are examples. Currently both an energy and

a communications transformation are under way globally. The case for coordination of transition and management of significant disruption by the state will be compelling.

Arguments of this kind—made eloquently by economists such as Rodrik (2007) and Liu (2019)—help explain why policymakers are newly interested in the role of the state in strategic economic management. Coordinating large-scale socio-technical transition in complex, interlinked modern economies and in the context of repeated experience of “radical uncertainty” (Kay and King 2020) is daunting. Little wonder policymakers have looked for ways of making their task seem more manageable and explicable to their constituencies.

Take, for example, the widespread political priority of “levelling up” (to use the UK’s recent political language), mitigating or reducing the increased spatial inequalities that have emerged as a result of more powerful agglomeration effects (whether due to technology, globalization, or both) (Autor et al. 2013). The income distribution has hollowed out in recent decades, with an increased wage premium to those with degrees and especially STEM skills (Stansbury et al. 2023). Its geographic expression is economic stagnation in places that are unconnected to thriving high skill cities, including the extreme phenomena of “deaths of despair” (Case and Deaton 2020) and falling life expectancy. Moreover, the geographic inequality has political consequences, from the UK’s Brexit vote in 2016 to right populism in many European countries and the USA.

The UK government responded to the pressures of spatial inequalities with a substantial policy effort resulting in its Levelling Up White Paper (DLUHC 2022). Although this policy document subsequently fell victim to broader political instability within the ruling Conservative Party, it captures much received policy wisdom about how to tackle this deep-seated economic and political challenge. It sets out, “an ambitious set of missions, galvanizing action across sectors to improve jobs, incomes, health, skills, transport, pride in place, safety, and well-being across the UK. These clear, quantified missions mean no-one can any longer be in any doubt about what is meant by success in levelling up” (p. 10). The missions it set out are summarized in Table 1, with their corresponding policy areas and an example of the many numerical targets set for each.

It is immediately apparent that the terminology of missions is being used here to bring apparent coherence to a wide-ranging set of policy aims of different types and with targets or indicators admitting of different degrees of control. Whereas a government can perhaps feasibly plan to achieve faster and wider broadband infrastructure, changing life expectancy is an outcome of many different contributory factors and not easily amenable to being influenced by policy on any normal political timescale. The whole set of missions in the White Paper is worthy, for sure, but spans most of any government’s domestic policy agenda. The rhetoric of missions in this example cannot disguise the absence of a unified analytical framework for determining which policy interventions are required to achieve the aim of reducing spatial economic inequality.

Table 1 The UK Levelling Up missions

Mission	Policy areas	Example of numerical target
Boost productivity, pay, jobs, and living standards	Living standards; research and development; transport connections; digital connectivity	“By 2030, the UK will have nationwide gigabit-capable broadband and 4G coverage, with 5G coverage for the majority of the population”
Spread opportunities and improve public services	Education; skills; health; well-being	“By 2030, the gap in Healthy Life Expectancy (HLE) between local areas where it is highest and lowest will have narrowed, and by 2035 HLE will rise by 5 years”
Restore a sense of community, local pride, and belonging	Pride in place; housing; crime	“The government’s ambition is for the number of non-decent rented homes to have fallen by 50%, with the biggest improvements in the lowest performing areas”
Empower local leaders and communities	Devolution of powers	“By 2030, every part of England that wants one will have a devolution deal”

Source: Department for Levelling Up, Housing and Communities (2022)

Mission-Oriented Policies in History

This is perhaps an extreme example of stretching a concept too far, much as policymakers did with the creative class construct; but others beyond the UK have also leapt on the missions bandwagon. The EU, for instance, has commissioned multiple studies of mission-oriented innovation policies.¹ Mazzucato’s original work (2013, see also 2018) largely focused specifically on policies to shape the direction of innovation, and she states some broad principles for the role of government captured by the acronym “ROAR”: routes and directions, organizations, assessment, and risks and rewards. In other words, this concerns one area of policy, innovation policies, and alludes to the role of setting a direction for societally relevant effort, coordinating multiple actors, evaluating outcomes including by considering who should bear what risks and with what returns. As discussed in the next section, these are useful headings for considering the role of the state in supply-side policies. However, the concept of mission-oriented policies has subsequently been broadened beyond innovation policy to embrace wide societal aims, such as green transition, plastic-free oceans, and economic development in Latin America and the Caribbean (Mazzucato 2021, 2023; Miedzinski et al. 2019). Inevitably, such very broad aims involve multiple policy instruments and actors, as in the UK Levelling Up White Paper example, and involve fuzzy analysis of how to achieve the stated missions.

¹ https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/mission-oriented-policy-studies-and-reports_en.

Are there lessons from the early examples of successful missions that would help map the appropriate terrain for this approach? Two US examples recur frequently in the literature: the Apollo program (the original “moonshot”) and the role of DARPA in digital innovation. In a sense both are consequences of a far more fundamental policy aim during the second half of the twentieth century, ensuring America’s technological superiority over the USSR in the context of the Cold War. It is well-documented that President Kennedy launched the space program in 1961 in response to the shock of the early lead gained by the Soviet Union. His exact statement of the ambition “to go to the moon...before this decade is out” was the subject of negotiation with the leadership of NASA, to ensure that it was sufficiently loosely worded to be more feasible (by giving them potentially an extra 2 years to hit the deadline) in the context of a politically unpopular, costly program (Gisler and Sornette 2009; Madrigal 2012). This offers perhaps the purest example of mission-driven policy: a clear ambition, with an uncontested success metric, and sufficiently important that financial resource and organizational effort (as well as political capital) was poured into the mission, effectively coordinated by NASA. Related innovation outcomes (such as Teflon and the miniaturization of transistors) were by-products.

The second example, which triggered a great deal of interest and commentary, was the development of the iPhone and the Internet, ascribed in *The Entrepreneurial State* to public sector investment. These would not have come about, the book argues, without DARPA commissioning basic research, or without public sector contracts enabling RAND to develop innovations subsequently picked up by entrepreneurs like Steve Jobs. This history of the interplay between government and private sector in the USA is very well known (see O’Mara 2019 for one recent account of many).

The novel element in describing this as “mission-oriented” is the attribution of intentionality and the conclusion that if it worked for inventing the Internet, it can work for other societal aims. Mazzucato sets out her argument concisely in an interview: “I describe in the longest chapter of my book, the US government has been a leading player in funding not only the Internet but all the other technologies—GPS, touchscreen display, and the new Siri voice-activated personal assistant—that make the iPhone, for example, a miracle of American technology. Crucially, mission-oriented policies are needed today to tackle climate change and other large societal, technological challenges.”²

It is unquestionably true that public investment in research has been important for many fundamental innovations. One can point to the basic research underlying mRNA vaccines, CRISPR gene editing, graphene, and many, many more technologies. It is entirely uncontroversial among economists and policymakers alike that governments have an essential role in funding basic research, where the private sector will underinvest because of knowledge spillovers they cannot internalize. It would also be very widely accepted that governments have a valid role in shaping

²<https://www.pbs.org/newshour/economy/the-entrepreneurial-state-appl>.

the direction of innovation, setting priorities for funding research. For example, in 1971 Richard Nixon announced the “war on cancer” through funding research at large scale through the National Institutes of Health; this was a broad and arguably unsuccessful mission (Surh 2021). Since the Nurse Review in 2015, UK government departments have expressed “Areas of Research Interest” linked to specific policy questions or issues. There is a considerable literature—theoretical and empirical—on how and why governments can and should influence the direction of innovation (e.g., Rothwell and Zegveld 1984; Aghion and Tirole 1994; Acemoglu 2002; Bryan and Lemus 2017; Bryan and Williams 2021; Acemoglu and Johnson 2023). The literature addresses two types of market inefficiency: *too little* socially valuable innovation and the *direction* of innovation away from those that would deliver the greatest social value.

In this sense, the importance of innovation policies that can help achieve directional aims is motherhood and apple pie, in economic research and the policy world alike. But can governments deliver specific outcomes? Contrary to the impression some have taken from the debate, the US government did not intend to invent either the iPhone or the Internet; these innovations were the result of many unplanned, serendipitous actions by a multitude of public and private actors. Governments can certainly incentivize innovation in specific areas, as the USA and EU are now by funding research on green energy technologies or chip manufacture. Governments also have a large portfolio of policies available to them to encourage both private and public sector innovation (Bloom et al. 2019). But the standard mission-oriented examples do not represent intentional and specific innovation by an “entrepreneurial” government.

So on the one hand, there is scope for fruitful state intervention to bring about better societal outcomes; but on the other hand, it is not immediately obvious how broad or narrow in scope a government’s aims should be, whether these are packaged as missions or in some other way.

State and Markets

Given the shift in the intellectual climate described above, how should governments think about their role in supply side interventions? Although many of those who advocate a more active state dislike the construct of “market failure” for thinking about this (and understandably so, as market failure is pervasive), the different ways in which private and social welfare can diverge offer a useful diagnostic approach (Coyle 2020).

On the question of when a policy intervention makes sense—and what type—it is useful to think about whether the private-social wedge is due to missing markets, asymmetric information and knowledge spillovers, Pigouvian externalities, or the gap between the social and private discount rates. The diagnostic will point to different policy approaches. For example, markets for some future technologies are highly uncertain, deterring private investors even if the societal payoff is likely

to be large. Policy tools such as public sector advance market commitments (as with Covid vaccines or new antibiotics) or prizes (Kremer et al. 2020; Murray et al. 2012) may be the most effective approach. Some innovations will help tackle externalities (such as CO₂ emissions) but may not be initially profitable, due to learning-by-doing or scale economies, for example, meriting taxpayer subsidies. Subsidies in the initial stages to the production and installation of photovoltaics led to extremely rapid declines in the price of generating solar electricity (Way et al. 2022).

The longer time horizon of the public sector—a lower social than private discount rate—is relevant in contexts ranging from blue skies research to investment in infrastructure. If a project has a longer payback period than private investors will accept, or there is a high nonmarket, social return, a combination of direct public investment and incentives for complementary innovations and assets may be appropriate (Offer 2022). Large infrastructure projects are also a good example of the need to overcome coordination problems. The intention of large projects is to bring about non-marginal changes in economic activity. The economy consists of a large set of complicated nonlinear relationships. Multiple equilibria and tipping points characterize such systems (Coyle 2022), creating the scope for purposive policies to achieve a different equilibrium or to reach a critical scale that will overcome early coordination challenges. While governments can consider criteria such as existing strengths or resources in innovation and production or identify reasons for believing production can attain a region of increasing returns to scale, there is bound to be an arbitrary element in the selection of investments or points of intervention. These may vary depending on current priorities and political preferences, as there is no “best” way to run a complex modern economy. A mission—in other words, a societally desirable aim—may, like a policy narrative (Shiller 2017; Akerlof and Snower 2016), be one way of expressing a goal intended to align private sector decisions or achieve a tipping point in coordinating actions around a set of standards or achieving a critical scale of activity. Coordination problems probably offer the strongest case for mission-oriented approaches.

Even in this latter case, though, devising an appropriate mission involves more specificity about the nature of the problem to be solved than is generally apparent in current policy discourse. Some missions in the sense of coordinating policy narratives may be useful, but not every policy can be shoehorned into a mission. Indeed, the usual examples of successful mission-oriented approaches in the postwar USA were not intentional in the way the subsequent literature has sometimes portrayed them. The problems that have helped recently shift the climate of opinion in economics and policymaking in the direction of a more activist state are highly complex and create a decision-making context of huge uncertainty.

There is broad agreement about key societal aims such as achieving an energy transition or improving productivity and incomes, and there will be no simple solutions. How then should governments intervene in the economy to help bring about the desired aims, which must involve multiple private sector businesses and consumers, in this complex and uncertain environment? Although a coordinating narrative or mission can be thought of as one of the instruments available to government, nevertheless useful political rhetoric answering the demand for simple

solutions should not be mistaken for a consistent or sufficient framework for policy action. A supply-side economic strategy requires assignment of specific instruments to identified aims and the delegation of responsibility for implementation to the relevant agencies or departments (and individuals within them). The outward-facing rhetoric risks obscuring the chain of accountability essential for successful industrial policies. Missions are not enough.

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Engineering Is Not Entrepreneurship



Randall G. Holcombe

Abstract The idea of mission-oriented government, or entrepreneurial government, has been supported using examples of successful government programs such as the Manhattan project or the Apollo program. These are examples of engineering successes, but they were not entrepreneurial. Entrepreneurship consists of producing innovations that produce more value than they cost, and in those examples there was no attempt to compare benefits to costs. A realistic view of the political process under which government actually operates shows that attempts to make government more entrepreneurial will result in programs with vague goals and no clear indicators of success. Voters like feel-good aspirations, and politicians like to propose programs that appeal to voters. The real entrepreneurs in the political process are lobbyists and interest groups who find opportunities for rent seeking and regulatory capture, reducing the efficiency of government. With sufficient resources, governments can produce engineering successes, but the political process works against governments being entrepreneurial. Engineering is not entrepreneurship.

Keywords Industrial policy · Market failure · Entrepreneurship · Innovation · Engineering

JEL Codes O25 · O31 · O32 · O38 · L26 · L50 · L52 · P16

Introduction

Governments have produced some remarkable achievements throughout history. The Roman Empire built a system of roads and aqueducts that enabled the Empire to thrive and expand, medieval governments (in cooperation with the church) built spectacular cathedrals that remain marvels in the twenty-first century, and the Great Wall of China stands as a tribute to the accomplishments of that government. More

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recently, the United States government developed atomic bombs to hasten the end of World War II, put a man on the moon in the 1960s, and created a system of GPS satellites that provide people throughout the world with precise location information. While moonshots and atomic weapons are probably things we would be at least as well-off without, governments have produced much that has benefited many.

The accomplishments of government listed in the previous paragraph all are accomplishments of engineering, not entrepreneurship. When faced with engineering challenges, governments often can meet them, given sufficient resources. Government's engineering successes do not constitute entrepreneurship, however. Entrepreneurship consists of identifying and implementing new production methods or new or improved goods and services that create more in value than they cost to produce. Was the value of the Apollo program that landed men on the moon worth more than it cost? There is no way to tell, and the goal of the program was not to produce value in excess of its cost anyway. It was to land a man on the moon, and it succeeded.

Not all entrepreneurial activity is successful. The market test to see whether entrepreneurial actions are successful is whether they are profitable. If an innovation creates more value than it costs in resources to produce it, that innovation is profitable and an example of successful entrepreneurship.¹ If the innovation costs more to implement than its value to purchasers, the innovator realizes losses and the entrepreneurial act was unsuccessful. Whether successful or not, the entrepreneur's goal is to create value, which then generates profit.

To lead with an example, in 1981 John DeLorean began producing an automobile with a stainless steel body. Production was short-lived. The DeLorean automobile was never profitable, and the firm went out of business. Mr. DeLorean's automobile was an engineering success. It worked as promised, and the rust-proof stainless steel body offered some advantages to consumers, although consumers viewed those advantages as insufficient to return Mr. DeLorean a profit. The DeLorean automobile was an engineering success but an entrepreneurial failure.

Building on that example, consider two government projects: the Manhattan project that produced the atomic bomb and the Apollo program that landed a man on the moon, both of which have been offered as examples of the successes of the entrepreneurial state. The Manhattan project was initiated jointly by the governments of the United States, the United Kingdom, and Canada in 1939, with the goal of producing an atomic bomb. As is well-known, the project was successful, and the use of two atomic bombs prompted the Japanese to surrender to end their involvement in World War II. The Apollo program was officially initiated in 1961 when

¹A caveat that will become relevant later is that an innovation could be profitable and yet create external costs large enough that the costs exceed the total value of the innovation. The entrepreneur would still have been successful at producing a profit—the goal of entrepreneurship.

President Kennedy announced the goal of landing a man on the moon and safely returning him to Earth before the end of the decade.²

The Manhattan project and the Apollo program are examples of engineering successes, much like the production of the DeLorean automobile. In all three cases, the engineering goals were met. Stainless steel automobiles were produced, atomic bombs were produced, and men landed on the moon. But there was no entrepreneurship involved in the Manhattan project or Apollo program. Rather, political leaders established engineering goals, much as John DeLorean did, and spent enough money on those projects to see them to completion.

As Mazzucato (2021, p. 4) says about the Apollo program, “cost was not the issue: the point was to get the job done.”³ Could those projects have been completed more quickly had different methods been used? Could the same result have been accomplished at lower cost had different methods been used? More important from the standpoint of entrepreneurship, did the end products produce more in value than they cost to produce? These questions cannot be answered because the programs were produced through a top-down process in which resources were taken involuntarily from taxpayers to fund projects that could only fail in an engineering sense. While the programs undoubtedly produced benefits, there is no way to evaluate whether the benefits exceeded the costs. Those projects are not examples of entrepreneurship.

Entrepreneurial Government

While the Manhattan project and the Apollo program are examples of engineering, not entrepreneurship, one example of government entrepreneurship is the cooperative effort of the British and French governments to produce a supersonic airliner. That program had an engineering goal but also an entrepreneurial one—to enable cost-effective commercial supersonic flight. That program was an engineering success but an entrepreneurial failure.

Mazzucato (2021, p. 51) describes the Anglo-French supersonic Concorde airliner as “a technological triumph but cost vastly more than forecast to build and never led to a supersonic revolution in commercial air travel.” The Concorde was, in this sense, like the DeLorean automobile. Both were engineering successes, but entrepreneurial failures. The difference between the Concorde and the Apollo program or the Manhattan project is that the latter two did not have to justify the

²The engineering on this project was begun in 1960 under the Eisenhower administration, but the end-of-decade goal was announced by President Kennedy.

³Mazzucato (2021, ch. 4) provides an excellent history of the Apollo program, the many challenges it faced, and the way it succeeded in meeting them. But the successes she describes are engineering successes, not entrepreneurial ones.

worth of their engineering successes. Using the same criteria Mazzucato uses to evaluate the Apollo project, the Concorde was just as successful.

These examples illustrate how entrepreneurial government must be evaluated. The setting and accomplishing engineering goals gives no evidence about whether government is entrepreneurial. Entrepreneurship is at its foundation an attempt to create value, not an attempt to achieve some technological goal. The engineering successes of governments, such as the triumph of producing a supersonic airliner or landing a man on the moon, offer no evidence about whether government has been a successful entrepreneur. At least in the Concorde's case, governments were trying to be entrepreneurial. They just failed. In the case of the moon landing, there was no consideration given to the creation of value in excess of its cost.

To be clear, the issue here is not over whether the value created by the Apollo program exceeded its cost. Perhaps it did, but that is irrelevant. The goal of the program was not to create value in excess of its cost. The goal was an engineering one of accomplishing the mission, regardless of cost. This paper is not arguing against governments establishing engineering goals. Rather, it is arguing that engineering is not entrepreneurship.

The idea of entrepreneurial government is misguided. The above examples are suggestive, but when one understands what entrepreneurship is and the role it plays in economic development, it becomes apparent that attempts to design an entrepreneurial state cannot succeed. This is not just a matter of semantics. Mazzucato argues that the success of the Apollo program, the Manhattan project, and other government engineering successes lay the foundation for the employment of an entrepreneurial mission-oriented government that can be equally successful at addressing other challenges, such as climate change, inequality, improving health care, and narrowing the digital divide. These issues are categorically different from the engineering challenges like the Apollo program or the creation of a supersonic aircraft. This paper explains why, but the short answer comes down to a simple distinction: engineering is not entrepreneurship.

Engineering and Entrepreneurship

Schumpeter (1939) made a distinction between invention and innovation. Invention is the development of a new idea or process. Innovation is the creation of a profitable product as a result of implementing the invention. Entrepreneurs are the people who transform inventions into innovations. Using Schumpeter's taxonomy, the government accomplishments listed in the preceding section are inventions, not innovations, and they are not the result of entrepreneurial government. Emphasizing the difference, Schumpeter (1939, p. 84) says "Innovation is possible without anything we should identify as invention, and invention does not necessarily induce innovation, but produces of itself. . .no economically relevant effect at all." Engineering and invention by themselves produce no tangible benefit to people. The benefits come when those inventions are transformed into innovations that create value.

Consider the example of the development of the graphical user interface for computers. The graphical user interface, including windows on a computer screen and the use of a mouse to navigate the screen, was invented at the PARC laboratory of the Xerox Corporation in the early 1970s. The engineers at Xerox were the inventors, but Xerox never made a profitable product using their invention. The innovators were Steve Jobs, who introduced the Apple Macintosh computer, and Bill Gates, who developed the Microsoft Windows operating system. The people at Xerox did the engineering. Steve Jobs and Bill Gates were the entrepreneurs.

When one thinks of great entrepreneurs in markets, they are innovators, to use Schumpeter's terminology, but rarely inventors. Andrew Carnegie did not invent the Bessemer process but made a fortune applying it to create the US Steel Corporation. Henry Ford did not invent the assembly line, but he made his fortune applying the concept to the manufacture of automobiles. As just noted, Steve Jobs and Bill Gates did not invent the graphical user interface for computers. All of those entrepreneurs took the inventions of others to create profitable products. Thomas Edison, founder of the General Electric Company, is a rare example of an individual who was both an inventor and an innovator.

Mazzucato (2015, ch. 5) discusses the growth of Apple in the consumer electronics market, pointing out that much of the technology Apple used was created with some government backing. Her recounting of Apple's success illustrates Schumpeter's distinction between invention and innovation. This is one of many examples of government invention—engineering accomplishments—that have enabled entrepreneurs to be innovative. Her discussion illustrates the difference between invention and innovation—between engineering and entrepreneurship. As she explains, government engineering produced inventions that opened the opportunity for Steve Jobs and his Apple Computer Company to be entrepreneurial. Government contributed to the engineering. Apple and Microsoft did the entrepreneurship. Entrepreneurship creates value from inventions. On their own, inventions have no value. Entrepreneurs transform inventions into innovations that people value.

Apple provides an excellent example of innovative entrepreneurship because product after product that the company introduced were panned by experts as having no commercial potential. Computer experts argued that people did not want toy computers like the Apple II. Marketing experts said the iPhone would be a niche product because people wanted phones with mechanical keypads. Steve Jobs had the entrepreneurial vision to turn the inventions of others into profitable innovations that enhanced people's lives. Mazzucato (2015, p. 112) also notes that the technology behind Apple's "virtual assistant Siri was developed at Stanford University." But again, the invention has no value until an innovator applies it. Jobs recognized its potential and incorporated that technology in his iPhone in 2007.

Engineers are the inventors, but they are not entrepreneurs. Entrepreneurship, when successful, adds value to the economy and improves human well-being. Engineering provides raw material that can be used by entrepreneurs, but engineering by itself does not make people better off. Engineering is not entrepreneurship.

Profits and Progress

Capitalist economies are continually evolving. As Schumpeter (1947, pp. 82–83) observed: “The essential point to grasp is that in dealing with capitalism we are dealing with an evolutionary process. . . . Capitalism, then, is by its nature a form of method of economic change and not only never is but never can be stationary.” Biological systems also evolve, but there is no metric to judge whether a present ecosystem is better or worse than those that preceded it. The same is not true of economic evolution.

Schumpeter describes the evolutionary process of capitalism as one of creative destruction. New and improved products and new production methods displace the old. Much as with biological evolution, the process of creative destruction evolves through the survival of the fittest, and fitness in a market economy is profitability. Production occurs through the purchasing and combining inputs to produce output, and profits result when the value of the output exceeds the cost of the inputs. If the inputs cost more than the output, the result is a loss. Profitable firms thrive and grow. Firms that incur persistent losses wither and die.

Profit is an indicator that the profitable firm adds value to the economy, according to the judgments of those who are producing, buying, and selling profitable products. Profit occurs because those who are consuming the output place a higher value on it than those who are selling the inputs place on those inputs that produce the output. A profitable firm takes inputs with less value and combines them into outputs with more value than the inputs. Profit is not a measure of the full value generated by an innovation. Profit is the benefit to the seller, but the buyer also receives benefits in the form of consumer surplus—the utility the buyer gets in excess of the price of the product. The evidence is that both buyers’ and sellers’ benefit is that they both want to enter into the transactions that produce the seller’s profits.

When a firm introduces a value-enhancing product into the market, it generates profits for the firm. Over time, competing firms have an incentive to introduce similar products and even more, to introduce products that consumers prefer to existing profitable products. Profits for the initial innovator decline as a result, but the value of the innovation remains. As Holcombe (2014) describes, the result of competing innovators is that the value produced by a firm’s innovations increasingly shifts away from producers toward consumers in the form of consumer surplus. The process of creative destruction displaces products in the market with products that bring higher value to consumers. The fact that purchasers choose to purchase the new products over the old is evidence that they place a higher value on the new products.

People can see by casual observation that humankind is materially better off now when compared to a century ago, or even 50 or 20 years ago. Entrepreneurship is the engine that drives economic progress, as Holcombe (2007) explains. Innovations enhance the standard of living well-beyond income growth by bringing new products to market. Air conditioning, jet aircraft, smart phones, and an endless list of innovative products have been the result of entrepreneurs who have found ways to

add value to everyone's life. Engineering, by itself, adds no value. Entrepreneurship transforms engineering advances into innovations that enhance human well-being.

The distinction between engineering and entrepreneurship is crucial for public policy purposes because government missions detract from human well-being if they cost more than the value they bring. Advances in human well-being are produced by entrepreneurship, not engineering. Policymakers will be misled if they equate engineering successes with entrepreneurship. The examples offered above clearly show the distinction. The Apollo program was not entrepreneurial. The Concorde project was. Engineering is not entrepreneurship.

Uncertainty and Entrepreneurship

Kirzner (1973) defines the act of entrepreneurship as the discovery of a previously unnoticed profit opportunity. This definition would eliminate the Manhattan project and Apollo program as examples of government entrepreneurship because they were not intended to produce a profit or designed to return value greater than their cost, even if they might have done that. Those programs had engineering goals, not entrepreneurial ones.

Mazzucato (2021) emphasizes the risks involved in those programs and the uncertainties about how their goals could be accomplished, or even if they could be accomplished. There are always risks and uncertainties when trying to do something that never has been done before. But there is a fundamental difference between the risks and uncertainties in those projects and the risks and uncertainties that entrepreneurs face.

Because entrepreneurial innovations introduce something new into the economy, the entrepreneur can never know whether an innovation will be profitable. Henry Ford's judgment that his innovation would be profitable proved correct; John DeLorean's judgment turned out to be incorrect. These entrepreneurs faced engineering uncertainties as they designed products and production methods that had not previously been tried. But they also faced the uncertainty that even if their engineering goals were met, they would not add value to people's lives—they would not be profitable.

Because entrepreneurs are speculating about the profitability of something previously untried, Foss and Klein (2012) emphasize that a major component of entrepreneurship is making judgments in the face of uncertainty. One can only speculate about how something that has not previously been tried will turn out. Entrepreneurs use their judgment about the potential for engineering successes but also about profitability. For government projects to be entrepreneurial, they must not only set engineering goals but also embody measures to indicate whether the value they produce exceeds the cost. Few government projects do this. The Anglo-French Concorde, discussed above, is a rare exception. Discussion about entrepreneurs tends to focus on the successful ones, the Henry Fords and Steve Jobs of the

world, rather than the John DeLoreans who had ideas they thought would be profitable but turned out not to be.

The engineering uncertainties in the Manhattan project and Apollo program were different types of uncertainty. To succeed, those projects required technological advances beyond the technologies currently available, and there was genuine uncertainty about whether those technological challenges could be met. But there was no consideration of any entrepreneurial risk: whether the value of those projects would be greater than their cost. That did not matter to the success of the projects.

The fact that there were risks and uncertainties as to whether the Manhattan project or the Apollo program could achieve their engineering goals does not make them entrepreneurial. Entrepreneurship is the attempt to create more value than the cost of the entrepreneurial venture. Are we better off because we have nuclear weapons and have landed men on the moon? A persuasive argument could be made that people would be better off had nuclear weapons never been developed. One piece of evidence that the Apollo project was not worth the cost is that four decades after the last moon landing, nobody has found it worthwhile to go back. If the goal of these programs was to be entrepreneurial, good arguments could be made that they were entrepreneurial failures which, like the Concorde, cost more than they returned in value.

This is not to say that these programs were failures. They accomplished their goals. They were successful. They just were not entrepreneurial. The idea behind entrepreneurial government is that it should add value to people's lives. Most missions that governments pursue have no way to judge whether they do so. Engineering is not entrepreneurship.

Government Monopolies

Governments do market some output. Water and wastewater treatment is widely produced and sold by governments, and in many cases electricity, telephone service, internet service, and public transportation such as bus and train service are government-produced. One might be tempted to view these as entrepreneurial ventures, but in almost all cases, governments prohibit competitors and establish themselves as monopolists. Because consumers have no choice if they want to consume the service, this blunts any entrepreneurial incentives. Government-enforced monopolies have a disincentive to innovate, because innovations can cannibalize their existing products and devalue their capital investments.

Christensen (1997) called this the innovator's dilemma. Several examples in the computer industry illustrate the problem. In the 1960s IBM had a dominant position in the computer industry with their exceedingly profitable mainframes. They were slow to enter the minicomputer market because they did not want their minicomputers to cannibalize their mainframe business and were eclipsed by minicomputer innovators such as Digital Equipment Corporation (DEC). While DEC had substantial market share with their profitable minicomputers in the 1980s, many readers may

be unfamiliar with the company, because they were slow to enter the PC market, not wanting to cannibalize their very profitable minicomputer business. DEC was bought by Compaq which then was bought by Hewlett Packard, fading out of the computer market.

That is the way that the creative destruction of capitalism works, but that innovator's dilemma does not apply to government-enforced monopolies. Government monopolies do not go out of business, and they do not face entrepreneurial uncertainty. They do not have to worry about competitors undermining their operations with new and improved products and lower costs. This removes the incentive to innovate. Innovation is always risky, and there is no reason for those in government to interfere with a currently successful operation by taking the risk.

Economists usually conclude that monopolies are inefficient, and there is no good reason to think that government monopolies are an exception. While they may restrict output to raise their prices, Niskanen (1971) has explained that government managers have an incentive to maximize their budgets and to invest in capacity well beyond the efficient level. The incentive structure facing government decision-makers leads them to allocate resources under their control inefficiently and does not give them an incentive to be innovative or entrepreneurial.

Government Decision-Makers

Governments do not take actions or make decisions. Individuals act, and individuals make decisions. Recognizing this, governments cannot be entrepreneurial in the literal sense, and any suggestion that they are must be a shorthand reference to individuals within government acting entrepreneurially. The idea of entrepreneurial government must be analyzed by looking at the incentives and actions of individual government decision-makers.

Mazzucato (2021, p. 24) describes the goal of her book by saying “*Mission Economy* is about how government must change from within in order to deliver on ambitious outcomes, as well as how it must change its interaction with other actors.” She goes on to say (2021, p. 25, *italics in original*) that government “must transform *itself* into an innovating organization with the capacity and capability to energize and catalyze the economy to be more purpose driven.” These statements make government appear as if it is a single individual. Looking at her italicized *itself*, it should be clear that government cannot do anything to itself, although individual government decision-makers may be able to initiate and enact changes.

This is not a minor point. Mazzucato treats government as an omniscient benevolent despot that can change its behavior at will. In fact, the actions of government are the result of a collective decision-making process in which many individuals, all with their own individual interests, interact within an institutional structure to determine what collective actions it will undertake. If Mazzucato is correct that “government must change from within,” one question is why government has not already made these changes. The answer is that those who make the decisions that

determine the direction of government do not have an incentive to make the changes Mazzucato recommends. Even if government decision-makers wanted to make those changes, in many cases they lack the information needed to make them. Government is not omniscient.

In democratic governments, public policies are made by elected officials whose primary incentive is to win the next election. Even the most public-spirited elected officials can only act in the public interest if they are reelected. Those policies are carried out by government bureaucrats whose incentives are to maximize their budgets, as Niskanen (1971) explains, and to perpetuate their jobs. Elected officials have an incentive to address problems that resonate with voters. Bureaucrats have little incentive to solve those problems, because if the problems go away, so do their jobs.

What Goals Make Good Missions?

The Manhattan project and the Apollo program are examples of good missions, in the sense that they had clearly defined goals and clear indicators of mission success. Those were engineering missions, not entrepreneurial ones. Mazzucato argues that the successes of these programs provide a template for employing an entrepreneurial mission-oriented government to solve a wide range of problems. Unlike the Manhattan project and Apollo program, that had clearly defined goals, the missions Mazzucato (2021) suggests do not have clearly defined goals and do not have clear indicators of mission success.

Mazzucato (2021, pp. 104–105) lists 17 goals for a mission-oriented government. Those goals are popular, making them good goals from a political standpoint, but they make poor missions because they are not clearly defined goals and do not have clear indicators of mission success.

The first goal in Mazzucato's list is to end poverty in all its forms everywhere. This is an aspiration that has no policy content. Poverty has no absolute definition. Someone below the official poverty line in the United States would have a standard of living above the median citizen of many countries. Sen (1999) concludes that elimination of poverty requires more than just increasing people's incomes—it requires expanding their freedoms. The point is not to accept or reject Sen's definition of poverty, but to show that the goal is ambiguous. It gives no hint of how it can be accomplished, or what would indicate that the goal has been accomplished. One can point to clear evidence that a man has landed on the moon. One would be hard-pressed to offer a metric that would show whether poverty has been eliminated. This is an aspiration, not a mission. Most of the goals Mazzucato lists have that same quality.

The second goal is to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture. This is similarly vague. How would one measure improved nutrition and know whether that goal was achieved? If nutrition improved, would people declare that goal accomplished and move on, as they did

with the moon landing? Unlike a moonshot, these goals are open-ended and can never be achieved. It is disingenuous to set goals that never can be achieved.

Other goals are similarly open-ended. Good health; inclusive and equitable education; access to affordable and reliable energy; safe, resilient, and sustainable cities; and the building of resilient infrastructure are among the other goals Mazzucato lists. The ends those goals envision are, for the most part, desirable, but they are not missions like building atomic bombs or landing men on the moon. They are not amenable to engineering solutions.

Among the vaguest of the listed goals is “take urgent action to combat climate change and its impacts.” Governments are currently taking action on many different margins to combat climate change, so reading this charge literally, it has already been accomplished. Mazzucato (2021, pp. 137–146) discusses this mission at length, framing it as the green new deal, but she is vague about specific steps that would lead to a clear “mission accomplished” conclusion. Lofty aspirations to approach vague goals are not the same thing as missions.

Another goal is to “Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all.” This is what capitalism has been doing since the beginning of the Industrial Revolution, with no central plan and no government direction. Indeed, many of the goals Mazzucato lists have been advanced through entrepreneurial activity in decentralized economies. Capitalist economies have reduced food insecurity, reduced poverty, provided reliable energy, and more. Why set aside institutions that have already shown success in exchange for turning them into government missions?

The “war on poverty” declared by United States President Lyndon Johnson in 1964 provides a good example of the way governments address missions with vague goals. According to the government’s official poverty statistics, the percentage of the population in official poverty at the end of the 1960s was about 12 percent and has fluctuated around that number for the next half-century (Chaudry et al. 2016, p. 9). It has risen to slightly above 15 percent and fallen to slightly above 11 percent over the half-century, but one must be impressed by the remarkable stability of the US official poverty rate for half a century, in the face of a mission to go to war against it.

The US government set mission goals to land a man on the moon and to eliminate poverty at about the same time. The first goal was accomplished in less than a decade, while there has been no progress (according to official statistics) in the second. This section suggests why. Missions with vague goals and no clear indicators of success are not amenable to attack by entrepreneurial governments.

Mission-Oriented Democracy

The missions discussed in the previous section are lofty aspirations, but whether they can be effectively addressed depends on the capability of government to address them. Rather than rely on wishful thinking, this section discusses the way that government policies are made and considers how decision-makers in democratic

governments—voters, politicians, bureaucrats, lobbyists, and interest groups—will interact to respond to those mission statements. The common elements in the missions discussed in the previous section is that they have vague goals and no clear indicators of success.

Voters. Voters collectively determine who holds elective office, but each individual voter has no political power. In elections with more than just a few voters, voters know that their one vote will not be decisive, so they have little incentive to be well-informed. They are rationally ignorant, as Downs (1957) explains, and following Caplan (2007) may even be rationally irrational. Knowing that their one vote will not be decisive, Brennan and Lomasky (1993) explain why voters may vote for alternatives they would not choose if the choice were theirs alone. Because they know election outcomes will be the same regardless of how they vote, or even whether they vote, voters vote for alternatives that make them feel good, with little incentive to analyze the public policy outcomes that would be likely under the election alternatives they face.

Issues are complex, and voters cannot have the expertise to understand the details of public policy. Few of those voters will understand enough about electricity to do their own home electrical repairs. They will hire an electrician. Similarly, they will hire a plumber to do plumbing repairs. Public policy issues like those Mazzucato (2021) lists are more complex than plumbing or electrical wiring. The idea that voters can make informed choices about the efficacy of specific policies to improve food security, provide reliable and sustainable energy, or improve health outcomes is wishful thinking.

Most voters adopt their views on public policy from those of their political leaders, as Holcombe (2023) explains. They are offered alternatives by various parties and candidates and choose one to anchor on as they form their public policy preferences. They vote for the public policies that make them feel good about casting their vote. It is easy to see why voters would vote for candidates who want to end poverty, generate sustainable and reliable energy, and increase educational opportunities. Voters can feel good about supporting those aspirations.

Politicians. The first motivation of politicians is to win the next election, so they can remain in power. Even the most public-spirited politicians can only do good things if they remain in power. Voters like policy proposals that make them feel good, so legislators offer policy proposals that make them feel good. Those policy proposals tend to come in the form of vague aspirations rather than concrete policies. Ending poverty or increasing food security are examples. They are worthy aspirations, but without the suggestion of any actual policies that can accomplish those goals.

Mazzucato's (2021) book is in this sense a good script for a successful political campaign. She offers vague "feel good" policy aspirations along with the claim that government can do these things, without detailing specific policies that can accomplish those policy goals. People like the message, which explains why this is a formula for a successful political campaign and explains the appeal of her book.

Political platforms are deliberately vague on the details because many people will share those aspirations but will differ on how to best accomplish them. As Arrow

(1951) shows, there is in general no set of public policies that will be preferred by all others by a majority of voters.⁴ Feel-good aspirations generate political support. Specific policy proposals risk generating opposition.

Vague policy aspirations have another advantage. Because they are vague on actual public policies, they allow legislators the flexibility to design policies that work to the advantage of organized interests, who can also offer political support. Legislators shape specific policies to conform to the desires of organized interests, who repay legislators with campaign contributions and support. Interest groups tend to be well-informed about policies that affect them, in contrast with the rational ignorance of voters.

From a political standpoint, whether politicians succeed in accomplishing the aspirations they campaign on seems to be of little importance. Franklin Roosevelt instituted his New Deal to mitigate the Great Depression, but the Depression lingered on until the military buildup due to World War II brought it to an end. The New Deal was not successful at ending the Depression, but it was politically popular. Similarly, Lyndon Johnson declared a war on poverty in 1964, but ending poverty remains one of Mazzucato's (2021) goals well over half a century later. Lofty aspirations win political support, regardless of whether they are achieved.

Bureaucrats. While public policies are chosen by legislators, they are implemented by bureaucrats. Niskanen (1971) explains why, in the same way that firms act to maximize profits, bureaucrats act to maximize their budgets. While their budgets may be inefficiently large, bureaucrats have no incentive to actually accomplish vague missions such as ending poverty or ending hunger. If an agency's goals were accomplished, the jobs of those who work in the agency would be in jeopardy. The Manhattan project ended. The Apollo program ended. Bureaucrats have no incentive to produce themselves out of their jobs.

When missions are vague and do not have clearly defined metrics to determine whether they are succeeding, bureaucratic incentives lead to self-perpetuating programs that never approach accomplishing those vague goals. To do so would eliminate the jobs of the bureaucrats who administer the programs.

Lobbyists and interest groups. Missions with vague goals and with no clear mechanisms to accomplish them invite entrepreneurial individuals to propose actions they can take to address those goals. While citizens and voters have little incentive to be informed about public policy or to actively engage in the political process, organized interest groups have an incentive to negotiate with politicians to gain benefits for themselves. Those who represent organized interest groups are the real entrepreneurs in entrepreneurial government. They engage in rent seeking (Tullock 1967; Krueger 1974) and agency capture (Stigler 1971) in which concentrated and organized interests have an advantage in gaining benefits for themselves at the expense of larger but unorganized interests (Olson 1965).

⁴A more formal exposition of this idea is found in McKelvey (1976), who demonstrates that when voters are concerned about more than one issue, there is always some political platform that is preferred to the status quo by a majority of voters.

The mandate in the United States that gasoline for motor vehicles contain ethanol, passed in 2005, is a good example. The vague policy goals were to move the nation toward energy independence and to move toward more sustainable and environmentally friendly energy sources. Most ethanol is made from corn, and lobbyists representing the corn farming and processing industries, with corn processor Archer Daniels Midland heavily involved, argued that requiring motor fuels to contain ethanol would move toward accomplishing those goals. Since 2010 the United States has been a net exporter of petroleum, raising the question of whether energy independence remains a justification for the mandate. Whether ethanol is more environmentally friendly than petroleum is questionable, considering the amount of land that must be cleared to grow the corn for ethanol.

The mandate remains in place because it benefits a concentrated and well-organized interest group—the corn lobby—while it imposes costs on a larger but poorly organized group, those who purchase motor fuels. Organized interests can negotiate with government decision-makers to promote programs that benefit them, while unorganized interests are left out of the bargaining process. This example shows the way that entrepreneurship actually works in government. While legislators and bureaucrats have little incentive to be entrepreneurial, lobbyists and organized interests can take advantage of vague missions to propose actions to address those missions. Lobbyists and interest groups are the entrepreneurs in entrepreneurial government.

Amenta and Stagnaro (2022) show that subsidies to renewable energy in Europe have produced little renewable energy but have benefited the subsidized firms. Sandström and Alm (2022) document the failures of Swedish policies to subsidize biogas, ethanol, and fossil-free steel to accomplish their environmental goals, while benefiting the firms receiving government support. These are examples of a system of what Holcombe (2018) calls political capitalism, in which profitability increasingly comes from government connections rather than from producing value for consumers.

Promoting mission-oriented government, Mazzucato (2021, pp. 32–35) is critical of the conclusions arrived at by public choice approach to analyzing government—an approach that explains why entrepreneurship in government favors concentrated interests rather than the general public interest. But Mazzucato offers no explanation why the public choice analysis leads to flawed conclusions. Public choice theory uses the same tools of analysis that social scientists use to analyze markets to analyze government decision-making. This is the way that social science should be undertaken.

Government is not a single entity that makes decisions and designs public policy. Rather, individuals make decisions and public policies are the result of a collective decision-making process in which the interactions of many individuals are aggregated to create public policy. When thinking about the missions government might address, a complete analysis must set aside wishful thinking to analyze the way that governments actually do arrive at collective decisions and make public policy. Doing so points toward public policies that benefit well-connected interest groups

while doing little to further the stated missions. Lobbyists and members of concentrated interest groups are the entrepreneurs in this process, not those in government.

Choosing Missions

Politicians look for missions that will gain political support. Voters favor missions that make them feel good about supporting them. Few people will be opposed to ending poverty and hunger, improving health outcomes, and generating sustainable economic growth. In contrast with missions such as building a nuclear bomb or landing a man on the moon, there is no metric to signal that their goals have been accomplished. Indeed, that is part of the political appeal of such goals. They lay the foundation for establishing perpetual bureaucracies to address them.

Governments are not institutionally designed to achieve goals like this. As documented in many studies in Wennberg and Sandström (2022), issues like this are better addressed by decentralized market institutions rather than the hierarchical structure of government, but this idea is a difficult political sell. Voters are more inclined to support candidates who claim they have the answers than those who say decentralized private activity will better address these issues if government just gets out of the way.

A mission-oriented state will choose its missions based on their political popularity rather than their potential to benefit citizens or the likelihood that the stated missions can be accomplished. Politicians and bureaucrats within government have no incentive to be entrepreneurial. The entrepreneurs in mission-oriented government are lobbyists and organized interest groups.

Conclusion

Successful government cannot run on slogans. The ideas of entrepreneurial government, or mission-oriented government, are slogans that have little content for actually developing successful public policy. Examples that advocates of entrepreneurial government have used to promote the idea have been examples of engineering, not entrepreneurship. Those examples, like the Manhattan project to create a nuclear bomb or the Apollo program to land a man on the moon, had well-defined goals, were not constrained by costs, and were not designed to create value in excess of their cost. Indeed, there was no attempt to measure the value of the completed projects.

This engineering approach to accomplishing missions cannot be applied when goals are vague and when there is no clear indicator of what constitutes success. The institutional structure of democratic government leads to interest group politics, rent seeking, and bureaucracies more intent on protecting and increasing their budgets rather than accomplishing a mission. Indeed, if the missions actually were

accomplished, those working on them would lose their jobs, creating a disincentive to success.

Many real-world examples illustrate the divide between political success and mission success. Roosevelt's New Deal and Johnson's War on Poverty were politically successful, despite the New Deal's failure to end the Depression and the War on Poverty's failure to even reduce poverty (according to official government statistics). The British/French Concorde supersonic airliner is an example of actual government entrepreneurship, and while it was an engineering success—they did build a supersonic airliner—it was an entrepreneurial failure.

Over time, a mission-oriented government would enable interest groups to strengthen their political connections resulting in what Olson (1982) describes as the decline of nations. The people who have the incentive to be entrepreneurial in a mission-oriented government are not those in government, but members of concentrated and well-organized interest groups. The theory behind these conclusions is well-established. The institutional challenge is to design political institutions to prevent these welfare-reducing activities from taking place. Attempting to make government more mission-oriented and more entrepreneurial will encourage these counterproductive political activities.

The mission goals Mazzucato (2021) suggests, such as reducing poverty, increasing food security, providing reliable and affordable energy, and increasing educational opportunities, are goals that capitalist economies have been accomplishing since the beginning of the Industrial Revolution. She gives no good reason for displacing those decentralized market institutions that have proven successful to take a chance on government missions to address the same issues. The examples Mazzucato (2015, 2021) uses to promote entrepreneurial mission-oriented government are examples of engineering, not entrepreneurship. Engineering is not entrepreneurship.

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A Behavioral Economics Perspective on the Entrepreneurial State and Mission-Oriented Innovation Policy



Jan Schnellenbach

Abstract It is argued that the concepts of mission-oriented innovation policy and also of the entrepreneurial state will lead to the implementation of policies that are highly vulnerable to behavioral biases and the inefficient use of heuristics. In political practice, we can therefore not expect efficient mission-oriented policies. In particular, I argue that missions as a political commitment mechanism intended to devote massive resources to a specific cause will often only work if biases like the availability bias and loss aversion are deliberately used in order to secure voter consent. Furthermore, I also argue that the argument used by Mazzucato (*Mission Economy: A Moonshot Guide to Changing Capitalism*. London: Penguin UK, 2021) herself also contains several behavioral biases.

Keywords Behavioral political economy · Mission orientation · Innovation policy · Heuristics · Biases · Narratives

JEL Codes D91 · E71 · H11 · O30 · L52

Introduction

The concepts of the entrepreneurial state and of mission-oriented policymaking have been subjected to thorough criticism from innovation economics and also from political economics. The latter criticism recognizes specifically how policymakers may be driven by motives other than promoting welfare-enhancing innovation projects. From this perspective, the power given to governments in defining and executing missions likely is another lever for special interest policies with adverse effects on overall economic efficiency.

What is missing so far, however, appears to be a reading of these concepts from the point of view of behavioral economics. I make a first attempt to close this gap

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somewhat with this contribution. I begin by giving a brief overview over the emerging field of behavioral political economy, with some emphasis on typical biases and heuristics that matter for innovation policy in general. This is followed by a discussion of why the concept of a mission-oriented innovation policy is particularly susceptible to behavioral biases, and why an efficient application of this concept is unlikely. I then argue that Mazzucato's (2021) argument for mission-oriented policies itself suffers from behavioral biases. In other words, not only will the application fail due to biases but the very concept itself as it emerged on the market for ideas contains major biases. Finally, the last section concludes.

Behavioral Political Economy in Innovation Policy

What Is Behavioral Political Economy?

Before taking a closer look at Mazzucato's specific understanding of the state as an entrepreneur from a behavioral perspective, it is useful to briefly discuss on a more general level how departures from fully rational decision-making can have an influence on policymakers when deciding on innovation policy. In addition to the behavioral element, I also depart from the still popular assumption of welfare-maximizing policymakers and follow the standard public choice assumption of politicians, voters, and bureaucrats pursuing self-interested motives (see Schnellenbach and Schubert 2015, 2019).

Systematic deviations from full rationality are empirically well-established, and their existence is now also widely accepted in mainstream economics. Being heavily influenced by psychologists and their research methodology (Camerer and Loewenstein 2004), behavioral economics does not focus on deductive, axiomatic reasoning as theoretical microeconomics does, but on the empirical identification of typical patterns in individual decision-making. This has led to a more realistic but also a more complicated understanding of how decisions are formed and what influences them. Even a short glance into current textbooks on behavioral economics (e.g., Wilkinson and Klaes 2018; Angner 2021) shows that the established catalogue of observed biases, heuristics, and other deviations from neoclassical rationality is large. And it is not always clear which of these deviations are active or even dominant in a particular setting.

The many degrees of freedom that one often has in applying behavioral approaches to a particular decision-making situation often make it difficult to predict *ex ante* how an individual will behave. There may, after all, be different decision-making biases at work; they may even be counteracting each other; and they may be of different relative importance in different individuals. But nevertheless, there often are typical patterns of behavior. In explaining observed behavior (both in the laboratory and in the field) *ex post*, behavioral economics can be very powerful. And if a certain bias or a certain heuristic is consistently observed to matter in a

certain decision situation, then the behavioral approach also gains predictive power (Angner 2021, pp. 252–254).

There is no reason to assume that innovation policy is not susceptible to the same behavioral influences that also affect decisions in other areas. If anything, the presence of complexity and uncertainty in innovation policy leaves room for a relatively greater impact of simple heuristics and behavioral biases on decision-making (Schnellenbach and Schubert 2019). Consider, for example, the discussion on national and regional systems of innovation, defined by Freeman (1987) as a network of private and public sector institutions that facilitate the interaction of individuals and organizations in innovation processes. These networks are complex, and while a comparative analysis of different systems of innovation may lead to hints at underdeveloped links within a particular system of innovation, it is far from clear that a single political intervention will causally improve its performance. For example, Frenken (2017) argues that the claim by Mazzucato that Europe should emulate government funding schemes from the United States may be unwarranted, because other important elements of the American innovation system, such as strong private research universities and a large military sector, are missing.

This high degree of complexity of innovation policy, combined with the frequent lack of clear-cut causal evidence on the effectiveness and efficiency of single policy measures, often invites reliance on intuitive reasoning, as well as the use of heuristics. It also leaves room for giving preference to policies that are in line with broader political prejudices and biases that every individual inherits to a certain extent. This is not a new insight, and not even one specific to behavioral political economy. In an influential paper, Denzau and North (1994) already argued that under conditions of uncertainty and complexity, what they called shared mental models influence and facilitate decision-making. Communication, not only face-to-face but also through mass media, allows large groups to develop shared perceptions of how the world works and which policies may be successful or not. Recently, this line of research has been rejuvenated as narrative economics (Shiller 2019). Roos and Reccius (2023) argue that collective narratives are often the basis of economic policymaking, both in terms of agreeing upon policy objectives, and in terms of making sense of causal relationships in policymaking.

It is important to note that such narratives develop in a path-dependent fashion. They ought not to be expected to be the result of unbiased deliberation and Bayesian updating according to incoming new information. Rather, the collective nature of the process of finding a common narrative and the mutual expectation among individuals to stick to a narrative once it has been agreed upon often lead to persistence of interpretations of the world even if they could already be identified as factually wrong with available data (Schnellenbach 2005). In stabilizing narratives once they have emerged, not only interpersonal influences such as peer pressure play a role but also intrapersonal mechanisms.

Caplan (2005) coined the term “rational irrationality” to describe this phenomenon. He implies that individuals can have a preference for holding beliefs that are irrational in the sense that they are objectively false. The reason for a rational demand for irrational beliefs is the very limited damage they do individually in the

political sphere. While inaccurate beliefs are likely to be quickly punished in terms of individual income losses in private decisions, an individual who reckons that she is one of millions with virtually no immediate influence on the collective decision can harbor false beliefs at no cost. Why should she do so? Because the zero cost is being outweighed by positive benefits. These may consist in being in line with her peer group. But they also may consist in the pleasure of holding beliefs with expressive value (see Hillman 2010; Hamlin and Jennings 2011). An individual who generally considers herself to be a supporter of free markets would therefore attempt to hold and defend beliefs that underpin this general orientation. They have expressive value for her, because they signal the support for policies that are in line with her general personal and political orientation.

In sum, the coincidence of complexity and absence of unambiguous, uncontested evidence of causal relations on the one hand, and low to no immediate punishment for individual errors in judgment make it easy for citizens/voters to be guided by faulty or oversimplifying narratives and to act according to other behavioral biases. One might argue that the situation is different for professional politicians, who are much more likely to be punished, e.g., at the ballot, for bad decisions with unsatisfactory outcomes. But politicians themselves are constrained in their actions by dominating public narratives. And they can even use them deliberately to their advantage, for example, by framing policies that actually serve influential vested interests in accordance with some popular narrative (Schnellenbach and Schubert 2015). It is therefore highly unlikely that we will observe benevolent, rational welfare-maximizers in the political arena. Rather, we will observe voters and political professionals who are both influenced by behavioral biases and who deliberately use behavioral biases to their own advantage.

Behavioral Political Economy in Innovation Policy

It can be argued that in practical innovation policy, behavioral biases and rational irrationality frequently play a role. Clearly, I cannot give an exhaustive overview here, but a few examples, drawing to a great extent from Schnellenbach and Schubert (2019), can serve as an illustration. One example is the overconfidence bias. Since early experimental studies by Alpert and Raiffa (1969), we know that under uncertainty, individuals tend to have too high confidence in their own judgments. There is also evidence indicating that individuals are particularly overconfident in areas where they have some expertise (e.g., Liu et al. 2017). Angner (2006) discusses a case study of economists acting as experts in policy advice and finds supporting evidence for the hypothesis that overconfidence matters in economic policy consulting, and learning from experience is imperfect. He argues that overconfidence in this area may be amplified because only experts who are very confident in their own judgment decide to enter the business of policy consulting in the first place.

One immediate effect of overconfidence in expert judgments is, plain and simple, bad policy advice. If a choice between different projects is to be made for subsidizing

innovation with public funds, experts or politicians involved in the decision may be subconsciously driven by their own prejudices and preferences and decide accordingly in favor of supporting projects that a completely independent and unbiased individual would not have chosen. If overconfidence occurs, it may also present itself as a willingness to overpay once a decision has been made (Massey and Thaler 2013). Individuals become so convinced of the choice they have made that they begin to overestimate the returns associated with their choice drastically.

In the realm of innovation policy, this implies that the overconfidence bias is particularly threatening if the discretionary leeway of politicians and bureaucrats is large. While a broad and rule-based system of subsidizing innovation, e.g., through amplified tax credits for R&D-spending, would be largely immune to the overconfidence bias, a system relying on experts picking winners for discretionary subsidies would be extremely susceptible. Anecdotal evidence on cases where projects for innovation that eventually failed were picked is abundant. But this is not a problem in itself: Clearly, not every subsidized project can succeed. However, evidence indicates that politicians and bureaucrats are not more successful in picking winners (Elert and Henrekson 2022, pp. 360–361; Kirchherr et al. 2023). If anything, they are less successful (Murtinu et al. 2022). One important explanation for this may be that private venture capital firms risk significant economic losses if they do not learn to de-bias their process of decision-making to some extent.

Another question is how decisions on the winners to be picked are made. Real-world selection processes can often be convincingly criticized with standard political economy arguments. The risk of rent seeking and other types of favoritism granted to well-connected interest groups obviously exists. In some empirical studies, it is found that a Matthew effect in receiving innovation grants exists. Firms that already have received a number of grants are more likely to receive another one (Czarnitzki and Hussinger 2018). The explanations for this phenomenon are diverse. One is the establishment of a stable rent-seeking relationship between firms and politicians. Another explanation is that firms learn to specialize in writing successful grants (Karlson et al. 2020). This can be problematic, because those firms that are successful grant writers are not necessarily also the most efficient in putting subsidies to good use, as many third-party-funded academics also know. A third explanation is that politicians and bureaucrats may use the success of past grant applications as a heuristic to gauge the expected success of future projects (Antonelli and Crespi 2013). This does not mean that these firms have also been extremely successful in actually producing innovations with past grants. Political decision-makers normally have no means to evaluate the efficiency of past grant usage relative to the hypothetical performance of other firms. Rather, having received a grant and not having failed (or at least not having failed too miserably) serves as a heuristic for future grant-worthiness.

Clearly, using this heuristic does not systematically lead to an efficient allocation of grants, but primarily to a very defensive, risk-averse allocation: Those who have not done too much damage in the past are likely to receive money in the future. It can be politically rational to act in such a way if the political cost of large errors in picking winners is significant; in this case, one rather aims at avoiding picking losers.

And there is another problem in this process: Whether a subsidized firm has failed or not is sometimes determined not in an objective evaluation, but in the creation of a positive narrative. Collin et al. (2022) find a strong positive bias in a sample of 110 evaluations for Swedish innovation policy and cast strong doubt on the objectivity of these evaluations.

Political costs associated with acknowledging failure may also exacerbate a pre-existing sunk-cost fallacy. An unhinged overconfidence bias will also lead to attempts of denying failure if denial is still possible. Projects are continued over an inefficiently long period of time, burning public funds. This well-known bias in decision-making also is easier to be left uncorrected if public, rather than private funds, finances the continuation of a failed project. A famous example in economic history is the development and production of the Concorde airplane, which also led to the use of the term “Concorde fallacy” in this context. According to Bletschacher and Klodt (1992), it was clear from relatively early on that, with permanently increasing kerosene prices, the project was most likely to be economically unsuccessful. Nevertheless, backed by the soft budget constraints secured through industrial policy and a political reluctance to write off sunk investments, the development was continued, and, once the planes were produced, they remained in service for decades even though employing them was profitable only for short periods.

These are only a few examples of how biases and heuristics can negatively influence innovation policy if it is characterized by a large scope for discretionary decision-making. I will discuss further examples when engaging with the entrepreneurial state and mission-oriented policymaking directly in the following two sections. An important takeaway thus far is that from a narrow behavioral perspective, rule-based and broad innovation policies that do not aim to define and implement single missions or pick winners to receive subsidies would be preferred (Schnellenbach and Schubert 2019).

Is the Mission-Oriented Entrepreneurial State Susceptible to Behavioral Biases?

Mission Orientation as a Political Commitment

Behavioral biases in political decisions are ubiquitous, and not only in innovation policy. The discussion so far shows that limiting discretionary scope and implementing rule-based policies instead may limit the damage done by biases. But it is not always possible to rely solely on these rule-based types of programs. However, the ideas of an entrepreneurial state and of mission-oriented innovation policy propose a particularly far-reaching, active role for politicians and bureaucrats. It is therefore an interesting question if, and if yes, in which way these concepts are particularly prone to behavioral influences that limit their expected economic efficiency.

It is useful to start with the basics: What exactly is mission orientation in innovation policy? Interestingly, Mazzucato (2021) does not rely on a formal, dry academic definition of mission orientation, but primarily uses historical examples to illustrate her understanding of a mission economy. In general, mission-oriented policies have the objective to “...target the development of *specific* technologies in line with state-*defined* goals (mission)” (Robinson and Mazzucato 2019, p. 938; emphases as in the original). In doing so, governments or government agencies are supposed to actively create new markets, for example, by introducing new goods or by guaranteeing a demand for new products that the private sector needs to develop. But if we look at the Apollo program, which is the case study Mazzucato (2021) chiefly uses to motivate her concept, another important characteristic becomes clear: Missions serve as a commitment device for governments.

When Kennedy declares that he will put Americans on the moon, regardless of the cost of doing so, he makes a political commitment to dedicate all resources necessary to reach this goal. And he knows that the political cost, in terms of a loss of reputation, will be tremendous if he (or his successor in office) fails. But we cannot be sure that this kind of commitment always works. It did in the case of the Apollo program, and one reason might have been the peculiar situation of the Cold War. Many ordinary American citizens demanded a big success story for their space program to signal technological superiority after the Sputnik shock. Being able to beat the Soviet Union in the race to the moon had an extraordinarily high symbolic value, and a large majority of the population was willing to devote substantial resources to this cause. Under those circumstances, the government’s commitment had a binding effect. The negative effect of failure would have been too high.

Would the commitment mechanism also work without such strongly aligned preferences? Not necessarily. A recent example is the 2022 announcement by the German government, in the face of the new Russian threat, to set up a fund of EUR 100 billion to acquire and develop better military material and to sustainably reach the NATO goal of spending 2 percent of GDP on defense annually. Even with Russian military aggressiveness presenting itself as a threat in the immediate neighborhood, this self-commitment has recently been watered down in terms of reaching the 2 percent goal after a general tightening of the fiscal leeway available to the German federal government. Due to a lack of salience and popularity of the issue in the German political debate, renegeing on the earlier commitment was possible at low (if any) political cost for the government.

A change of priorities within government is one possible reason for a mission to be abandoned. A change of political priorities among voters is another. It is unlikely that governments will pursue a mission-oriented innovation policy against strong opposition within a population in any democracy.

Loss Aversion

In addition to the Apollo program, Mazzucato (2021, p. 92) also uses Covid vaccine development as an example for a successful innovation mission. It is interesting that she does so without mentioning the Biontech-Pfizer Covid vaccine anywhere in her book, while Moderna being helped and guided by the US government's DARPA agency is used to illustrate the potential of mission-oriented innovation policy. In a sense, Biontech is a good counterexample: The firm has existed as a research firm for over a decade before producing its Covid vaccine. Before, it focused on using the mRNA technology to treat cancer, and while having produced important knowledge in basic research, it had no market-ready product before the pandemic. Biontech had also never been a part of any mission-oriented scheme of innovation policy. It had received some government research grants, but these were on a similar scale as normal research grants received by university researchers, and they were granted for well-defined, smaller projects, not for missions. Biontech never received a large grant before the fall of 2020. At this stage, the vaccine development had already been completed, and the purpose of the grant was to speed up the final stages of clinical trials and to enable the rapid buildup of production facilities. At this point in time, the German government did not conduct a mission-oriented innovation policy; it simply rewarded the massive positive externalities of a quick and broad vaccine rollout. Biontech is an example that shows how private entrepreneurship and serendipity, rather than government planning, result in a highly successful innovation.

What is more interesting in our context, however, is what Moderna/DARPA and the Apollo program have in common. They were both started in what behavioral economists call a loss frame. Within the framework of prospect theory, a behavioral and empirically founded alternative to neoclassical decision theory (see Kahneman and Tversky 1979), expected losses and gains are evaluated differently, starting from any given status quo reference point. Supported by extensive empirical research, the theory assumes that losses are generally associated with a larger marginal disutility compared to the positive marginal utility of gains. Individuals are loss averse. This empirical regularity in individual decision-making can be deliberately exploited, if individuals are put in a loss frame (Tversky and Kahneman 1981). One way of doing so is to present them with a decision situation in a way that strongly emphasizes losses, as well as the potential to avoid these losses by decisive action. Putting individuals in a loss frame will increase the willingness to take risks if the risks are associated with a chance to avoid the strongly negative outcome.

This has been the case both in the Moderna/DARPA and in the Apollo cases. Enduring a longer pandemic without a vaccine would have been associated with extremely high losses, both in terms of health, lives, and negative economic results. Losing the space race against the Soviet Union similarly would not only have led to a reputation loss but also been interpreted as an indicator of technological backwardness and ineffectiveness relative to the socialist Soviet Union, i.e., of negative real effects. In both cases, making the case for a loss frame was plausible, and a strong political support for investing large amounts of resources into the proposed missions

could be mobilized. This is different in the third example mentioned above. Contrary to fears present in 2022, the war started by Russia in Ukraine now seems to be limited to Ukraine. The risk of the conflict spreading over to Western Europe is generally perceived as very low. Accordingly, it is not surprising that the German political debate seems to gradually leave the loss frame, and political support for investing heavily into a mission in defense policy is now much smaller than it was a year before.

In Mazzucato's 2021 book, the creation of loss frames is a central means to motivate the analysis. In Chap. 2, entitled "Capitalism in Crisis" she discusses, inter alia, distributional issues, the supposed fragility of the financial sector, the supposed short-sightedness of private business decisions, and global warming. Some of these issues have little or nothing to do with innovation policy. The purpose of that chapter appears to be the establishment of a loss frame: Markets are leading us to negative, potentially even catastrophic outcomes, and only strong interventionist governments can prevent those outcomes. The same argumentative pattern is used when the so-called Green New Deal is discussed (Mazzucato 2021, pp. 99–104). And in fact, this allows Mazzucato to argue in a very simplistic fashion: If we do nothing, the outcomes are catastrophic, therefore we must do *something*, and in this case that something is the Green New Deal, which she uses as another example for mission-oriented policymaking. What she does not do, however, is to establish that the Green New Deal is the most efficient policy choice, or the one leading to success with a higher probability than others. For her argument, once loss aversion is triggered in the reader, it suffices to argue that this is *something* that can be done.

Picking Missions

Another interesting question concerns which innovation policy missions should be selected, and which will be selected. Larsson (2022) has already discussed the problem critically from a standard point of view. In particular, he highlights the problems of politicians to account for the opportunity cost of projects and argues that, often, missions that do the least good are chosen. His contribution allows us to focus on the behavioral side of the problem. Under the rubric "Selecting a mission," Mazzucato (2021, p. 91) gives only very few criteria for picking a mission that is worth to be pursued:

First and foremost, a mission has to be bold and inspirational while having wide societal relevance. It must be clear in its intention to develop ambitious solutions that will directly improve people's daily lives, and it should appeal to the imagination.

There is a relatively large intellectual distance between these criteria and standard economic thinking. From a normal economic point of view, we would expect a criterion such as expected cost-effectiveness to play a role, or the extent of positive externalities associated with the successful implementation of such a mission. That a policy should be bold and inspirational, and appeal to the imagination of citizens, is

obviously not standard economic thinking, and these criteria are probably also difficult to operationalize. And in the rest of the paragraph on selecting missions, Mazzucato rather elaborates on the design of missions: They should, for example, allow for different technological pathways to the defined goal, and they should cut across different disciplines and economic sectors.

Given this very limited advice on how missions should be picked, it may be more interesting to ask how they actually will be picked. Will governments reliably address the most pressing societal needs by picking the corresponding missions? Some behavioral arguments lead to skepticism in this respect. In general, politicians are not very good at identifying the most pressing societal needs that need the most urgent political attention. This may be surprising at first, since this is often assumed to be a core competence of politicians. But the problem follows from a well-documented pervasive difficulty that people have with estimating low but important risks.

Research on the availability bias dates back to Tversky and Kahneman (1973). This bias leads individuals to overestimate small risks if examples where these risks have materialized in the past are available to their memories. A simple example is that I will overestimate the likelihood of a plane crash for a while if I have only recently read about a plane crash in the newspaper. On the individual level, the damage that is typically done by the bias is not too large. On the contrary, it can even be useful as it leads otherwise not very risk averse individuals to behave as if they were more risk averse, and this may lead them to avoid dangerous decisions. On the collective level, however, Kuran and Sunstein (1999) have shown how the availability bias may lead to mass scares about risks that are negligible. On the other hand, more important risks that may warrant regulatory attention often go unnoticed when all political attention is focused on availability cascades.

Cascades occur when an upward biased individual risk perception becomes amplified through media coverage and collective communication. Interest groups can deliberately trigger cascades in order to pursue their own self-interest through risk regulation. Kuran and Sunstein show how, once established, availability cascades are difficult to neutralize, even if clear scientific evidence contradicting them surfaces. They discuss cases where it has simply become socially unacceptable to state the correct, lower risks in public and where people who attempted to correct biased public risk perceptions became ostracized, for example, for supposedly showing too little empathy with the (imaginary) victims of (imagined) risks.

Mazzucato makes no attempt to propose any strategy that might help decision-makers to identify missions that are actually worth pursuing. And more importantly, she does not propose any mechanism to avoid a huge waste of resources on missions that in fact should not be pursued. This is a major gap in her approach.

Relatedly, Kirchherr et al. (2023) criticize a normativity bias underlying the mission-oriented policies. They argue that there is a danger that these policies are pursued if their stated objectives sound normatively appealing, without any detailed regard for the efficacy of the proposed measures, and for unintended side effects of the mission pursued. Any trade-offs between competing goals are often largely ignored. This is certainly also a major problem. Who would not want to stop climate

change, or end poverty, or cure diseases? But with limited resources and possible trade-offs between different individually worthwhile and maybe even inspirational goals, Mazzucato gives no advice on how to prioritize competing missions. And again, the even more important question may be how to introduce safeguards that avoid resources being wasted on missions oriented toward goals that sound normatively appealing but are problematic on closer inspection.

Throughout her book, Mazzucato (2021) talks repeatedly about mission-oriented policy being inspirational, visionary, even about “imagining a better future” (p. 18), as well as about aligning public and private interests between broad societal goals. Sympathetically, one might call such an approach charismatic; critically, one might rather point toward the danger of inducing society-wide groupthink and the danger of discrediting dissent and criticism of mission-oriented policies. The conjunction of a normativity bias with the self-declared impetus to save the world, to present grand visions rather than strive for piecemeal progress, is not entirely riskless in itself. The economic and social damage inflicted by charismatic leaders who refuse to be questioned and criticized is large enough in single projects (see, e.g., the case of “Ethanol Jesus” in Sandström and Alm 2022) but may be significantly larger in a mission-oriented framework.

The Cognitively Biased Argument for the Mission-Oriented Approach

In several of Mazzucato’s publications, in particular in her popular 2015 and 2021 books, a strong narrative is created that is now shared by a substantial number of scholars, policymakers, and also by interested laymen, who, as engaged citizens, actively think about political solutions to current problems. But as I will argue in this section, that narrative itself is not evidence-based, but the result of an interpretation of the data that is influenced by cognitive biases.

Mazzucato’s concept of the entrepreneurial state has at its core a very positive perspective on the ability and willingness of politicians and bureaucrats to design and implement effective innovation policies. The word *effective*, rather than *efficient*, is used here on purpose, because for efficiency, a clear-cut normative benchmark such as welfare maximization or at least cost minimization of policies would need to be explicated. But in her entire book on *The Entrepreneurial State*, Mazzucato (2015) does not do this. She does not claim that her concept of innovation policy is efficient in any meaningful way. Rather, she repeatedly claims that it is effective in the sense that it yields the politically desired results, such as helping to invent technologies that are deemed politically important (Mazzucato 2015, p. 153), or becoming a co-owner of patents and administer the dissemination of innovation-related knowledge (Mazzucato 2015, p. 203).

The same pattern is found in Mazzucato (2021), where she again tells a story of how governments supposedly get things done in the realm of innovation policy. But

she does not discuss in any detail what the costs are, either fiscally, or in terms of unintended side effects in the form of inefficient incentives. In this sense, her works do not offer a careful weighing of countervailing arguments that could be found in the literature. Rather, she presents the result of her own confirmation bias to the reader, i.e., a one-sided presentation of those cases and arguments that lead the reader to believe that governments could achieve nearly anything, if they only wanted to and if their leaders would only be sufficiently inspired, inspirational, and visionary.

Again, this approach is uncharacteristic for an economist. Economists normally tend to advocate rational institutions that direct self-interested individuals to make decisions that increase general social welfare. This is a central theme in economics at least since Adam Smith argued that we expect to be able to eat dinner thanks to the self-interest of the butcher and the baker, not thanks to their altruism. Mazzucato presents no theory of good institutions. Rather, she appeals to policymakers to become bold, visionary, inspirational political entrepreneurs. Certainly, we sometimes find similar voices also on the other side of the political spectrum, for example, when classical liberals praise reform-savvy politicians such as Margaret Thatcher (Kirchgässner 2002). But this is nevertheless not how economists typically reason: Their focus is on institutions. And it is very difficult to find empirical foundations for the belief that, once mission-oriented policymaking becomes common, politicians will act in a manner so different from what is typical in contemporary democracies.

We have discussed the normativity bias in the application of mission-oriented policymaking briefly above. It is noteworthy that Mazzucato (2021) extensively exploits the normativity bias of her readers in making her argument. Applying the mission-oriented approach to climate change is justified, because it is normatively justified to stop climate change. Hardly anyone would disagree with the second statement. But is a government mission in innovation policy the most efficient way to reach this goal? Could not simply setting the right incentives for private entrepreneurs by emission trading, together internalizing positive externalities through subsidies for basic research be more efficient? What does the mission orientation really add, compared to standard bread-and-butter innovation policy, apart from lofty calls for vision, leadership, and inspiration? Such questions are not answered conclusively; rather, the shortcut from the laudable goal to the justification of the political approach is taken.

A normativity bias on steroids appears when Mazzucato (2021, pp. 75–112) uses the 17 UN development goals to justify a number of worldwide missions. These goals have reached high status in activist academic circles because they can be used to justify almost every policy one desires. Again, it is not necessary to discuss the actual efficiency of policy proposals, as justification seamlessly spills over from the goal to the proposed means. More importantly, with 17 UN development goals, trade-offs and the need to prioritize are unavoidable. Nothing of this is discussed, and a false harmony of all kinds of desirable goals that should be pursued through missions is assumed. Opportunity costs of missions are largely ignored, and this is a behavioral bias in itself.

Moreover, Mazzucato frequently appeals to the availability bias of her readers and sets them into a loss frame, as we have already seen above. Mission orientation is *the* universal tool (and the only one discussed) to fend off the nearing apocalypse. Do you fear climate change? Then governments should organize a mission to fight it. Do you worry that you might suffer from dementia in your old age? Mission orientation will help. Do you want to save the dolphins from plastic waste in the sea? A mission will do. The so-called mission maps in Chap. 5 in her book tend to confuse, rather than clarify. Everything is somehow connecting with everything, and everyone needs to be mobilized for the mission. It is difficult not to see snake oil being sold here, but once enough fear has been spread and the loss frame made sufficiently vivid, some people seem to buy anything.

Conclusions

As in any field of policymaking, innovation policy can be significantly influenced and its quality significantly impaired, through behavioral biases influencing decision-makers on a subconscious level. As we have seen, politicians, interest groups, or even social scientists can also deliberately appeal to cognitive biases of their respective target audiences in order to promote their preferred policies. The complexity of innovation policy and the lack of clear empirical evidence on causal relations in this field increase the likelihood that behavioral influences work in both of these ways.

A central problem with mission-oriented policy is that it increases the discretionary leeway given to policymakers and bureaucrats. In a more rule-based framework for innovation policy, involving, for example, tax credits for R&D spending, the influence of biases will be low. In a framework where individuals define missions, pick policy instruments, decide which firms receive grants, and which subsidies should be continued, the door for behavioral influences to distort decisions and make them worse than they would have to be is wide open.

I have also argued that implicitly, behavioral biases matter a lot for the internal argument supporting Mazzucato's concept of mission-oriented policymaking. Firstly, she is influenced by heuristics and biases herself. Among them are an extensive ignorance and/or intentional disregard of opportunity cost, a normativity bias where policy measures are justified by virtue of the goals they are supposed to implement, and a reliance on the quality of persons in office, rather than good institutions. But secondly, I have argued that Mazzucato also appeals to biases herself to influence her audience. An example is the frequent appeal to loss aversion, by depicting catastrophic scenarios, for which mission orientation is advertised as a solution.

In sum, from a behavioral perspective, this appears unlikely to be consistently successful. Even if some spectacular "missions" such as the Apollo program may have been effective in the sense that they reached their goal, generalizing this to a new approach to policy is unlikely to yield consistently good results. A more

rule-based and broad innovation policy with less scope for behavioral biases to have an effect seems preferable.

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Innovationism and the New Public Intellectuals



Olof Hallonsten

Abstract Public intellectuals were once honest and knowledgeable academics who engaged in critical debate and spoke truth to power, but seem today rather to be celebrities who make vast amounts of money from selling an oversimplified message to policymakers and the public. This chapter discusses the role of the new public intellectuals for the rise of oversimplified and misguided innovation policy, both in the wider context of the recent spread of the ideology of “innovationism” and with specific attention to the sociological mechanisms involved. With the help of a conceptual discussion and some key examples, the chapter issues some warnings of what might happen when public intellectuals give up essential virtues of academic work in favor of fame and fortune, and the role they can then come to play in the spread of “innovationism” and misdirected innovation policy agendas.

Keywords Innovationism · Public intellectuals · Innovation policy · Academia · Vanity trap

JEL Codes O30 · O38 · I23 · Y80 · Z13

Introduction

Public intellectuals have always been around—in magazines and newspaper arts sections, in talk shows and public affairs broadcasting, and on other media formats—to add perspective and set the direction of public discourse around current affairs and to influence decision-making. In earlier times, public intellectuals were mostly academics of the humanities, who engaged in critical debate and could afford to speak truth to power, out of the security of an academic position and/or elevated status in society. But in recent decades, a new type of public intellectuals has emerged, usually with a background and a parallel academic career in business or

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77

economics, who promote a simplified and easily marketed message and enjoy a contemporaneous celebrity status reminiscent of pop stars. They offer advice—both solicited and unsolicited—to governments and their agencies as these engage in innovation policy initiatives.

Society, we are told, is faced with “grand challenges”: Not only do we need to undertake a profound *transition* to change our patterns of production and consumption to accomplish continued economic growth that is sustainable and reverses man-made climate change, a task that is simultaneously global, national, regional, and local. We also need to—on the local and national level—continue to make sure that our regions and cities nurture and develop knowledge-based economies and get ahead in the global competition for talent. At least so the story goes, and this story has been quite effectively promoted by new public intellectuals, whose usually substantial academic qualifications and neatly packaged messages evidently speak to decision-makers and bureaucrats and provide them with both content and justification for far-reaching action.

It takes two to tango, and it takes a whole innovation system (for want of a better term) to engage in the type of “mission economy” that is currently rolled out in Europe and North America through billions of euros and dollars of investments and elaborate strategies for an envisioned transition to a green economy. The new public intellectuals are hardly alone in promoting oversimplified and misguided strategies and campaigns. In this chapter, emphasis is therefore both on the systemic features—the historical and sociological causes of the current societal obsession with innovation and the misguided political efforts of promoting innovation that have followed—and on the role of new public intellectuals and how their motives and incentives can be explained. The former is analyzed with the help of the concept of *innovationism*, coined by Valaskivi (2012), and based on recent work published elsewhere (Hallonsten 2023). But the chapter also makes a novel effort to discuss the intellectual foundations of innovationism, with a sociological perspective, and with specific attention to the new public intellectuals who seem to have played active roles in the rise of innovationism. The chapter discusses three examples of such public intellectuals, from three successive (and partly overlapping) time periods: Michael Porter, whose work on the “competitive advantage of nations” became hugely influential in the 1990s; Richard Florida, who reached similar fame for his concept of the “creative class” in the 2000s; and Mariana Mazzucato, whose ideas of the “entrepreneurial state” and the “mission economy” became extraordinarily influential in the 2010s.

The three examples are representative but by no means exhaustive, and the chapter makes no claim to any comprehensive analysis of the causal mechanisms of the impact of the new public intellectuals on policymaking. Instead, the overall aim is to conduct a conceptually oriented discussion of an intriguing phenomenon in need of greater attention in scholarly work. Within the bounds of this ambition, the chapter explores the role of the new public intellectuals and academic research in the rise of innovationism and its evident impact on policy, with the help of a sociological understanding of individual agency, incentives, institutions, and academic work that has hitherto been lacking in similar studies.

Public Intellectuals

Ever since the institutions of modernity reached a first level of maturity toward the end of the nineteenth century—the capitalist market economy, the democratic and bureaucratic state, and the organized systems for the search, use, and proliferation of scientific knowledge—one of the defining features of modern society has been *public life* with an elite of its own. Max Weber commented on the rise of the *intellectual* as a central actor in the organization of modern society, noting how culture is reproduced by the influence on public discourse by educated men of high status (Weber 1946c [1922], pp. 171–179). The twentieth century saw many such men (and later also women) rising to positions of influence and great reputation, usually occupying tenured positions in universities but also frequently engaging in public debate together with writers and journalists from outside of academia that share an interest in critical dialogue around public affairs.

In one of his early works, German sociologist Jürgen Habermas chronicled the rise of intellectuals in the bourgeoisie society of early modernity and their crucial role in the creation of a *public sphere* that would expand to greater portions of society in the first half of the twentieth century, as national welfare states began to be built up and a new middle class arose (Habermas 1989 [1962], pp. 79ff). While the development and expansion of democracy and freedom in the world throughout the twentieth century has been driven by the institutionalization of civil and social rights, democratic principles of free and fair elections, and equality before the law, it is also safe to say that the broad opportunity to take part in open and free discourse in this Habermasian public sphere, with solid foundations in scientific approaches to knowledge, has been just as decisive. Public intellectuals, anchored in deep scholarly knowledge and insight and engaging in open debate with each other and society's various power holders, have a crucial role to play in this. They are bearers of what C. Wright Mills (1963, p. 611) called a “moral conscience” of society—asking inconvenient questions, pointing out wrongdoings and inconsistencies, and demasking authority, all out of a position as honest and knowledgeable free intellectual agents—a function identified as central for democracy and societal progress in several important works by prominent scholars (e.g., Weber 1946b [1919]; Berger 1963; Habermas 1971 [1968]; Said 1994; Giddens 1996). We can therefore now look back on a myriad of insightful and knowledgeable contributions to the open and free debate that arguably forms a backbone of liberal, democratic society, throughout the nineteenth and twentieth centuries, and conclude that they were made by critical and well-educated public figures who used their expertise, academic credentials, and status to engage in public debate on current issues, usually with the ambition to broaden the discourse or offer a counternarrative to an all too dominant view. These public intellectuals were surely specialists in training—sociologists, historians, philosophers, economists, and in rare cases also natural scientists—but also comfortable with engaging in a broad range of topics and expected to supply their audiences with deep insight and knowledge (Brouwer and Squires 2003). They were typically thought of being committed not only to the knowledge development

of their own discipline and to the internal well-being of academic collectives but also to the public domain and the learning and cultivation (*Bildung* in German) of the broader public (Jacoby 1987, p. 235). This included a mandate and a need to make expert knowledge accessible to a broader public, a task accomplished not only by simplification but also by engaging directly in current debates and connecting to the (political) realities of people in general (Posner 2001, pp. 17–40). Although many of the figures that typically come to mind when thinking about public intellectuals were able to reach continued respect and recognition for decades—some even for life—it is also generally true that the classic public intellectual had to “continuously prove that they still qualify for their title” (Etzioni 2006, p. 4).

It would seem as if this classic public intellectual is a phenomenon of the past. Commentators have declared public intellectuals “an endangered species” (Etzioni 2006), noticed their “decline” (Posner 2001), and wondered where they all have gone (Furedi 2006). Today, it is way more common for newspapers, tv shows, podcasts, and book fairs to be crowded with academics on part-time leave from their regular teaching and research duties, who offer their services as consultants to governments and business and tour the world promoting a comprehensive “theory” or “approach” that is easy for special interests in politics, media, or business to adopt and identify with. A few scattered examples include critique of free-market fundamentalism (Stiglitz 2002), underscoring the role of social equality for prosperity (Wilkinson and Pickett 2009), warnings for a new “precarious” underclass (Standing 2011), optimism and continued trust in the values of enlightenment (Pinker 2018), and rules for dealing with life’s challenges and becoming a better person (Peterson 2018). In the slightly narrower area of innovation policy, the most prominent examples include the promotion of innovation-driven competitive advantage as the key route to success for industries, nations, and regions (Porter 1990), attracting members of the “creative class” and building especially attractive urban environments to accomplish such a development (Florida 2002), or expanding the role of the state in promoting innovation for the transition to a greener and more sustainable economy (Mazzucato 2013, 2021). Before going into some more depth on these new public intellectuals and their motivations and incentives, we will discuss the current political hype around innovation and the context and breeding ground it seems to provide for lofty and oversimplified ideas.

Innovationism

Current society is obsessed with innovation, but the policymaking attempts to mobilize innovation for all the purposes it allegedly is capable of fulfilling are largely misdirected. State interventionist attempts to plan and direct innovation cost huge amounts of money but have limited results and signal a lack of understanding of how innovation really works, and what it needs in order to thrive (Ridley 2020; Wennberg and Sandström 2022; Hallonsten 2023).

While there shall be no doubt that innovation is good and has served humanity in astonishing ways, it is also evident from ample empirical and theoretical works that innovation for with few exceptions is a very slow, cumulative, complex, serendipitous, and social process distributed in time and space, and that hence, in the absolute majority of cases, *it cannot be planned* (e.g., Basalla 1988; Arthur 2009; Harford 2011; Mokyr 2016; Ridley 2020). This is the opposite of how it is usually presented in policy reports and in the everyday language of politicians and bureaucrats, and how it is sometimes also described in academic studies. Politicians and public administrators seem to believe that their centrally planned innovation programs, their diluted but glossy innovation strategies, and their overpopulated innovation agencies are the means by which real innovation can and should be achieved. From one viewpoint, this is fully understandable: Given that innovation today evidently is believed to be the solution to whatever problem society is facing, and that oversimplified “theories” of the role of government and centralized decision-making in innovation have reached considerable influence in the past few decades, it is perhaps no surprise that politicians and public administrators want to make a difference, and thereby run the risk of overdoing it.

Overdoing and overbelief seem to be at the core of the problem. Politics, public administration, industrial firms, consultants, academia, mass media, and popular culture are all co-responsible for crowning innovation as the key to continued progress and the solution to whatever problem society is facing (Godin 2012; Gripenberg et al. 2012). The obsession with innovation has led to both unrealistic expectations (Borup et al. 2006) and a takeover of innovation policy and broader society’s view of innovation by rhetoric and superficial imagery (Vinsel and Russell 2020; Hallonsten 2023). This all amounts to what Valaskivi (2012) has coined “innovationism”—the spreading of innovation as a new “worldview or belief system.”

The process is systemic and self-reinforcing and leads to the institutionalization of misguided beliefs about how innovation works and how it can be accomplished through planning and command—in politics, administration, and business (Godin and Vinck 2017; Hall and Löfgren 2017; Wennberg and Sandström 2022). Innovation policy, with a deficient knowledge base, gets overall priority and becomes invasive, subsuming other important policy areas under its aims including research policy, education policy, environmental policy, and industrial policy (Nauwelaers and Wintjes 2008; Flanagan et al. 2011). Within this framework, concrete efforts are made to steer and direct the innovation system in preferable directions, at enormous costs to taxpayers and with significant risks of displacements, usually under topical banners such as green energy, sustainable transitions, and circular economy (Karlson et al. 2021; Wennberg and Sandström 2022). Major marketing efforts accompany these policies, sometimes branded as information campaigns, producing a deluge of nice talk and glossy brochures that paint the future in very bright terms, with the between-the-lines addendum that such a future is only available to those who support and play along with the policies (Pfothenhauer and Jasanoff 2017, p. 784; Hall and Löfgren 2017, p. 311; Pfothenhauer et al. 2019, p. 895; Hallonsten 2020, pp. 246ff). Similarly, innovationism is manifested in a torrent of workshops, conferences, and

other events where entrepreneurs, academics, elected officials, and public servants meet and mingle under visionary slogans and imaginative rhetoric. The purpose is clearly not to innovate, but to breed and manifest “a form of collective endorsement of belief” in innovation (Andersson Cederholm and Hall 2020, p. 1416) and build a collective identity around it (Valaskivi 2012, p. 150; Hall and Löfgren 2017, p. 314).

To sustain all these events and marketing efforts, a growing cadre of “innovation experts” in the borderlands between academia, public administration, and consultancy, occupy themselves with formulating, executing, documenting, and evaluating innovation policies and all that surrounds them (Wisnioski 2019). They command the efficacious but essentially empty “innovation-speak” that simultaneously proclaims the crucial importance of innovation for everything and everyone and dilutes the term beyond any operational significance (Vinsel and Russell 2020, p. 10). And at the center stand the new public intellectuals, at once the celebrities and prophets of innovationism, preaching or selling an oversimplified and not seldom overambitious concept or plan for decision-makers, bureaucrats, communication officers, and “innovation experts” of all kinds, to absorb and reproduce in their essentially empty but also very costly programs and initiatives.

There are many reasons behind all this. Historical developments in the world economy—most of all the end of the postwar economic boom and the broad downturn in the 1970s, followed by globalization, digitalization, and new competition from faraway labor markets—made competition and renewal into key priorities in industries and national economies alike, and economic growth into the highest priority of government policy (Kuttner 1999; Wentzlaff 2019; Berman 2022). Meanwhile, not only private actors but also governmental and supra-governmental agencies have their own interests to guard (Niskanen 1971), among which are attention and funding for their specific areas. The political economy of innovationism therefore entails its fair share of paradoxes and contradictions. While the democratic and bureaucratic state for several decades has been viewed mostly as a complication for economic development—a basic infrastructure for free markets to rely on, at best—the economy and its well-being also became the highest priority for governments and thus an expanding policy area.

While the market economy was crowned as a superior form of organizing value creation and value distribution, the notion of *market failure* was also revived, especially in innovation policy, and the belief was widely accepted that private enterprises do not have sufficient incentives to invest in the research and development necessary for the long-term renewal of the economy through innovation (Nelson 1959; Arrow 1962), so that governments must step in and secure renewal through innovation. And while an enterprise culture and entrepreneurship ideal spread and took root as ideal for the organizing of society (Keat and Abercrombie 1991), subsidies and rent seeking also became increasingly common (Helm 2010). Some of these contradictions still characterize innovation policy: In order for the economy to grow, for society to develop, and for challenges to be met, innovation has to happen. And since actors on markets won't do it voluntarily, or at least not enough, or at least not in preferable ways, the government *has to* intervene.

The Role of the New Public Intellectuals

Academics were not late in offering their support to the rise of innovation policy and later innovationism. In the 1980s, the first broad “theories” (or shall we say, “doctrines”) of innovation policy started to spread, when the economic sciences had caught up with world developments and begun to pay close attention to the role of institutions, knowledge, and human creativity in the dynamic renewal of economies. The “chain-linked model” of innovation, which emphasized its nonlinear, dynamic, iterative, and interactive nature (Kline and Rosenberg 1986) and the systemic approach to innovation, which emphasized the heterogeneity of the networks (or systems) within which innovation occurs (Nelson and Winter 1982; Freeman 1987), both put the spotlight on the *linkages* between research, development, and commercialization, and the opportunities for (state) intervention to create and improve such linkages. As mentioned, *market failure* became a watchword: Originally conceptualized in the 1950s and 1960s, this hypothesis of deficient incentives among private actors to invest in necessary innovation was refurbished and used as theoretical rationale for the expansion of the role of the state in innovation processes.

The recent decades have seen several similar examples of theoretical concepts and explanatory models for the dynamics of innovation and related processes in the economy and society at large that have emerged out of a scholarly context and become axiomatic principles for policy. In Sweden, the *innovation systems approach* (Lundvall 1992; Edquist 1997) became hugely influential in the 1990s, together with the *triple-helix framework* (Etzkowitz and Leydesdorff 1997), and the recombination of these even led to the creation of a new government funding agency, Vinnova, in 2001 (Eklund 2007; Hallonsten 2020, pp. 65–77). Almost simultaneously, the *diamond framework* for the competitive advantage of nations was launched and promoted by management scholar and guru Michael Porter (1990). It became very influential in several countries, as a basis for attempts to accomplish an “innovation-driven” economy as the route to success (through competitive advantage) (Davies and Ellis 2000; Wilson et al. 2014).

Developments in human geography, not entirely unrelated to Porter’s work and intellectually indebted to the systems approach to innovation, led to a new focus on regional development and the role of innovation in the structural transformation of local and regional economies and labor markets, with competitiveness and innovation as watchwords. Based on theories of *geographic proximity* as a key factor for innovative capacity, such work evolved into a *regional innovation systems approach* (Cooke et al. 1997; Maskell et al. 1998). Around the turn of the millennium, these ideas formed the basis for the theory of the “creative class” and the agglomeration of not only talent but also technology and tolerance as the most conducive factors for innovation, dynamic progress, and prosperity of cities and regions (Florida 2002, 2005). Most recently, the ideas of the “mission economy,” based on a kind of expanded systems of innovation approach that takes a far broader set of actors,

institutions, and processes into account, have become immensely popular largely through the work of Mariana Mazzucato (2013, 2021).

Today, calls for “evidence-based” decision-making are perhaps stronger than ever (Cairney 2016). While this could signal a higher status of scholarly knowledge in society, there is also a lot to suggest the opposite. Especially in politics, “evidence-based” decision-making seems to be a way for policymakers to avoid taking full responsibility for their priorities, by appropriating credibility of academic studies and the academic titles of their authors (Hallonsten 2021, p. 19). Of course, academics are not innocent victims of such a development but share some responsibility for how their work is used. Most academic researchers remain in academic positions for their entire careers, making substantial but unspectacular contributions to the cumulative knowledge development within their fields and cannot reasonably be expected to take much responsibility for how their results are used after publication. Some move cleverly between contexts of academic research (and teaching) and consultancy work for both the private and public sectors and manage to play both roles without compromising the quality of either. Others still—by all accounts a small number of particularly influential figures—transcend the institutional delimitations of academia and become celebrity public intellectuals. This move usually means exposure to heavy critique from academic peers, regarding weak empirical underpinnings and faulty theoretical logic in their works, but it is safe to assume that the material and vanity rewards are more than enough to compensate.

Three such public intellectuals, of enormous fame, have been mentioned already: Michael Porter, Richard Florida, and Mariana Mazzucato. All three are academics, with professorships in business administration and/or economics at renowned universities, but all three have also earned wider reputation by the publication of books of broader circulation and interest, by serving as consultants for governments and private companies, and by public appearances in news media, at conferences and events, and broadcast interviews. Table 1 summarizes (some of) their accomplishments.

What unites these three public intellectuals is not only their fame and contributions to innovationism but also that they have received ample critique not least from academic peers, who have undertaken systematic examinations of the concepts and arguments they publish and promote. Porter has been criticized for methodological flaws, unclear definitional work, and lack of explication of the concrete processes of building national competitiveness, which has left policymakers with an oversimplified “laundry list” rather than a thorough understanding of what policy can and should do to increase national competitiveness (O’Shaughnessy 1997; Davies and Ellis 2000). Florida’s work, though in many respects merely the grandiose and appealing front of a whole school of economic geography, has diminished greatly in popularity and been dismissed as insufficiently underpinned and largely empty of any real guidance for policymakers in search of means to enhance or reawaken the productivity and innovativeness of their regions (Peck 2005; McGuigan 2009). And Mazzucato has been systematically criticized for using anecdotal evidence and confusing laboratory R&D with innovation on consumer markets, and for overemphasizing the (essentially theoretical and only sparingly

Table 1 Basic facts for the three examples

	Michael Porter	Richard Florida	Mariana Mazzucato
Born	1947	1957	1968
PhD	Business economics, 1973	Urban planning, 1986	Economics, 1999
Famous for	Five forces Competitive advantage/ Diamond model Value chain	Creative class	Entrepreneurial state Mission Economy
Notable works (books)	<i>Competitive Strategy</i> (1980) <i>Competitive Advantage</i> (1985) <i>The Competitive Advantage of Nations</i> (1990) <i>On competition</i> (1998)	<i>The Rise of the Creative Class</i> (2002) <i>Cities and the Creative Class</i> (2005) <i>The Flight of the Creative Class</i> (2005)	<i>The Entrepreneurial State</i> (2013) <i>The Value of Everything</i> (2018) <i>Mission Economy</i> (2021)
Number of publications (WoS)	116	65	52
Number of citations (WoS)	36,407	4472	2224
Followers on <i>twitter</i>	170,764	190,418	245,295
Speaking fee (live event)	n/a	USD 50,000–100,000	USD 50,000–100,000

Source: Wikipedia, Web of Science (WoS), Twitter, AAE Speakers (www.allamericanspeakers.com, accessed May 25, 2023)

empirically underpinned) argument of market failure (Karlson et al. 2021; Wennberg and Sandström 2022).

Nonetheless, as scholars, they are renowned. Although the figures on publications and citations listed in the table above come with methodological challenges and possible errors (given inaccuracies in the reporting and representation of data), and although such indicators generally should be taken with a huge grain of salt (see, e.g., Hallonsten 2021), these figures show three academics that have been immensely successful in accumulating academic merit. Furthermore, all three are professors. But all three have also reached fame and fortune outside of academia, which shows in the followership they have attracted on social media, and the fees they charge for giving speeches.¹ However, this career move seems to come with some significant risks that might even become threats to the core of proper academic practice.

¹It deserves to be mentioned that USD 100,000, the maximum fee charged by both Richard Florida and Mariana Mazzucato for a single speech at a live event, is more than the average annual salary of a Swedish university professor (Hallonsten 2022b, p. 9).

The Vanity Trap and Tedious Academia

In 2016, in a blog post on the website of *Nesta*, a UK governmental foundation for funding of innovation, chief executive Geoff Mulgan wrote about “a new generation of public intellectuals, selling books in big numbers, doing talks at TED and other events, and gaining star status.” In his essay, Mulgan refers to a conversation he had with political scientist and political advisor (to US president Jimmy Carter, among others) Samuel P. Huntington, most famous for the best-selling book *The Clash of Civilizations* (1996), and by all accounts a public intellectual, where Huntington allegedly spoke about the phenomenon of celebrity public intellectuals managing to break free of the institutional boundaries of academia. Huntington “commented that many of his peers had become bored of the scrutiny of academic life” and developed a celebrity-like “lifestyle” where they only would attend events “where they were keynote speakers” and only interact with people who “were fans.” Huntington issued a warning: The phenomenon entailed the process of “turning great minds into great performers who were losing the capacity to think” (Mulgan 2016).

Based on this anecdote, Mulgan conceptualizes the “vanity trap” of being a public intellectual and the contrast it presents to academic life and its “rough egalitarianism which forces even the grandest professors to deal with critics, however much lower their status.” For public intellectuals, he claims, at least some of them, “different rules apply”—ignoring critics becomes a habit and a rational course of action in order not to draw attention to the (presumably weak) underpinnings of their arguments and simplified messages.

Among Mulgan’s key examples are Michael Porter, briefly mentioned, and Mariana Mazzucato, discussed in some more detail. Mulgan refers to a systematic scrutiny of Mazzucato’s first major success, *The Entrepreneurial State*, in a blog post by fellow Nesta executive Stian Westlake, who allegedly is generally sympathetic to Mazzucato’s ideas and finds her argumentation “superb” and “compelling,” but who is also able to spot several serious errors and gaps in it (Westlake 2014). The key point is, Mulgan explains, that Westlake’s critique was “offered in a constructive spirit” but that Mazzucato (until the time of writing, in 2016) had not bothered to respond. This is both puzzling and irresponsible conduct, Mulgan rightly points out. If Mazzucato’s analysis is indeed flawed, it will be “problematic, to say the least, if policymakers follow it,” whereas if she is right and her work “is in fact solid,” then she should make an effort to demonstrate this by offering a substantial response. “Intellectuals who, like her, have received very generous public funding over many years, surely have a duty to engage,” writes Mulgan (2016).

Mulgan is of course right, both in arguing that public intellectuals have an obligation to make a serious effort to refute their critics, and in launching as plausible explanation for the lack of such response is a “vanity trap” that risks making public intellectuals “too grand to engage in debate,” “so concerned with embellishing their brand that they find it hard to admit to error,” and thus end up as “the enemies of learning” (Mulgan 2016).

These words are strong, but so is the logic of Mulgan's argument, although it is in some need of proper sociological foundations. Such foundations can be found in the functionalist tradition of the sociology of science, pioneered by Robert Merton (1973) and refined by followers (e.g., Hagstrom 1965; Whitley 2000 [1984]; Gieryn 1999; Hallonsten 2022a), and in latter-day institutional theory that promotes the analysis of society as composed of institutional orders with distinct "institutional logics" (Thornton et al. 2012; Alvehus and Hallonsten 2022). In the functionalist tradition, with roots in classical sociological works (Durkheim 1969 [1893]; Simmel 2015 [1890]; Weber 1946a [1904]), different institutions or spheres of society are viewed as exhibiting distinct norm systems that are functional for maintaining their inner workings and contributions to society as a whole. Merton made especially thorough efforts of explicating the norm systems of (academic) science and how it comes in conflict with other norm systems and the "culturally defined goals" of society's other institutions (Merton 1973, pp. 254ff, 267ff).

Simply put: Academia, media, and government are governed by different norm systems, operate according to different logics, and have different reward systems. Academic work is inherently conservative and proceeds in small steps through the forming of consensus among peers, which includes the tiresome but elementary exchanges of ideas and critique, arguments and counterarguments, in a myriad of settings ranging from informal exchanges between colleagues, via seminars and conferences, to highly formalized and usually anonymous journal and grant peer review (Hagstrom 1965; Whitley 2000 [1984]). This is called "organized skepticism" (Merton 1973, pp. 277–278) and has a central function in the social organization of (academic) science (Hallonsten 2022a). In contrast, mass media and social media, not entirely simple to keep apart today, and politics and public administration, have logics and norm systems that correspond to the culturally defined goals of these spheres or institutions—swift disclosure and circulation of information, legitimate allocation, discharge, and exercise of power and public resources. Today, both media and the decision-making processes of politics and public administration seem beset with simplifications and the hunt for immediate gratification (Roberts 2015; Alvesson 2022 [2013]; Hallonsten 2023).

A highly plausible partial reason that public intellectuals such as Porter, Florida, and Mazzucato can evade critique is that they have taken a step outside of academia and thereby get access to other reward systems and can afford to discard or ignore the norm and key social mechanism of organized skepticism. Simply put, when they have access to policymakers and media platforms, they can sell their message without having to pass peer review, apply for funding, or build a reputation based on rigor, ingenuity, and the respect from colleagues that this earns. The lure is likely great, and the win-win is easily recognized by all parties involved. But the loss is also major, albeit not as simply visible in the current media and information landscape: If these public intellectuals become figureheads for entire lines of research, or entire academic disciplines, while also being immune to basic critique of the type that (academic) science arguably depends crucially on for its legitimacy and credibility, the same legitimacy and credibility is seriously undermined. While this might indeed pose threats to the entire modern social order, which in no small

part is dependent on the social legitimacy of expert knowledge, the issue here is the effects this has on contemporary innovation policy.

It is rather evident, from recent works (e.g., Ridley 2020; Wennberg and Sandström 2022; Hallonsten 2023) and the other chapters in this volume, that misunderstandings, simplifications, and flawed logic characterize the conceptual and empirical underpinnings of current innovation policy under the “entrepreneurial state” and “mission economy” paradigm. The “vanity trap” of being a public intellectual, and the forsaking of crucial guiding norm systems and institutional structures of (academic) science that the trap entails, is a likely contributing factor.

The Old and the New Public Intellectuals

The old public intellectuals, discussed in the first section of this chapter, are typically portrayed as reproducing ideals and virtues of the academic profession and the institution or value sphere of (academic) science: They spoke truth to power, asked inconvenient questions, engaged in demasking of authority, and put their own work and the work of their peers up for scrutiny in accordance with the institutional mandate of organized skepticism. They brought these ideals to society and the institutions of society, *including* politics, business, and media. Whether or not this is an oversimplified, romanticizing, or naïve description of a class of public intellectuals that in reality neither embodied nor practiced these ideals, it is clear that the new public intellectuals of today do the opposite of what this image conveys. They give up essential virtues of academic work in order to serve as policy advisors, and in the process, they throw aside the ideals and norm systems that have supported them in their careers and arguably given them the platform from which they can take the step into stardom.

The question is why. The answer provided in this chapter is that it seems to make sense, for these individuals, to try to escape the tiresome work processes of academia, including the constant scrutiny of peers and the apt meritocratic conservatism of promotion and demotion of ideas and people, in favor of the vanity of fame and fortune. Strangely, and interestingly, the move they have made comes at very little cost if only looking at shallow measures of academic success: As shown in Table 1, all three examples brought up in this chapter are highly cited. This suggests that they are still able to influence the agenda of academic research in the areas where they are active, a dangerous prospect given their seeming immunity to the scrutiny and critique of peers.

The theoretical underpinnings and the logic of the argument behind this conclusion, provided in this chapter, perhaps raise more questions than they answer. At the center is of course the issue whether these new public intellectuals—and the politicians, high-level public administrators, and consultants who repeat and reproduce the messages—really believe what they preach, or if they indeed are only in it for the vanity and the money. Empirical studies are needed to answer these and other important questions.

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Part III
Empirical Evidence

Analyzing the Effectiveness of State-Guided Innovation



Rodney H. Yerger Jr

Abstract A crucial debate exists over the effectiveness of government-guided innovation efforts, which recently through economist Mariana Mazzucato's arguments for an entrepreneurial state that encourages the public sector's active role in technological change and value creation, is considerably shaping global policy. This essay addresses a key assertion by Mazzucato that the government is the boldest innovator accountable for the greatest value in society. Through use case analysis, I argue that Mazzucato's claims of the state providing mission-oriented directionality that drives technology development do not survive the scrutiny of the Supply-Chain Fallacy, the belief that every item in a line of production or chain of events is necessary and causal. I do find occasions of public sector innovation success in the development of military technologies, particularly during times of war, which can have beneficial spillover effects. However, I show that the potentiality of such successes in a persistent peacetime environment is limited by the viability of the public sector entrepreneur.

Keywords Public goods · Entrepreneurship · Innovation · Political economy

JEL Codes H41 · L26 · O31 · P16

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Introduction

A cardinal rule of economic development holds that real income growth stems from increases in real productivity, which in turn results from improvements in physical capital, human capital, and governing institutions. At the cornerstone of these improvements lies the concept of technological innovation. While institutions play a critical part, there exists a lack of clarity over the specifics of the institutional functions and their impact on incentive alignment that most effectively drive technology advancement. Specifically, a crucial debate exists over the effectiveness of state-guided innovation efforts.

The traditional notion of government's involvement in economic matters, at least within the domain of the democratic free world, comprises the role of addressing market failures. This view of a more static function for the state has been reinforced over time given the disastrous economic consequences suffered by those countries that have adopted socialist governance mechanisms to institute centralized industrial planning. Yet, a strong and vocal counterview endures that governments throughout the Western world should take a more dynamic approach away from bureaucratic stagnation and towards a strategic structuring that promotes agility and flexibility to promote and foster innovation.

The most prolific advocate in recent times for state-guided innovation is Mariana Mazzucato, an economist whose work on the study of the entrepreneurial state, which entails the public sector's active role in technological change and value creation, is considerably shaping global policy. Indeed, her calls for a mission-oriented approach to innovation has influenced elements of recent United States' (US) public policy agendas such as the Green New Deal and the Biden administration's Build Back Better plan. Mazzucato not only argues that the driving force behind innovation is state investment but also proffers a rethinking of the state to alleviate institutional constraints to innovation through the transformation of the government civil service and their respective organizations toward the role of value creators (Mazzucato 2015a, 2021a, 2021b, 2022).

This essay addresses a key argument promoted by advocates of the entrepreneurial state: that government is the boldest innovator accountable for the greatest value to society. According to Mazzucato (2015b, pp. 134–135), “most of the radical, revolutionary innovation that have fueled 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. Such radical innovations did not exist before the State envisaged and developed them...” I critically examine the theoretical underpinnings of Mazzucato's worldview as well as relevant counter-positions. I emphasize that many of Mazzucato's assertions of the state providing mission-oriented directionality that drives technology development do not survive the scrutiny of the Supply-Chain Fallacy, the belief that every item in a line of production or chain of events is necessary or causal. I explore two use cases of successful technology advancement, touch screen technology and the Global Position System (GPS), to assess the validity

of Mazzucato's declarations that these underlying technologies for the iPhone are exemplars of state-guided innovation. Additionally, I detail observations resulting from my use case analysis to include ascertaining the potentiality of government-led creative destruction in a peacetime environment and assessing the viability of the public sector entrepreneur.

The Debate

In *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*, Mazzucato (2015a) attempts to show via several use cases that the public sector is best equipped to make investments that provide critical directionality for technological growth and innovation, to include in areas "defined by high capital intensity and high technological and market risk" that "tend to be avoided by the private sector. . ." (Mazzucato 2015a, p. 29). Throughout her demonstration of public sector innovation successes, Mazzucato credits the state's role in each stage of the research and development (R&D) process, and the examples she touts almost entirely emphasize the post-World War II era of state-guided R&D. Importantly, World War II altered the landscape of public sector innovation by pushing the United States into government-funded defense research. Not only did these efforts lead to spectacular successes in military innovation, none more so than the Manhattan Project, but also justified the continuation of large-scale government investment for innovation following the war. Thus, Mazzucato (2015a, pp. 80–84) focuses on model public sector organizations that were established during this vast shift in R&D funding, like the National Aeronautics and Space Agency (NASA) and the Defense Advanced Research Projects Agency (DARPA), which she credits with creating the initial manifestations of what would become the modern day internet.

In *The Myth of the Entrepreneurial State* (2020), Deirdre McCloskey and Alberto Mingardi capture a critical issue with Mazzucato's reasoning in that the credit she allocates to state action fails to consider economic substitutes. By ignoring "private substitutes as counterfactuals," Mazzucato can leverage the state's increased involvement in innovation affairs as evidence of causality for an accomplishment (McCloskey and Mingardi 2020, p. 196). This Supply-Chain Fallacy addresses the fact that we are conditioned to a world where public funding is omnipresent and has exponentially increased throughout the course of the twentieth and early twenty-first centuries. It is likely impossible to trace the origins of a human accomplishment without finding some relevant government-funded pre-event. However, in accepting these conditions, one should still question the opportunity costs of each pre-event as well as assess the potential crowding out of private investment from so many government-funded endeavors. Furthermore, even if such analysis passes the opportunity cost and economic substitution test, what credit does the state warrant for contributing to a chain of events considering its ubiquitous involvement in society? As McCloskey and Mingardi (2020, pp. 107–108) cleverly point out, while innovation can stem from a cumulative effect, it is not common practice to overly credit

every private sector tinkerer or agent along the path leading to each innovation, such as crediting the inventor of the piano for a beautiful concerto or even crediting the composer's parents.

The Supply-Chain Fallacy underscores state action over human action in inducing innovation, which McCloskey and Mingardi compare to the flawed reasoning in combining the fixed-coefficient inputs of the neoclassical production function to yield routine output. Instead, McCloskey and Mingardi argue that the causal force behind innovation is human creativity, which they claim is ignored in Mazzucato's view of entrepreneurship. Nevertheless, Mazzucato's push for a mission-oriented approach to innovation involves nuance that warrants further elaboration on the relationship between entrepreneurship and R&D investment.

A private sector view of innovation stresses the profit motive coupled with market demand for new products and processes as important factors that spur creative activity. At the cornerstone of this coupling process is Israel Kirzner's theory of entrepreneurship, which involves alertness to unnoticed profit opportunities. R&D investment can be a fruitful activity within the innovation process but should be aligned to entrepreneurial profit opportunities. Holcombe (1998, p. 53) summarizes: "Research and development expenditures are not the cause of entrepreneurial opportunities, they are the result of entrepreneurial opportunities."

However, Mazzucato (2015a, p. 43) also acknowledges the vital importance of entrepreneurship (the root word is in the title of her book!) by stressing that successful innovation relies on "feedback loops between markets and technology, applications, and science." Moreover, she recognizes the "serendipity and uncertainty that characterize the innovation process" yet argues that innovation should be driven by "long-term strategies and targeted investments" (p. 43 and p. 65). These elements that comprise Mazzucato's worldview of innovation connote a government that takes extreme risks, picks winners and losers, and invests not to increase demand à la Keynesian economics, but to increase the capacity of innovation by attempting to engage in a state-guided version of creative destruction.

A significant difference in Mazzucato's view of entrepreneurship is the agent involved: the public sector entrepreneur. Holcombe (1998, pp. 58–59) convincingly argues that when entrepreneurship is recognized as the key to innovation, then "emphasis should be placed on market institutions" to ensure success. However, regarding public sector entrepreneurship, the concept of demand can encompass a broader meaning that captures the notion of necessity, which according to the proverb, serves as the mother of invention. Importantly, Godin and Lane (2013, pp. 26–31) stress that ideally the concept of demand should reflect societal or national interest-based "need," which concerns decisions made in the public domain and has a clear tie to military innovation during times of war. Need is a more nebulous concept than economic demand and has been largely ignored in empirical research. Despite its murkiness, previous studies have been conducted on how to efficiently make R&D decisions based on military objectives or needs. Understanding and attempting to respond to societal needs could shape state-guided innovation efforts, which depends on government agents providing directionality through entrepreneurial action.

With a fuller understanding of what entails the entrepreneurial state, I next shift focus to an analysis of particular cases of public sector innovation touted by Mazzucato regarding the iPhone and its underpinnings by state-guided technologies: “every technology that makes the iPhone ‘smart’ (i.e., the Internet, GPS, touch screen display, and Siri) was publicly funded directly” (Mazzucato et al. 2015, p. 122). McCloskey and Mingardi (2020, pp. 71–74) confront one such case of purported state-guided innovation, the Internet, and effectively demonstrate that although this achievement partially resulted from military spillover benefits, this was an unintended consequence having no relation to a long-term strategy. In fact, McCloskey and Mingardi cite that any mission-oriented directionality involved in this case were considerations by the Air Force in the 1960s for decentralized communications grids, research that was subsequently terminated by the Department of Defense. Based on this assessment, credit given to public sector efforts regarding the internet innovation might classify under what Kirzner (1985) refers to as the “wholly superfluous discovery process.” In this scenario, government research and investment has altered entrepreneurial actions, but these actions and their associated outcomes cannot be anticipated due to the inability of public sector agents operating with imperfect information to perceive profit opportunities. The next section explores in detail additional novel innovations connected to the iPhone to assess their alignment with Mazzucato’s vision.

Use Case Analysis

Use Case #1: Touch Screen Technology

The origins of touch screen technology can be traced back to the 1960s with the creation of the first finger-controlled touchscreen by Eric Arthur (E.A.) Johnson while employed at a British government defense agency called Royal Radar Establishment. Johnson’s creation could only handle one touch at a time and was not pressure sensitive. The resistant touch screen that responded to pressure sensitivity was invented by Samuel Hurst in the 1970s at the University of Kentucky, while studying atomic physics. Hurst commercialized the technology through his start-up company despite the university’s view that the technology had little application outside of a laboratory. Early work on multi-touch technology occurred in the 1980s in various private and public research labs, the biggest advancement took place at Bell Labs, which created the first transparent multi-touch screen overlay (Ion 2013; History-Computer n.d.). However, the truly revolutionary technology advancement in this arena started in 1999 with Wayne Westerman’s doctoral dissertation at the University of Delaware on multi-touch scrolling and gesturing via hand tracking and finger identification, which would become key features of the future iPhone (Westerman 1999). Soon thereafter, Westerman and his professor John Elias formed the company FingerWorks to develop their groundbreaking technology until Apple acquired them in 2005 (Ion 2013).

While tracing the history of touch screen technology development, Mazzucato (2015a) credits the state's role in each stage of the process, most visibly when she maligns FingerWorks' accomplishments because of the government grants provided to Westerman during his dissertation research at a public university. If Mazzucato wants to convincingly argue for the successes of public sector innovation, especially as directed by a mission-oriented approach, then her claims regarding FingerWorks are truly a stretch.

In the case of touch screen technology, Mazzucato's reasoning is a clear illustration of the Supply-Chain Fallacy. Many of the state-funded pre-events can classify as basic research. Johnson's finger-controlled touchscreen was eventually adopted for air traffic controllers, and so some degree of national interest demand might come into play. However, the primary advancements in this field from Hurst and Westerman occurred through individual entrepreneurial instinct and alertness to profit opportunities, which succeeded via the key linkage of attending to consumer demands. Mazzucato's argument fails to provide convincing evidence that the advent of touch screen technology was precipitated by government mission-oriented directionality, and by ascribing so much causality to government-funded pre-events, she seems to contradict her own view that innovation is serendipitous and unpredictable.

Use Case #2: GPS

The fascinating story of the GPS innovation starts with the launch of the Sputnik satellite by Russia in 1957. Soon thereafter, two scientists from the Johns Hopkins University Applied Physics Laboratory (APL), William Guier and George Weiffenbach, began tracking Sputnik's signal and figured out a method to determine from a fixed point the satellite's position in orbit. Legend has it that this analysis started casually while on a lunch break. Fellow colleague, Frank McClure, who was working on the challenge of submarine navigation under the direction of his US Navy sponsor, suggested flipping the Guier and Weiffenbach method in order to determine the locations of submarines from a known satellite position. This revised method led to the APL's development of the Navy Navigation Satellite System (NNSS), which was fully operational by 1964 and provided positioning for the US submarine ballistic missile force, a critical Cold War deterrent (Parkinson and Powers 2010a, 2010b).

The modern GPS program was launched in 1973 by the Department of Defense, improving on the accuracy and technologies of the NNSS primarily via the contributions of the Naval Research Laboratory and the Aerospace Corporation, a federally funded research and development center. The first satellite prototype was completed in 1978, and the full complement of 24 satellites was fully operational by 1993. Originally intended for military use, President Ronald Reagan granted civilian use privileges via executive order in the 1980s (Parkinson and Powers 2010a, 2010b). The economic impact from civilian use of GPS is substantial. A

study by RTI International estimates economic benefits totaling USD 1.4 trillion for the US private sector since the 1980s across the industrial sectors that depend on GPS for their daily business activities. Furthermore, the study estimates the impact of losing GPS would cost USD 1 billion per day for the United States (McTigue 2019).

Clearly, the GPS case qualifies as a strong representative of public sector innovation. Even if some credit is appropriately allocated to the private sector for the entrepreneurial success in the diffusion of the technology, the government still provides the critical service of sustaining and improving the system, which is budgeted at over USD 1.5 billion a year (GPS.gov n.d.). The GPS success story provides two important features that warrant further consideration as to their uniqueness and potential for translation to future public sector innovation endeavors.

First, if Mazzucato's vision of a public sector mission-oriented approach to innovation is to win the day, then organizations like the APL would serve as the linchpin of that victory. The tracking of Sputnik's position by Guier and Weiffenbach is a great representation of creative engagement, which captures the curiosity component of basic research that leads to technology-push effects on innovation. Furthermore, the tracking of Sputnik began as a leisure activity similar to the origins of the Wright brothers' flying machine invention. Studies have shown that leisure can foster better innovative thinking in pursuing what is more important to the creator, "shielded from the work time pressures of groupthink and hierarchical decision-making" (Davis et al. 2009, p. 22). Accordingly, if government-funded research labs or university-affiliated research centers can provide the sufficient conditions that allow human creativity to flourish, then this competes well with a major tenant of private sector innovation.

The success of GPS also depended on a second critical feature, the military's need for submarine navigation positioning, which provided the directionality to convert a basic research discovery into an applied research mission. Thus, the GPS story in terms of both the discovery and development of new technologies serves as an exemplar for Mazzucato's mission-oriented approach to innovation. Nevertheless, it is important to note that the "need" factor was clearly identifiable in the GPS case as it stemmed from the United States's engagement in the Cold War. This less nebulous version of government demand typifies military innovation.

Observations

My analysis of the two use cases selected to represent successful public sector innovation endeavors reveals several observations worthy of comment. First, I contend that the development of touch screen technologies does not represent a public sector innovation achievement, especially of the Mazzucato style, where government funding provides the mission and direction to guide success. In fact, this technology should classify as a private sector innovation achievement considering that the public sector contributions stem primarily from basic research and the

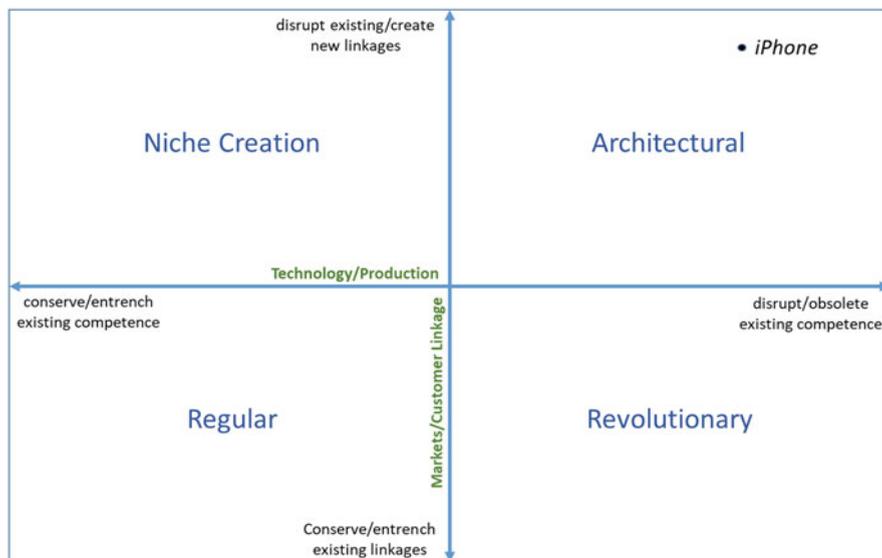


Fig. 1 Transilience map for innovation. *Source:* Author's own application of Fig. 1 in Abernathy and Clark (1985)

cumulative effect of innovation. Unfortunately for Mazzucato's argument, many of the state-guided innovation achievements she cites in *The Entrepreneurial State* fall within this category, where her claims do not withstand the Supply-Chain Fallacy.

Furthermore, she biases credit away from private sector contributions. For example, in the case of the iPhone, Mazzucato (2015a, p. 99) asserts that Apple is only an integrator of new technologies, not a developer of them. Yet, according to the noteworthy Abernathy-Clark innovation model, Apple's role in this regard should be deemed the most radical. Figure 1 reproduces the transilience map from the Abernathy-Clark model depicting four quadrants of innovation types as measured by market linkage and technology competence impacts. The iPhone is an example of architectural innovation, plotting high on the y-axis by disrupting existing markets and creating new ones as well as plotting high on the x-axis by disrupting or rendering obsolete existing competencies (Abernathy and Clark 1985). In other words, Apple's launch of the iPhone achieved the very Schumpeterian creative destruction that Mazzucato hopes to accomplish through her mission-oriented approach to innovation.

Second, I submit that the development of GPS does represent a public sector innovation achievement within a mission-oriented directionality construct. The GPS example also showcases government or quasi-governmental organizations fulfilling Mazzucato's vision by both excelling at creative thinking during the basic research phase and effectively executing the mission in the applied research stage. Considering the clarified military need aspect, the question remains, however, as to whether such accomplishments can be replicated in a persistent peacetime environment.

Furthermore, absent military need, can such government directionality produce transformational results given a nonlinear innovation model of various feedback loops between markets, science, and technology?

War and preparing for war has spurred a massive amount of invention and innovation over time; so much in fact, that some economists ponder the likelihood that our current period of relatively persistent peace is a causal force for the recent trend of slow economic growth. Nuclear power, the computer, radar systems, microwave technology, the modern aircraft, and yes, GPS can trace their origins to military-directed efforts as dictated by the needs of war (Cowen 2014). McCloskey and Mingardi (2020, p. 52) acknowledge the spinoff benefits from war, but question the cost in terms of lives lost and destruction reaped upon property and society. Nonetheless, if war is a frequent and necessary evil, assuming a Hobbesian view of human nature, then at least society can exploit its benefits.

War streamlines the government's focus, influencing a more effective decision-making process (Cowen 2014). Still, this typically involves a single pre-defined end for which a mission-oriented approach may yield technological success, which differs from economic success where costs have to be taken into account to determine the best possible use of available resources (Hayek 1935, pp. 3–8). By conflating technological success with economic success, a mission-oriented approach risks rationalizing industrial planning efforts in a persistent peacetime environment where the state's ability to effectively solve the economic problem *or* the technological problem remains in question. In order to assess the effectiveness of state-guided innovation efforts in a persistent peacetime environment, it is critical to analyze the viability of the public sector entrepreneur, who must play a pivotal role in any government-led creative destruction process.

Public Sector Entrepreneurship

Mazzucato's worldview of a mission-oriented approach to innovation depends on public sector agents and organizations providing directionality through entrepreneurial action. In *Mission Economy: A Moonshot Guide to Changing Capitalism*, Mazzucato (2021a, p. 175) calls for a complete reinvestment in government civil service to transform modern bureaucracies away from the "role of simple market fixer" toward a role as value creator. While there is a strong case for the functionality of public sector entrepreneurs considering the close relation to their private sector counterparts in terms of traits, characteristics, and motivations, a full determination of viability requires an assessment of public sector institutional effects on entrepreneurial behavior.

Schnellenbach (2007) argues that government institutions in democratic societies are not conducive to the bold, non-incremental changes envisioned by proponents of Schumpeterian public sector innovation. He cites the existence of both formal and informal institutional constraints; the former consisting of the role of veto players, either through collective action or organizationally, and the latter consisting of voter

behavior, which all serve to resist changes to the status quo or those changes occurring at the margin that drive innovation. These constraints relate to the median voter theorem and are attributed to the desire for political stability.

Schnellenbach (2007) provides empirical evidence demonstrating that significant political/policy changes occur almost solely when the status quo is deemed unsustainable by decision-makers and voting majorities. Therefore, political innovations will primarily “occur in times of crisis and not be implemented with ample foresight by bold public entrepreneurs” (p. 16). Not only is alertness raised during crisis situations, but the need for novel solutions influences rapid, non-incremental change within the public sector sphere as was the case with the success of the GPS. Schnellenbach (2007, p. 12) concludes that at best the public sector agent can act as a Kirznerian entrepreneur responding to “windows of opportunity” where latent demand for novel solutions has manifested; but, importantly, the agent “can do little to influence the emergence of such windows,” and consequently, policy innovations often experience delayed implementation inhibiting their effectiveness.

To mitigate the institutional constraints defined above, Schnellenbach refers to frequent proposals among economists for a reduction in checks and balances (i.e., the number of veto players) within a given system. This involves a tradeoff between a perceived increase in public sector innovation and an increased threat to political stability. The extreme outcome of this solution likely results in political dictatorship; however, from the perspective of micro-level firm theory, decision-making can be improved by reducing transaction costs through the adoption of centralized control governance mechanisms that foster independence, speed, and flexibility in problem-solving (Miller 1992, pp. 77–101). Translating to the public sector, this can be thought of as streamlining and reducing the red tape of bureaucratic agencies so as to increase their agility and creativity, which aligns closely with Mazzucato’s vision of government silos providing mission-oriented directionality to innovation.

Analyzing the effects to entrepreneurial activity within a scenario of dismantled checks and balances requires the consideration of additional institutional constraints inherent in the public domain. Using a combined Austrian-public choice approach as per Boettke and Lopez (2002), I first relax the omniscience assumption of the public sector entrepreneur, which exposes the existence of information problems involved with any central planning endeavor as illustrated by Hayek (1945). The dispersion of knowledge “of the particular circumstances of time and place” makes problematic any involvement by the government in picking winners. Furthermore, from a purely entrepreneurial trait perspective, Kirzner (1982, p. 275) emphasizes market competition as critical to fostering alertness, guiding the economic calculation of “socially worthwhile” innovation via profit and prices that allows the entrepreneur to “push the economy forward in the direction of a possible Nirvana” (Douhan et al. 2007, pp. 217–218). Without this guidance which is revealed via the dynamic and rivalrous market process, directions toward social betterment are unknown. Central planners are instead guided by their judgment or the judgment of their superiors and yet assume a role as perceived experts.

This expert role played by central planners exposes the issue of technical feasibility versus economic feasibility. Given the institutional constraints inherent in the

public sector, the planning expert within a specific domain or industry is not equipped to perform economic calculations. Lavoie (1985, p. 53) highlights this issue by detailing the engineering expert's role in assessing the best use of a commodity such as wood: "This is not an issue about which the engineer has any special expertise. It is not a question to which quantitative measurement of any physical dimension is relevant. It is a question of the relative value of wood in alternative uses." Government planners have no ability to assess the opportunity costs of these alternative uses.

Given the criticality of opportunity costs in the calculation problem, the success of central planning efforts cannot be proven. As Powell (2005, p. 311) elaborates:

We can point to evidence of failures in calculation, because firms demonstrate they should exist as structured by succeeding in the free market despite discouragement by the government or when firms continually subsidized by the government fail to become privately profitable. In both cases feedback from the market indicates a knowledge failure on the part of the planners. Successful planning, however, cannot ever be established by observing that a subsidized firm eventually becomes privately profitable. No market feedback mechanism is in place to show that the gain in the subsidized industry is greater than the opportunity cost of the industry that would have developed in the subsidy's absence.

This holds true for the advent of the GPS, where the opportunity costs of the next best alternatives are unknown. The implication of the calculation problem for public sector entrepreneurs is that personal or political incentives reign supreme due to the absence of residual claimancy; therefore, at a minimum, entrepreneurial discovery will lag behind the private sector (Douhan et al. 2007, p. 218).

Moreover, when the benevolent assumption is next relaxed, public sector entrepreneurial action could result in considerably unfavorable ends. Baumol (1990) first introduced the concept of unproductive and destructive entrepreneurial outcomes as entrepreneurs in general are biased more toward profit rather than innovation. Consequently, if the rules of the game promote higher profit channels via rent-seeking activities, then the level of productive entrepreneurial activity will decline. Holcombe (2002) expanded upon the scope of entrepreneurial consequences by incorporating the public sector entrepreneur and tracing the political profit motivation to two outcome types. The first type is efficiency-enhancing in that collective benefits are supplied or socially and economically worthwhile innovation is generated. The rewards to the public sector entrepreneur politically manifest in a myriad of ways that align with the agent's self-interest to include gains in recognition, power, and compensation.

The second type is via the forcible transfer of wealth from one person(s) to another, where the public sector entrepreneur stands to benefit from the payment of the transfer recipient. Such political profit is a form of predation and occurs via coercion, which is one of the primary attributes of government action that contrasts with private enterprise where transactions are entered into voluntarily. It is important to stress that these unproductive activities are still considered entrepreneurial because they require an alertness to potential rents and then action taken to acquire them (Douhan and Henrekson 2010). Holcombe (2002, pp. 149–150) further alleges that predatory opportunities are typically more profitable than productive ones given

the logic of concentrated benefits and dispersed costs. Public sector entrepreneurs stand to gain more from specific lobbyists and special interest groups than they do from the general public's welfare improvement via productive policies.

In summary, the entrepreneurial signals that enable the state to frequently repeat public innovation successes like the GPS in a persistent peacetime environment are dubious considering the incentives and abilities of the average bureaucrat. Lavoie (1985, p. 201) describes the dangers of government-directed industrial policy as a catastrophic combination of the knowledge problem and the totalitarian problem. The former problem suggests that planners cannot "possibly know which industries ought to be picked in order to enhance industrial growth," while the latter problem dictates "power will instead be wielded in response to political clout rather than careful debate"; and the irony as cited by Lavoie is that these policies are allegedly purposed to minimize the influence of special interests.

Conclusion

This chapter examined the effectiveness of state-guided innovation by assessing the claim by advocates of the entrepreneurial state that government drives innovation better than the private sector. I find that many assertions of the state serving as the boldest innovator through a mission-oriented approach fail the test of McCloskey's Supply-Chain Fallacy. However, my use case analyses did find occasions of state-guided innovation success, particularly when societal demand is made clearer as witnessed during times of crisis. In order to assess the effectiveness of state-guided innovation efforts in a persistent peacetime environment, I next analyzed the viability of the public sector entrepreneur. I contend that the checks and balances provided by political institutions severely constrain Schumpeterian innovativeness, while information and incentive problems can channel Kirznerian alertness to political profit toward unproductive or destructive ends.

My research has one important implication: advocates and executors of a mission-oriented directionality toward public sector innovation take a pause, or at a minimum, proceed with humility and consider the effectiveness of their approach through an economic lens. Within and across inherently governmental organizations, encouragements to enact a culture of innovation need to account for the lack of residual claimancy and rivalrous competition that place the public sector at a distinct disadvantage. Recognizing the sufficient conditions that allow human creativity to flourish and understanding the impacts of government's influence over entrepreneurship will be critical components in improving the effectiveness of state-guided innovation efforts. At a minimum, increasing the understanding of what fosters innovation is a valuable aim considering that innovation is the key to driving economic growth and development.

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A Case Study on DARPA: An Exemplar for Government Strategic Structuring to Foster Innovation?



Rodney H. Yerger Jr

Abstract Advocates for a mission economy contend that government bureaucracy can be transformed through a strategic structuring that would improve upon the dynamic capabilities necessary to pursue and direct innovation. The Defense Advanced Research Projects Agency (DARPA) is touted as a model organization of strategic structuring for inducing public sector innovation of emerging technologies. Applying economic theory and employing empirical analysis, I objectively examine key factors that are attributed to DARPA's success, such as the organization's autonomy, small size, and limited tenure of its program managers, in order to assess the worthiness of the agency's exemplar status of empowering a mission-oriented approach to innovation. I find that while DARPA undoubtedly provides value for national defense and has distinct advantages over other government organizations, it falls short in representing a sustainable and scalable source of strategic structuring that would benefit the entrepreneurial state.

Keywords Public goods · Entrepreneurship · Innovation · Political economy

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Introduction

Advocates for a mission-oriented directionality to innovation tout the Defense Advanced Research Projects Agency (DARPA) as one model improvement within the public sector that provides the agility and flexibility to pioneer revolutionary

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technology advancement (Mazzucato 2021). The purpose of this chapter is to execute a case study analysis of the DARPA organization, exploring its origins from 1958 and detailing changes in its focus and processes over time and how those changes track with its effectiveness at Schumpeterian entrepreneurship. The bulk of the case study describes and documents the institutional mechanisms that DARPA possesses to promote innovation. Much has been espoused regarding the success of the DARPA model in the form of various attributes (Gallo 2021 and DARPA 2016), which I categorize by the following three key factors:

- 1) Trust and autonomy.
- 2) Small size and the externalization of research.
- 3) Limited tenure and urgency.

This research objectively analyzes each factor, applying economic theory to corroborate or counter the expected outcomes from DARPA's purported strengths and defending these assessments empirically where possible. I find that the organization's touted autonomy is unstable over time due to political transaction costs as evidenced by increased congressional oversight, shifting focus toward incremental technology advancement to fulfill short-term military priorities, and a transfer of expert power to established vendors. While DARPA has distinct advantages over other government organizations, it falls short in representing a sustainable and scalable source of strategic structuring.

DARPA's History and Construct

Following the Soviet Union's success in the space race with the launch of Sputnik, the Eisenhower administration established the Advanced Research Projects Agency (ARPA) in 1958, chartered with preventing "technological surprise" (Van Atta and Windham 2019a, pp. 3–4). The agency was initially focused on large missions such as missile defense and nuclear test detection with a brief foray in space-related technology development until that function was absorbed by the standup of the National Aeronautics and Space Administration (NASA). However, within a few years, ARPA assumed an additional role in pursuing a "set of smaller, technically focused programs" in areas such as materials science, information technology, and behavioral science (Van Atta and Windham 2019a, p. 4). These pursuits led to what is typically acclaimed the agency's two greatest contributions to innovation: the precursor to the Internet and the foundation of personal computing.

In 1972, because of increased scrutiny on military spending for many reasons including the unpopularity of the Vietnam War, the agency encountered its most significant focus change when Congress limited research efforts to only those having direct military application. This not only resulted in the name change from ARPA to DARPA but also added increased process and oversight (Fong 2019). The effects of these process changes to DARPA's purported strengths are explored in subsequent sections.

DARPA continued to evolve and shift focus throughout the decades following its renaming, primarily aligning with changes in national security priorities, such as the Global War on Terror in the 2000s. Despite these shifts, the underlying organizational mission has remained basically the same: “to prevent and create technological surprise” (Gallo 2021, p. 5; DARPA 2016, p. 4). DARPA asserts a commitment to achieve transformative research and development (R&D) with a stress on higher risks and higher rewards over incremental advances. To accomplish its mission, DARPA adheres to a process that externalizes research through an annual budget of approximately USD 3.5 billion to fund performers primarily from industry (62 percent in 2020), and secondarily from universities (18 percent in 2020), federal laboratories and research centers (15 percent in 2020), other nonprofits (4 percent in 2020), and foreign entities (1 percent in 2020) (Gallo 2021, p. 10). DARPA’s funding levels have stayed fairly constant over time. So too has the agency’s manpower footprint, which is primarily composed of approximately 100 “empowered program managers coordinating high-risk high-reward external research” (Reinhardt 2020). This feature along with special hiring and contract authorities sets DARPA apart from other government agencies in terms of its independence, which advocates claim provides flexibility for both ideas generation and enhanced engagement opportunities with potential performers. These elements of the DARPA model frame my case study approach in analyzing the three key factors that purportedly promote innovation. The first factor is trust and autonomy.

Factor 1: Trust and Autonomy

DARPA’s autonomy stems from its explicit separation from the larger Department of Defense (DoD) to include the military services, which allows for disruptive technology pushes beyond the constraints levied by specific military requirements and missions (Gallo 2021). This uncoupling represents a mitigation of the institutional constraints that drive median results in the government domain and obstruct Schumpeterian entrepreneurship (Schnellenbach 2007). Less checks and balances, especially the avoidance of excessive oversight from Congress, provides DARPA a level of opacity that promotes speed and flexibility in decision-making, garners independence in problem-solving, and incentivizes risk-taking (Miller 1992; Reinhardt 2020). Ter Bogt (2003, p. 151) connects the “autonomization” of a public organization to transaction cost economics (TCE); specifically, DARPA represents an “internally autonomized organization,” which stakes a claim in the lowering of economic transaction costs by limiting political influence.

The trust and autonomy bequeathed by the DoD and Congress to DARPA also extends to within the organization from the agency director to the aforementioned empowered program managers, who can select and terminate projects through their ability to deploy money rapidly and independently (Gallo 2021; Reinhardt 2020). Thus, DARPA’s organizational structure consists of a unique combination of centralized and distributed control mechanisms. Miller (1992) stresses that causes of

market failure such as information asymmetry and team production externalities lead to hierarchical solutions for social dilemmas. Moreover, disadvantages of democracy such as preference instability and indecisiveness and/or manipulation in decision-making lend favor toward centralizing power (cf. Arrow 1963). In DARPA's case, autonomy has been purposefully granted to the agency director, and other stakeholders like the military services and Congress are restrained in their decision-making authority as it pertains to DARPA's purview.

Nonetheless, a hierarchy contains its own set of issues. Central planning efforts suffer from Hayek's knowledge problem and what Tullock (2005 [1965], pp. 148–152) refers to as “whispering down the lane,” where agile coordination is constrained by the multiple levels of superior-subordinate interactions that impede knowledge diffusion and discourage entrepreneurship alertness and discovery. Miller (1992, p. 80) argues that firms can address these issues by injecting an additional level of autonomy within the organization via delegation: “. . . a dictator who needs good information and good ideas must create the basis for independence inside the hierarchy.” The DARPA equivalency is delegating real shares of decision-making authority to program managers, who are hired from industry and academia and serve as experts in their specific domains of research within the fields of science and engineering (Gallo 2021).

Provided the strengths of DARPA's unique form of independence through the combination of centralized and distributed control governance structures, theoretical counters exist to this organizational construct's stability in maintaining autonomy, which also calls into question the appropriateness of possessing high levels of opacity for inherently governmental entities. The first counterpoint considers the overall agency level and its relationship to its external stakeholders. Because DARPA classifies as an “internally autonomized organization,” it is neither truly independent nor private; therefore, political influence can still erode efficiency, at least over time. In attempting to incorporate TCE into the public sector domain, Ter Bogt (2003) proffers a political transaction cost framework to account for the lack of emphasis placed on economic efficiency in government organizations. This framework analyzes each of the primary characteristics of TCE as promulgated by Williamson (1981)—asset specificity, frequency and scale, and uncertainty—in order to assess the political willingness to increase or decrease an organization's autonomy. According to Ter Bogt's analysis, the willingness to “autonomize” will increase for basic government functions such as the provision of student loans or road maintenance. DARPA's case is the opposite of basic functionality. Its product, innovation, involves high asset specificity in terms of uniqueness and importance and high uncertainty in terms of the frequency with which it can be produced and the ability to measure success.

Furthermore, Ter Bogt's (2003) framework considers additional political transaction costs associated with maximizing electoral support, the influence of special interest groups, and political opportunism with a focus on increasing political efficiency for inherently governmental organizations. Applying these considerations, DARPA's independence as an organization could be jeopardized by two key sources. The first source consists of special interest groups working through the

larger DoD and military services, who might desire to control the shape and direction of DARPA-related technology development efforts. This source includes large public-private partnership companies that perform a huge proportion of defense-related R&D. The second source are the taxpayers, who typically demand the very checks and balances that have been removed through “autonomization” to ensure their money is being spent wisely and competently. The higher the level of opacity within an inherently governmental organization, the more difficult the challenge to safeguard against abuses. Given that DARPA explicitly regards each program manager as filling the role of a technical subject matter expert, this high level of opacity can result in what Koppl (2018, pp. 189–200) refers to as a “rule of experts” scenario, where a monopoly of experts increases the likelihood of unreliability, which can lead to bad decision-making.

Another critical counterpoint involves DARPA’s autonomy internal to the organization residing with the individual program managers. Miller (1992, pp. 86–89) highlights the downside of distributed control governance as explained through the Sen paradox: “. . .any organization that delegates decision-making authority to more than one subset of individuals must suffer from either incoherent behavior or inefficiency for some combinations of individual preferences.” The tradeoffs given the Sen paradox involve the individual self-interest of each DARPA program manager and the agency’s best interest. Thus, distributed control can evolve into a threatening construct to both the dictator and external stakeholders. However, the DARPA model exhibits additional strengths purported to combat inefficiency in outcomes and intransitivity in preferences. The second and third key factors of my case study analysis elaborates further on these strengths.

Factor 2: Small Size and Externalization of Research

To avoid the Sen paradox, Miller (1992, pp. 94–95) contends that the hierarchy must “shape and mold individual preferences into patterns that are mutually consistent.” One way DARPA mitigates the threat of incoherent behavior and inefficient coordination is through its small manpower footprint. DARPA’s core staff size gravitates toward Dunbar’s number (~150), which is the suggested limit at which social relationships flourish as each member can get to know every other person in the organization. Knowing everyone creates peer pressure through scrutiny, which provides a check against abusing opacity and fosters an adherence to a common set of goals (Dunbar 1992; Reinhardt 2020). Remaining small in size may also help counter external threats to DARPA’s independence from special interest groups and the taxpayer. By staying below the radar, DARPA might avoid targeting for predation and regulation despite the higher political transactions costs associated with extremely uncertain and disruptive innovation efforts.

DARPA maintains its small footprint by externalizing research, which is promoted as another strength of its governance model. The agency avoids the high transaction costs involved in obtaining the unique knowledge and equipment

required in pursuing groundbreaking research. DARPA does not establish its own labs or the bureaucracy involved in managing them (Cummings 2018; Reinhardt 2020). Instead, it outsources these assets through discrete project funding that yields a lower overhead and streamlines accountability by ensuring each project is responsible to one person, the program manager (Reinhardt 2020).

Despite the perceived advantages of DARPA's small size and externalization of research, there may also exist associated drawbacks. Overcoming the Sen paradox by internally streamlining preferences might restrict a sense of competition among independent program managers and instead promote expert failure by enhancing synecological bias through motives that Koppl (2018) argues are inherent in maximizing expert utility. These motives include identification that is tied to a common mission as well as a sympathy for and a desire to please fellow experts.

Moreover, even though the organization's small footprint might help to ward off threats to predation, it increases the detrimental effects of politicization should the willingness to decrease autonomy dominate as predicted by Ter Bogt's political transaction framework. If all program managers are aligned tightly with DARPA's director, absent bureaucracy, politicization of the director could lead to a prioritization of goals and efforts entirely dictated by external forces rather than the organization's stated mission (Reinhardt 2020).

An intentional restriction in size also shapes broader ramifications for Mazzucato's vision of strategic structuring that calls for a replication of the DARPA model to induce the entrepreneurial state. Breznitz and Ornston (2013, p. 4) argue that bastions of successful public sector entrepreneurship will more likely "occur at the periphery of the public sector, in low-profile agencies with relatively few hard resources and limited political prestige." They cite DARPA as a peripheral organization that does not suffer from the political interference found with a larger and "centrally positioned" agency. These strengths pose a significant challenge in attempting to scale the DARPA model in order to achieve a vision of transformational value creation by the public sector.

Finally, there are disadvantages in externalizing research that involve tradeoffs in transaction costs. While DARPA avoids the high overhead costs associated with providing its own labs and equipment, it incurs the costs of finding and establishing relationships with appropriate and competent performers and ensuring that these performers produce value on time and on budget. These costs involve large undertakings, which typically require hierarchical control to monitor and prevent shirking (Reinhardt 2020). Koppl (2018) argues that synecological redundancy is a key tenant in mitigating expert failure. Instead, the DARPA model relies on a lone program manager tasked with multiple ventures, which exacerbates the risk of unreliability due to expert error to include making unintentional or "honest" errors given the limited cognition of an expert's bounded rationality. Therefore, by outsourcing its potentially transformative research efforts, DARPA might find it tempting or even necessary to outsource the centralized control mechanisms required to produce such results. Such requirements can limit research partnerships to larger, more mature companies and increase the likelihood of rent-seeking behavior. Nevertheless, the DARPA model provides a check against these alleged disadvantages

by motivating active program management, which involves the third key factor of my case study analysis.

Factor 3: Limited Tenure and Urgency

Congress grants DARPA special privileges in hiring and contracting authority. Specifically, DARPA can directly and expeditiously hire science and engineering experts from industry and academia for term appointments, typically 3 to 5 years. DARPA's special contracting authority lowers the transaction costs of the government acquisition process in not only bypassing burdensome procurement regulations to develop flexible agreements with R&D performers but also by empowering the program manager to reprioritize and reallocate funds based on performance (Gallo 2021; DARPA 2016). These authorities give DARPA distinct advantages through the motivation of active program management and ideas generation as well as in providing a counter to the Sen paradox.

Limited tenure encourages program managers to take risks in funding ideas for short-term durations but with a long-term view in mind, where both the need and value proposition are uncertain (Bonvillian et al. 2019; Gallo 2021). The hiring process sets expectations upfront that the program manager position is not career oriented. Excelling in the position will not result in a promotion within the organization, and funding unsuccessful long shot ideas will likely not adversely impact one's career (Reinhardt 2020).

To achieve long-term impact, program managers seek ambitious project ideas and tolerate associated failures as "the cost of supporting potentially transformative or revolutionary R&D" (Gallo 2021, p. 6). However, checks are inherent in the DARPA process that attenuate the effects of failure via the short-term funding of seedling projects, which allows the program manager to track progress and terminate and redeploy funding for those projects that underperform (Van Atta and Windham 2019a). In this manner, while DARPA externalizes research, it bears the risk for the performer, which advocates insist is a major advantage over private sector venture capitalism. Furthermore, DARPA can also bear the risks for other funding mechanisms by signaling technology validation, which encourages larger industry performers to front their own money or other government entities like the National Science Foundation to provide grants to continue development (Reinhardt 2020).

In addition to incentivizing risk taking via active program management, limited tenure creates constant turnover of personnel (~25 percent per year) that should ideally result in a continued infusion of ideas. Not only does this turnover model help with new idea generation but also allows a revisiting of old ideas that might have been tried previously and failed. Subtle tweaks to an old idea or simply the timing and environment in which the idea reemerges may result in improved outcomes that would not have otherwise materialized had the organization preserved the memory of past naysayers (Gallo 2021).

A final advantage of limited tenure is that along with the aforementioned small manpower footprint, DARPA's hiring flexibility provides a counter to the Sen paradox associated with distributed control governance mechanisms. The DARPA director can shape coherent behavior by hiring similarly minded and motivated subordinates with preferences that align to the DARPA mission of creating and preventing technological surprise.

As with the other key factors, there exist theoretical counterpoints to the purported benefits of DARPA's limited tenure and flexible hiring policies. An obvious drawback to excessive risk taking is that associated failures are a cost to the taxpayer and moreover, could result in destructive entrepreneurial outcomes. While logic supports the need to tolerate failure when pioneering disruptive technology advancement, understanding the returns to such efforts via cost-benefit analysis remains an appropriate consideration. This includes taking into account the costs in revisiting or duplicating old ideas that simply will not work despite the fact that program manager turnover reinvigorates their appeal (Gallo 2021). Furthermore, while limited tenure may motivate risk-taking, it cannot completely displace familiarity bias, which influences agents to invest in and with those they trust (Reinhardt 2020). In the case of the DARPA program manager, this bias might result in allocating funding to those researchers with sound and stable reputations over less mature, smaller enterprises, which runs counter to Schumpeterian entrepreneurship.

With regard to flexible hiring practices, the methods DARPA uses to streamline preferences and foster coherent behavior do not fully embrace the theoretical underpinnings required in overcoming the Sen paradox. As government employees, neither DARPA program managers nor the director are residual claimants, which is a striking difference between public sector entrepreneurs and venture capitalists. The standard solution to address the agency problem caused by decision managers not being residual claimants is via compensation that accurately reflects performance in the overall market for management (Fama 1980). Miller (1992, pp. 100–101) stresses that the streamlining of preferences via socialization is insufficient because adverse selection causes measurement error in determining the potential fit of a candidate for hire. Instead, the most effective means of “reconciling transitivity, efficiency, and delegation” is through the compensation system. While DARPA's unique status allows for the authorization of higher salaries than compared to other government agencies, a pay gap certainly exists between similarly skilled private sector counterparts in the science and engineering communities. Consequently, DARPA must depend on the aforementioned personal gain incentives.

A final concern exists with the overall concept of active program management, which has sparked debate over the benefits of DARPA's changes to process over time. In the days of ARPA (1958–1972), program managers exercised less control over the efforts of performers, while maintaining responsibility of overall vision and funding (Worrydream 2017; Kleinrock 2014). Tracking progress and performance via standard program management techniques can focus too much priority on near-term results and derail long-term vision (Cummings 2018). This focus is bureaucratic in nature, which ironically is what DARPA is chartered to avoid.

Empirical Analysis

The next step of my case study analysis explores quantitative and qualitative evidence that bolsters either the points or counterpoints described above regarding the three key factors of the DARPA model. First, regarding independence, ample evidence exists that DARPA has become less autonomous over time, which is an indication that political transaction costs have influenced the willingness of political actors to tolerate a high level of opacity. Starting with the transition of ARPA to DARPA in 1972, increased oversight has influenced how DARPA spends its money. Lump sum authorization of funding by Congress has shifted to demanding annual budgets for each program that include a description of the work to be performed. Despite DARPA's streamlined processes over other government institutions, grants for seedling projects must still go through an open and involved solicitation process. As a result of orienting DARPA's work more to the needs of the military to counter existing threats, DoD has shaped and dictated shorter-term areas of R&D efforts to support active conflicts such as the Vietnam War in the 1970s and Global War on Terror in the 2000s. Finally, and perhaps the biggest example of increased politicization, the appointment of DARPA directors is now aligned with presidential administrations (Reinhardt 2020).

Regarding the pros and cons of organizational size, DARPA has maintained a relatively small manpower footprint over time. In remaining small and flat, DARPA has successfully resisted Parkinson's Law, a crucial contributor to bureaucratic inefficiency where success is measured by the growth in the number of subordinates under a director's control (Tullock 2005 [1965]). However, evidence exists that DARPA's externalization of research suffers from the high transaction costs involved in searching for competent researchers and monitoring performance. In 2001, DARPA started awarding prime contracts almost exclusively to "established vendors," which relegated universities and start-up firms into a teaming concept that reports through the prime contractor (Fuchs 2010, p. 1138).

Sound reasons exist for the shift in awarding prime awards to established vendors. Fuchs (2010) cites the decline of corporate R&D labs over time as responsible for raising the transactions costs. An established vendor can better perform the systems management necessary to see technology advancement through to production and thereby avoid "the Valley of Death." Conversely, the relegation of start-ups to a supporting role in the DARPA process is concerning considering the view that newer entrepreneurial firms are the linchpin for breeding successful innovation because of ownership incentives and information advantages (Karlson et al. 2021). Furthermore, the dependence on larger, more mature companies to provide the hierarchal control mechanisms for the externalization of research increases DARPA's vulnerability to rent seeking by special interests, which directly stunts productive entrepreneurial opportunities.

In a sense, DARPA's arrangement with established vendors might represent a transfer of expert power from the program managers to the large industry R&D performers. Koppil (2018) proffers an information choice theory model of an

epistemic system utilizing a sender-receiver game construct. As applied to DARPA following the shift in awarding prime contracts to established vendors, the program manager now represents the receiver (or nonexpert) beholden to a monopoly of senders (or experts) as represented by the large defense contractors. The receiver grows more powerless as rivalry among senders is reduced. Not only does this lack of rivalry increase synecological bias, but the intentional relegation of start-up companies also restricts free entry, which Koppl cites as a key contributor to expert failure: “‘Potential competition’ is more important than the number of incumbent competitors” (Koppl 2018, p. 205; cf. Baumol 1982).

DARPA’s adherence to active program management might offset the increased likelihood of expert failure and vulnerability to rent seeking caused by the shift in contracting strategy. Anecdotal evidence supports the view that DARPA program managers have a healthy tolerance for failure. Over DARPA’s history, project losers ranging from research into paranormal activity to developing mechanical elephant transports to more recently, testing rapid space launch capabilities have showcased a willingness to try out challenging and quirky ideas (Gallo 2021). Of a more quantitative nature, Goldstein and Kearney (2017, 2020) conducted studies measuring past project selection and performance for ARPA-E, the Department of Energy’s transformational R&D organization, which can serve as a proxy for DARPA. Goldstein and Kearney (2017) find that ARPA-E program managers exercise autonomy via their tendency to select projects for funding that receive less consensus from external peer reviews.

Furthermore, Goldstein and Kearney (2020) find that program managers do not shirk from playing an active role in the management of their portfolio by frequently redeploying money to increase funding for stronger performing projects and decreasing or terminating funds for those that perform weakly. In this manner, they are exercising real options similar to the way venture capitalists monitor their investments and unlike the hands-off approach that other public sector entrepreneurial mechanisms such as the Small Business Innovation Research (SBIR) program take via the provision of grants.

In terms of the effectiveness of DARPA’s flexible hiring practices, compensation gaps between program managers’ salaries and their private sector counterparts loom as a significant concern. Reinhardt (2020) estimates that experienced scientists and engineers at large tech companies receive at least twice as much compensation, whereas this gap was much less severe (~20 percent) in the 1960s during the days of ARPA. The commercial high-tech sector promises to be even more competitive going forward, which may not bode well for attracting top talent to a position that entails no promotion and requires relocation to Washington, DC.

In analyzing possible frictions between DARPA’s dual roles in executing transformative R&D and responding to threat-based time-sensitive challenges for the military, a review of DARPA’s history tells a tale of two different organizations. The first tale involves the ARPA years from 1958–1972, when Congress and DoD exercised much less oversight over the agency and the program managers exercised much less oversight over research performers. One of the earliest DARPA directors, Jack Ruina, “valued scientific and technical merit above immediate relevance to the

military” and delegated a high level of autonomy to his program managers (Fuchs 2010, p. 1137). The best example of this delegation involves one of the organization’s greatest successes, the R&D that led to the advent of the Internet and personal computing. J. C. R. Licklider, the program manager for these efforts, advanced an ambitious vision that foresaw computers serving as “interactive intellectual amplifiers for all humans, pervasively networked worldwide” (Worrydream 2017, para 14; Kleinrock 2014). This vision was only loosely connected to solving command and control challenges for national defense, and it did not entail a specific set of goals nor a roadmap. Instead, Licklider leveraged the power of his vision to find and organize an impressive network of researchers and sustain investments in the underlying technologies to achieve success (Van Atta and Windham 2019b, pp. 39–40; Bonvillian 2019, pp. 94–98).

It is important to note that ARPA’s considerable level of independence did not always result in productive entrepreneurial outcomes. Project AGILE supported combat operations in Vietnam and involved mismanaged efforts to improve weaponry, which included chemical agents. The project was an unmitigated disaster, which led to the conviction of the program manager, William Godel, for embezzlement. Yet, because of its covert nature, the project avoided scrutiny allowing it to survive for over a decade (Van Atta and Windham 2019a; Reinhardt 2020). This example of a destructive entrepreneurial outcome calls into question the sustainability of unfettered independence for inherently governmental organizations, which provides a convenient segue to the second tale of DARPA.

The shift from ARPA to DARPA in 1972 increased oversight and focused the organization’s efforts more directly on military application. By 1975, DARPA’s new director, George Heilmeier, instituted what became known as the “Heilmeier Catechism,” which was the genesis of active program management. Heilmeier influenced more of a top-down and mission-oriented approach for the management of projects that involved setting intermediate and long-term goals, tracking progress, and estimating the costs and benefits of each research effort as it pertained to the customer (Van Atta and Windham 2019a, pp. 14–15; Fong 2019, pp. 193–194; Cheney and Van Atta 2019, pp. 233–234). Although active program management mitigates the risks of longer-term, highly uncertain technology advancement efforts and increases the success rate of technology transition, it also entails greater costs to autonomy and disincentives toward risk-taking over ARPA’s more vision-oriented approach.

The ultimate empirical evidence in evaluating the effectiveness of DARPA over time would be to accurately measure return on investment in terms of innovative output. Attempts at measuring patents per award and funding per patent illustrate that DARPA performs considerably well compared to other government agencies; however, these cannot be considered apples-to-apples comparisons given the varied charters and missions of these agencies, nor do these assessments address the more important question as to how well DARPA performs compared to the private sector (Piore et al. 2019, pp. 49–52).

Reinhardt (2020) reviews the agency’s own advertised accomplishment timeline and bins what he refers to as “outlier successes” into two categories: pre-1972

(ARPA) and post-1972 (DARPA). An outlier success can be considered synonymous with architectural innovation, which disrupts and creates markets while also outmoding existing competencies (Abernathy and Clark 1985). The results of Reinhardt's binning excursion reveal that the vast majority (over 70 percent) of DARPA's architectural innovation occurred during the ARPA years. The ramifications of this revelation do not detract from the value DARPA has provided and continues to provide to its single customer, the military; albeit this value is harder to appreciate given its specific military utility and narrow applicability.

Conclusion

This chapter analyzed the institutional mechanisms of DARPA as a model for strategic structuring that fosters Schumpeterian public sector entrepreneurship. In reviewing three key factors that expound the DARPA model, I explored theoretical points and counterpoints that make for a complex and inconclusive assessment as to the potentiality of DARPA's distinctive form of organizational governance in fulfilling the vision of an entrepreneurial state.

Through a unique combination of centralized and distributed control mechanisms, DARPA possesses a higher level of autonomy, at least compared to other government organizations; however, I find this autonomy to be unstable. Political transaction costs associated with state-guided innovation efforts decrease the willingness to autonomize, which erodes independence via three discrete sources. First, concerns from the taxpayer over abuses to opacity and expert failure have led to more congressional oversight over time. Second, vulnerability to rent seeking by special interests has increased, which is evidenced by a transfer of expert power to and a growing dependence on established vendors to provide the hierarchical control mechanisms for the externalization of research. Third, pressures from external stakeholders such as the military have influenced a greater focus on shorter-term military or administration priorities, which can incentivize technology transition over risk-taking. While DARPA is better equipped than others to ward off threats to its autonomy through such advantages as flexible hiring practices and special contract authorities, its model depends on employing highly competent and motivated program managers, and yet, subsequently cannot depend on compensation to overcome the residual claimant agency problem.

My research reveals that the vast majority of DARPA's architectural innovation occurred prior to the critical shift from ARPA to DARPA in 1972, which was a time characterized by much less external oversight and a much lower pay gap between government and private sector high-tech labor. It is important to note, however, that this correlation between ARPA's greater autonomy and innovation success should not imply causation. Another factor at play could be the characteristics of the post-World War II era, or perhaps more specifically, the height of the Cold War, which involved a level of crisis that dictated a demand for rapid and novel change and raised alertness to entrepreneurial opportunities. Indeed, DARPA's founding is

steeped in a collective mobilization across the public sector domain to counter the crisis of technological surprise. Since that time as the Cold War diminished, preparing for “system-level war” shifted toward a focus on responding to “shorter-term tactical missions.” Ruttan (2006, pp. 183–184) contends that the absence of a major war, or at least the threat of one, diminishes the probability that our political system could generate the willpower and resources “required to initiate and sustain the development of major military and defense-related general-purpose commercial technologies of the past.”

Another crucial concern in assessing DARPA as a model for Mazzucato’s strategic structuring vision is its scalability. Even if DARPA can effectively sustain a resistance to political interference, this would be attributed to its small footprint and its existence as a peripheral organization. The fact that DARPA’s disruptive technology efforts can threaten status quo defense acquisition processes, which can drive opposition within the military, does not support the claim that the high-risk, high reward approach inherent in Schumpeterian entrepreneurship could expand to transform large areas of the government. Even attempts at cloning DARPA for the sake of establishing other peripheral organizations dedicated to long-term revolutionary R&D have met with resistance and limited success. For example, despite consultation on adopting the strengths and processes of the DARPA model, ARPA-E suffers from greater hierarchical control both internally and externally. Within the organization, the program managers are outnumbered by support staff, which entails a higher level of process-driven activity. External to the organization, ARPA-E is directly funded by the Department of Energy instead of Congress, which threatens independence of basic functions such as program selection and idea generation (Fuchs 2009; Reinhardt 2020).

In conclusion, DARPA undoubtedly provides value to the defense of the United States and has generated productive public sector entrepreneurial outcomes. However, the agency falls short in representing a sustainable and scalable source of strategic structuring that would benefit the entrepreneurial state.

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The State of the Entrepreneurial State: Empirical Evidence of Mission-Led Innovation Projects around the Globe



**Maral Batbaatar, Johan P. Larsson, Christian Sandström,
and Karl Wennberg**

Abstract This chapter reviews theoretical rationales for mission-oriented innovation policy and provides an empirical overview of extant 28 papers and 49 cases on the topic. We synthesize varieties of mission formulations, actors involved, and characteristics of missions described as more or less failed or successful. Fifty-nine percent of the studied missions are still ongoing, 33 percent are considered successful, and 8 percent as failures. Sixty-seven percent of the studied missions have taken place in Europe, 24 percent in North America, and 8 percent in Asia. The majority of innovation projects referred to as missions do not fulfill the criteria defined by the OECD. Results suggest that missions related to technological or agricultural innovations are more often successful than broader types of missions

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aimed at social or ecological challenges. Challenges regarding the governance and evaluation of missions remain unresolved in the literature. We find no case that contains a cost-benefit analysis or takes opportunity cost into account.

Keywords Innovation · Government agencies · Mission-oriented policies · Grand societal challenges

JEL Codes H11 · H50 · L26 · L52 · O32

Introduction

Industrial policy has experienced a renaissance over the past decade (Juhász et al. 2023; Aghion et al. 2023). Ideas of an *Entrepreneurial State* and a *Mission Economy* are currently permeating policy departments, notably in Europe, as the concepts are put into practice and rolled out across the globe. A mission is best understood as an encompassing endeavor seeking transformational change with large potential societal benefits; missions span several sectors and are tightly linked to regulatory bodies (see, e.g., OECD 2021).

Much effort has been invested into deepening our theoretical and conceptual knowledge of mission-led growth and state entrepreneurship. But the state of our knowledge about their effects is still incomplete, not to say entirely uncertain. Researchers and policymakers increasingly look to probe the logic behind the mission “organisms” by studying the empirics of missions, their contents, and outcomes.

To begin with, we have no established empirical operationalization of what a mission really is. What types of missions have been conducted and in which contexts? How are those missions deployed, by whom, with what constellation of actors, and what have the outcomes been thus far?

We are not aware of a systematic review of the empirical literature on the subject, hitherto. There are indeed few empirical evaluations or studies of how missions are designed and executed (cf. Essén et al. 2022; Kantor and Whalley 2023). Crucially, we seem to know little about when missions are more or less likely to work as intended. In response to these gaps in the literature, we provide an empirical overview of 49 concluded or ongoing missions from around the world. We synthesize varieties of mission formulations and policy tools attached to such missions and critically discuss what precise characteristics that may qualify them as missions. We then analyze characteristics of missions depicted as more or less failed or successful, and compile policy recommendations and future research recommendations on mission-oriented innovation policy. In pursuing this endeavor, we also provide a database for overview of articles on the subject.

Methods and Literature Overview of Missions

To examine documented mission-oriented innovation policies that have been launched and analyzed, we conduct a policy mapping exercise (Burgess et al. 2007; Kivimaa and Kern 2016). We make use of international academic databases such as EBSCO, ABI-INFORM, and Google Scholar. The result is a compilation of missions from various continents to aid analysis of missions. Key terms include “missions*,” “mission-oriented*,” “mission innovation*,” and related terms.

Considering that mission-oriented innovation policy is a relatively recent term that is gaining popularity, we expected to find a sizable number of papers on the subject. However, most of the papers that we identify through systematic search are purely conceptual. We scanned reference lists, including in conceptual and methodological papers, to identify papers containing descriptions of missions, and conducted wider internet searches for “grey” literature (policy reports, evaluations, non-peer-reviewed articles, etc.).

Departing from reference papers, including Mazzucato’s publications and corresponding reviews, we searched through citations using a snowball technique. We did not perform tailored searches for any specific large-scale government initiatives (e.g., the US Marshall Plan). We screened all our identified papers for available empirical data.

In the following, we include all papers that use some sort of empirical data in describing missions. Altogether, we found 28 papers containing descriptions of 49 unique missions. The data encompass both first-source information, such as interviews conducted with agents involved in specific missions, and secondary data, including archival records related to past missions.

We added key data from all these publications to a comprehensive spreadsheet, available in an online Appendix (Batbaatar et al. 2023). Some papers include a case study of a single mission, while others encompass several missions. Papers covering several missions were bifurcated so that each row in the spreadsheet contains a single mission. Our analysis covers 49 missions in total.

From the identified studies, we extracted and coded key information about each mission into the spreadsheet. Each row contains a paper and mission, and each column reflects one form of information about the mission. If a paper contains several missions, and therefore features the same overarching future research recommendations, research question, and discussion points, then they are bundled together in one column in the online Appendix. The spreadsheet table is to be read from left to right.

The studies are numbered in column A. Column B numbers the mission cases, which are then described in column C. The study and mission case numbers simply reflect the order at which the studies were added to the spreadsheet. Column D contains the geographical setting of the mission. If a mission spanned more than one country, all countries are listed. The period during which the mission is studied is recorded in column E. If a mission is still ongoing, the year listed denotes the period covered by the study in question. Column F contains the key research questions

posed. The reasons for studying the missions vary, e.g., to assess the practical implication of missions, to provide recommendations for agents involved in specific missions, or to study how a mission unfolds in terms of collaboration, governance, and outcomes.

The columns “Mission Description” (column C) and “Grand Challenge” (column G) describe specific sectors or contexts of the missions analyzed. The Grand Challenge column states either the Grand Challenge that the mission aims to address or the mission’s desired outcome. Some missions contain time-bound and quantifiable elements (e.g., “80 percent reduction of green-house gas emissions by 2050”), while others simply state the success of a specific aspect as their goal, without explicitly defining success (e.g., “contribute to transformative change in Norway”). In column H it is indicated whether a study explicitly utilizes the term “missions” (Yes/No).

Column I describes more precisely how the mission was studied. In most papers different agents involved in the respective missions were interviewed, while historical missions utilized press releases, government archives, and other publicly available information.

The main findings from each mission as reported in the studies are presented in column J, and the authors’ policy recommendations are summarized in column K. The degree of success of the mission (column L) was coded based on the mission descriptions as “Success,” “Failure,” or “Ongoing.” The final two columns in the online Appendix contain suggestions for future research (column M) and for missions in general (column N).

Results

In this section we summarize key findings. We begin this section with an overview of the missions in our selection, their geography, and core contents. An initial observation is that there appears to be no such thing as an “average” mission. The span is considerable in terms of durability, level of ambition, and available policy tools. Hence, a swift overview is in order.

Mission Types and Settings

The missions reviewed span a diverse set of sectors, geographic locations, and levels of ambition more generally. Several of the historical, often successful, missions were motivated by wartime needs (Agarwal et al. 2021). Missions aiming to generate scientific advances and applications, particularly pertaining to biotechnology and medicine, are also common (Essén et al. 2022; Prochaska and Schiller 2021; Grillitsch et al. 2019; Grundy et al. 2023). Several missions have been aimed at infrastructure and solutions to transportation problems such as in Singapore

(Quirapas Franco et al. 2018), Sweden (Edquist and Zabala-Iturriagoitia 2012), Finland (Kivimaa and Rogge 2020), and the United States (Reinecke 2022).

A rather large number of more recent missions target environmental sustainability, and CO₂ emissions (Kivimaa and Kern 2016), renewable energy (Brett et al. 2023), paludiculture (Ziegler 2020), clean energy (Tosun et al. 2023), nutrient recycling (Nylén et al. 2023), and circular food systems (Begemann and Klerkx 2022). Other missions are aimed at addressing social equality and inclusion: children's perspectives and democratic competence (Thøgersen 2022), inclusion in the mobility sector (Kivimaa and Rogge 2020), and quality of life of older people (Fisher et al. 2018). One mission addresses how government defense funding spurs general economic growth (Deleidi and Mazzucato 2021), while other missions are aimed at economic and innovative collaboration across borders (Cappellano and Makkonen 2020; Tosun et al. 2023).

When we compare the identified missions to accepted definitions of missions, the term has clearly been liberally used in both the academic and policy literatures. Our review reveals that most of the projects referred to as missions do not live up to OECD's (2021) definition. According to this definition, missions are "measurable, ambitious, and time-bound targets that have the potential to become significant vehicles for important societal change." Moreover, missions must carry potential benefits for many, extend across several fields, both scientific and institutional regulatory, and have technological "general purpose" characteristics so that discoveries can be widely exploited (Nelson 2011). Few of the 49 missions adhere to these defining characteristics.

Several missions are formulated as traditional innovation policy goals without measurable outcomes, or time-bound targets, such as "Establish a vital and innovative biotechnology landscape" (Prochaska and Schiller 2021), "Develop new forms of flexible automation in the footwear industry for the region to be a leading producer in the world" (Foray 2018), or "Bring transformative effects from science and research in Finland" (Kivimaa and Rogge 2020). Yet other missions are formulated in terms of "directional" statements of broad social or economic goals, but similarly tend to lack measurable and time-bound targets, such as "Increase children's influence in childcare facilities" and "Support children's democratic competences" (Thøgersen 2022). Some missions are formulated as "grand challenges" but lack explicit targets, e.g., "Reduce deforestation and CO₂ emissions" (Olbrei and Howes 2012) and "Curb traffic congestion rates" (Quirapas Franco et al. 2018).

The heterogeneity of projects (public, private, or public-private) framed as missions in our analysis highlights a significant gap between how missions are envisaged and motivated and how the term mission is used in practice to motivate a highly diverse set of innovation policies. The topics identified in the above examples from the 49 reviewed missions can all be classified under the rubric "innovation policy," broadly construed, although some of the missions should rather be classified as social policy or regional policy more broadly.

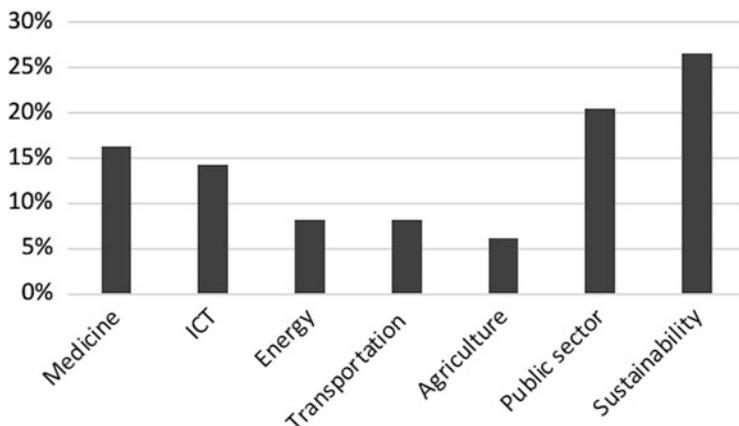


Fig. 1 Missions by sector

Types of Mission Deployment

The majority of the 49 missions (29 cases or 59 percent) are described as ongoing, 33 percent as successful, while 8 percent are deemed to have failed. Two-thirds of the missions (33) were launched in Europe, followed by 14 in North America (24 percent) and four in Asia (8 percent), while the three remaining missions were launched in Latin America.¹

As shown in Fig. 1, the mission cases covered a wide range of sectors/purposes: environmental sustainability (27 percent, 13 cases), public sector concerns (20 percent, 10), medicine (16 percent, 8), ICT (14 percent, 7), energy (8 percent, 4), transportation (8 percent, 4), and agriculture (6 percent, 3).

Mission Launch Date and Duration

Most missions analyzed to date in the literature are historical missions launched during or after the Second World War, or from the 1990s onward when the concept of mission innovation started to become popularized. The peak around 2010 and subsequent drop likely indicates that missions initiated after 2010 simply have not yet been as frequently analyzed.

A necessary mission criterion is *time-boundedness* (Mazzucato 2021). However, our summary of the 49 mission cases shows that only about half of these missions (25 cases) stipulate a deadline for mission completion. Hence, some missions are

¹Some missions such as the production of Covid-19 plasma and the green revolution in agriculture took place in more than one region. Therefore, the sum of the regional shares exceeds to more than 100 percent.

likely “perpetually ongoing” or otherwise associated with an uncertain duration. Most ongoing missions that have an associated due date are set to be completed during the next decade, or by 2050 at the latest. Four missions analyzed failed to reach the initially agreed deadline. With close to half of all missions not having any deadline at all, and several missions extending their deadline as this was approaching, it is hard to gauge the overall magnitude of missions completed by the set deadline. This may be related to a problem identified in the conceptual literature: difficulties in deciding when a failed mission should be terminated ahead of the original plan (Larsson 2022).

Governance and Actors Involved in Missions

In the missions studied, many are initiated by academics or industry experts who raise concerns and garner attention from public sector agents (Agarwal et al. 2021). However, the majority of missions analyzed were directed primarily by the respective national government (69 percent, 34), such as Singapore’s traffic congestion mission (Quirapas Franco et al. 2018). In these cases, some were administered by a committee or agency created temporarily to execute the mission (14 percent, 5). Such “working groups” include the UK Climate Change Committee (Kivimaa and Kern 2016) and the US Office of High-Speed Ground Transportation (Reinecke 2022). Around 22 percent (11) were governed by a specialized innovation agency. Although these innovation agencies are part of the national government, they are distinguished from the national government for higher level of responsibility of the missions as opposed to other missions that are otherwise more prone to changes in the administration. Such innovation agencies include the Academy of Finland (Borrás and Schwaag Serger 2022), Vinnova in Sweden (Essén et al. 2022), the Netherlands Enterprise Agency (Janssen et al. 2021), and the United Kingdom’s Research Councils in collaboration with Innovate UK (Deleidi and Mazzucato 2021). At times, mission governance is delegated by the government to another actor such as an innovation agency. This may be done to ensure that different missions do not compete with one another (Kivimaa and Kern 2016; Grillitsch et al. 2019).

In some instances, the constellation of actors features agents from the public, private, and academic sectors (Agarwal et al. 2021; Foray 2018), a governance mode frequently stressed in the conceptual literature (Mazzucato 2021; OECD 2021).

Interestingly, the historical missions in Mexico and Southern Asia that brought on the green revolution in agriculture experienced the inverse effect, where the government agents raised concerns regarding agriculture and world food supply to private sector agents, notably the Rockefeller and Ford Foundations, which became the primary responsible bodies for the governance of the mission (Wright 2012).

The mission targeting forest preservation and reduction of CO₂ emissions in Indonesia, based on funding from the Australian government, was incrementally dismantled and can now be described as a failure (Olbrei and Howes 2012). By

contrast, historical missions funded by and implemented by the Rockefeller Foundation to enhance agricultural efficiency in developing countries were successful (Wright 2012).

An OECD study with 227 respondents from different mission-driven innovation programs worldwide reported that funding primarily came from state funds (30 percent), followed by the EU (13 percent) (Hanson et al. 2022). The fact that the initiative and problem formulation are created centrally has several advantages (clear locus of control, prerequisite for long-term funding, direct governance). On the other hand, centralization increases the risk that some important perspectives or potential approaches are overlooked (Mazzucato 2021). There is also a risk that top-down missions get stuck in the existing institutional structure rather than challenging prevailing institutions, a feature frequently stressed as an important component of missions. Thus, missions easily become sensitive to changing political priorities.

In one case the mission arena consisted of 42 parties (Wesseling and Meijerhof 2021). However, when analyzing the constellation of actors involved in each mission, it is difficult to precisely identify the number of agents. The more distinct the actors are, the more ways a mission can be interpreted as a success (Agarwal et al. 2021). We will return to this point in the discussion of how to interpret successful missions.

Leadership and Institutional Entrepreneurship in Missions

One way to understand the leadership complexities involved is by considering a mission's geographic reach. If the mission is dealing with a global problem, it stands to reason that its implementation should often transcend national borders. Particularly for cross-border or cross-regional missions but also, more generally, institutional leadership in addressing bureaucratic and legal challenges is the key issue. Remember, the team executing a mission should have the authority to wield the necessary regulatory power over the problem at hand.

How to exercise power in the international arena is of course a long-standing problem in many more areas, from conflict resolution to infrastructure. When one large state was the change agent—as in, e.g., the Apollo Program—this can work, subject to the previously discussed requirements.

A considerable number of missions in the collection apply a regional and cross-regional focus on grand societal challenges that, in our view, clearly belong at a higher geographic and governance level. Some papers in the collection do address the functioning of innovation and entrepreneurship in the face of geographic barriers or cross-border regional development (Cappellano and Makkonen 2020). Geographically delineated missions include reaching net-zero emissions in different Swedish regions (Brett et al. 2023) or to develop Covid-19 Plasma in six different countries (Grundy et al. 2023). International collaboration in the form of foreign aid is also noted in a few missions (Olbrei and Howes 2012; Wright 2012).

One cross-national mission revealed that while policymakers could fly back and forth between Washington State in the USA and Canada, scientists could not easily move and collaborate across borders (Cappellano and Makkonen 2020). These legal-administrative problems posed restraints on the mission and strained its leadership. Similar issues could emerge in relatively integrated cross-national missions, such as those spanning national borders in the European Union (Edquist and Zabala-Iturriagoitia 2012). Clearly, optimal geographic area of missions appears to be an issue in urgent need of academic study.

Several missions lacked national leadership and change agents, especially large-scale cross-border missions launched in the European Union (Tosun et al. 2023). Several of the studies stress the importance of middle managers who shoulder the main responsibility in implementing missions, which points to talent management as a crucial component for missions to be successful (Thøgersen 2022; Nylén et al. 2023; Kivimaa and Rogge 2020).

Evaluating Missions

Nelson (2011, p. 684) argues that “one cannot learn from experiments if one does not have ability to identify, control, and replicate effective practice.” Among the 49 mission projects analyzed, very few include formal evaluations of effectiveness, and none include a cost-benefit assessment. At present, there simply does not appear to exist a solution to the problem of evaluation. We begin by considering what the evaluations are based on and what they can and cannot do.

Learning from a Selected Sample

By necessity, this is a “small n” field, with few studies of few projects. The material presented in this chapter is subject to certain selection bias. While we systematically included studies according to the above criteria, this in and of itself does not guarantee an exhaustive or representative list of missions in the wider sense. Most notably, survivor bias is likely to have skewed our selection toward missions that survived for some period.

The papers made use of historical and archival data to understand the missions, and so selection of missions is determined by data availability. Since successful and surviving missions benefited from data collection and media attention, our collection likely overstates the true success rate of missions.

Recall that one of the features of missions is high risk, wherein the governing agent of a failed mission is likely to attract negative media attention and result in overall organizational dejection. Consequently, there are grounds for governing agents of missions to attempt to downplay unsuccessful missions, or unsuccessful aspects of otherwise successful missions. The data presented elsewhere in this

volume indicate that government agencies do so systematically (Björnemalm et al. 2024) and an important avenue for further research is to seek a fuller understanding of the extent and nature of forgotten or downplayed failures if we are to learn from such failures (Denrell 2003).

It is also useful to keep opportunity costs in mind. Missions are designed as directional innovation processes, intended to “tilt the playing field.” But little attention has been paid to ideas and solutions that were *consciously* put aside in cases where the playing field was tilted. What would have been the offshoots of those solutions? Addressing such counterfactual questions remains a fundamental issue in the scientific analysis of mission-oriented innovation policy (Bloom et al. 2019).

With authorities acting as main funders and backers in mission-oriented projects, there are no market mechanisms to inform when a project has realistically passed its due date. In our analysis of mission progress among the missions analyzed in this paper, at least four have been extended beyond their original target date. Missions that were delayed include manufacturing of the X2000 train in Sweden (Edquist and Zabala-Iturriagoitia 2012) and the failed mission surrounding high-speed passenger rail in the USA (Reinecke 2022). Moreover, the agricultural mission in relation to the Green Revolution in Southern Asia experienced delays despite having achieved its agricultural developments (Wright 2012). It is certainly also the case that many projects of this size should probably be aborted long *before* their due dates.

Do we have reason to be hopeful that credible evaluation methods may emerge? To begin with, it is of course correct that missions must at the very least be concrete. But even in the case of something concrete, like “cutting carbon emissions by 50 percent in 10 years,” a myriad of problems remains to be dealt with. Even if this is a national target, for an accurate evaluation in the broad sense, we would need to have ideas about both direct and indirect effects of the policy, including opportunity costs imposed on seemingly unrelated sectors.

Existing methods of policy evaluation are not equipped to deal with these problems. To conduct a cost-benefit analysis, for instance, we need measurable costs (Prest and Turvey 1965). For smaller projects where alternatives are easier to identify, these methods represent a pragmatic way forward. This is hardly the case for the Mission Economy. To summarize, it is difficult to identify systematic answers to the following key questions: How do we identify the right missions to pursue? How do we assess the importance of the problems and means forgone by our answer to the first question?

Mission Types, Risks of Failure, and Mission Capture

In our analysis of failed and successful missions, historical and contemporary missions that center around technological or agricultural innovations stand out as more successful than broader missions, aimed at social or ecological challenges. This

distinction has also been highlighted in the conceptual literature on mission-oriented innovation policy. It has been argued that missions aiming for faster scientific and technological advancement and missions targeting societal challenges are different in key dimensions (Kuittinen et al. 2018; OECD 2021; ESIR 2017).

The distinction helps us understand why picking missions is so difficult. OECD (2021, p. 35) notes: “When selecting the challenge to be addressed, governments thus face a trade-off: The challenge must be broad enough to engage a broad set of actors across policy fields and sectors without ‘picking winners’ (i.e., be overly prescriptive in terms of potential solutions), but sufficiently concrete and well-defined so that it provides strong orientation and is ‘actionable.’” This challenge plays into how stakeholder groups and strategies are identified and put into action. OECD (2021) warns against resulting “mission capture” because someone in charge of a mission must identify and rely on established communities and stakeholders. Often, these communities relate to incumbents in key sectors that tend to avoid transformational agendas involving reshuffling established economic positions (Mazzucato 2021). This risk is present independently of any malicious intent among incumbents.

Incumbents can be incentivized to play an active role in transformation and aid in creating momentum for the transition (Kivimaa and Kern 2016). The study of Danish healthcare frontline workers reveals how incumbents can adapt to new mission aims and methods of working at different paces (Thøgersen 2022). However, our analysis also illustrates how incumbents, intentionally or unintentionally, can tend to gravitate back to the old regime (Begemann and Klerkx 2022). We regard the latter as an effect of status quo bias inherent in most “governed” systems, including systems of innovation.

Finally, lobbyists may also serve as powerful constituents for innovation directionality. The case of the Kalimantan Forests and Climate Partnership between Indonesia and Australia reflects such a case where a project with an initial ambitious aim to reduce deforestation and CO₂ emissions is incrementally downscaled over time until it resembles a simple demonstration project, with significant project delays, internal conflicts, and lack of transparency (Olbrei and Howes 2012).

Discussion

Our overview of the literature and analysis of 49 historical and contemporary missions show that a wide array of policy programs aimed at technological, social, or environmental improvement are united under the umbrella term *missions*. We can only speculate why this is the case. It is possible that policymakers find it convenient to “rebrand” ongoing policy programs as missions to gain increased attention, funding, and capabilities. A similar logic has been long noted in international relations and policy studies (Meseguer and Gilardi 2009; Sebhatu et al. 2020) as well as in research or “management fashions” in the private sector (Abrahamson

1996). In light of this material, and in our view, it is reasonable to ask whether there is a buzzword component involved in determining what is called a mission.

It could also be the case that scholars relabel past policy programs with transformative outcomes—such as the green revolution in Mexico and Southeast Asia—as missions, despite the lack of explicit mission formulations (Wright 2012). If this mechanism is meaningful, we should recall what we said about selection issues above. It means that today’s academics and policymakers are likely oversampling success stories when we learn about missions through case studies.

If policymakers, practitioners, and researchers mean different things when using a term that is becoming increasingly central in growth and innovation policy, then in and of itself that must be considered a problem.

The term *definition* deserves a much more central place in the study of mission-oriented innovation policy. Strictly speaking, if a project does not aim to be revolutionary, but rather incrementally adding to what is already there, it does not fulfill the criteria for a mission as specified by OECD (2021). A mission must also span several sectors and be “general purpose” in its potential private sector applications. Our results show that a considerable portion of the missions studied do not fulfil the criteria for being labelled as missions. It would be desirable to have an agreed-upon terminology in the literature, where a mission is used in its “revolutionizing and game-changing way.” There is a pertinent parallel here to the discussion in entrepreneurship research about the precise meaning of that term (Henrekson and Sanandaji 2014).

In our view and to sum up, missions suffer from three overarching weaknesses that have not yet been fully addressed in the literature.

First, it is still not clear how to best pick or operationalize missions. Previous overviews (Kuittinen et al. 2018; OECD 2021; ESIR 2017), as well as our analysis, suggest that those that build on technological or agricultural innovations seem to succeed more often than broader types of missions aimed at social or ecological challenges. Nelson (2011) reasoned that technological missions tend to have clearly defined parameters and can be approached with scientific methods, while sociological or ecological missions reflect deeper elements of human and organizational behavior. Projects like Project Apollo aiming to land a man on the moon, that in terms of the interpretation of their success are less influenced by social factors, tend to have higher success rates. However, closely defined technological missions may certainly fail as was the case with the Metroliner mission launched during the same time and in the same region as the Apollo mission (Reinecke 2022). Despite sharing technological and governmental context with the Apollo mission, the Metroliner mission failed in its push for high-speed passenger rail in the USA. Evidence is emerging that *mission governance* is a perilous task for a myriad of reasons. What constitutes successful governance, when, where, and under what circumstances are urgent issues for future research.

Second, we have not generated ways to systematically evaluate mission successes and failures. At this point, any effort to evaluate a mission may be likened to assessing a moving and undefined target. We must also consider that opportunity costs are not only likely to be sizable; they also arise in incredibly complex ways.

Third, it is inherently difficult to make a flesh-and-blood person accountable for the failure of a mission, which greatly increases the risk that an unproductive, or even destructive, project is initiated, as well as supported past its due date. A firm that is hijacked by a bad idea suffers financially. A state that is hijacked by a bad idea is unlikely to suffer by any parameters it cares about. It might even find parameters by which it appears successful and tout its success.

In his book *The Moon and the Ghetto* (Nelson 1977), Richard Nelson asks how it came to be that humankind managed to put a man on the moon but could not teach ghetto kids to read. It is of course a hopeful proposition that resources and political willpower are the missing pieces, as embodied in the call for missions. But when Nelson reflected on his book almost 35 years later (Nelson 2011, p. 685), he recalled that a central argument of the book, and something he still considered central to things we could not do, was “not so much political, as a consequence of the fact that, given existing knowledge, there were no clear paths to a solution.” With problems where the “what to do” is reasonably straightforward, where it is obvious who the experts are, where we can draw on already well-developed knowledge in science and private enterprises, and where there is currently a lack of critical mass, missions may work in theory. The question is how many problems of significant importance fit those criteria.

Contrary to the Apollo or Manhattan projects, it is unlikely that one technological solution will take us past the global warming scare (Mowery et al. 2010). High degrees of complexity lower the likelihood that a mission can solve the problem. Alas, those are the kind of missions that we are steering against. If we allow our states to take on these issues, they risk failing in more ways than one.

If missions are going to work, we believe that the following four points need to be urgently addressed. First, we need better tools to select missions and to distinguish them from other large-scale innovation policies. These tools must inform us about whether an area is likely to produce general purpose technologies. Second, how do we address the implications of a mission’s geographic boundaries, whether regional or global? Third, how do we assign the appropriate due date associated with a mission and how do we know when to switch off the lights? Fourth, in an evolutionary economy, how can we understand the foregone value of those solutions eliminated by a mission that has won political and bureaucratic support?

As this review highlights, the quality of research on missions is plagued by the fact that the cases are not randomly selected; they are usually selected among the winners and success cases. Many missions lack an explicit end point, and if they have one, it is often postponed. We therefore remain uninformed about the success rate of innovation missions.

Conclusions

In this chapter we review the empirical literature on mission-oriented innovation policy and identify 49 mission-oriented initiatives. Fifty-nine percent of these initiatives are still ongoing, 33 percent are described as successful, and 8 percent are described as failures. Two-thirds of the missions reviewed were instituted in Europe, followed by 24 percent in North America, 8 percent in Asia, and 6 percent in Latin America. More than one quarter of the missions concerned environmental sustainability, followed by public sector concerns, medicine, ICT, energy, transportation, and agriculture.

By analyzing the characteristics of these initiatives more closely, we find that initiatives referred to as missions are no different from traditional goals of innovation policy or social/regional policy, and rarely meet OECD's criteria for an innovation mission. We find the cases reviewed to be lacking when it comes to, e.g., common understanding, an integrated and coherent vision, clear, measurable, and time-bound goals, and milestones, which in turn would enable follow-up and evaluation. Our review also shows that only half of the missions had laid down a deadline for the mission's completion.

While the theoretical literature has emphasized that missions should ideally be sufficiently general and span many fields in order to accomplish institutional regulatory, scientific, and commercial advances with potential for broad-ranging spillovers (Nelson 2011), our review shows that almost none of the missions we have identified fulfill these criteria in a satisfactory way.

None of the 49 mission evaluations included a cost-benefit analysis or an attempt to assess opportunity costs. This calls into question the standard by which 33 percent of the missions were rated as "successful."

Appendix: Studies in the Literature Review

Study	Reference
1	Agarwal, R., Kim, S., & Moeen, M. (2021). Leveraging private enterprise: Incubation of new industries to address the public sector's mission-oriented grand challenges. <i>Strategy Science</i> , 6(4), 385–411.
2	Kivimaa, P., & Kern, F. (2016). Creative destruction or mere niche support? Innovation policy mixes for sustainability transitions. <i>Research Policy</i> , 45(1), 205–217.
3	Deleidi, M., & Mazzucato, M. (2021). Directed innovation policies and the supermultiplier: An empirical assessment of mission-oriented policies in the US economy. <i>Research Policy</i> , 50(2), 104151.
4	Mateos-Garcia, J. (2019). Mapping research & innovation missions: With an application to the UK government mission to transform the prevention, diagnosis and treatment of chronic diseases using artificial intelligence. Available at SSRN: https://ssrn.com/abstract=3483203

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Study	Reference
5	Prochaska, L., & Schiller, D. (2021). An evolutionary perspective on the emergence and implementation of mission-oriented innovation policy: The example of the change of the leitmotif from biotechnology to bioeconomy. <i>Review of Evolutionary Political Economy</i> , 2(1), 141–249.
6	Wesseling, J., & Meijerhof, N. (2021). Developing and applying the mission-oriented innovation systems (MIS) approach. Working paper. https://doi.org/10.31235/osf.io/xwg4e
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8	OECD (2021). The design and implementation of mission-oriented innovation policies: A new systemic policy approach to address societal challenges. OECD Science, Technology and Industry Policy Paper No. 100. Paris: Organisation for Economic Co-operation and Development.
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10	Thøgersen, D. (2022). Windows of translation in public service innovation. Introducing a new mission in public childcare. <i>Journal of Change Management</i> , 22(4), 401–421.
11	Kivimaa, P., & Rogge, K. (2020). Interplay of policy experimentation and institutional change in transformative policy mixes: The case of mobility as a service in Finland. SPRU Working Paper SWP 2020-17. Brighton: University of Sussex, Science Policy Research Unit.
12	Begemann, S., & Klerkx, L. (2022). Scrutinizing the construction of transformative missions through the lens of policy assemblages: The case of the Dutch Circular Agriculture Mission. Available at SSRN: https://ssrn.com/abstract=4137893
13	Grundy, Q., Campbell, C., Ali, R., Herder, M., & Holloway, K. (2023). “A most equitable drug”: How the clinical studies of convalescent plasma as a treatment for SARS-CoV-2 might usefully inform post-pandemic public sector approaches to drug development. <i>Journal of Law, Medicine & Ethics</i> , published online.
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15	Olbrei, E., & Howes, S. (2012). A very real and practical contribution? Lessons from the Kalimantan Forests and Climate Partnership. <i>Climate Law</i> , 3(2), 103–137.
16	Janssen, M. J., & Abbasiharofteh, M. (2022). Boundary spanning R&D collaboration: Key enabling technologies and missions as alleviators of proximity effects? <i>Technological Forecasting and Social Change</i> , 180(July), 121689.
17	Ziegler, R. (2020). Paludiculture as a critical sustainability innovation mission. <i>Research Policy</i> , 49(5), 103979.
18	Wright, B. D. (2012). Grand missions of agricultural innovation. <i>Research Policy</i> , 41(10), 1716–1728.
19	Foray, D. (2018). Smart specialization strategies as a case of mission-oriented policy—A case study on the emergence of new policy practices. <i>Industrial and Corporate Change</i> , 27(5), 817–832.
20	Tosun, J., Heinz-Fischer, C., & Luo, R. (2023). Who takes the lead? A disaggregate analysis of the EU’s engagement in the Clean Energy Ministerial and Mission Innovation. <i>Journal of Cleaner Production</i> , 382(7), 135240.

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Study	Reference
21	Brett, N., Magnusson, T., & Andersson, H. (2023). From global climate goals to local practice—Mission-oriented policy enactment in three Swedish regions. <i>Science and Public Policy</i> , published online.
22	Reinecke, D. (2022). Moonshots to nowhere? The Metroliner and failed high-speed rail in the United States, 1962–1977. <i>Journal of Transport History</i> , 43(1), 33–53.
23	Borrás, S., & Schwaag Serger, S. (2022). The design of transformative research and innovation policy instruments for grand challenges: The policy-nesting perspective. <i>Science and Public Policy</i> , 49(5), 659–672.
24	Brown, R. (2021). Mission-oriented or mission adrift? A critical examination of mission-oriented innovation policies. <i>European Planning Studies</i> , 29(4), 739–761.
25	Cappellano, F., & Makkonen, T. (2020). The proximity puzzle in cross-border regions. <i>Planning Practice & Research</i> , 35(3), 283–301.
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28	Edquist, C., & Zabala-Iturriagoitia, J. M. (2012). Public procurement for innovation as mission-oriented innovation policy. <i>Research Policy</i> , 41(10), 1757–1769.

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When “What Works” Does Not Work: The United States’ Mission to End Homelessness



David S. Lucas and Christopher J. Boudreaux

Abstract This chapter presents a case study of the United States’ federally led mission to eradicate homelessness, focusing on the early twenty-first century. We document the emergence of a federal strategic plan to prevent and end homelessness in the wake of the Great Recession, paying special attention to the role of “evidence-based” solutions and state leadership in this effort. We then review the disparities between the stated goals and realized results. Despite a doubling of federal funding, broad cross-sector collaboration, and a successful imposition of government-preferred practices in the homeless services industry, none of the four goals defined in 2010 were completed over the next decade. We assess these lackluster results and elicit new insights for other “moonshot” missions aimed at grand societal challenges.

Keywords Homelessness · Mission · Evidence · Grand challenges · Innovation

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Homelessness is solvable; we have learned a lot about what works. (United States Interagency Council on Homelessness 2010)

We don’t know how to end homelessness. Not in the aggregate, anyway. (O’Flaherty 2019)

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Introduction

Much of the discussion in *Mission Economy* (Mazzucato 2021)—and from other contributors to this book—focus on the relationship of the state to for-profit companies as they collectively engage with major social objectives. However, it is also instructive to consider how the principles of state-directed, mission-oriented thinking have fared in contexts where third sector-state relations dominate. Indeed, in the United States and elsewhere, government and nonprofits (rather than companies) are the key players in a broad array of initiatives aimed at social problems like poverty, education, healthcare, and homelessness, among others. In addition, the focal target for *Mission Economy* prescriptions are the UN’s Sustainable Development Goals (SDGs). Many of the SDGs involve contexts where extensive (and expensive) public-private partnerships already abound, wherein governments provide public services via grants, contracts, and policies that are primarily channeled through nonprofit organizations (Smith and Lipsky 2009). As such, it is useful to consider the prospects of mission-focused state leadership in these contexts.

This chapter provides such an analysis. Specifically, we provide a case study of the US federal government’s (mis)adventures in its mission to prevent and end homelessness, focusing on the period from 2008 to 2022. Homelessness in the United States is an illuminating case to consider in relation to the Mission Economy’s core principles and focus. First, homelessness looms large as an enduring and pervasive social issue—stubbornly persisting across impoverished nations and wealthy, market-oriented economies alike (Toro et al. 2007). Second, homelessness has been referred to as “intractable” (Eide 2020), a “wicked problem” (Brown et al. 2013), and a “grand challenge” (Henwood et al. 2015)—i.e., exactly the kind of social issue that proponents of the Mission Economy would see amenable to an innovative, collaborative, government-led response. Third, and most importantly, the US government’s engagement with homelessness in the twenty-first century is distinctive in its almost-prescient alignment with Mazzucato’s prescriptions for successful “moonshot” initiatives (Mazzucato 2021). Rather than a passive remediator of market failures, the federal government played a catalyzing leadership role in defining and pursuing a bold and innovative mission against homelessness. Spearheaded by the United States Interagency Council on Homelessness (USICH), a “federal agency with a sole mission on preventing and ending homelessness in America” (USICH 2023), the government worked throughout this period to facilitate broad coordination, dramatically expand funding, and mobilize a shift toward innovative, evidence-based approaches to homeless services—all while engaging diverse stakeholders across areas and levels of government, sectors, and communities to pursue a suite of clearly defined goals related to the prevention and eradication of homelessness.

But despite a clear mission, good intentions, bipartisan political support, evidence-based innovations, major funding increases, thorough stakeholder engagement, and unequivocal state leadership, the results during this period were underwhelming at best. A more-than-doubling of federal expenditures and the

widespread diffusion of evidence-based practices saw a mere 9 percent reduction in total homelessness; in fact, the downward trend stalled early, with no single year-over-year decline in homelessness since 2016. Not a single one of the four objectives initially outlined in 2010 were met, and each one was eventually delayed, revised, or dramatically curtailed. Even those supportive of the government’s efforts to date acknowledge that “most plans to end homelessness have fallen far short of the mark” (Lee et al. 2021, p. 15).

In what follows, this chapter will analyze the government’s “rescue mission” of homelessness. We first outline the historical conditions that gave rise to a new era of homeless response in the wake of the Great Recession, documenting the emergence of a government-led, evidence-based mission unlike previous efforts. We then review the results during the ensuing period, marking the divergence of realized outcomes from the original objectives. Next, we highlight several unintended consequences generated by the government’s interventions during this period. Finally, we assess the repetition of history with the most recent federal strategic plan for homelessness, which features a suite of updated goals and a renewed state-led strategy to achieve them. The case study reveals the limits associated with a government-coordinated mission to address a particular form of human suffering—even when that mission is designed to promote evidence-based policies and engage “bottom-up” solutions.

A Very Brief History

Homelessness is not a new phenomenon, nor is a government-led response to engage with it. As part of the New Deal programs enacted in response to the Great Depression, a program called the Federal Transient Service was created specifically to address the apparent rise of what were then referred to as “tramps” or “hoboes”—mostly White, older men with highly migratory lifestyles. While the program only lasted for 2 years, it exemplified an “era” of homelessness lasting throughout the early twentieth century that was characterized by this demographic.

By the 1980s, however, there was a growing consensus that the problem of homelessness had taken on a new chapter. Homelessness was affecting broader swathes of society, including greater numbers of people, more families, and more people of color. Activists emerged as prominent national voices to elevate homelessness into a cultural crisis. Highly politicized debates about the extent of homelessness raged; one activist claimed 2–3 million, while a 1984 report from the Reagan administration estimated roughly 350,000 (United States Department of Housing and Urban Development 1984). Whatever the number, the sense was that this new homelessness also required a new approach—one where the federal government played a key role in funding and mobilizing homeless responses. In 1987, the Stewart B. McKinney Act (later updated to the McKinney-Vento Act) emerged as the centerpiece of federal homelessness legislation, ushering in what many refer to as the “modern era” of homelessness.

Through the end of the twentieth century, the nation's homeless response infrastructure matured and reached a relatively stable equilibrium. By the 1990s, homeless services began to be coordinated via Continuums of Care (CoCs), networks of nonprofit, and local government organizations serving the homeless in a particular geography. The federal government was a major source of funding, channeling resources through the CoC system. Notably, this infrastructure of homeless service providers evolved distinctly from (and often disconnected from) other programs related to affordable housing (e.g., the Low Income Housing Tax Credit), public housing, and most housing subsidies (e.g., Sect. 8 Housing Vouchers).

From the Linear Model to Housing First

The modern homeless services infrastructure consists of organizations providing four main forms of housing programs: emergency shelter, transitional housing, rapid rehousing, and permanent supportive housing. Emergency shelter fits with the layperson's understanding of a homeless shelter, typically characterized by many beds in larger, mostly public sleeping areas. These exploded in the 1980s as a stopgap meant to keep individuals in crisis from "sleeping rough." As such, they are the lowest common denominator, intendedly meant to address bouts of housing displacement as manifested emergency.

To understand transitional housing, however, requires a brief foray into the notion of service models—the programmatic strategies for facilitating exits from homelessness. Table 1 illustrates the two main alternative service models. The early modern homeless era was characterized by what scholars call the "linear model" of homeless services. Because homelessness was viewed as a problem of individual behaviors and responsibility, providers sought to cultivate and ensure "housing readiness" in their clients—through e.g., some combination of mental health stability, work, and control of substance abuse. Typically ranging from 6 to 18 months, transitional housing programs provided more private housing units but also targeted case management and support services. In the linear model of homeless services, transitional housing was viewed as a key intermediate step out of emergency shelter and toward an exit into stable housing. For some, this meant moving back into traditional, independent housing. For others, the ultimate destination was permanent supportive housing—fully or heavily subsidized housing on a long-term basis, often with case management.

Eventually, a second service model arose in stark contrast to the linear model: Housing First. While the next section will discuss the political circumstances that propelled Housing First to the front-and-center of the government's mission to end homelessness, we will first review the approach and philosophy. Housing First is an approach that emphasizes rapid and unconditional placement into supportive housing. As its proponents indicate, the original "Pathways Housing First" program, originating in New York City, featured a "(1) program philosophy and practice values emphasizing *consumer choice*; (2) *community based, mobile support*

Table 1 Alternative homeless services models

	Linear model	Housing first
<i>Philosophical premises</i>		
Supportive housing timeline	When client is “ready”	Immediately
Case management	Required	Offered, but optional
Psychiatric stability	Precondition	Not a precondition
Approach to behavior	Elimination	Harm reduction
Geographic context	Concentrated	Scattered-site ^a
Theory of change	Personal stability precedes and facilitates housing stability	Housing stability can precede behavioral stability, but consumer choice prioritized over behavioral change
<i>Types of programs</i>		
Emergency shelter	Yes	Yes
Transitional housing	Yes	No
Rapid rehousing	No	Yes
Permanent supportive housing	Some	Yes

^aWhile scattered-site programming is a part of the original Pathways Housing First model, the evidence suggests that many providers do not utilize this in their adaptations (Gilmer et al. 2013)

services; and (3) *permanent scatter-site housing*” as well as “harm reduction” (Padgett et al. 2016, p. 3). As such, the Housing First model’s main program is permanent supportive housing—long-term subsidized units for individuals or families with (optional) case management. Alongside this, however, was the introduction of “rapid rehousing” a medium-term option following the Housing First philosophy. As such, rapid rehousing effectively replaces transitional housing in the Housing First model, because it offers a similar timeframe but removes all preconditions and notions of readiness.

The Emergence of a Mission for Homelessness

The Preconditions

As hinted above, the linear and Housing First models stand in stark philosophical and practical contrast. In the 1980s, when the homeless services industry emerged

alongside targeted federal legislation, the linear model was the dominant paradigm. However, Housing First was introduced in the 1990s by a pioneering organization in New York City, Pathways Housing First. Led by Sam Tsemberis, Pathways focused on the long-term, hard-to-house subset of the homeless population—arguing that the behavioral and psychiatric expectations of the linear model programs functioned as unnecessary barriers to housing for this group. Seeing housing as a human right, Tsemberis developed Pathways Housing First to remove these barriers—and, in doing so, to pursue a harm reduction rather than behavioral change focus.

Importantly, Tsemberis also developed randomized trial studies of Pathways' programs. Tsemberis and a team of researchers published a series of papers demonstrating much higher rates of housing retention for those served by his program than the traditional services for this particularly hard-to-house population (Tsemberis et al. 2004; Tsemberis and Eisenberg 2000). These studies proved pivotal for an emerging body of academic research that would lay the foundation for Housing First to become one of the most prominent examples of evidence-based policy in the United States (Lucas 2018).

Lucas (2018) elaborates on this to describe how policy entrepreneurs, including Tsemberis, leveraged academic evidence to elevate Housing First as a centerpiece of a renewed policy discussion around homelessness. Importantly, the housing retention success of Tsemberis' New York City program dovetailed nicely with other researchers' findings about the taxpayer costs of homelessness. Specifically, Dennis Culhane's pioneering scholarship showed that the costs of homelessness in terms of public services were essentially power-law distributed: a very small subset of homeless individuals utilized a very large share of shelter services and also imposed high costs in terms of hospitals, jails, and police expenses (Culhane et al. 2002; Poulin et al. 2010). The vast majority, by contrast, utilized shelter services in a manner that was brief and nonrecurring.

Taken together, the two components of the evidence showed that (i) a small group of homeless individuals the "chronically homeless"—accounted for a disproportionate share of the economic burden of homelessness, and (ii) the Housing First approach could dramatically improve housing retention for this group—at a lower cost than that imposed through these individuals' use of public services in the status quo. As such, a narrative emerged around Housing First as both a fiscally responsible use of taxpayer dollars *and* a compassionate alternative to the linear model. Championed both by journalists (e.g., Gladwell 2006) and policy advocates alike, Housing First steadily garnered increasing bipartisan support through the early 2000s (Stanhope and Dunn 2011). Housing First was championed within the George W. Bush administration by Phil Mangano, Executive Director of USICH. In a telling profile in *The Atlantic*, Mangano is quoted as saying, "Research is the new advocacy" (McGray 2004). Indeed, evidence proved pivotal to mobilize political energy around a renewed vision and mission for homelessness policy (Lucas 2018). Given the ideologically divisive nature of entitlement spending in the United States, stakeholders in the homeless services ecosystem recognized a profound opportunity to transform homelessness policy for the first time in decades.

But it was not only advocates’ efforts to elevate Housing First that initiated the emergence of a national policy mission for homelessness. Rather, the 2009 global financial crisis created fertile conditions for dramatic policy change. It was evident that the Obama administration’s policy response was intendedly revolutionary. As Obama’s then-Chief of Staff, Rahm Emanuel, famously asserted in November 2008, “Never let a serious crisis go to waste. What I mean by that is it’s an opportunity to do things you couldn’t do before” (*Wall Street Journal* 2009). Homeless services proved a suitable target for this opportunity, given the housing market’s role in the Great Recession. Therefore, alongside the federal government’s sweeping stimulus package came the HEARTH Act of 2009, a major revamp of the McKinney Vento Act that established the scope of federal homelessness response. The HEARTH Act redefined homelessness policy, promised a dramatic increase in federal funding, and set forth a mandate for the federal government to develop a strategic plan aimed at ending homelessness (Lucas 2017).

Opening Doors: The Federal Plan to Prevent and End Homelessness

Under the mandate of the HEARTH Act, USICH produced a revolutionary strategic plan that outlined a federal mission for homelessness: “Opening Doors: The Federal Plan to Prevent and End Homelessness.” Opening Doors introduced four ambitious goals:

- Finish the job of ending chronic homelessness in 5 years.
- Prevent and end homelessness among Veterans in 5 years.
- Prevent and end homelessness for families, youth, and children in 10 years.
- Set a path to ending all types of homelessness.

Of these four goals, the first three have a well-defined success criterion. It is worth noting that USICH does note that these goals could be seen as “aspirational” (p. 52). Yet, the plan also exuded significant optimism about the effectiveness of the strategies recommended: “Solutions exist. New collaborative leadership, more coordination, and wise investments in proven strategies. . . *will lead* to major reductions in homelessness” (USICH 2010, p. 24, italics added).

The plan also provided ten objectives related to these goals. Notably, the last objective falls under the theme of “Retool the Homeless Crisis Response System.” Hence, although “collaboration” is emphasized throughout the plan, this functionally translated to top-down pressure to conform to “expert” policy prescriptions: “The Plan also proposes the *re-alignment* of existing programs based on what we have learned and the best practices that are occurring at the local level, so that resources focus on what works” (p. 4, emphasis added). As then-HUD Secretary and USICH Chair Shaun Donovan writes, “The Council members and the Administration are fully committed to taking these best practices and proven solutions to scale across

the federal government” (p. 3). The plan makes clear that the “proven solutions” being considered were based on the presumed superiority of Housing First. Discussing the goal of ending chronic homelessness, the plan states: “Permanent supportive housing using Housing First is a proven solution that leads to improvements in health and well-being. Supportive housing also has been shown to be a cost-effective solution in communities across the country” (p. 38). Elsewhere, the plan declares the “documented success” of Housing First over the linear model (p. 49), chiding communities that have not yet emphasized a transition toward a Housing First-based system of care.

In sum, the plan was equal parts optimistic, focused, and evidence-based, articulating a confidence in the ability to make significant impact by leveraging evidence to initiate systems change. In other words, the federal government set forth a top-down mission to alleviate homelessness. Furthermore, this mission focused on federal leadership, cross-agency and cross-sector collaboration, provider coordination, and rigorous applications of evidence—all hallmark prescriptions offered by the advocates of centralized policy missions to address grand challenges.

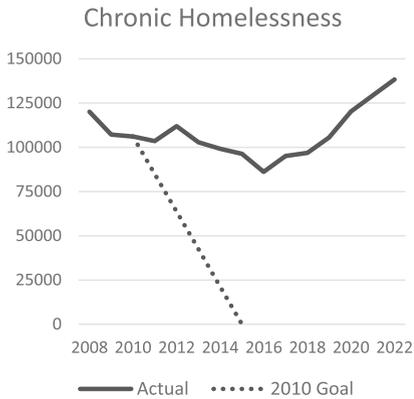
Results

The Four Goals

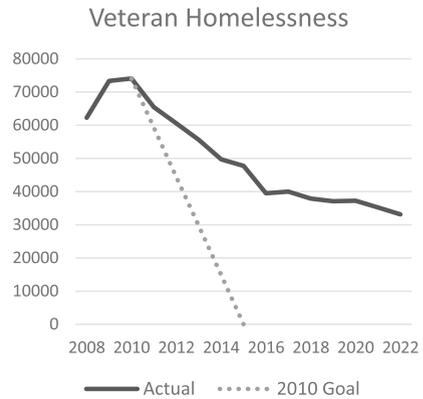
We begin our assessment of the results with respect to the 2010 strategic plan’s four overarching goals. Of the four goals outlined in USICH’s 2010 strategic plan, zero had been met by 2020. Figure 1 details these results. The dashed lines report the government’s goal projections; for simplicity, we take the target deadline for eliminating homelessness among each subpopulation and linearly interpolate the trajectory. The solid lines are the observed trends as reported by the Department of Housing and Urban Development in its *Annual Homeless Assessment Report* to Congress.

Chronic homelessness. Among the four goals, eliminating chronic homelessness appeared to offer the greatest certainty of success *ex ante*. This is because the chronically homeless were the group for whom the evidence supporting the government’s preferred service model, Housing First, was deemed to be strongest. As the 2010 strategic plan boldly declares, “For people experiencing chronic homelessness, *the research is clear* that permanent supportive housing using a Housing First approach is *the solution*” (p. 18, *emphasis added*). By many accounts, this goal also seemed positioned to do the “most good,” in that it focused on housing a group acutely suffering from the cooccurrence of long-term or repeated bouts of homelessness and the presence of disabilities. Although a small fraction of the homeless population, chronically homeless persons are perhaps the most visible subpopulation and most aligned with the typical lay notion of a person experiencing homelessness.

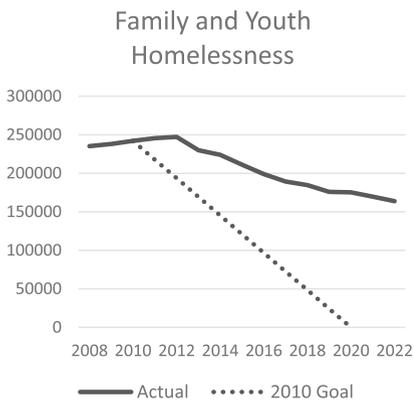
It is important to recognize that chronic homelessness was also central to the “economic” arguments for Housing First. Individuals facing long-term or recurrent



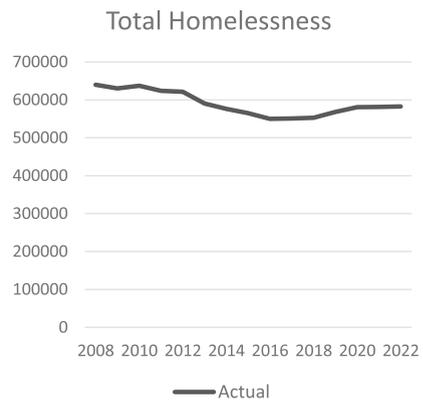
(a) Ending chronic homelessness by 2015



(b) Ending veteran homelessness by 2015



(c) Ending family and youth homelessness by 2020



(d) Setting a path to end all homelessness

Fig. 1 US government goals vs. observed trends in key homeless populations, 2008–2022. *Source:* Point in Time Counts of Homelessness, United States Department of Housing and Urban Development

bouts of homelessness have long been identified as heavy users of public services like hospitals and jails—imposing disproportionate costs on taxpayers. The federal government projected Housing First would save taxpayers money and provide long-term housing to those whom had otherwise been unable to secure it. At the heart of this claim was the elimination of chronic homelessness. In turn, much of the bipartisan support for the federal homelessness strategy was grounded in the dual claim that Housing First was not only compassionate but also cost-effective (Stanhope and Dunn 2011).

However, despite a dramatic increase in permanent supportive housing beds and a widespread commitment from communities across the country to implement Housing First, chronic homelessness persisted and even worsened. Not only was the end of chronic homelessness far from being realized in 2015, but the chronic homeless population was estimated to have *increased* by roughly 30 percent from 2010 to 2022. Furthermore, chronic homelessness had not only increased but also become a more pervasive experience *among the homeless*, increasing from 16 to nearly 24 percent of the homeless population.

Anecdotal evidence also affirms that this particularly harsh, long-term, and visible form of homelessness is indeed worsening—especially in major urban cities. National media regularly covers the “crisis” of homelessness in San Francisco, a city increasingly associated with long-term tent encampments and open-air drug markets. Despite the Bay Area’s affluence and prominent reputation for cultivating tech giants—along with USD 680 million in direct programmatic homeless spending by the city each year—chronic homelessness nearly doubled from 2015 to 2019 (1629 to 3030). By the end of the period, roughly 1 in 100 residents was counted as homeless (Enzina 2021). Other California cities like Los Angeles have seen similarly bleak trends in chronic homelessness and an increasingly visible “street homeless” population, transforming the safety profile of many neighborhoods.

The abject failure to eliminate or even reduce chronic homelessness is striking, and we will consider some of the factors for these trends later in this chapter. In sum, the raw data make clear that chronic homelessness proved not to be the “golden goose” of the evidence-based policy as had been anticipated, but rather the “canary in the coal mine”—indicative of a profound disconnect between the intentions and outcomes of this state-led mission.

Veteran homelessness. The second goal, ending veteran homelessness by 2015, appeared to fare better than the chronic homelessness goal. Indeed, veteran homelessness saw the largest reduction of any subgroup throughout the period. While still far short of the initial goal, veteran homelessness did decline by roughly 50 percent from 2010 to 2020. Understandably, then, proponents of the US policy interventions typically hold veteran homelessness as the proof of success. It is typically contended that this proves the efficacy of the government’s leadership and the validity of its evidence-based initiatives.

Yet, inquiry into this trend casts significant doubt on the lessons that can be drawn for other homeless populations. One key reason is a dramatic secular decline in the *number of veterans* at risk of homelessness during the period. O’Flaherty (2019) documents how the number of adult veterans aged 18–65 dropped by 26.7 percent from 2010 to 2016. Because the total number of veterans at risk of homelessness declined dramatically, O’Flaherty estimates that the trends in the *incidence* or rate of homelessness among this group mirrored overall trends. Recent work has also shown that exposure to combat is an important predictor of homelessness among veterans (Ackerman et al. 2020), indicating that the antecedents and experience of veteran homelessness is likely atypical.

Furthermore, the veteran homeless population receives far more targeted homelessness funding than the rest of the homeless population (Perl 2023). From 2010 to

2020, while moving down in the share of the total homeless population from 11 to 6 percent, veterans moved up in the share of targeted homelessness funding from the federal government from 16 to 26 percent. On a per capita basis, the spending difference is particularly stark. Back-of-the-envelope calculations indicate that each homeless veteran is allocated about USD 47,000 in federal spending compared to USD 9100 for each nonveteran. To increase nonveteran per capita funding to spending parity would require an *additional* USD 20.5 billion per year (over a 300 percent increase from 2020 levels). And even this would not account for the myriad other government programs to support veterans beyond homelessness.

Taken together, the secular decline in the population of veterans at risk of homelessness along with the massive and targeted investment into this group reveal that the “strongest” evidence of any margin of success in the state’s mission to end homelessness is, in fact, dubious. O’Flaherty (2019, p. 21) summarizes the results of the federal efforts toward veteran homelessness in the early 2010s: “This great initiative appears to have accomplished little.”

Family and youth homelessness. Family and youth homelessness trends fall between veterans and the chronically homeless, with modest but notable declines. USICH’s 2010 goal was to end family and youth homelessness by 2020. Over that decade, family and youth homelessness declined by roughly 30 percent. It is worth noting that families are typically said to experience homelessness as a brief and nonrecurring experience—and rarely as “unsheltered” homeless outside of the established shelter system. This has implications for the long-term potential for this downward trend to persist as will be discussed below.

Total homelessness. Total homelessness declined only modestly during the period. In fact, no single year-over-year reduction in total homelessness was observed from 2016 to 2022, such that the second half of the period unraveled the vast majority of the modest gains made during the initial years of the mission. The lackluster trend has been difficult to ignore. In fact, scholarly consensus has also shifted significantly away from the confidence of a decade prior. As noted in the epitaph quote from a leading homelessness economist, “We don’t know how to end homelessness. Not in the aggregate, anyway” (O’Flaherty 2019). Overall, the goal to “set a path to end all types of homelessness” has not been met.

Federal Strategies Through the Period

The federal government did not sit idly by while these underwhelming trends unfolded. Its mission engagement and leadership continued throughout the period, revolving around three main areas: funding increases, Housing First prioritization, and strategic revisions.

Federal Homelessness Funding

First, although some pundits blame limited funding availability for the results above, the federal government dramatically increased the fiscal footprint of its homeless services spending throughout the period. Figure 2 presents the nominal expenditures for targeted federal homelessness programs from 2010 through 2022. Funding increased steadily throughout the period; by 2022, funding had more than doubled from 2010 levels to USD 7.9 Billion annually. This amounts to roughly USD 13,500 per person counted as homeless in the 2022 point-in-time count—greater than the annual median gross rent in the United States.¹ It should also be noted that these trends were unaffected by the election of Donald Trump in 2016; funding continued to increase at a similar rate as in the Obama era. This casts significant doubt on the claim that the new administration’s policy shifts slowed progress toward the homelessness goals in the later end of the period. Overall, there is little evidence that funding constraints hindered the plan’s success, even though this is a relatively common assertion.

Advancing Housing First

The second role of the government to pursue this mission was in its “leadership” role in pressuring homeless service providers to implement Housing First and its associated programs. As the 2010 strategic plan clearly indicated, the federal government aimed to lead an evidence-based “retooling” of the homeless services industry—away from the linear model and toward Housing First. While the federal government did not explicitly require these changes, the competitive funding model prioritized Housing First programs both within and across communities. The largest grant under this mission, the CoC grant, was structured such that organizations in a community would apply jointly for funding. The representative organization for that community was tasked with ranking each program on a set of criteria provided by HUD. As of 2013, existing programs that aimed to revise away from linear model practices toward Housing First received extra points and a high likelihood of funding (USICH 2020, p. 9). By contrast, new programs were very unlikely to be competitive for federal funding if they did not commit to following Housing First practices; these projects were scored to rank near the bottom in each community’s annual grant request. Similarly, existing programs that did not fit the Housing First ideology—most notably, transitional housing—faced a high risk of defunding.

¹ <https://www.census.gov/quickfacts/fact/table/US/HSG860221>. Accessed 5/3/23. There are more people than this experiencing homelessness throughout the year; HUD estimated roughly 934,000 people interacting with the homeless shelter system in 2021. This would imply approximately USD 8400 per person if all spending went toward individuals who interact with the provider network.

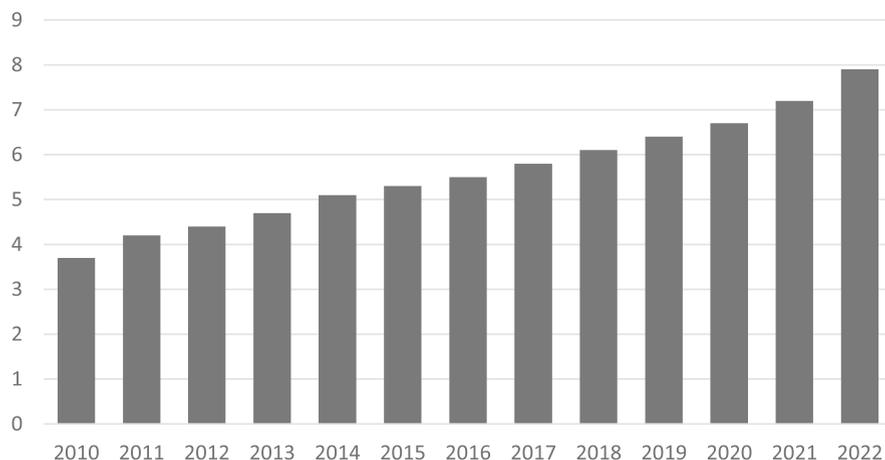


Fig. 2 Federal targeted homelessness expenditures, 2010–2022 (billion USD). *Source:* President’s Budget: Fact Sheet on Homelessness Assistance, United States Interagency Council on Homelessness

Figure 3 shows how these funding priorities corresponded to a rather successful “retooling” of local homeless providers’ programs. Each line indicates the total number of year-round beds associated with shelter programs of each main type. The two hallmarks of the Housing First model, permanent supportive housing and rapid rehousing, exploded over the period. Permanent supportive housing more than doubled to nearly 400,000 beds. Rapid rehousing, which was not tracked until 2013, also increased rapidly, reaching 150,000 beds by 2022. It should be noted that there is limited data on how faithfully these two programs have been implemented with respect to Housing First principles. However, it is clear that the reason for the bed increases in these two program types was a federal emphasis on Housing First. We will revisit this point in a later section.

By contrast to permanent supportive housing and rapid rehousing, linear model programs dwindled precipitously. The clearest evidence of this is in transitional housing. The supply of transitional housing beds was halved over the decade. While some providers did retool their transitional housing programs to a rapid rehousing (the most direct “substitute” in the Housing First model) or other approach, the data also suggest that many providers simply closed these programs as funding decreased. Little is known about how different transitional housing providers navigated this period, and this is an important area for organizational scholarship.

Overall, the federal government was highly effective at mobilizing local public and nonprofit providers to abandon what the government deemed to be outdated practices and replace them with the “evidence-based” innovations they believed to be effective at preventing and ending homelessness. This is particularly notable in that transitional housing had been a bedrock component of homeless service

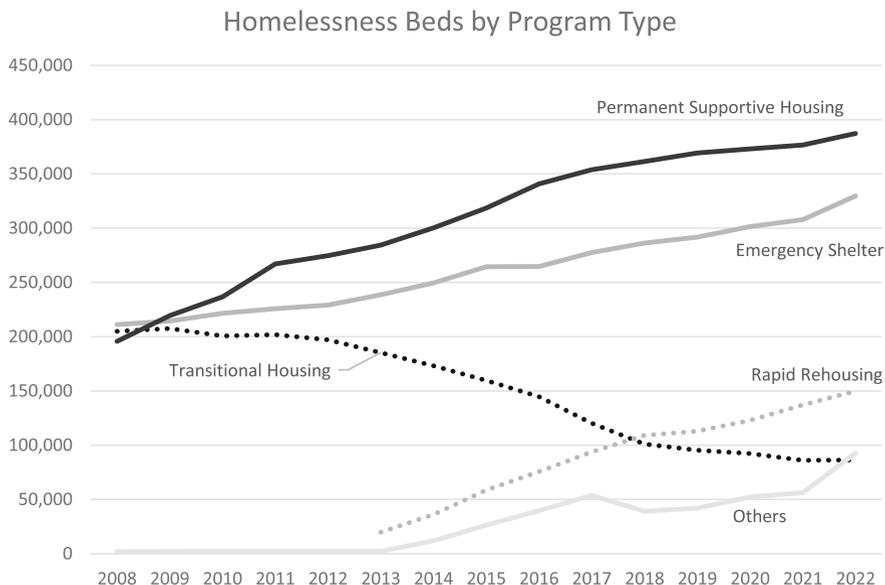


Fig. 3 Retooling the homeless shelter system. *Source:* Housing Inventory Counts, United States Department of Housing and Urban Development

provision across the United States since the 1980s. In this sense, a crucial component of the strategic plan to prevent and end homelessness was carried out with remarkable precision and rapidity.

Another important point is that the trends do not appear subject to changes in political power. As with the funding continuations during the Trump administration, the trajectory away from transitional housing programs and toward the Housing-First-friendly programs continued with no visible evidence of disruption.

Revisions to the Federal Mission

It was evident long before 2020 that the nation was not on pace to complete the mission set out in the initial Opening Doors plan. As such, in addition to the funding increases and institutional pressures imposed on providers during the period, the federal government also actively revised the strategic plan in response to the lackluster trends. In 2015, the federal government introduced an updated version of the plan and revised the goal of preventing and ending chronic homelessness—moving this deadline from 2015 to 2017. Other goals remained in place.

In the 2015 update, the revised strategic plan also doubled down on Housing First commitments and strategies. For instance, even while updating the goal of ending chronic homelessness due to the limited results to date, the plan boldly reiterates: “For people experiencing chronic homelessness, the research is overwhelmingly clear that permanent supportive housing using a Housing First approach is *the* solution” (USICH 2015, p. 25, emphasis added). The plan also indicates that the mission’s strategies were, in fact, being pursued: “Consistent with Opening Doors, communities are increasingly adopting evidence-based practices and replicating promising program models that incorporate a Housing First approach, leveraging resource commitments from the public and private sectors and from homeless assistance and mainstream systems” (ibid., p. 11). According to the revised plan, the ostensible reason for limited successes to date was due to “a lack of Congressional support for the expansion of permanent supportive housing” (ibid., p. 8), even though funding allocations and permanent supportive housing inventory had increased steadily and significantly, as noted above.

The 2015 strategic plan update doubled down on efforts to prioritize, fund, and spread Housing First practices: “This crisis response system involves the coordination and reorientation of programs and services to a Housing First approach that emphasizes rapid connection to permanent housing, while mitigating the negative and traumatic effects of homelessness” (ibid., p. 55). Notably, rather than grappling with the growing number of questions about the ability of the federal government to achieve its stated mission via these strategies, the plan stated an unwillingness to consider alternative solutions: “To attain value for money, agencies and communities alike must direct resources towards evidence-based and cost-effective solutions like permanent supportive housing, Housing First, and rapid re-housing, and away from models and programs that are outdated, unsupported by evidence, or are not cost-effective” (ibid., p. 61).

In 2018, USICH put out a new strategic plan entitled “Home, Together” (USICH 2018). This strategic plan update was notable in that it departed from offering “deadlines” for the goals articulated in prior plans—which, as noted above, were either past or far short of the stated targets. Still, the plan reaffirmed efforts to end homelessness among the same groups as before (ibid., p. 6). In addition, the plan reiterated the prioritization of Housing First once again, indicating that the new administration was continuing in the mission of its predecessor. When looking retrospectively over the period, the plan even appears to assert that past efforts had been little short of a great success. For instance, the document confidently states that “evidence-based Housing First approaches have helped serve more people with better results” (ibid., p. 12). Such statements, paired with the trends in funding and program evolution above, affirm that the shortcomings in the federal plan are not well explained by shifts in political power or by a lack of “political will.”

Another important update in the 2018 was the first recorded instance in the strategic plan efforts to define “success.” Recall that the prior plans had set out to

“set a path to end all types of homelessness.” In *Home, Together*, USICH offered a working definition thereof: “Achieving these goals is grounded in a shared vision of what it means to end homelessness: that every community must have a systemic response in place that ensures homelessness is prevented whenever possible, or if it can’t be prevented, it is a rare, brief, and one-time experience.” This is notable because the plan clarifies that “ending homelessness” functionally means having a “systemic response” in place—i.e., a permanent, federally funded homeless services industry (Lucas 2017).

A Brief Tide-Turning

However, as the end of a decade of the federal homelessness mission loomed, the tides began to turn. Executive branch leaders offered a striking series of reports that offered a rigorous and contemplative assessment of the past decade’s efforts, while revisiting these strategies for the future. In October 2020, prior to the presidential election, USICH put out a remarkably different plan called “Expanding the Toolbox: The Whole-of-Government Response to Homelessness” (USICH 2020). This plan dovetailed with a report issued by the Council of Economic Advisors just 1 year prior: “The State of Homelessness in America” (CEA 2019).

The CEA report offered a series of careful critiques of the federal mission. After affirming that federal policy and funding was responsible for the surge in permanent support housing, rapid rehousing, and the corresponding Housing First approach, the report offered two major critiques. First, the report reviewed academic literature studying the trends of the period, concluding that “research suggests that previous Federal policy is not capable of explaining a large portion of the reported decline in homelessness between 2007 and 2018.” Second, the report questioned whether homelessness was in fact decreasing at all—even at the minimal rate reported in annual estimates. Although the raw numbers indicated a 15 percent reduction in total homelessness from 2007 to 2018, the report noted that definitional inconsistencies may have driven this change. Specifically, persons in transitional housing programs—the intermediate-length, linear model program disfavored by the Housing First hegemony—are counted as homeless. But persons in rapid rehousing programs—the Housing First substitute—are not counted as homeless. Because the inventory of transitional housing beds plummeted by over 100,000 beds and was replaced by rapid rehousing programs, a similar number of people could be served by the homeless services industry while numbers were improving.

The remarkable CEA report garnered considerable debate in academia (O’Flaherty 2020) as well as opposition from many homelessness advocates (National Alliance to End Homelessness 2019). Nonetheless, when USICH

introduced a revised strategic plan in 2020, it was evident that the report reflected a substantive shift in the administration’s homelessness mission. “Expanding the Toolbox” cited the CEA report on page one. The plan also acknowledged that “despite significant increases in funding and beds, overall homelessness has been increasing in the United States” (USICH 2020, p. 1).

In addition, for the first time in a decade, the plan indicated a significant reconsideration of the supremacy of Housing First: “prioritizing housing first as a one-size-fits-all approach has not worked to reduce homelessness for all populations and communities” (ibid., p. 1). In the plan, an entire section devoted to Housing First provided a potent critique of the federal emphasis on Housing First. The plan asserted that the government’s mission effectively imposed housing first as a “one-size-fits-all” approach that “has produced concerning results” (p. 11). In turn, “Housing First should be considered as one tool in the toolbox, but not the only tool in the toolbox” (p. 11).

In contrast to the prior plans, this approach called for a more heterogeneous set of locally driven solutions. Some of the most notable deviations from prior strategies included support for programs that emphasized job training and related work requirements, trauma-informed care, and flexible programming for various homeless subpopulations. Furthermore, the plan also removed the specific goals of the earlier plans entirely. Instead of targeting the end of homelessness for particular subpopulations, the plan emphasized the development of solutions that would facilitate innovation in program delivery and self-sufficiency for clients. In this, the plan asserted (p. 12):

Our aspirational goals should expand our thinking to move beyond the basic goal of providing subsidized housing assistance. As Congress has suggested, we must optimize self-sufficiency through the reduction of reliance on public assistance and implement policies that pursue this as an end goal. Communities should prioritize projects that increase self-sufficiency. Regulatory constraints should be removed, and innovation should be encouraged. Program quality should be measured by reductions in homelessness and by increases in exits from any kind of subsidized housing to unsubsidized market rate housing.

Another goal revision was a call for an emphasis on “outcomes” instead of “outputs,” where the latter relates to the programs themselves (e.g., success as implementing Housing First), while the former relates to substantive, long-term changes in the experience and prevalence of homelessness. In sum, the end of the Trump administration marked a thoughtful and honest assessment of the prior decade’s homelessness mission considering the observed results.

Lessons (Not) Learned

Unfortunately, the revised vision of “Expanding the Toolbox” was short-lived. Following the 2020 election, the Biden administration’s USICH returned with vigor to the earlier period’s policies. Given that then-Vice President Biden was a part of the administration that had so strongly championed Housing First, this return to the Obama-era federal policies was somewhat unsurprising. However, the confidence with which these strategies were reasserted stood in stark contrast to their observable results. In December 2022, USICH published “All In: The Federal Strategic Plan to Prevent and End Homelessness” (USICH 2022). The new plan “restores the importance of Housing First” (ibid., p. 5). Notably, while prior plans were cautious in the application of Housing First evidence to the chronic homeless population, the new plan aspires “To truly bring Housing First to scale for all populations” (p. 42). “All In” also doubled down on claims of the effectiveness of Housing First: “When implemented to fidelity, the model is a proven solution that leads to housing stability as well as improvements in health and well-being” (p. 45). As such, the new qualifier *when implemented to fidelity* effectively asserted that providers were not implementing Housing First “correctly”—a point to which we will return below. While similar statements were made earlier in the period, the evidence for such conclusions proved far weaker by this time. Most dubious are the claims about health and well-being, as summarized in a 2018 consensus study, “Overall, except for some evidence that [permanent supportive housing] improves health outcomes among individuals with HIV/AIDS, the committee finds that there is no substantial published evidence as yet to demonstrate that PSH improves health outcomes or reduces health care costs” (National Academies of Sciences, Engineering, and Medicine 2018, p. 4). Nevertheless, the plan reiterated the intention to leverage federal funding to pressure the adoption of Housing First principles by providers (pp. 46, 49, 60). As of spring 2023, USICH’s website stated, “USICH believes in evidence-based practices, particularly Housing First. Compared to other interventions, Housing First has been proven to quickly rehouse people and to reduce the likelihood of experiencing homelessness again.”²

Along with this recommitment to Housing First, the plan also reintroduced a single, measurable goal. Far shy of the ambitious benchmarks of the prior decade, the plan’s goal was to “reduce overall homelessness by 25 percent” from 2022 to 2025 (p. 70). Estimates from 2022 are the most recent ones available as of this writing. Only time will tell if doing the same thing over again will produce different results this time around.

²<https://www.usich.gov/about-usich/>. Accessed May 8, 2023.

Takeaways

The United States’ federal mission to prevent and end homelessness through the twenty-first century offers profound lessons that call into question the prospects of an expanded role for the State to mobilize and drive societal responses to grand challenges. The case illustrates how most or all of the necessary ingredients for a successful moonshot mission were present: bipartisan political support, increased government expenditures, a laser-like focus on evidence, clear indicators of success, strong federal leadership, broad and cross-sector collaboration, and a stated emphasis on local engagement and solutions. In fact, few initiatives in history can boast such a constellation of promising factors. And yet, even if such conditions are necessary for success, it is unambiguously clear that these factors were not sufficient to achieve the desired results.

A number of scholars have carefully assessed federal homelessness policy to offer specific explanations for the shortcomings observed (Corinth 2017; Eide 2022; Lucas 2017). Rather than delving into this literature, we conclude by considering how the case of homelessness offers general insights into the prospects of state-led missions directed at grand challenges.

The Mirage of “What Works”

One of the most striking aspects of the federal homelessness mission was the relentless emphasis on “evidence.” That Housing First was an “evidence-based” policy became a quasi-religious axiom in homelessness discourse across public agencies, homeless service providers, and advocates alike. It is safe to say that it would have been difficult to mobilize a comparable level of bipartisan, cross-agency political support for massive increases in homelessness spending and programs without the rallying cry behind “*the* evidence.” In turn, calls to focus on “what works” were repeated so frequently that Housing First’s ability at ending homelessness became something of a taken-for-granted fact among stakeholders in the homelessness context. By letting evidence “guide” policy, proponents argue, the only obstacle becomes something like “political will” needed to fund that policy to fruition.

The federal homelessness mission reveals several flaws in this premise. The first is that evidence cannot “guide” anything. Evidence comes from experts, and experts are human beings subject to imperfect knowledge and error (Koppl 2018). Evidence is not applied automatically to social problems, but is interpreted, negotiated, and extrapolated by policy actors with limited information and a variety of interests (both well-meaning and self-serving). As such, evidentiary information must be considered in the context through which the evidence is produced and utilized. In this context, Lucas (2018) suggests that evidence-based policy can be understood through the analytical lens of “public entrepreneurship,” wherein actors leverage

and apply evidence subjectively to achieve their private interests for policy change. He documents how the cultivation of “evidence” was pivotal to the policy dominance of Housing First and the broader emergence of a federal homeless mission. However, the problem was that Housing First quickly came to be prescribed for many purposes beyond what the academic research actually showed (Eide 2020).

Most of the studies about Housing First’s efficacy at housing retention showed results (i) for a specific homeless subpopulation, the chronically homeless, and (ii) at the individual level. It was clear that individuals who had repeated or long-term bouts of homelessness with a cooccurring physical and/or psychiatric disability were, on average, more likely to become and stay housed through the Housing First programs that followed the Pathways Housing First approach as introduced in New York City. Notably, however, these studies said *nothing* about the actual goals of homelessness policy: the substantive reduction of homelessness across many groups at the population level. In other words, the question of whether a Housing First program improves housing retention for an individual is *not* the same question as whether “retooling” the homeless shelter system to a Housing First approach will reduce the amount or rate of homelessness in a community. The federal homelessness mission inappropriately extrapolated the evidence beyond this unique group of chronically homeless individuals to many different homeless subpopulations, who experience homelessness very differently in terms of duration, repetition, and services utilized. It also inappropriately extrapolated the insights about individual-level housing outcomes to community level results—an archetypal example of the “atomistic fallacy.” In fact, the research that has emerged since that time casts doubt on whether increases in permanent supportive housing bed provision correspond to *any* reductions in community-level homelessness (Corinth 2017). Ultimately, federal funding’s main function has been to provide more beds in the shelter system and thereby increase the total number of people who are counted as homeless (Lucas 2017).

The two epitaph quotes reveal a core problem of “what works,” i.e., the limits of evidence as a tool for state-led social and environmental missions. The evidence does not speak for itself but the political process uses it in a manner that oversimplifies, overpromises, and underperforms. Whereas the federal strategic plan from 2010 emphasized that “homelessness is solvable,” careful academic researchers a decade later were quick to conclude that we have yet to find clear evidence on how to achieve this goal. It appears that “what works” remains an open question.

An increasingly common response by Housing First advocates to the above analysis is that Housing First was not actually tried at scale throughout the period. To be fair, researchers have developed careful scales of fidelity to the programmatic tenets of Housing First. Using these, they have found considerable variance across programs that purport to utilize the approach (Gilmer et al. 2013). As such, it is unclear how much of the growth of permanent supportive housing and rapid rehousing bed types conforms to a Housing First approach. Like modern-day socialists, the claim is something like, “*actual* Housing First has never really been tried.”

For our purposes, this argument only weakens the federal homelessness policy’s premises. For one, consider the claim of the relative cost-effectiveness of Housing First, which is questionable considering the massive funding increases over the period and limited results. To evaluate and monitor each local provider’s programming for fidelity to Housing First is both a major oversight challenge and practical cost that would dramatically increase the requirements to implement. In addition, the word “fidelity” does not appear in any of the strategic plans until 2022—indicating that this predictable concern was not a consideration in program success even as funding was doubling to nearly USD 9 billion annually.

While one might say it is hard to predict such a setback in advance, that is precisely the point. Whether fidelity concerns “could” have been foreseen by policy makers, they evidently were not. The fidelity counterargument thus illustrates a pragmatic reality endemic to many efforts to engage with all complex social challenges: many obstacles to success are only observable *ex post*. Because problems like hunger, homelessness, health, and crime are complex and interdependent, promising solutions often run into unforeseen obstacles and failures. What is needed for such problems is not “prescription” of “*the* solution,” but support for the emergence of new solutions and the development of feedback mechanisms to reward those that may show promise in a particular context. By contrast, top-down efforts to mobilize a specific “solution” to such a problem in ways not backed by research and for purposes beyond the extant research basis mistakenly prioritize “outputs” over “outcomes”—and are almost certain to fall short in the process.

Whither State Leadership?

Finally, the case of the federal homelessness mission illustrates the profound tensions associated with state “leadership” that is also supposedly “collaborative” and open to “bottom-up” solutions. In the development of its strategic plans, notices of funding availability, and implementation of programs, the federal government relentlessly worked to emphasize “local” context, knowledge, and collaboration in the fight against homelessness. The word “local” is mentioned 74 times in the 2010 federal strategic plan, which even indicates that each community’s homelessness strategies “should be locally driven, reflecting local conditions, since a one-size-fits-all plan does not exist.” The plan goes on: “interdisciplinary, interagency, and intergovernmental action is required to effectively create comprehensive responses to the complex problem of homelessness” (USICH 2010, p. 30).

On the surface, the federal government’s leadership was thus structured to facilitate the use of local knowledge and context-specific, bottom-up solutions—an approach that some scholars explicitly call for (Lucas 2020). However, the reality was far removed from the stated commitment to bottom-up, emergent organizing. Communities were invited to develop their own strategies and introduce innovative programs. . .so long as these accorded with “best practices”—aka Housing First. Federal funding decisions, in turn, were not based on the success of programs, but on

organizations' and communities' commitment to the programs that the federal government prioritized. The demise of transitional housing during this period is clear evidence of this; such programs were essentially penalized simply for their programmatic features—regardless of how successful they may (or may not) have been. Little to no funding was reserved for alternative but promising programs that some organizations were implementing. For instance, the New York City Doe Fund's Ready, Willing and Able program was a work empowerment program purporting to offer highly effective programming for previously homeless persons. Austin Texas' Community First was a tiny home community that offered a variety of social and economic activities and programs alongside housing. Unfortunately, there is not yet robust evidence about the efficacy of these alternative programs. But this does not mean they are inferior; it only means they are understudied. True federal leadership would facilitate such locally driven experimentation and support the evaluation of promising alternatives so that effective programs can be identified and replicated as appropriate. Overall, the "collaborative leadership" of the federal government in fact moved significantly toward centralizing the approach to an already top-heavy homeless response system, functionally eliminating any substantive collaboration that would enable the emergence of entrepreneurial, flexible, and bottom-up solutions to this complex problem.

Conclusion

The philosopher George Santayana famously wrote, "Those who cannot remember the past are condemned to repeat it." While the United States' misadventures in its mission to prevent and end homelessness in the early twenty-first century are but recent history as of this writing, its lessons are notable for those who would seek to promulgate a future where the state is the lead player in developing and driving missions to face grand social challenges. Homelessness is an important problem for societies to grapple with, especially those societies that have generated immense wealth and technological advance. However, if the federal government persists with a monolithic focus on failed solutions of the past—as the most recent federal strategic plan indicates—then we must be prepared for the letdowns of the past to reemerge as well.

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The Cost of Missions: Lessons from Brazilian Shipbuilding



André Cherubini Alves

Abstract This chapter focuses on the challenges of implementing mission-oriented policies (MOPs) in developing countries, with a particular emphasis on the Brazilian shipbuilding sector. The aim is to analyze the difficulties associated with setting MOPs and their impact on market creation and innovation. Despite the implementation of comprehensive institutional arrangements to foster technological and industrial development, the sector's progress has been hindered by coordination uncertainties and high capability-building costs. The policies initially provided a boost, but the industry ultimately failed to catch up with international competitors. The article highlights the blurred boundary between policy expectations for market creation and the practical limitations of building a thriving industry.

Keywords Mission-oriented policies · Innovation · Capability-building costs · Shipbuilding · Industry

JEL Codes L16 · L52 · O32 · O38 · M11

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169

Introduction

Innovation has long been acknowledged as the primary driver of economic development and prosperity, a concept that gained prominence through the contributions of Schumpeter. As a result, it is considered a top priority and often an ultimate objective for policymakers. Although innovation stems from the entrepreneurial endeavors of companies aimed at introducing valuable solutions to the market, firms do not exist in a vacuum. They are embedded social/market relations (Polanyi and MacIver 1957; Granovetter 1985) and institutions (North 1991), where governments have a direct and indirect influence on the rate of innovation and development that can be achieved. However, “getting institutions right” to foster development presents considerable challenges and is fraught with uncertainty.

In recent literature, there has been a growing recognition of the historical significance of governments in influencing the course of change and market dynamics through their role in fostering innovation. In this sense, governments should go beyond the regulation of markets and correction of “market failures,” but they can actively contribute to the creation and shaping of markets by implementing targeted policies that prioritize innovation-driven missions (Mazzucato 2013, 2015). However, the effectiveness of the employment of such government tools is open for debate (Ergas 1987; Brown and Mason 2014; Foray 2018; McKelvey and Saemundsson 2018).

This holds a particular significance for developing nations, as they prioritize innovation policies and investments in research and development (R&D) to enhance their overall sectoral capabilities within specific industries and markets, both established and emerging (Kim 1980; Kim and Nelson 2000). In these contexts, traditional sectors concentrate on an initial stage of catching up, which can potentially serve as a pathway for leapfrogging in the future (Lee and Lim 2001). The dual nature of innovation policies in developing countries creates ambiguous boundaries when it comes to market creation. However, this observation also sheds light on the challenges associated with mission-oriented policies and claims for the creation of markets. The question is, at what cost? In this chapter, it is argued that MOPs need to cope with the puzzle and impreciseness of both “building innovation capabilities for market creation” and “market creation for building innovation capabilities” (Alves et al. 2021).

Given bounded rationality and the inherent uncertainty in decision-making processes, it becomes challenging to anticipate the behavior of economic agents and the extent to which they can be trusted to build the required innovation capabilities. The inability to rationally convert policy innovation efforts into concrete packages of technological and operational capabilities that will produce the expected positive outcomes leads to an innovation paradox where developing countries often have negative returns on R&D and innovation investments (Cirera and Maloney 2017). This process also contributes to the stagnation of these nations into what is called the middle-income trap (Griffith 2011; Lee 2013).

This chapter examines and explores the key challenges associated with implementing effective mission-oriented policies in developing countries. To illustrate these challenges, I analyze the successes and limitations of a specific mission-oriented policy implemented in the Brazilian shipbuilding sector. This sector experienced a significant growth in recent years, supported by a comprehensive institutional framework aimed at technological catch-up, industrial development, and innovation. The policy gained a momentum in 2005 following the discovery of giant oil fields in the ultra-deep waters along the Brazilian coastline, known as the Pre-Salt region. Measured against such high expectations, the strategy cannot be said to have fully succeeded. While the set of policies put in place managed to mobilize a large number of actors and resources around the country in the pursuit of becoming a global player in this market, the industry ultimately failed to catch up and innovate.

From Institutions to Missions

Institutions and policy play a crucial role in setting the course of inventive and economic activity (Bush 1945; Arrow 1962; Langlois and Mowery 1996). They set the “rules of the game” by which economic agents make decisions (North 1991), but they are also often used to foster endeavors toward technological change, innovation, and the underlying production systems within an economic structure (Edquist 1997).

As an evolutionary process, institutions and the technological structure of regions co-evolve to produce comparative advantage (Nelson 1995), which creates potential windows of opportunity for technical and economic transformation (Lee and Malerba 2017). Yet, getting these institutions and policies right remains a major challenge (Williamson 2009), which often creates unintended consequences and unpredicted costs as they are based on optimistic views of complex and intractable problems (Morris 1980). These challenges may be even more critical in the context of emerging economies given the cruder estate of preexisting technological capabilities, internal market, and industrial and general institutions for innovation (Rodrik 2009). Mission-oriented policies (MOPs) have presented themselves as a potentially attractive policymaking vehicle to overcome the lack of appropriate institutions and complexities behind the implementation of industrial and innovation endeavors in emerging economies.

Mission-Oriented Policies and Industrial Innovation

The twentieth century, especially after the post-war period, has presented several mission-oriented programs. In the United States, this process has been notorious through endeavors such as the Apollo space program, research on cancer, and several other defense-related programs (Mowery 2010; Pisano and Shih 2012).

Fisher et al. (2018) provide an extensive coverage and interpretation of mission-oriented policies with significant innovation results across various countries stressing the need for a mix of appropriate policy instruments, social approval, accountability, and a sense of urgency. The question lies in the continuation and sustainability of such initiatives without governmental incentives.

According to the mission-oriented policy advocates, different than the conventional economic approach of government whose intervention focuses on the regulation and correction of failing markets, mission-oriented policies (MOPs) look beyond by “creating new markets” as a result of the proactive state’s role in fostering innovation-led growth and development (Mazzucato 2013). The state’s role can create new markets through significant public procurement (Edquist et al. 2015). MOPs are also expected to achieve the specific goal by setting up institutions to promote education and skills, by building infrastructures to support innovation, and by shaping long-term behavior (Mazzucato and Penna 2015), as well as by giving governments a strategic role in providing the necessary finance for innovation (Mazzucato and Penna 2016).

However, successful MOPs require the strong buy-in and engagement of the private sector beyond governmental policy. While governments can create the right conditions, ultimately management decisions will determine what happens (Pisano and Shih 2012, p. 20). In this sense, it is argued that MOPs differ from the so-called old missions, which are said to be top-down policy decisions (such as the creation of government agencies such as NASA and major initiatives relating to national defense, space exploration, and public health). New missions, on the other hand, should encourage bottom-up stakeholder-based initiatives (Mazzucato and Penna 2015). Table 1 below brings forth some of the argued differences between types of missions.

Thus, it is understood that missions must be well-defined, comprise a portfolio beyond research and development (R&D) projects, involve different types of actors, and engage in joint policy decision-making (Mazzucato and Penna 2016). Policies should include specific targets, organization, evaluation and assessment, risk, and rewards (Mazzucato 2013, 2018; Fisher et al. 2018).

MOPs are expected to achieve specific goals by creating the necessary incentives to save and invest, setting institutions to promote education and skills, building infrastructures, and shaping a long-term behavior. To achieve such goals, MOP is based on a fourfold set of elements (Mazzucato 2018): it should (a) apply an ambitious challenge translated into routes and directions, (b) nurture organizational capabilities, (c) establish new forms of assessment, and (d) offer a better sharing of rewards and ease risk-taking so that innovation-driven growth can also result in inclusive growth. With this said, we explore some potential limits to market creation.

Table 1 Characteristics of old and new mission-oriented projects

Elements	Old: defense, nuclear, and aerospace	New: Environment technologies and societal challenges
Definition criteria	“The mission is defined in terms of the number of technical achievements, with little regard to their economic feasibility”	“The mission is defined in terms of economically feasible technical solutions to particular societal problems”
Diffusion of results	“Diffusion of the results outside the core of participants is of minor importance or actively discouraged”	“Diffusion of results is a central goal and is actively encouraged”
Directionality	“The goals and the direction of technological development are defined in advance by a small group of experts”	“The direction of technical change is influenced by a wide range of actors, including government, private firms, and consumer groups”
Government degree of centralization	“Centralized control within a government and administration”	“Decentralized control with a large number of agents involved”
Breadth of participation of actors	“Participation is limited to a small group of firms due to the emphasis on a small number of radical technologies”	“Emphasis on the development of both radical and incremental innovations to permit a large number of firms to participate”
Complexity	“Self-contained projects with little need for complementary policies and scant attention paid to coherence”	“Complementary policies vital for success and close attention paid to coherence with other goals”

Source: Based on Soete and Arundel (1995) and directly quoted from Mazzucato (2018, p. 805)

Can MOPs Really Create Markets?

One of the main claims for MOPs is the supposed capacity of creating markets rather than correcting for market failures (Mazzucato 2013). To understand this claim, it is important to first address what markets are and how they arise and work. Functioning markets presume the co-existence of producers and consumers that interact and exchange by means of economic transactions to supply and satisfy the needs of value. Hodgson (1988) maintains that the closest definition of a market is the one provided by Mises (1949, p. 257) where he states:

The market economy is the social system of the division of labor under private ownership of the means of production [...] The market is not a place, a thing, or a collective entity. The market is a process, actuated by the interplay of the actions of various individuals cooperating under the division of labor.

Firms are the key players in this process as they, by means of transaction, are the direct interface to the consumer or buyer. As the main institutions of the economic system, firms and markets are inexorably inseparable or even considered alternative ways to organize the economic activity (Coase 1937). Thus, a workable market presumes, on the one hand, a relation of needs and demands to be satisfied by some economic agents and, on the other, the ability to fulfill those needs through

production by other economic agents. Firms are only valuable as long as they are able to fill some market gap and, consequently, transact and profit from whatever solution it provides.

From the perspective of “transaction cost economics” (TCE), a hierarchical structure will “naturally” arise and grow until it inevitably meets with the market for buying or selling, in other words, where it can engage in transactions with other economic entities, such as other firms or consumers. Firm boundaries and ability to grow, therefore, arise from this techno-economic logic of mastering the same routines and capabilities (Nelson and Winter 1982), managing efficiently the allocation of a pull of resources (Penrose 1959) and specific assets (Williamson 1985), and relying on complementarities (Richardson 1972; Teece 1986) to solve problems efficiently and profitably. For “market creation” to be sustainable, it relies on the ability to create firms and capabilities to transact and profit from such a market. While innovation is perhaps the “purest” way to achieve market creation by firms, the question is: what is the role of governments and missions in the process and how?

According to Rodrik (2009), one way for governments to create a market is through the use of mechanisms such as local content policies, tax cuts, trade barriers, and special funding for production or even R&D. This results in a temporary reduction of transaction costs, letting economies internalize and make feasible formerly inexistent or economically impracticable capabilities. Such public incentives can work as “windows of opportunity” in laggard countries (Lee and Malerba 2017). Latecomers use such incentives to offset cost differences associated with the lack of capabilities. Geographic considerations in terms of technological and market proximities must also be considered to increase the chances of success (Orlando 2004). In countries behind the technological frontier, such types of markets are created for the sole purpose of catching up (Lee 2019).

However, windows of opportunity are always temporary, and the “artificial transformation” of marginal transaction costs is not sustainable in the long term without generating costs. To be able to take advantage of market entry incentives created by governments, latecomer economies must find faster ways to develop capabilities at the lowest possible cost. This also requires the absorptive capacities of economic agents to convert R&D output existing technologies into production, sales, and growth (Aldieri et al. 2018).

While, in theory, MOPs can be set to directly change and create new markets, fostering the conditions to build local capabilities that will support firms to populate the market is unavoidable. A precondition of market creation requires the building of capabilities that are often difficult to master and costly to develop. The mismatch between the positive expected intent and what is achievable based on the availability capabilities at any point in time creates a “fuzzy boundary” that often leads to the unsuccessful implementation of missions (Alves et al. 2021).

Capability-Building Costs in Catching up and Innovation

Catching-up theory postulates that backwardness learning provides an opportunity for fast growth from latecomer economies with lower costs (Abramovitz 1986). However, this process is dependent on previously existing conditions including knowledge, education across economic agents (firms and individuals), and managerial skills that when not present create high uncertainty and decrease the probability of success (Cirera and Maloney 2017). That's where the intent for market creation becomes blurry. While policies, as stated in the MOP literature, can define the goal and direction of change, the unavailability of ex ante capabilities generates higher capability-building costs. These costs are hard to predict even with the best estimates as they depend highly on the speed of learning of firms in each context.

For instance, R&D investments are required to accelerate the learning of firms to both use freely available knowledge (Nelson and Winter 1977) and access a network of information (Rosenberg 1990). Adoption or imitation costs will vary dramatically based on the technological level achieved by firms in a country (excluding the costs of factors). This becomes even more problematic for less industrialized countries unless there is a window of opportunity to be exploited (Rip and Kemp 1998).

The ability to create a market and conduct transactions economically is undermined by the failure to master and coordinate various complementary competencies. Complexity in the knowledge and the number of technological interfaces can generate friction beyond transaction and production costs (Alves 2015). Some of these are technological transfer costs (Teece 1977). Others are related to coordination decisions such as suppliers switching costs (Monteverde and Teece 1982). Capability-building costs are similar to what Langlois (1992, p. 113) calls dynamic transactions costs, that is, the “costs of persuading, negotiating and coordinating with, and teaching others” or, simply, “the costs of not having the capabilities when you need them.” Capability-building costs are *dynamic learning costs* that must be taken into consideration by mission-oriented policies in emerging economies as they will influence the economic scope and the rate at which new industries can and will dynamically grow.

The “New” Mission Case: Policy for Innovation in the Brazilian Shipbuilding and Offshore Industry

The new mission for the resurgence of Brazil as a shipbuilding superpower was grounded on a window of opportunity and a wave of optimism coming from international growing markets before the 2008 financial crisis.

Brazil has a long history of shipbuilding, dating back to the sixteenth century. It experienced a significant growth during the 1950s. The establishment of the Merchant Marine Fund (FMM) and the National Development Bank (BNDES) aimed to rejuvenate the national fleet, reduce ship imports, and stimulate exports (Foster

2013). This led to substantial foreign direct investment and the establishment of major shipyards in Rio de Janeiro and international companies such as Ishibras and Verolme. By 1975, Brazil was the world's second-largest shipbuilding nation. However, the industry faced a downturn in the following decades due to economic challenges, tight monetary policies, reduced subsidies, and strict local content requirements. This resulted in a decline in technological capabilities, delivery delays, cost overruns, and an inability to compete (Cho and Porter 1986).

A revival occurred in the 2000s after Brazil successfully addressed its fiscal deficit and rolled back inflation. With a stable economy, a new wave of confidence emerged fostering industrial private investment and growth. A key factor in this resurgence was the discovery of significant offshore oil reserves. This created a demand for advanced oil platforms and transportation vessels, providing a boost to the shipbuilding sector. The discovery of an estimated 15 billion barrels of oil equivalent (BOE) positioned Brazil as one of the world's top 10 oil producers. This development serves as a focal point in the subsequent narrative, emphasizing the industry's re-emergence and its connection to the oil discoveries.

Routes and Direction: Setting Policy to Create the Market

The exploration of Brazil's deep-sea oil reserves required advanced technologies. Petrobras, the state-owned oil company, played a leading role in deep-water exploration, employing complex strategies and developing new technologies. The operational depth increased from 410 feet in 1977 to over 8000 feet in 2010, necessitating the expertise of specialized professionals in engineering, geology, and geophysics.

These challenges generated enthusiasm and drew comparisons to the "space race" of the 1960s, as the pursuit of technological advancements and oil production created a demand for various vessels. However, high costs and waiting times in international shipyards led Brazil to build ships and oil rigs domestically. To accomplish this quickly, comprehensive public policy interventions were implemented, culminating in a mission-oriented approach (Alves et al. 2021).

In 2002, Petrobras announced the procurement of two offshore oil rigs, P-51 and P-52, from foreign companies. This sparked opposition from labor unions, arguing for domestic construction to create job opportunities. President Luiz Inácio Lula da Silva responded to these concerns by supporting domestic production of the platforms (Foster 2013). This decision set in motion a series of legislative acts and policy changes that took place in the following years presented in Fig. 1.

The creation of the National Program for Mobilizing the Oil & Gas Industry (PROMINP) through a legislative act was aimed to maximize the participation of national suppliers of goods and services to the oil and gas industry. PROMINP was responsible for mapping national capabilities and providing training in several related fields of shipbuilding to the oil industry. In 2007, the Brazilian government established the Program for Growth Acceleration and identified the shipbuilding industry as a key national strategic sector for wealth generation and job creation

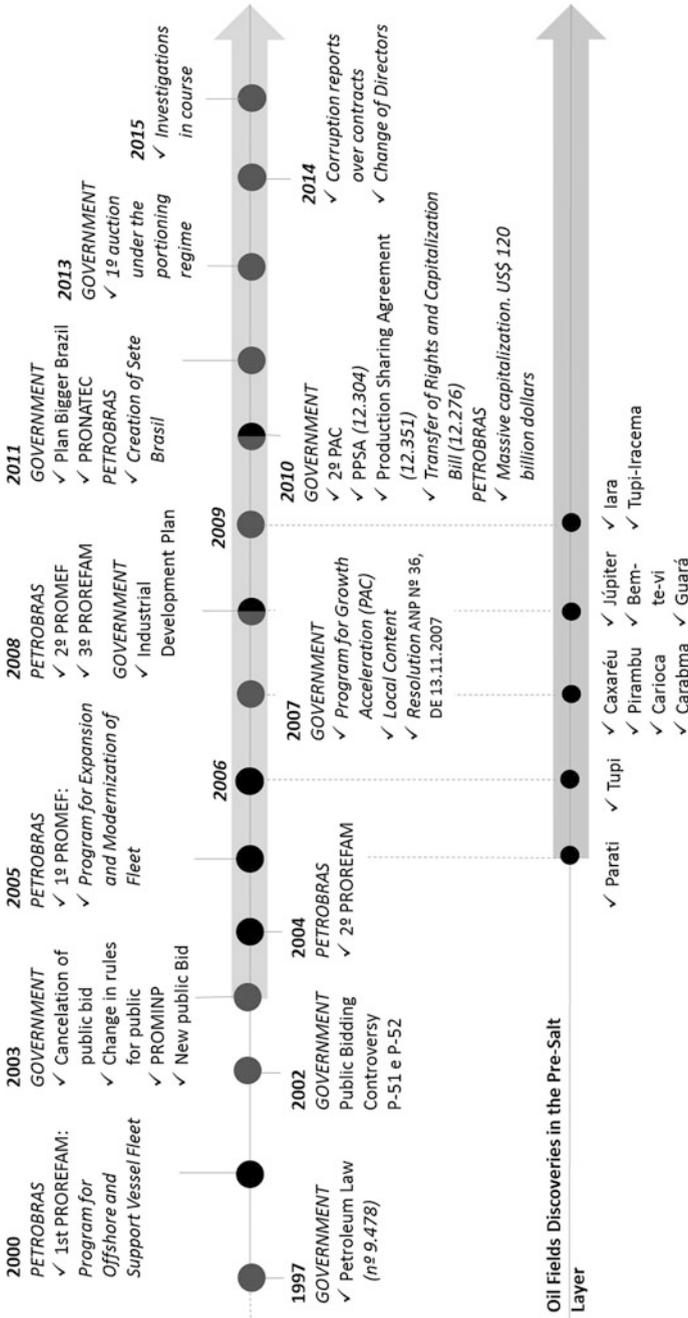


Fig. 1 Chronology of policies targeting the Brazilian shipbuilding industry. *Source:* Alves (2015)

(De Negri and Lemos 2011). The same year, the National Oil Regulatory Agency created a resolution establishing minimum local content requirements.

In 2010, Petrobras announced a historic capitalization of USD 120 billion to fund the exploration, development, and production of the Pre-Salt fields. The company's purchasing power was directed toward national shipyards to stimulate the national industry to develop a supplier base capable of meeting the demands for the renewal of their fleet of platforms, tankers, and support boats. In 2011, Petrobras, alongside other major construction companies, established Sete Brasil SA, a company responsible for the drilling operations of the Pre-Salt fields, which placed several orders for drill ships to various shipyards.

The demand for oil rigs, tankers, and support vessels primarily came from companies involved in offshore oil exploration and production activities, with Petrobras playing a central role in this endeavor. In 2007, the National Oil Agency (ANP) introduced the Local Content Resolution. According to this resolution, oil concessionaires operating in Brazilian offshore fields were required to procure a minimum of 70% of goods and services from national suppliers. The National Organization of the Oil Industry (ONIP) was tasked with certifying suppliers for participation. This local content policy aimed to create a reserved domestic market for national suppliers, providing incentives for the gradual development of capabilities and capacity. This, in turn, formed the basis for Brazilian legislation defining three exploration regimes: production sharing, concession, and transfer of rights regime.¹

Under the *production sharing* agreement, all oil from the Pre-Salt fields is owned by the state which was guaranteed participation in the exploration in all fields. The operating firm contracted through a public bid was responsible for exploration and extraction, bearing all operational expenses, in exchange for a portion of the oil field's value assuming all costs and risks associated with the specific field. In the *concession regime*, the extracted oil belongs to the operating firm for the duration specified in the contract upon payment of taxes and royalties. Lastly, the *transfer of rights agreement* allows the government to grant Petrobras the rights to explore and produce in specific Pre-Salt areas, up to 5 billion barrels of oil and natural gas, at the company's own expense and risk. This serves as compensation for Petrobras' capitalization efforts to promote the supporting industry.

Local content requirements, along with incentives such as tax exemptions and financial support, provided a foundation for promoting domestic supply. By establishing contractual connections between oil-producing firms, national shipyards, and engineering, procurement, and construction firms (EPCs), a national market for shipping vessels and parts was created, facilitating capability building across the domestic supply chain. Complementary training programs involving universities and technical schools aimed to identify national suppliers and provide necessary training in various fields.

¹Lei 9.478/97 (Lei do Petróleo), Lei 12.351/10 (Lei da Partilha de Produção), Lei 12.304/10 (Lei da criação da PPSA), Lei 12.276/10 (Lei da Cessão Onerosa).

Table 2 Institutional incentives to stimulate the supply side

Incentives	Description	Legislation
Local content	Local content requirements for vessels used in the activities of exploration and production of oil and gas in the Brazilian offshore oil fields	ANP Resolutions 36a 39/2007
Fiscal	Exemption of tax (IPI) for industrial production on parts and materials for the construction of ships in domestic shipyards. Zeroing of PIS/PASEP and COFINS taxes on equipment for the marine industry	Act 6.704/2008 and Law 11.774/2008
Finance	Facilitating financing conditions to the sector through the Navigate Brazil Program, which introduced changes in access to credit for ship owners and yards, increasing the participation of the Merchant Maritime Fund (FMM) from 85 to 90% in the operations of the shipbuilding industry and increase in the maximum loan term from 15 to 20 years	Re-edition Provisory Act 1.969/67
	Establishment of differential interest rates and participation in financing with FMM resources for those contracts that ensure local content rates of over 60 or 65%	Resolution CMN 3.828/2009
	Creation of the Shipbuilding Guarantee Fund (FGCN) with the purpose to ensure risk credit to financing operations for the construction and production of vessels and the risk of performance of Brazilian shipyards	Law 11.786/2008
Training	The institution of the Program for Mobilization of the National Oil and Natural Gas – PROMINP, which aims to enhance the participation of the national goods and services industry, competitively and sustainably, in the implementation of oil and gas projects in Brazil and abroad	Act No. 4.925/2003

Source: Alves (2015)

The comprehensive set of laws, resolutions, and incentives aimed at reducing the comparative cost disadvantages faced by existing Brazilian suppliers compared to foreign competition. They also stimulated the entry of new national players into the supply chain. Credit facilitation measures also enabled firms to secure loans at lower interest rates to invest in activities related to the shipbuilding industry. Table 2 presents the resolutions aimed at stimulating capability building and providing financial support for innovation.

From Market Creation to Building Production and Technological Capabilities

With the institutional conditions in place “creating the market,” Petrobras assumed the central role as the lead firm driving the sectoral development. Petrobras was assigned three key roles: securing demand, coordinating suppliers, and managing cross-sectoral investments. These responsibilities entrusted Petrobras with the task

Table 3 Order book and investment by type of vessels by company (2012)

Vessel type by program	Number	Investment ^a	Average cost/vessel ^a	Investor
Support vessels PROREFAM 1, 2, and 3	223	16.7 billion	75 million	Petrobras
Platforms FPSOs	22	53.9 billion	2.45 billion	Petrobras
Large crude carriers PROMEF 1 and 2	49	6.8 billion	139 million	Transpetro
Drill ships	29	54 billion	1.8 billion	Sete Brasil
Total		131.4 billion		

Source: Campos Neto and Pompermayer (2014). Data from reports of contracted orders

^aValues in BRL. One USD was equal to BRL 1.95 in 2012

of ensuring a steady demand for products and services, organizing the network of suppliers and overseeing investments that spanned multiple sectors.

Petrobras held the responsibility for operational activities related to oil production and the procurement of platforms and support vessels. To handle transportation and storage operations for oil products, the company utilized its subsidiary Transpetro, which required a substantial fleet of crude carriers and LNG carriers. In 2011, a separate entity named Sete Brasil was established with a focus on exploration and drilling activities. Sete Brasil took charge of placing orders for drill ships. Table 3 provides an overview of the number and values of the order books as of 2012.

The sector's re-emergence was characterized by the establishment of multiple shipbuilding sites along the Brazilian coastline in 11 major states, with employment in shipyards expected to reach 100,000 employees (SINAVAL 2014). While modern infrastructure and equipment were being implemented in these shipyards, technological capabilities were recognized as a crucial element for the sector's successful resurgence. Partnerships for technology transfer aimed to bridge knowledge gaps, although not all intended partnerships were formally established through contracts.

The initial requirement for shipyard operators was to either have prior experience in the industry or demonstrate a partnership with an experienced international company. National companies without significant shipbuilding experience needed to demonstrate their engineering, procurement, and construction (EPC) capabilities based on their track record in complex projects and commit to establishing technological partnerships with recognized shipbuilding firms to facilitate technology transfer. Technology partners from countries such as Japan, South Korea, China, and Singapore brought specialized know-how to Brazil.

The primary objective of the examined MOP was to establish a foundation for innovation throughout the shipbuilding industry. This entailed fostering innovation capabilities across the entire value chain, starting from the main contractor (Petrobras) and extending to the "last" supplier. Additionally, Petrobras and other operators were obligated by the National Petroleum Agency to invest 1% of their operating revenues in research providers within the country, further promoting research and development activities.

As an operator, Petrobras took on the responsibility of overseeing the contractual interfaces in the shipbuilding projects. To ensure compliance with technical

requirements and delivery schedules, Petrobras deployed staff members to different shipyards. This was crucial for the smooth management of such a large-scale operation. The minimum local content requirements for various types of vessels, ranging from 45 to 70% of locally sourced materials and components, were determined based on factors such as technological complexity, availability, and the time required for local suppliers to master the necessary technologies.

The company conducted a thorough mapping of potential suppliers across Brazil for each specific technology, equipment, ship parts, and materials specified in the engineering projects. According to Petrobras president's assessor for local content at the time, the company possessed a comprehensive understanding of the gaps within the national industry with detailed documentation in several publications outlining various technologies and their feasibility for implementation in Brazil. To further enhance their knowledge and keep abreast of potential suppliers, Petrobras conducts continuous surveys through its inspectors.

These efforts are complemented by studies conducted by other institutions, such as the Development Bank, on the competitiveness of the Brazilian industry. These combined initiatives contribute to a comprehensive assessment of the national industry and enable Petrobras to make informed decisions regarding local content requirements and supplier selection. Backed by a set of major institutional setups and financial prospects, planning for local content, the shipbuilding industry was able to rapidly emerge in Brazil under the strong coordination by Petrobras to develop and manage technological interfaces and contractual complexities (Alves 2015).

The Cost of a Mission-Oriented Policy: From Market Creation to Market Failure

Since its inception in 2005, the implementation of a mission-oriented policy in shipbuilding has sparked a series of transformations in Brazil's industrial landscape, impacting areas such as infrastructure, the value chain, research and development, as well as capital and labor. This policy mobilized significant resources, leading to a notable growth in employment within the shipbuilding sector, which eventually became the second-largest industry in the country, trailing only behind the automobile industry.

For approximately a decade, there were high hopes and great expectations surrounding the mission-oriented policy's establishment, aimed at fostering the development of Brazil's shipbuilding industry. However, despite the intuitional mission-oriented incentives and extensive planning, over time, these expectations started to crumble. The industry's employment trajectory tells a story of drastic shifts, from a state of near despair in the 1980s to a rapid rise in the 2000s. Employment within the shipbuilding sector reached its peak in 2014, with a total of 82,000 jobs (Fig. 2).

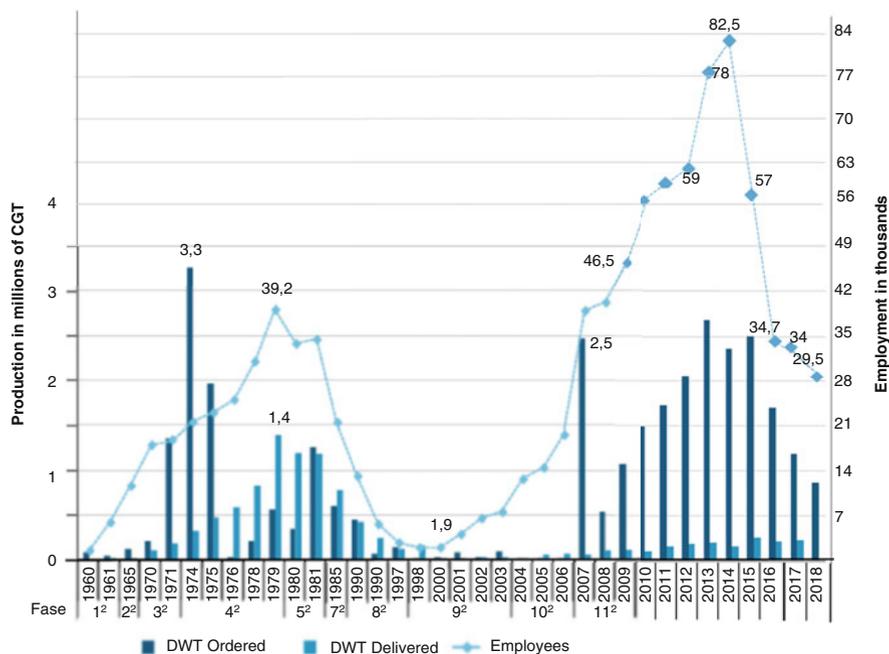


Fig. 2 Labor and production evolution. *Source:* Updated from Alves et al. (2021), adapted from Barat et al. (2014) based on data from Clarkson (2018) and SINAVAL (2018)

Despite the significant employment growth, the shipbuilding industry in Brazil faced major challenges in terms of productivity. The industry struggled to achieve substantial output growth and grappled with high construction costs, which hindered its ability to compete on the international stage. Moreover, a lack of competitiveness combined with corruption scandals, notably the “car-wash” investigations centered around Petrobras, dealt a severe blow to the industry. As a result, by the end of 2018, the number of employees in the shipbuilding sector had dwindled to just 29,539.

As a state-owned company, Petrobras participated in shipbuilding (EPCC), with variable involvement levels. It provided shipyards or firms with the General Technical Description (GTD) developed at CENPES. Two groups at CENPES collaborated on technical descriptions and engineering projects. The Research and Development in Engineering and Production group collected surveys and advanced technology, while the Basic Engineering in Exploration and Production group focused on fundamental requirements and sometimes created basic engineering projects. When Petrobras leased oil fields, it provided technical descriptions to the operating firm, which engaged national suppliers. Petrobras inspected vessels and participated in commissioning. As the primary operator, Petrobras had three contract approaches, yielding different cost and delivery results. “Charter” contracts with less Petrobras involvement had fewer issues. Increased Petrobras’ involvement in

Table 4 What prevents building capabilities

Sources of frictions	Reason	Internal response	Results
External interference of the Petrobras in the process	Need to comply with regulations and specifications	Extra task force efforts to guarantee compliance	Higher costs and re-work
Pressure from Petrobras for time schedules and deadlines	Need to capitalize on oil production	Speeds up and starts process with incomplete projects	Eventual mismatching of parts, re-work, and need to update the original project
Insufficient engineering teams with the right tools and skills	Re-building of the engineering team in the shipyard	Uses different systems to produce drawings	Slow project updates and risk of mismatching project and construction
Lack of key suppliers nearby	Difficulty in obtaining all required environmental licenses, onerous bureaucracy	Outsource	Delays and higher costs
Lack of an industrial ecosystem of key materials and suppliers	Lack of accessible logistics, infrastructure, economic incentives, and regional disputes for resources	Needs to plan in advance, organizes cash flows, and makes inventory	Higher costs, risk of material waste, delays, and quality
Project specs not fully defined by Petrobras	Oil field characteristics still being studied	Finds standard parts to be produced and adapts later continuous meetings with Petrobras	“Living” project subjected to frequent changes, re-work, and higher costs
Low labor productivity	Underdeveloped skills and managerial disorientation	Frequented meetings, training, and supervision	Delays and re-work

Source: Adapted from Alves (2015)

complex projects posed difficulties, including sudden changes and project reviews during production.

In Brazil, public bids for shipbuilding projects were predominantly won by a select few domestic companies. These firms specialized in civil engineering projects of a complex nature, such as roads, bridges, dams, and industrial complexes like refineries and petrochemical facilities. These companies possessed the necessary capabilities to mobilize large resources, including labor and materials. However, it is important to note that infrastructure projects have a distinct technological foundation compared to shipbuilding. The shipbuilding industry faced critical bottlenecks, including a shortage of engineering teams, inadequate systems and tools, a lack of local suppliers near shipyards (Pires et al. 2007), and frequent delays and re-work. Table 4 illustrates some of the most cited reasons, as mentioned by interviewees in the shipyard that hindered the capability-building process.

Frequent project changes, a lack of standards and adherence, high overhead costs, external pressures, and client demands all contributed to these challenges. Additionally, the industry lacked engineering capacities, and the institutional processes for licensing and permits were slow, further impeding progress. These factors resulted in cost escalation, making it difficult to build capabilities due to the need for constant project changes and the pressure to meet deadlines. The limited window of opportunity proved insufficient given the existing local capabilities. While mission-oriented policies generate high expectations for market creation and capability building, two factors make the transition from the current state to the desired new state uncertain.

First, the duration of the window of opportunity is challenging to predict due to changing competitive conditions. Brazil's mission-oriented policy to build local shipbuilding capabilities capitalized on high demand from Petrobras and the fact that international shipyards had a long waiting list of orders and were unable to meet the desired timelines by the Brazilian oil company. However, after the 2008 crisis, the demand for cargo ships plummeted worldwide, significantly shortening Brazil's window of opportunity.

Second, the speed of learning and the costs associated with transitioning from existing capabilities to new or more advanced ones were also difficult to anticipate. The complexity of coordinating various interfaces and acquiring technological and organizational capabilities hindered shipyards' ability to reach full production capacity. Without reliable organizational capabilities, meeting market demand became a significant challenge. Despite having state-of-the-art facilities and necessary assets, mastering the required routines demanded extensive knowledge, skills, and organizational capabilities.

Ten years after the implementation of the policy, the cost of producing ships in Brazil still exceeded the costs of importing them. The lack of industry-specific knowledge necessitated numerous technological interfaces with other firms. This made it harder to orchestrate the necessary capabilities and control technology transfer costs, dynamic transaction costs, and supplier switching costs. Consequently, reaping the benefits of learning curves became more challenging. Uncertain challenges requiring dynamic problem-solving capabilities contradicted the need for stability to excel in routine operations.

The deficiency in technical and organizational capabilities led various stakeholders to act opportunistically, resulting in moral hazards and corruption scandals. Beyond technical and operational inefficiencies, the "car-wash" scandals served as evidence of institutional collapse. The highly anticipated "passport to the future" envisioned by the complex mission-oriented policy fell short. An unstable institutional framework coupled with government-driven personalistic maneuvers further exacerbated institutional instability.

In retrospect, the primary policy efforts focused on macroeconomic and institutional conditions rather than addressing the balance between macro- and micro-challenges. There was a relative lack of focused policies and programs aimed at developing strong technological and organizational capabilities. While markets were created through institutional and fiscal incentives, and local content policies reserved

market shares, the complexity of mastering shipbuilding capabilities within the suddenly limited window of opportunity was underestimated by public authorities.

Concluding Remarks

Mission-oriented policies (MOPs) have primarily aimed to stimulate market creation and foster innovation (Mazzucato 2013). However, as Morris (1980) noted, good policy intentions often come at a high cost. While “new” MOPs emphasize the state’s role in directing change to tackle grand environmental and societal grand challenges, the Brazilian shipbuilding case brings insights into the difficulties associated with governmental efforts to market creation. Well-functioning markets rely on producers’ ability to meet the technical and economic requirements for delivering desired outcomes. The misalignment between policy intent and the real possibilities of market creation that considers the concrete availability of technological and organizational capabilities at any given time results in policy ambiguity that hinders the successful implementation of missions (Alves et al. 2021). Moreover, this unclear view of the gap between policy expectations and the technological and organizational requirements is riddled with uncertainty, leading to unanticipated costs.

Although the Brazilian shipbuilding mission-oriented policy exhibited important “success factors” outlined in the MOP literature – including a window of opportunity, ambitious technological goals, institutional incentives, significant public financing, extensive private sector investment and involvement, detailed planning, a sense of urgency, and social and national engagement (Mazzucato 2018), it failed to really create and sustain a market.

While in the short term, markets can be created through an active interventionist, real markets must be sustained in the long run through competitive transactions and technological innovation. A crucial requirement is matching current regional and national capabilities to be leveraged with those necessary for comparative and competitive advantage. The difficulty in quickly finding this balance can result in high costs and undermine the prospects of success. These costs encompass technology transfer, supplier switching, and dynamic transaction costs (Langlois 1992), which involve the efforts of persuading, negotiating, coordinating, and teaching others or simply the costs incurred by lacking necessary capabilities when needed.

Mission-oriented policies, through institutional frameworks (e.g., knowledge base, S&T system, business propensity and culture, supply chain, and regulation), may come as a tempting strategy in developing countries to escape the middle-income trap and build the foundations of viable markets. However, to fully capitalize on market entry incentives, latecomer economies must find faster and cost-effective ways to learn and develop capabilities or selectively choose specific packages that align with their technological levels and economic context.

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You Can't Develop What You Don't Know: The Realities and Limitations of Foreign Aid Missions



Kathryn Waldron and Christopher J. Coyne

Abstract Mariana Mazzucato argues that capitalism needs to be rebuilt around private-public partnered “missions.” To facilitate these missions, Mazzucato provides seven pillars to serve as guidelines. Using Mazzucato’s pillars, we critically review US government efforts to develop the local economy and establish new political institutions through foreign aid. We analyze the successfulness of these “missions” by assessing government officials’ ability to overcome the “knowledge problem” and “political economy problems.” We conclude that Mazzucato’s pillars are unlikely to be satisfied due to these dual problems.

Keywords Mazzucato · Foreign aid · Intervention · Knowledge problem · Political economy problem · Missions

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Introduction

Mariana Mazzucato has garnered significant attention during the past decade for her work advocating a more proactive role for government in steering and creating markets. In her most recently published book, *Mission Economy: A Moonshot Guide to Changing Capitalism*, Mazzucato (2021) argues that we need to rebuild capitalism to create a “solutions-based economy” (p. xxiv). She envisions the economy not as an emergent order but as a collection of directed goals guided by collaborations between public and private organizations.

Mazzucato points to several pre-existing public-private partnerships that, to her way of thinking, exemplify ideal missions. These include the US government’s mission to send a man to the moon, DARPA’s role in creating the Internet, and the European New Green Deal. Another key example is the United Nations’ Sustainable

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Development Goals (SDGs), which Mazzucato calls “the perfect starting point for considering the challenges missions might address” (p. 109). The SDGs are merely one of the latest attempts by the international community to encourage economic development and state capacity. But international economic and political development projects have long existed, with much controversy over their efficacy. The history of foreign aid thus makes an excellent proving ground for Mazzucato’s arguments.

In this chapter we judge the various missions by the US and multinational organizations to develop economies and shape institutions through foreign aid against the seven principles for creating a new political economy identified by Mazzucato in *Mission Economy*. These principles are (1) collectively creating value; (2) focusing on market shaping, not market fixing; (3) creating dynamic capabilities within organizations; (4) budgeting based on desired outcomes; (5) pre-sharing risks and rewards; (6) focusing on stakeholders instead of shareholders; and (7) utilizing open systems to co-design the future.

Our theoretical framework is grounded in two related problems that all economic decision-makers face. The first is the “knowledge problem,” as identified by Austrian economists (Mises 1974 [1936]; Hayek 1948; Lavoie 1985). Scholars in this tradition highlight that economic knowledge—knowledge of the best use of scarce resources—is not objective and given, but rather emerges through the process of interaction in different institutional environments. The second is the range of “political economy problems” identified by public choice scholars. Scholarship in this area identifies the frictions and perverse incentives that often exist in political institutions which can frustrate even the most well-intentioned policies. Together, these two challenges threaten to hinder the ability of key mission actors to adapt in the face of changing conditions or error. In order to adapt, actors require both knowledge that adjustment is necessary and the incentive to act on that knowledge. Absent either component, errors will persist, and failure is more likely.

Drawing on these theoretical insights, our analysis seeks to answer the following question. Given the knowledge and political economy problems, can we expect Mazzucato’s pillars to be effectively implemented and adjusted to achieve the ends stated by proponents of missions? If government officials suffer from knowledge problems regarding the best use of resources or perverse incentives due to political dynamics, then we should be less optimistic about the likelihood of Mazzucato’s principles successfully guiding missions. Similarly, if foreign aid missions that adopted similar principles still struggle to achieve objectives, then we should question whether the implementation of Mazzucato’s principles is likely to lead to future mission success.

We proceed as follows. The next section presents Mazzucato’s seven pillars, as well as the knowledge and political economy problems, in more detail. We then apply our theoretical framework to Mazzucato’s pillars in the context of foreign aid programs. We conclude with some thoughts regarding more fruitful avenues for economic development.

Theory

What Is a Mission Economy?

In the first chapter of *Mission Economy*, Mazzucato writes (p. 7):

We cannot move on from the key problems facing our economies until we abandon this narrow view [viewing government as simply a tool for leveling the playing field]. Mission thinking of the kind I outline here can help us restructure contemporary capitalism. The scale of the reinvention calls for new narrative and new vocabulary for our political economy, using the idea of public purpose to guide policy and business activity.

Mazzucato offers seven “key pillars” or principles to successful missions. The first pillar is collectively creating value. “Missions are about bringing a high level of strategic purpose to value creation. They are an admission that growth has not only a rate but also a direction—and that direction should have purpose” (p. 168). Missions need to work to promote the public interest. This requires rejecting the traditional economic framework wherein individuals seek to maximize their own utility according to their own subjective preferences. Additionally, it requires rejecting the price system as a guideline for value. Instead, Mazzucato argues the government, and the community must come together to determine what is valuable.

Rejecting the price system leads directly to Mazzucato’s second pillar—market shaping, instead of market fixing. Mazzucato views the absence of real-world perfect competition as an opportunity for governments to proactively reshape markets by using policy to direct entrepreneurs to certain technologies. To do this, governments will need to develop “dynamic capabilities” (p. 174), changing the way bureaucracies think about evaluation and administration and increasing their tolerance for risk-taking (pillar 3). Governments also need to engage in outcome-based budgeting (pillar 4). Mazzucato argues that the government’s ability to print money allows the public budget to accommodate additional spending. As a result, missions should be funded with the success of the mission in mind and not by affordability.

The next two pillars, pre-distributing risks and rewards (pillar 5) and embracing stakeholder value instead of shareholder value (pillar 6), are both centered around the question of who should benefit from a mission. Unlike redistribution, which seeks to reallocate wealth after its creation, pre-distribution involves shaping markets before wealth creation in such a way that any wealth generated will be distributed so that all contributors will be getting their “fair share” (p. 189). To do this, Mazzucato suggests building public wealth funds paid for through government-funded activities or equity stakes in companies that have received public investments. Similarly, Mazzucato argues that companies that focus on creating value for their stakeholders ignore the impact of company decisions on others in the community. Governments should intervene to shape markets so that all stakeholders in a mission will profit.

The final pillar is utilizing open systems to co-design the future through increased citizen engagement and participation. Additionally, it includes incorporating feedback loops and embracing uncertainty and ambiguity. In this, Mazzucato draws upon

the evolutionary theory of the market espoused by Joseph Schumpeter and the political theory of Alexis de Tocqueville. She envisions citizens participating in the creation of the vision of the mission and the method of achieving the said mission.

Together, Mazzucato believes these pillars will help ensure mission success. But there are two significant challenges any government program has to overcome in order to have any hope of being successful—the knowledge problem and political economy problems.

The Knowledge Problem

The knowledge problem originated from the socialist calculation debate of the early twentieth century. The debate took place between proponents of central government planning and proponents of markets. The former argued that the abolition of private ownership over the means of production, coupled with state planning, was superior to private markets for rationally allocating scarce resources; the latter argued that markets served a crucial function in enabling economic actors to discover how to best allocate scarce resources among an array of possible alternatives. The main market proponents—Ludwig von Mises and Friedrich Hayek—argued that the socialist model of planning was doomed to failure because it ignored the role of market prices in coordinating knowledge.

Their argument against planning was as follows. Without private property in the means of production, there could be no market for the means of production. Without a market for the means of production, there could be no exchange. And without exchange there could be no market prices which capture the relative scarcities of resources. Efforts to address this issue through a mixed system of “market socialism” inappropriately presumed that economists can identify equilibrium conditions. But equilibrium data does not exist outside the market process that generates the relevant knowledge.

The knowledge problem, then, consists of three components. The first is that knowledge necessary to production is often dispersed throughout society. The market is thus an important mechanism for coordinating this knowledge. The second is that much of this knowledge is inarticulable because it arises from the lived experiences of individuals. Monetary prices, however, are able to communicate this knowledge through people’s decisions to buy and sell. The third is that the dynamic process of the market leads to the creation of new knowledge that cannot be generated absent the market context. Hayek (2002, p. 13) notes that it is only through the use of markets that people discover “Which goods are scarce, however, or which things are goods, or how scarce or valuable they are. . . .” This knowledge, crucial for effective production and economic development, is only generated through individuals exchanging goods and services. Thus, markets both serve as a coordinator and creator of economic knowledge.

Government intervention disrupts the market's ability to communicate "knowledge of circumstance" while also distorting the process of discovery that takes place in markets. The result is what Kirzner (1985) refers to as the "stifled discovery process," which refers to the distortions caused by government regulations and interventions in markets.

Lavoie (1985) makes the important distinction between "comprehensive" and "non-comprehensive" planning. Comprehensive planning refers to government efforts to plan the entire economy. Non-comprehensive planning refers to government efforts to plan and control certain aspects of economic activity.

Non-comprehensive planning fits with Mazzucato's vision of missions. Private markets still exist, but they are guided by the public sector. Importantly, Lavoie (1985) noted that, from an economic standpoint, the difference between comprehensive and non-comprehensive planning are the ones of degree and not kind. That is, planners still suffer from the knowledge problem under non-comprehensive planning because the process of knowledge creation and coordination is attenuated due to government involvement whereby the political process, at least partially, replaces the market process.

To understand why this is important for missions, return to Mazzucato's pillars. The first pillar is that missions will collectively create value. This assumes that decision-makers possess knowledge of how to collectively create value as if this knowledge already exists and is available to collect. Missions are supposed to be "market shaping" (pillar 2) based on "dynamic capabilities" (pillar 3) possessed by government. Absent the market's discovery process, it is unclear how planners will know how to shape markets to achieve their ends. Similar logic applies to the issues of pre-distributing risks and rewards (pillar 5) and embracing stakeholder value (pillar 6). Both assume that decision-makers possess the economic knowledge necessary to ex ante influence markets to achieve the desired outcomes in terms of resource distributions and stakeholder value.

Political Economy Problems

Public choice scholars have identified several frictions and perverse incentives in democratic politics which can result in government policies failing to achieve their stated ends (Buchanan 1954; Tullock 1965; Reksulak et al. 2014; Wagner 2016). For instance, voters will tend to be rationally ignorant, meaning they will not obtain available political information because the cost of doing so is greater than the expected benefit. Because the impact of a single vote is limited, voters have a weak incentive to gather, and process, detailed political information on elected officials.

Another issue with voting is bundling: the fact that each voter casts a single vote for a candidate who represents a diverse range of major issues. Thus, individual voters cannot express their preference for specific issues. For instance, a voter may value a candidate's education policy but dislike the same candidate's health-care

policy. With a single vote, there is no way to communicate nuanced preferences across policies.

Exacerbating feedback between voters and policymakers are information asymmetries, as parties have different information. Rational ignorance assumes that information is available to voters, but they choose not to obtain it because the expected costs outweigh the expected benefits. Additionally, some information is unavailable to voters. For instance, the detailed workings of government bureaus are not available to voters. This is partially due to the complexities of agencies and partially due to the fact that congressional oversight committees often rely on agency reporting to carry out their monitoring. Agencies can strategically frame or withhold information which weakens oversight.

A final factor is special interest groups: collections of voters with a shared interest. While individual voters have little impact on electoral outcomes, special interest groups can have a bigger impact. The group's combined influence means members often have access to political actors that non-member voters lack. Where special interest groups are effective, they concentrate benefits on members while dispersing costs on taxpayers. These groups' success in influencing policy for their own benefit undermines the public interest justification for government action. Furthermore, in the process of currying favor, special interests can destroy wealth through rent-seeking activities, as they expend resources to secure resource transfers. This is wealth destroying because scarce resources are spent redistributing existing wealth instead of creating new wealth.

These political economy problems are prevalent in foreign aid. It is difficult for individual voters to track the specifics of foreign aid flows. Even if they were interested in gathering information to monitor political actors, the bureaucracy of foreign aid is so dense that important information is simply not available. Moreover, both domestic and foreign special interests are at work in foreign affairs, further intensifying the pathologies of politics. Absent the appropriate incentives, political officials will not pursue the interests of voter-citizens, or "stakeholders," as dictated by the mission model. Instead, there will be space for narrow opportunism whereby those in privileged decision-making positions, or those who have access to those in those positions, can pursue their own interests under the guise of inclusive rhetoric.

Like the knowledge problem, political economy problems present potential concerns for Mazzucato's key pillars. Consider, for example, how easy it might be for outcome-based budgeting (pillar 4) to be influenced by the political process. There are numerous government actors involved in the process who have an incentive to expand budgets for the benefit of their agency (Tullock 1965; Niskanen 1971). Officials can control flows of information to limit accountability. Moreover, special interests will seek to influence missions to benefit their members. The influence of these factors is likely to lead to missions that satisfy a subset of interests as compared to some overly broad and non-operationalizable conception of the "public interest."

Foreign Aid: Mazzucato's Principles in Action

The overall effectiveness of foreign aid has been a matter of much debate among economists (see, for instance, Easterly 2001, 2006; Sachs 2005). A well-known study by Burnside and Dollar (2000) finds that aid can indeed have a positive effect on GDP growth, so long as countries receiving the aid have good fiscal, monetary, and trade policies. In the absence of these policies, aid has little impact. However, the empirical robustness of Burnside and Dollar's findings has been questioned by many, including Hansen and Tarp (2001), Lensink and White (2001), and Easterly et al. (2004). These studies suggest far more dismal outcomes; outcomes that seem corroborated by the reality that many countries who have been lavished with foreign aid over the past few decades are still mired in poverty and corruption.

Foreign aid is a good arena in which to explore Mazzucato's principles for several reasons. First, foreign aid is nearly always mission-minded, given, or implemented with specific goals in mind. Second, it often involves collaboration between government and non-government players. Third, the significant number of foreign aid or economic development projects carried out over the past few decades allows us to compare results across varied institutional and cultural backdrops. Fourth, previous failures have theoretically allowed economists, political scientists, and the broader international community myriad opportunities to identify errors and implement potential solutions. Recently, there has been greater critique of aid programs that ignore the wishes of the recipient governments and even the local populace when designing programs, which dovetails with pillars 1 and 7 (Lancaster 2008, p. 51). There has also been a greater focus on building up state capacity and improving institutions, which arguably reflects pillar 3 (Lancaster 2008, p. 48). This provides the opportunity to explore whether the implementation of Mazzucato's pillars is crucial to mission success.

Collectively Creating Value

According to Mazzucato, missions should be determined based on a sense of public value and public purpose, which will guide the public and private together in co-creating value. Within our context, we can translate this into a collective determination of when foreign aid should be given, to whom and for what purposes.

Foreign aid hasn't always been considered a core function of governments. Prior to 1945, foreign aid was nowhere near as common as it is today. There are a few examples that can be pointed out. For example, US President Herbert Hoover headed up the Committee for Relief in Belgium during World War I, which aimed at relieving war-induced food shortages (Nash 1983). But the idea of utilizing public resources to help those outside a nation's borders, even in the case of humanitarian crisis, was anathema to many. As illustration, note that in the mid-1800s the US

Congress debated whether to send assistance during the Irish potato famine and eventually decided against it (Lancaster 2008, p. 26).

But by the end of World War II, politicians increasingly argued that promoting democracy required focusing on problems outside one's borders. Moreover, an active (government) hand needed to cultivate an international order sympathetic to US leadership. This change in perceived public purpose radically impacted both the scale and channels of foreign aid. The immediate concern of foreign aid in the wake of World War II was assistance for the war-torn countries of Europe. The ambitious spread of the USSR further unnerved US government officials, who also began giving aid to Asian countries in the aftermath of the Chinese civil war, hoping to stem the influence of communism in Asia. Both Moscow and Washington began using aid as bids to strengthen their own spheres of influence, although the United States was better able to establish long-term aid relationships, while the USSR was constrained by their domestic economic situation. Other countries also increased aid-giving as the international order shook off old ties and tested new alliances, particularly as former European colonies in Africa and Asia gained independence. By the 1970s, most countries were involved in the aid "business" in one way or another. Simultaneously, the number of NGOs involved in aid grew. These NGOs not only provided relief but also petitioned governments to provide additional resources.

Aid increasingly focused on economic development in the 1970s and 1980s and on meeting basic human needs among the global poor. Donors preferred projects that provided immediate benefits. And there was greater focus on aid from multilateral organizations, especially the World Bank's International Development Association. The collapse of the USSR in 1991 caused another reshuffling of aid relationships. While there was less pressure to use aid as a tool in the ideological struggle between capitalism and communism, there were also a host of typically impoverished newly created Eastern European states attempting to transition to a market-based economy. This furthered aid's transition to being primarily focused on economic development and as an incentive for policy reform (Lancaster 2008).

As this brief history attests, foreign aid has always been a heavily politicized process. Politicians often used it as a carrot to encourage cooperation from other regimes or to protect the giving country's own economic or political interests, with humanitarian goals coming second (Lebovic 1988; Alesina and Dollar 2000). Drury et al. (2005) and Coyne (2013) note even with humanitarian aid, such as disaster relief, and political considerations typically dictate both how much aid is given and if aid is given at all.

Of course, in Mazzucato's conception of the public interest, the government is not the sole value creator. NGOs, generally altruistically motivated (Büthe et al. 2012), have grown increasingly influential. But despite good intentions, NGOs often work with governments, entangling their work in political mire. Kim (2017) argues that countries with a higher presence of US-based NGOs are more likely to receive increased amounts of US-based aid. Additionally, the longer an NGO is present in a particular country, the more successful they are at petitioning for foreign aid. And government officials may view private aid as a potential tool for carrying out foreign

policy goals. For example, Baldwin (1969, p. 445) quotes a report from the Advisory Council on Private Enterprise in Foreign Aid, created by the Foreign Assistance Act of 1963, saying “private institutions may be far more effective instruments of national policy in some situations than government institutions.” A significant portion of private aid from the Western world is tied to promoting liberal values and institutions.

Can aid be sufficiently disentangled from political mechanisms to allow for the missions Mazzucato envisions? It seems quite unlikely, without completely cutting government from the mix, the opposite of what Mazzucato calls for in *Mission Economy*. Not only are government officials unlikely to let go of a tool for influencing other governments, but some recipient countries prefer to restrict foreign to public channels. These governments view private aid as a politically destabilizing force and legally restrict these groups’ funding (Dupuy et al. 2016). All of which suggests that Mazzucato’s first principle is unlikely to hold in light of our public choice argument.

Even in cases where government officials or multinational or private actors seek to grant foreign aid in as depoliticized manner as possible, there is no guarantee that they have the relevant knowledge to identify the correct missions or how to implement those missions to create value, relative to alternative uses for those resources. Missions at the level of the UN SDGs may seem so universally noble as to be almost unobjectionable goals. But considering potential paths of implementation immediately reveals the need to determine more specific priorities and make calculated tradeoffs. Perhaps this is why the announcement of the SDGs generated derision as “worse than useless” by *The Economist* (2015) or “senseless, dreamy, and garbled” by Easterly (2015).

Missions require specificity to determine whether success has been achieved. The SDGs are arguably broader and less-quantifiable than their predecessor, the Millennium Development Goals (MDGs). Yet it’s worth noting that despite their more targeted nature, the MDGs were typically considered failures, particularly in Africa. Because so many African countries started so far behind compared to other geographic regions, even countries that showed improvement were considered program failures (Easterly 2009). The MDGs’ creators could not account for the unique local challenges countries faced. Nigeria, for example, lagged behind partially due to the Boko Haram insurgency in the north of the country and a spate of kidnappings in the south (Oleribe and Taylor-Robinson 2016). The unsuitability of the MDG goals to local realities is dominant in the extensive literature on the limitations of the MDGs (Fehling et al. 2013). Other common critiques include the goals’ overly simplistic nature, lack of accountability, and inadequate inclusion of relevant stakeholders in goal creation. (This latter point is particularly relevant to Mazzucato’s framework.)

Market Shaping

Mazzucato's principle of market shaping follows naturally from her first principle of co-creating value, because market shaping requires a goal, a vision of what a specific market should look like. As she states, market shaping requires "goal-oriented investment on the supply side, market creation on the demand side, and governance mechanisms to achieve inclusive, innovation-led and sustainable growth" (p. 174).

Because missions require intervention by the government, they are inherently market shaping in that they change market activity relative to the counterfactual. However, what Mazzucato does not address is that all market interventions cause unintended consequences, and these unintended consequences often undermine the original intention behind the intervention. Because planners cannot have full knowledge of existing conditions or future conditions, they necessarily operate on very limited knowledge of the world. The result of simple interventions in a complex system is that unintended consequences emerge in forms and ways that planners cannot fully know or anticipate (Coyne 2013, pp. 143–168).

One of the most devastating of these unintended consequences is the increase in rent seeking and the subsequent politicization of nearly every aspect of life within aid recipient countries. P. T. Bauer (1981, p. 104) noted that, "[t]he tendency toward politicalization operates even in the absence of these transfers [of foreign assistance], but is much buttressed and intensified by them." As an example, consider how influxes of foreign aid can incentivize wealth-destroying behavior, as individuals recognize profit earning opportunities from lobbying for additional aid and shift resources into the political realm. Instead of focusing on the productive creation of economic wealth, individuals and firms choose to compete for political favors, diverting resources better used elsewhere and rewarding corruption for those in positions of power over how foreign assistance is spent. Economides et al. (2008) break down foreign aid transfers into two effects on growth—the positive impact that stems from increased financing of infrastructure and the negative impact that stems from increased incentives to rent seeking. They find that any positive impact on growth is significantly mitigated by adverse rent-seeking behavior. This issue is exacerbated by a large public sector.

Aid can also distort government spending into unproductive channels. Svensson (2000) argues that foreign aid may decrease productive spending on public goods because the influx of assistance reduces the pressure to use public spending in an effective manner. Aid money serves as a substitute for funds raised by taxation or other domestic sources, freeing up budgets for rewarding special interests.

Tying assistance to specific outcomes may seem like a solution for aid advocates trying to avoid abuse, but tied aid still shifts public spending. In a study of public spending in Malawi by Seim et al. (2020), government officials who became aware of aid programs at certain local schools were less likely to target these schools for local development projects. Feyzioglu et al. (1998) also assert that earmarked loans or assistance reduce spending in the designated areas. As a result, the rate of return of a particular aid-funded program is not accurately reflective of the overall impact of

the said program. Chatterjee et al. (2012) attempt to put numbers to the problems and suggest that 70% of aid is fungible and that aid given to spur public investment actually crowds out between 80 and 90% of domestic public investment.

The distribution of private aid also tends to be centered around which countries or issues are most likely to lead to receiving public funding, rather than determination of the greatest need. For example, there was a massive influx of NGOs in both Kosovo and Haiti after the international community made large funding commitments, following the respective country's conflict and earthquake (Coyne 2013, p. 97). Called the "NGO scramble" (Cooley and Ron 2002, p. 26), this phenomenon demonstrates how NGOs focus on highly publicized, short-term projects to attract future funding. It also leads to "disaster hype," as humanitarian organizations exaggerate the extent of a specific crisis in order to encourage additional donations. One example of such is the Darfur conflict, where the US government estimated fatalities of 60,000–160,000, while the Coalition for International Justice claimed fatalities were as large as 400,000 (Coyne 2013, p. 98).

Although mission-creating experts may be aware of the existence of issues such as corruption or NGO scrambles, without the feedback loops of the market, and the incentive to act on that knowledge, it is impossible for them to determine what the unintended consequences of a given foreign aid program will be. Thus, market shaping also falls prey to both the knowledge problem and political economy problems.

Building Up Government Capabilities

Perhaps the problem is the quality of government institutions. Mazzucato argues that in order to successfully shape markets, the public sector needs to build dynamic capabilities similar to that of the private sector. She identifies five capabilities she thinks are central to modern bureaucracy's ability to "manage complex and wicked problems": leadership and engagement, coordination, administration, risk-taking and experimentation, and dynamic evaluation. To Mazzucato, the government has been efficiently neutered by the broad acceptance of market failure theory. This has created a broader culture antithetical to the idea of government officials engaging in the risk-taking prevalent in the private sector.

What Mazzucato doesn't consider is that the behavior she admires, the ability to bear greater quantities of risk, may not be compatible with the bureaucratic structure of government. If government capabilities are indeed simply held back by citizens who only want the government to intervene as a last resort, then bolstering these attributes starts with changing public perception of the public sector. However, if the level of risk tolerance and other government capabilities is a result of government officials responding to the incentives generated by the bureaucratic structure, it is not public perception, but rather the non-market nature of government that determines which capabilities are developed by government officials.

As evidence of the influence of bureaucratic structure on behavior, consider the work of Arel-Bundock et al. (2015), who look at the 15 aid-giving agencies that are part of the US government. They argue that dependent agencies are more likely to give aid that closely tracks with the foreign policy goals of the president, while more independent agencies are more likely to be more responsive to the needs of the recipient country. This suggests that incentives differ across bureaucratic structure.

Far from being neutered by market failure theory, over the past few decades, the scope of the US government is arguably the largest ever. Indeed, a greater concern than government impotence is mission creep, as the activities expand beyond what was originally intended. The phrase was originally created in the 1990s to describe US actions in Somalia and Libya but has been applied to several non-military scenarios, including foreign aid. Consider this admission from former World Bank Managing Director Jessica Einhorn (2001, p. 22) that the World Bank's "mission has become so complex that it strains credulity to portray the bank as a manageable organization."

Unlike domestic government-involved missions, foreign aid involves a nexus of two different areas wherein government capabilities potentially play key roles: the abilities of both the giving government and the recipient government. Hodler (2007) notes that the quality of the recipient country's institutions impacts aid effectiveness and that countries with poor institutions that insufficiently protect public funds from being appropriated by government officials are less likely to see positive growth associated with aid. Similarly, Dollar and Levin (2005) evaluate World Bank development projects in the 1990s and find that the institutional quality of the recipient country matters far more for the likelihood of success than the project type.

A significant portion of foreign aid today is centered around attempting to build state capacity. However, it is dubious whether assistance can achieve this end. Djankov et al. (2008) look at 108 countries over a period of nearly 40 years and find that foreign aid negatively impacts democratic institutions. Knack (2001) finds that receiving higher aid levels actually erodes a country's governance quality, due to poorer bureaucratic quality, increased corruption, and weaker rule of law. Aid reduces government accountability, essentially subsidizing poor behavior, since badly managed countries typically receive the most assistance. Aid can even increase the likelihood of violent conflict, since whoever is in charge of the government often gains control of the rents provided by aid (Grossman 1992).

The erosion of foreign governance institutions suggests that economic development comes not from relaxing constraints on government officials, but on devising constraints that will prevent political opportunism while enabling ordinary citizens to engage in productive entrepreneurship. However, no expansion of government scope will enable bureaucrats or politicians to overcome the knowledge problem because this constraint is not an issue of capacity, but rather a fundamental inability of planners to solve the core economic problem outside of the context of private markets.

Budgeting Based on the Desired Outcomes

Recognizing the incentive problems caused by aid dependency, the past two decades have led some aid advocates to try to find less harmful methods of providing assistance. For example, the Center for Global Development, a development-oriented think tank, has argued for a form of outcome-based budgeting for foreign aid which they call cash on delivery (COD). COD aid programs try to limit aid abuse through practices such as tying payments to outcomes and requiring independent verification of progress. COD aid is tied to specific projects, but funding is doled out gradually, in exchange for achieving specific outcome goals. With this system, donors refrain from stating how goals are achieved, using independent monitoring to verify only outcomes instead of inputs, which is supposed to encourage recipients to take full responsibility for achieving goals (Birdsall et al. 2010).

COD aid is essentially an attempt to reduce or eliminate political economy problems from foreign aid. By requiring hands-off implementation, donors eliminate their ability to direct aid funding to beltway experts or special interest groups. Independent verification and public transparency keep performance in the public eye, where it is harder to get away with corruption. And payment for outcomes requires programs to actually be carried out in order to receive additional funding, reducing the ability of aid recipients to forestall achieving the donor's desired goals in order to prevent cutting off their stream of revenue.

Hands-off implementation also allows for some local knowledge to be incorporated into determining the best method of delivering the outcome. However, inclusion of local knowledge into the production process still doesn't eradicate the knowledge problem because there is no way to capture economic knowledge in determining the goal itself which must be pre-determined. Absent the market context, mission decision-makers are unable to correctly assess the true cost or benefit of a given mission relative to all other possible alternatives. Furthermore, because outcome-based budgeting requires quantifiable outcomes that can be easily measured, aid projects are likely to be centered around whatever outcomes can be verified and not necessarily where there is the greatest value. In comparison to other funding structures, COD aid may provide a superior option for policymakers. But this does not mean COD aid can determine the best desired and the best use of scarce resources to achieve that end.

The other danger of outcome-based budgeting is that budgets for programs will simply grow relatively unchecked regardless of whether the benefit is greater than the cost. Exacerbating the issue is the fact that government bureaus must spend down their yearly budgets in order to justify receiving additional funding in the next year. As a result, there is little incentive to withdraw funding from projects, even if projects are not meeting the desired thresholds (Coyne 2013, pp. 108–142). This is a problem within NGOs as well, particularly those who receive funding tied to carrying out specific projects. Even in cases where aid programs are theoretically tied to certain evaluations, the proposed consequences may be unlikely to be carried out.

Pre-Distributing Risks and Rewards

Mazzucato argues that missions should be “pre-distributive,” instead of merely redistributive. Pre-distributive policies, at their core, seek to shield actors from fully facing the forces of the market. But unlike redistributive policies, which seek to compensate the “losers” of a particular market through welfare transfers, pre-distributive policies seek to change “the way in which the market distributes its rewards in the first place” (Hacker 2011, p. 35). This desire can manifest itself in a myriad of different public policies, such as minimum wage laws and universal basic income proposals. These policies reduce the risk for many types of actions, encouraging people to engage in riskier behavior. That risk is instead borne by the government. Mazzucato argues that pre-distributive policies are crucial to mission success because the private sector underinvests in riskier projects.

Mazzucato’s preferred method of pre-distribution is the creation of public wealth funds, where the wealth is built up by returns to government-funded activity or equity stakes in companies that benefit from government investments. As such, we will focus on public wealth funds and their internationally oriented analogue, the sovereign wealth fund. Whereas public wealth funds are typically invested domestically, sovereign wealth funds (SWF) consist of investments made by a government primarily outside the borders of its own country. However, the definitions are not set in stone, with some scholars using the term sovereign wealth fund in both cases.

How do public or sovereign wealth funds impact foreign assistance missions? Sharma (2017) argues that sovereign wealth funds are key to the success of the UN SDGs, since the SDGs require significant amounts of long-term investment, and that governments should direct sovereign wealth fund investments toward economic development initiatives. As an example, he points to India’s National Investment and Infrastructure Fund (NIIF), which funnels investment into different infrastructure sectors, such as railroads.

Numerous experts have debated how, if at all, sovereign wealth funds change the tenor of international relations. In testimony for the House Committee on Foreign Affairs, Edwin Truman (2008, p. 1), a Senior Fellow with the Peterson Institute, argued that while sovereign wealth funds weren’t a significant threat to US foreign policy, “[t]he U.S. should continue to press countries with sovereign wealth funds to design and embrace best practices for these funds to enhance their accountability to citizens of the countries with the funds as well as to the citizens and markets in which they invest.” He describes five concerns that will become increasingly pertinent as wealth is increasingly concentrated in public hands. These concerns are that governments will mismanage the funds; that governments will manage SWFs to subsidize state-owned or state-controlled national champions; that financial protectionism will be encouraged, especially if states perceive future policies would benefit; that SWFs will increase market turmoil due to their opaque natures; and that government ownership of international assets makes it more complicated to balance the benefits of open markets and regulation.

Pre-distribution advocate Jacob Hacker (2015, p. xxix) argues, “a predistribution agenda does not make all the hard choices easy. But like the engineer who is allowed to open his toolkit, we are at least able to recognize what the real choices are.” As with market shaping, the successfulness of pre-distribution relies on whether or not the economy can be “engineered” by experts. Truman’s solution to this question is encouraging international commitments to SWF best practices. But the best practices are toothless checks on government behavior. Nor do they solve the government’s inability to access and incorporate dispersed, local, and tacit knowledge into their decision-making. The government’s inability to pick winners is not due to a lack of the best practices, but to the absence of market prices and profit and loss and the resulting economic knowledge.

Embracing Stakeholder Value

So far, we have primarily focused on the constraints of government planning in missions. But Mazzucato’s vision isn’t that the government carries out missions alone. In order for missions to be successful, they need to include both the private sector and the general public. Mazzucato’s sixth pillar comes out of the shareholders versus stakeholders’ debate regarding corporate governance. Whereas shareholder theory argues that companies should seek to maximize shareholder returns, stakeholder theory argues that financial considerations must be balanced by consideration of the interests of others impacted by the business in some way, whether that be employees, customers, or the surrounding community (Smith 2003). Shareholder advocates generally support a *laissez-faire* approach to the market, believing that the “business of business is business” (Pfarrer 2010). Stakeholder theory, in contrast, argues that the business of business extends far beyond maximizing market returns.

Predominant within stakeholder theory is corporate social responsibility (CSR). CSR programs can run the gamut from donating to local food pantries to participating in fair trade practices to diversity, equity, and inclusion programs. Michael (2003) identifies three schools of thought for CSR: company-led CSR, state-led CSR, and civil society-led CSR. These categories are determined not by actions taken by the corporation, but by the actor who incentivized the actions in question. Company-led CSR develops endogenously from within the company, often because the firm seeks to promote a reputation of being good for the local community or because they wish to attract and retain employees by offering a high-quality work environment. State- and community-led CSR programs, however, are programs a company pursues due to external pressure.

There are several ways CSR can impact international development, including lobbying for better legal and political practices, creating educational programs, or even just refusing to engage in bribery in countries with prominent corruption. Because stakeholder theory focuses on the relationship between corporations and the local community, stakeholder-ruled governance is sometimes viewed as an alternative to government regulation (Buchholz and Rosenthal 2004). Blowfield

(2005) posits that corporate social responsibility theory contains unique implications for international relations because it rewrites the perceived relationship between businesses and broader society. He argues that CSR even has the potential to discourage conflict among different sectors of society through creation of inclusive stakeholder partnerships.

Does CSR fall prey to the knowledge problem? It depends on the type of CSR program. Company-led CSR largely manages to escape the knowledge problem, since the decision to engage in such programs is internal to the firm and is thus part of their profit-loss calculation. However, businesses in developing countries, which tend to have less secure political and civil rights, may face increased responsibilities to their stakeholders compared to businesses that operate in countries with superior institutional environments (Reed 2002). This may discourage firms committed to CSR from entering the market in a developing economy, limiting their capacity in assisting mission success.

State-led and community-led CSR, on the other hand, are more likely to push programs based on external standards, such as pushing for more women to be included on boards. These external goals may or may not be driven by some amount of local knowledge, but since firms would arguably be already including such programs if they thought it would be profitable, the need to exert external pressure to achieve such external goals suggests these programs run counter to the economic calculation provided by the market.

How do CSR programs fair regarding political economy problems? Once again, externally motivated CSR programs are more likely to fall prey, particularly state-led CSR. State-mandated or state-subsidized CSR programs inherently politicize the concept of stakeholder. Michael (2003) points out that while advocates of state-led CSR argue externally encouraging such programs is necessary to build a “brighter capitalism,” what it really does is pit government and businesses against one another. Externally motivated CSR “represents a site of contestation for the right to determine social objectives and the funding of these objectives” (p. 123). With political rents up for grabs, state-led CSR could lead to a “CSR scramble” similar to the aforementioned “NGO scramble” where businesses who seek to benefit from government subsidies seek to implement programs they otherwise wouldn’t and waste resources lobbying for additional subsidies.

Open Systems and Co-Designing the Future

Mazzucato’s final pillar is intended to hold the government accountable through community engagement. But incorporating community engagement isn’t easy. Who should participate in the conversation and whose feedback should be given the most weight during disagreements when it comes to making decisions about mission goals and methods? Should taxpayers in donor countries have a say about how aid money is spent in another country? Milner and Tingley (2011) note that there are strong partisan divides in the United States when it comes to supporting economic aid but

that the opposite is true for military aid. There are also divides alongside economic class and racial ethnicity. Public opinion, however, typically focuses on broad buckets of aid (economic vs. military) and not on the details of specific projects.

There are relatively few large sample studies that look at the opinions on aid recipients. Findley et al. (2017) conduct one among 3000 Ugandans and find more support for projects funded by foreign aid, because they view aid projects as less politicized than they do for projects funded by their domestic government. They also find some support that Ugandans prefer multilateral aid to bilateral aid.

Of course, positing that governments ought to incorporate public opinion into their decisions regarding foreign aid doesn't mean that this will occur. Otter (2003) finds mixed evidence for whether or not first-world governments care about public opinion regarding foreign aid. While there are some cases where aid is increased or decreased in concordance with public opinion, there are many other cases where the opposite is true. Otter suggests faulty polling techniques may be partially at play, but also that government policies are determined by elites who only care about public opinion when it is sufficiently threatening to their electability. Another explanation might be the rational ignorance of voters who are likely to lack details as to specifics of aid flows. To the extent rational ignorance is at work, it would allow political decision-makers to pursue policies contrary to public opinion with little consequence.

Perhaps even more disappointing for Mazzucato is Winters' (2010) study on whether participation encourages accountability in aid programs. He finds that "in terms of donor accountability to aid-receiving countries and the end users in them, recent pushes for increased participation have not resulted in more accountability in the design of aid programs" (p. 218). This might be due to a lack of information, a lack of incentive to gather information, and a lack of voice or exit.

Experts' inability to properly incorporate public desires into their plans often undermines their goals. Ottaway (2002) argues that the initial stages of post-conflict rebuilding are particularly fragile and that the international community often pushes for institutional development too quickly in these situations. Reform is more likely to happen with a significant, prolonged engagement by the international community, but as Ottaway notes (p. 1021), this is a strategy that:

relies on force, or better on the threat of force, to coerce the groups that have caused the state to collapse to submit to external 'best practices' solutions. It involves the presence of foreign troops and the direct intervention of international agencies willing to make and impose policies. It is not a democratic option.

Here Ottaway acknowledges an uncomfortable truth many aid advocates are loath to understand and admit—missions are often inherently coercive. They involve experts imposing their wills upon others under the guise of freedom, individual rights, and self-determination (Easterly 2006, 2013). Mazzucato's pillars do not offer a clear path to avoiding this reality.

Conclusion

We have spent much of this chapter discussing the ways that foreign aid missions are doomed to fail. But there is one last argument in favor of missions that must be addressed: the argument of compassion. Even if the goals of missions may not be achieved successfully, what else is there to do? Surely the answer cannot simply be to turn our backs on human misery and do nothing? Isn't something better than nothing?

Sadly, it is indeed possible that doing nothing is better than doing something. If doing something runs the risk of doing more harm than good, then we should refrain from action. Granted, it is not always easy to gauge overall harm, but the possibility of harm is the reason enough to appreciate the challenges posed by knowledge and political economy problems. Any treatment of missions to aid others should take these factors into account.

Furthermore, there is an alternative to missions, and one with a proven track record of success—the expansion of free trade and movement of people. Although the narrative around capitalism today is too often a story of wealthy countries using the guise of free markets as yet another opportunity to oppress poorer countries, a look at where economic growth actually occurs shows this is simply not true. Empirically, countries that embrace capitalism reap the rewards of their decision, while those who restrict or nationalize markets suffer. Individuals from more capitalist countries on average experience better lives, becoming wealthier and healthier, and benefiting from greater amounts of education and political freedom (Leeson 2010). And allowing people the freedom to migrate offers them an opportunity to improve their own lives while contributing to broader wealth creation (Clemens 2011; Kukathas 2021).

Mazzucato's book is dedicated to the idea of reshaping capitalism through the use of missions. But as we see from the voluminous history of foreign aid, missions cannot overcome the knowledge and political economy problems, even when guided by Mazzucato's pillars. True capitalism doesn't need to be reshaped in order to be effective. If we truly believe in promoting human flourishing, the ultimate goals of the UN SDGs, then we should embrace the best path forward for doing so—individual freedom that enables people to unleash their creativity, which is the fountainhead of human progress (Norberg 2020).

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A Public Choice Perspective on Mission-Oriented Innovation Policies and the Behavior of Government Agencies



Rickard Björnemalm, Christian Sandström, and Nelly Åkesson

Abstract Mission-oriented innovation policies put government and state agencies at the forefront of the innovation process. Currently, little is known about the interests of the government agencies in charge of implementing mission-oriented innovation policies. In this chapter, we set out to explore the incentives and behavior of such government agencies. We do so by analyzing 33 annual reports from three government agencies in charge of implementing innovation policies in Sweden over a 10-year period: Sweden's Innovation Agency (*Vinnova*), the Swedish Energy Agency (*Energimyndigheten*), and the Swedish Agency for Regional and Economic Growth (*Tillväxtverket*). First, we track all cases in these annual reports where an evaluation is mentioned. Identifying 654 instances, we subsequently make a sentiment analysis and code whether these statements are positive, neutral, or negative. Our findings show that 84% of these instances are positive, 12% are neutral, and 4% are negative. Second, we relate these results to more critical evaluations and show that these agencies often ignore research that generates more critical results. In sum, our results suggest that government agencies in charge of implementing mission-oriented policies benefit from the enlarged role they are given and that they act according to their own self-interest.

Keywords Innovation · Government agencies · Public choice · Self-interest

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Introduction

Over the past two decades, the West has experienced an increasing implementation of interventionist innovation policies. The focus of innovation policy has evolved beyond creating favorable conditions for firms and enhancing the supply of research and development, which can lead to positive spillovers and economic growth. Scholars such as Mariana Mazzucato (2014, 2021) have elevated the European Union, national governments, and regional policymakers to the forefront of the innovation process. Consequently, a plethora of policies with larger budgets and higher expectations regarding their contribution to innovation and renewal have been launched.

These policies, which explicitly recognize the state as the primary driver and initiator of innovative change, need to be evaluated. While existing research has primarily concentrated on firms and specific industries, limited attention has been given to the government agencies that play an increasingly important role in steering the innovation process. As budgets expand at both the EU and national/regional levels, it becomes imperative to study the behavior of these government agencies. What are their incentives, and do they act in their own interest or in the best interest of society at large?

In this chapter, we delve into an examination and explanation of the conduct exhibited by government agencies responsible for implementing mission-oriented policies and advocating for the state as an important entrepreneurial force in society. Our analysis centers on the annual reports of three Swedish government agencies—*Vinnova* (Sweden's Innovation Agency), *Energimyndigheten* (the Swedish Energy Agency), and *Tillväxtverket* (the Swedish Agency for Regional and Economic Growth)—spanning a full decade. By examining the content of these 33 annual reports, we identify 654 instances where specific evaluations are mentioned. Utilizing sentiment analysis, we demonstrate that an overwhelming majority of these instances (84%) feature positive statements, while 12% remain neutral, and 4% can be considered negative or critical. Intriguingly, only 12 of these 654 instances (1.8%) are substantiated by references, making it challenging to locate original sources supporting claims made. Our findings align with the theory of public choice, which posits that government agencies act in their own self-interest.

The chapter is organized as follows. We begin by introducing the concept of mission-oriented policies and the notion of the state as the driving force in the innovation process. We also discuss relevant public choice literature and associated theories that elucidate the incentives and behaviors of government agencies. Then we present our methodology and data, followed by a comprehensive discussion and concluding remarks.

Background: Innovation Policy and Missions

While numerous scholars have proposed more directed innovation policies, no one has been more effective in disseminating and conveying these ideas to policymakers than Mariana Mazzucato (2014, 2021). Drawing on examples such as the Apollo Project and the Manhattan Project, Mazzucato argues that the state should embark on bold endeavors in uncharted territories, acting as a guide and driver of societal change toward social and economic progress. In her own words:

The key insight of this report is that missions are both a means of setting economic growth in the direction of where we want to be as a society and a vehicle we can use to get there. (Mazzucato 2018, p. 28)

From this perspective, policymakers assume a prominent role as the primary agents responsible for bringing about desirable transformations. As stated by Kattel et al. (2021, p. 18):

Moving towards a greener, low carbon economy entails redirecting all sectors and actors—public, private, and civil society—towards sustainable and inclusive economic growth.

The fact that the aforementioned publication by Mazzucato serves as an official document of the European Commission underscores the growing popularity of mission-oriented policies among policymakers.

With few exceptions, the literature on mission-oriented policies asserts that governments possess both the capability and the altruism necessary to effectively implement specific missions. These assumptions are clearly articulated in numerous reports, book chapters, and academic papers authored by Mazzucato and her colleagues. Here is an illustrative example (Mazzucato 2022, p. 93):

Governments are the only actors capable of underwriting the scale of investments required; of coordinating multiple actors around the common goal of decarbonization; and of ensuring the costs and benefits of a green transition are distributed equitably across society so that social injustices are tackled alongside environmental crises.

Furthermore, in the mission-oriented literature, various government initiatives are often invoked to support its arguments. In these instances, government actors are portrayed as both competent and motivated by good intentions (Sachs et al. 2019, p. 811): “Lessons should be learned from mission-oriented organizations like DARPA and ARPA-E in the U.S., Yozma in Israel, SITRA in Finland, and Vinnova in Sweden.”

Public Choice Theory and Mission-Oriented Policies

While policymaking is often perceived as an altruistic process free from self-interest, there exists a body of literature that challenges this notion. In their work *The Calculus of Consent*, James Buchanan and Gordon Tullock (1965) posited that politics is an ongoing process occurring amidst distributed agency. In other words,

stakeholders are assumed to have diverse and sometimes conflicting incentives when seeking to influence the policy-making process.

In their efforts to expand upon the public choice aspects discussed in *Questioning the Entrepreneurial State* (Wennberg and Sandström 2022; Bergkvist et al. 2022), Muldoon and Yonai (2023) provide a comprehensive analysis of how policymaking in innovation policy can lead to suboptimal outcomes due to divergent incentives and the influence of interest groups on the policy process. Stam and Vogelaar (2023) also underscored the importance of regarding government as a collection of groups and actors and that referring to the state as one homogenous entity would be an oversimplification.

Public choice scholars assume that actors in the policymaking process behave as economic agents, aiming to maximize their own utility. Powerful and concentrated interest groups, such as large corporations, labor unions, and industry associations, leverage superior relational and financial resources, often combined with asymmetric knowledge, to influence policies. As a result, they shape regulations, compensation schemes, and tax structures to their advantage.

Applying the public choice perspective to Mazzucato's ideas about an entrepreneurial state, Muldoon and Yonai (2023, p. 2) summarize their argument in the following manner:

She [Mazzucato] fails to recognize that increased government involvement will lead to rent-seeking and unproductive entrepreneurship (Kirzner 1985, pp. 144–245). This oversight is problematic because rent-seeking erodes support in institutions, politicians, and the larger society, leading to the decline of a nation (Olson 1982). We argue that scholars should pay closer attention to the Public Choice literature in economics when analyzing the partnership between governments and business.

Muldoon and Yonai further state that the notion of an entrepreneurial state (p. 3)

conjures an image of disinterested and competent technocrats who make decisions based on knowledge, with their sole motivation being the common good. In addition, because these technocrats are nonpartisan and not self-interested, their motivation will be in the long-term good.

Hence, mission-oriented policies are, according to Muldoon and Yonai, based on the idea of the entrepreneurial state as “a dynamic, thoughtful body that makes decisions based on relevant information” (p. 3).

Remarkably, Mazzucato briefly acknowledges the critique posed by the public choice literature in the chapter entitled “Bad theory, bad practice” in her 2021 book (pp. 33–34):

But just as MFT [Market Failure Theory] is a theoretical construct, so is its alter ego, public choice theory. The axiom underlying public choice theory is that bureaucrats and politicians behave like free-market actors: they rationally seek to maximize their ‘utility’. Self-interested bureaucrats and politicians are effectively entrepreneurs who compete to gain control of a monopoly, the state.¹ But, rather as with MFT, no empirical evidence was

¹A. Innes <https://blogs.lse.ac.uk/europpblog/2018/09/29/the-dismantling-of-the-state-since-the-1980s-brexite-is-the-wrong-diagnosis-of-a-real-crisis/> (accessed 2 January 2020).

advanced to support this idea. It was just assumed that social, constitutional and ethical concerns never motivated bureaucrats and politicians.

A detailed examination of the lack of empirical research on public choice, a field of study that has gained significant importance over the past 70 years (Mueller 2003), falls beyond the scope of this paper.

Public Choice and the Incentives of Government Agencies

Public choice scholars often posit that reducing government expenditure is challenging. Attempts by a government to cut funding for an agency are met with resistance, as the agency presents persuasive arguments highlighting the societal significance of their operations. A recent study by Bednarczuk (2022) yielded similar findings, demonstrating that government officials tend to support increased government expenditure when their own agencies receive more funding.

Nevertheless, the existing literature on mission-oriented innovation tends to portray the responsible agencies as competent and driven by altruistic motives. A notable example of this perspective is evident in Mazzucato's (2021, pp. 74–75) description of NASA, where she portrays the agency in the following manner:

Running a mission-oriented system of innovation requires leadership that – like NASA – encourages risk-taking and adaptation and can attract the best talent. It is important that agencies carrying out missions have sufficient autonomy to take risks without their authority being questioned.

Furthermore, Mazzucato (2021, p. 123) depicts the role of the government driven by altruism in mission-oriented innovation as follows:

The point is: to think in a mission-oriented way is revolutionary because it requires rethinking the role of government in the economy, putting purpose first and solving problems that are important to citizens. It means transforming government from being merely an “enabler” or even a “stifler” of innovation to becoming the engine of innovation.

Upon reviewing the public choice literature, Mazzucato (2021, p. 33) disparagingly summarizes the public choice view upon government:

In public administration, the lack of competitive pressure leads to “bureau-maximizing” behavior, whereby departments and agencies look after their own survival rather than the “common good.”

The extent to which the behavior of government agencies is aligned with the predictions of public choice theory is an important question. A deeper understanding is required regarding the actual conduct of government agencies responsible for implementing innovation policies. Hence, the objective of this paper is to investigate the motivations and actions of the government agencies that are put in charge of mission-oriented policies.

Method

We conducted an analysis of the annual reports, spanning a period of 11 years, from three of Sweden's innovation agencies: *Tillväxtverket* (the Agency for Regional and Economic Growth), *Vinnova* (the Innovation Agency), and *Energimyndigheten* (the Energy Agency). These reports were obtained from the agencies' websites (or web shop in the case of the Energy Agency), covering a total of 33 annual reports published between 2011 and 2021, covering the years between 2010 and 2020.

The use of annual reports as the unit of analysis offers several advantages. First, these reports are a mandatory requirement for all agencies, ensuring compliance with legal obligations (as stipulated in SFS 2000:605 and SFS 2019:577 after January 1, 2020). This guarantees a certain level of comparability between annual reports, both within and across agencies over time. Importantly, annual reports are expected to:

provide a brief basis for the government's follow-up, examination or budgeting of the agency's activities.

In addition, the annual reports are supposed to provide a *fair representation* of the agency's activities according to Chap. 2, § 6 in the ordinance SFS 2000:605:

The elements of the annual report shall be established as a whole and give a fair representation of the results of the activities as well as of costs, income and the financial position of the agency.

These two requirements are significant for our study. First, they provide us with insights into the utilization of these annual reports, such as their purpose in budgeting. Second, the legal obligation to provide a fair and accurate representation of their activities ensures the reliability and validity of these reports. Hence, we can confidently assert that the utilization of annual reports as a unit of analysis is justified and valuable for our research.

Data Analysis

Our analysis involved a comprehensive two-step approach. First, we employed a systematic coding scheme to examine the material. We reviewed all 33 annual reports, specifically focusing on sections where statements related to evaluations were mentioned. To ensure inclusivity, we utilized the Swedish search term "utvärld" (equivalent to "evalua" in English) to identify relevant passages. Each statement was assessed within its context and evaluated for its relevance to our research objectives. A statement was deemed relevant if it pertained to evaluations of the agency's activities. These pertinent statements were then documented in an Excel spreadsheet and coded based on the following criteria:

Table 1 The coding results of the three different researchers

	Researcher 1	Researcher 2	Researcher 3
Positive	554	528	530
% positive	85	81	81
Neutral	78	96	101
% neutral	12	15	15
Negative	22	30	23
% negative	3	5	4
Total	654	654	654

1. Positive, negative, or neutral tone.
2. Presence of a source for the evaluation.

The first criterion aimed to capture how evaluations were portrayed in the annual reports and how they impacted the agency’s activities. The second criterion sought to determine whether the mentioned evaluations were properly attributed. Additionally, we recorded the title of the annual report, the respective agency, the year, and the name of the evaluation if referenced.

Initially, one researcher meticulously reviewed all 33 annual reports and compiled the Excel spreadsheet following the aforementioned methodology. Subsequently, two separate researchers independently coded the recorded statements from the spreadsheet, applying criteria (1) and (2), without any knowledge of the initial researcher’s coding. This process resulted in a total of 665 observations. Out of these observations, 11 were found to use the term “evaluation” without discussing evaluations, and therefore, they were excluded from the dataset. The final dataset comprised 654 observations. The coding performed by the three researchers is depicted in Table 1.

In cases where there was a discrepancy in the coding of statements among the three researchers, the coding was based on the consensus of two researchers’ perceptions. Overall, the three researchers reached a mutual agreement in 88% of the cases. In the remaining 12% of cases (113 observations), one researcher’s coding differed from that of the others.

Results

This section commences with a concise depiction of the empirical context of innovation policy in Sweden. Subsequently, we delve into a review of pertinent research that explores the evaluation of government agencies’ endeavors by various groups of evaluators. Within this review, we also examine research that adopts a more cautious stance toward the effectiveness of innovation support. Following that, we present our findings regarding the utilization of evaluations by government agencies and their self-assessment of their work as documented in their annual reports.

Empirical Background

In Sweden, innovation policy is primarily administered through a few prominent and independent state agencies, which aligns with the typical structure of Swedish public administration. Notable agencies in this realm include the Energy Agency, the Innovation Agency, and the Agency for Regional and Economic Growth, collectively responsible for a significant portion of the allocated resources. The remarkable growth of the first two of those government agencies over the past decades is evident in Figs. 1 and 2. Expenditure related to innovation policy has grown rapidly, with state grants alone (excluding EU, regional, and municipal investments) surpassing 1 billion euros annually (Karlson et al. 2019). The corresponding US figure exceeds USD 13 billion (Hunt and Kiefer 2017).

Evaluations of Innovation Policies in Sweden

In Sweden, as in many other Western countries, evaluations are conducted extensively across the entire public sector, including within the domain of innovation policy. Two independent agencies, namely, *Tillväxtanalys* (the Swedish Agency for Growth Policy Analysis, henceforth SAGPA) and *Riksrevisionen* (the Swedish National Audit Office, NAO), are responsible for performing evaluations in this field. Additionally, evaluations are carried out by researchers and consultants who are specifically hired to assess particular tasks or initiatives.

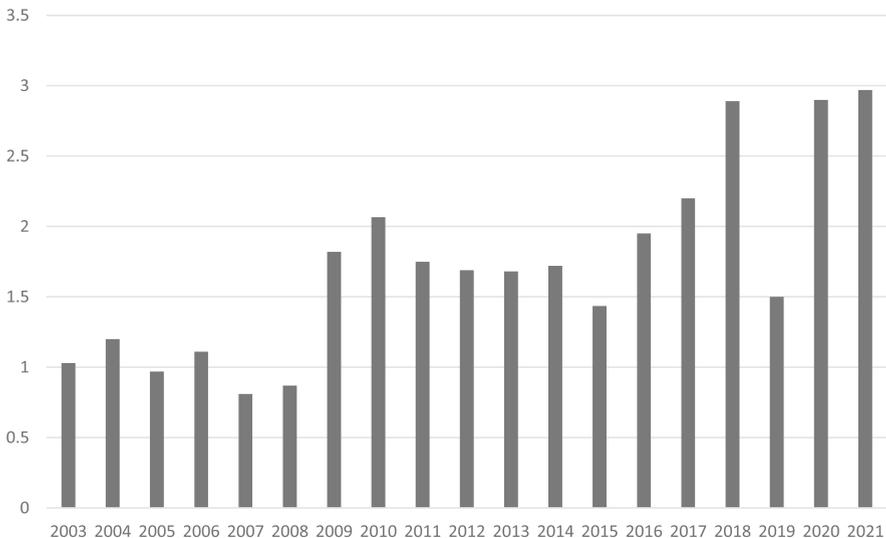


Fig. 1 The budget of the Energy Agency, 2003–2021 (billion SEK)

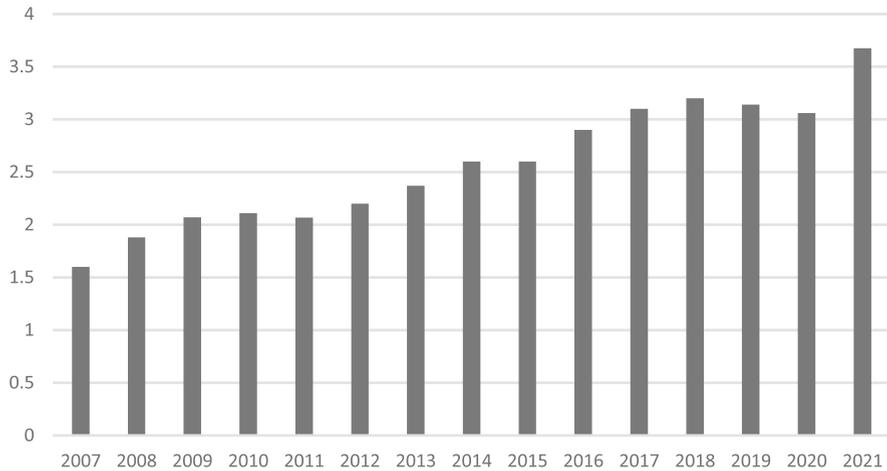


Fig. 2 The budget of the Innovation Agency, 2007–2021 (billion SEK)

Table 2 Share of positive, neutral, and negative evaluations of innovation policy per evaluator type

	Total	Evaluations by evaluator type			
		Auditing agencies	Consultants	Self-evaluation	Academic researcher
Positive	61%	51%	73%	50%	53%
Neutral	33.5%	33%	27%	50%	40%
Negative	5.5%	16%	0%	0%	7%

Source: Collin et al. (2022)

A comprehensive study conducted by Collin et al. (2022) examined two key aspects of 110 innovation policy evaluations: the entities responsible for conducting the evaluations, the findings and conclusions derived from these evaluations. Out of the 110 evaluations analyzed, 67 were categorized as positive, 37 as neutral, and 6 as negative. About 51% of the evaluations were conducted by consultants, 28% by auditing agencies, and 13.5% by researchers, while 7.5% were self-evaluations. Table 2 shows that 61% of the evaluations were positive, 33.5% neutral, and 5.5% were negative or critical. When looking at different categories of evaluators, it is clear that consultants and self-evaluations are more positive.

Examples of Critical Policy Evaluations

While the majority of evaluations and research papers tend to overlook failures, there are a few notable exceptions. Daunfeldt et al. (2016, 2022) conducted a counterfactual study using a matched control group, which showed that several support schemes had no significant effects on employment, turnover, or profits. In a

subsequent study, Gustavsson Tingvall and Videnord (2020) documented a difference between rural and urban areas. Positive but weak effects were found for cities, while a statistically significant negative effect was found for rural regions (Gustavsson Tingvall and Videnord 2020).

Gustafsson et al. (2016) examined the long-term performance of firms after receiving innovation grants. Contrary to popular belief regarding the substantial long-term benefits of such grants, the effects were only initially observed. The primary cause of these effects was an initial boost of investment. However, the positive effect was not sustained. The authors aptly referred to this phenomenon as a “sugar rush” effect due to the absence of sustained long-term effects.

Gustafsson et al. (2020) studied “subsidy entrepreneurs,” defined as firms that received multiple grants and R&D subsidies from government agencies. During the period 1997–2013, they found that out of 14,205 firms receiving support, 3624 had obtained more than one grant, with some even receiving more than ten different grants. Interestingly, these subsidy entrepreneurs, on average, paid higher wages but exhibited lower productivity compared to non-recipients of support. Apart from this disparity, no significant effects were identified.

In a subsequent study, SAGPA examined 15 innovation programs that collectively amounted to SEK 1.8 billion disbursed to firms between 2001 and 2010. The results of this analysis are summarized by SAGPA (2019, p. 28):

No significant connection between receiving support and firm turnover could be found in the short or long term. The absence of effects on turnover holds regardless of whether we compare with the firms’ own past development or a control group of similar firms that have not received support.

The researchers found significant effects only for one category: firms with fewer than 250 employees. However, they were unable to identify any indirect effects in terms of investments or the number of employees. SAGPA further asserts (p. 28):

Regardless of controlling for city or countryside, manufacturing or services or different definitions of growth-oriented support, the result is the same. No effect on firm turnover can be found.

In summary, prior research has demonstrated that a significant portion of evaluations of innovation policy is conducted by actors who are reliant on government agencies, and these evaluations often yield positive conclusions, despite limited scientific evidence supporting such positivity. Furthermore, we note that these actors, including consultants and self-evaluations, who depend on government agencies, tend to exhibit a more positive outlook. In the following section, we will present our empirical contribution, which examines how government agencies responsible for innovation policy utilize evaluations and provide commentary on their own operations.

How Government Agencies Use Evaluations

After examining the evaluations of the three innovation agencies and comparing them to evaluations that emphasize effects and employ a counterfactual approach, we will now delve into how these government agencies incorporate evaluations into their annual reports. Figure 3 illustrates the distribution of positive, neutral, and negative statements made by these agencies in their annual reports. To provide a clearer understanding, Tables 3, 4, 5 offer illustrative examples of positive, neutral, and negative statements.

Across all three agencies, a consistent pattern emerges with a prevalence of positive statements, a limited presence of neutral and negative statements. The Innovation Agency stands out by having the highest proportion of positive statements (92%) and the lowest proportion of negative statements (1%), while the Agency for Regional and Economic Growth exhibits the lowest share of positive statements (78%). In contrast, the Energy Agency records the highest percentage of negative statements (5%).

Figure 4 presents how the share of positive, negative, and neutral statements has evolved over time. Here, no significant differences can be identified during the studied time period.

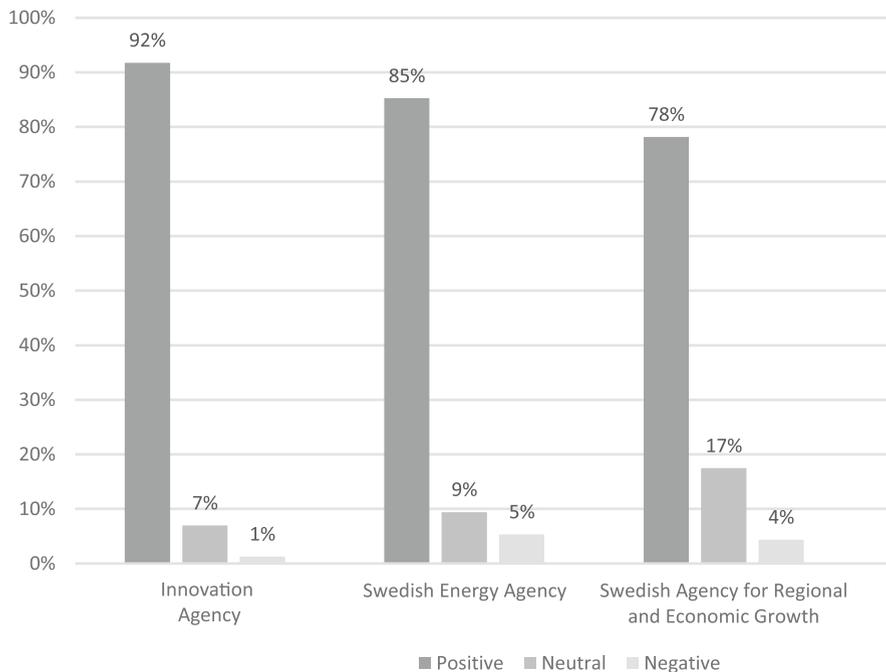


Fig. 3 Share of positive, neutral, and negative statements regarding evaluations of innovation policy in the annual reports of the three agencies (2011–2021)

Table 3 Illustrative examples of positive statements made by government agencies concerning evaluations

Annual report	Quote
The Energy Agency (2020)	“Thereby, the program contributes to energy efficiency improvement that otherwise would not have occurred within the Swedish industry.”
The Energy Agency (2015)	“An evaluation conducted in 2015 shows that the program is a pioneering effort, both nationally and internationally.”
The Agency for Regional and Economic Growth (2016)	“Furthermore, it was revealed that the program strongly contributed to saving companies and jobs, and that the survival rate is high among the companies that have received counseling via the Business Emergency Line.”
The Agency for Regional and Economic Growth (2013)	“The impact and the ability to reach customers improved and also became greater than if the company had carried out the initiative on its own.”
The Innovation Agency (2011)	“A preliminary study also shows that companies participating in <i>Produktionslyftet</i> have shown better growth than companies on average, even during the financial crisis.”
The Innovation Agency (2011)	“The evaluators conclude that TSS has performed exceptionally well in connecting various actors in Sweden with an interest in demonstration and testing activities of vehicles.”

Table 4 Illustrative examples of neutral statements made by government agencies concerning evaluations

Annual report	Quote
The Energy Agency (2020)	“The evaluation points out that there is a continued need to work on energy efficiency among SMEs, but that the support needs to be differentiated and adapted to different industries.”
The Energy Agency (2019)	“However, the program has only partially contributed to increasing companies’ opportunities to spread their innovations.”
The Agency for Regional and Economic Growth (2019)	“Based on these evaluations, The Agency for Regional and Economic Growth concludes that the content can generally be considered relevant. However, it is clear that a certain target group demands some form of knowledge exchange that is more specialized and advanced.”
The Agency for Regional and Economic Growth (2020)	“The evaluation showed that the results and effects of the mission are visible primarily in the long term.”
The Innovation Agency (2012)	“After conducting an employee survey and a 360-degree evaluation in 2011, improvement areas were identified and action plans were established.”
The Innovation Agency (2014)	“Evaluations during the year, on the other hand, have given a mixed picture of the programs’ effect on the companies.”

Table 5 Illustrative examples of negative or critical statements made by government agencies concerning evaluations

Annual report	Quote
The Energy Agency (2012)	“Regarding the agency’s processing, some criticism was raised concerning extensive administration and decision-making processes.”
The Energy Agency (2011)	“The Energy Agency’s role and involvement in the course need to be developed.”
The Agency for Regional and Economic Growth (2019)	“Kontigo also pointed at a lack of program ownership in the form of organizations that take long-term strategic responsibility in the border region, and who can work across boundaries.”
The Agency for Regional and Economic Growth (2017)	“The evaluators pointed out that the implementation can be improved, for example through clearer prioritization among policy documents and through clearer description and consensus on how each program is expected to achieve its goals.”
The Innovation Agency (2014)	“The authors of the previous report argued that no significant effects on, for example, growth and employment from the Innovation Agency’s investments could be identified with the method applied.”
The Innovation Agency (2018)	“However, the programs should strengthen their work on internationalization and enhance communication efforts, as well as further develop their work on gender equality and diversity.”

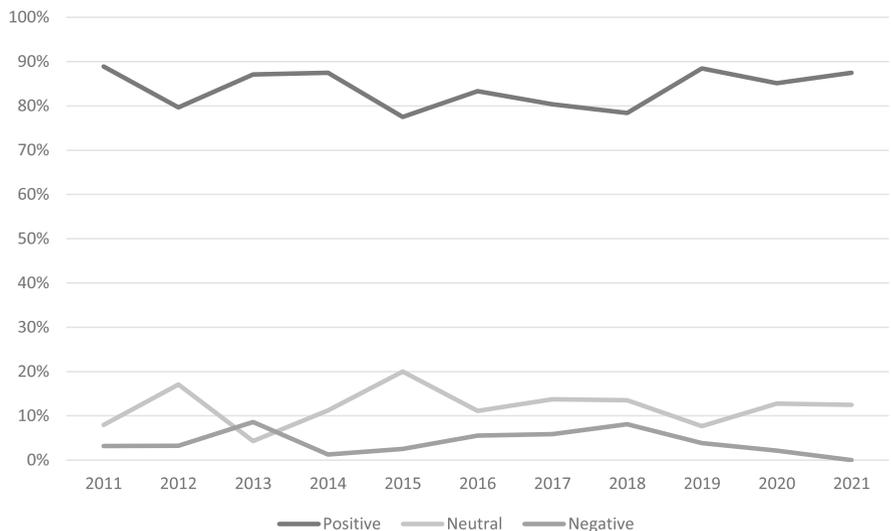


Fig. 4 Share of positive, neutral, and negative statements regarding evaluations of innovation policy in the annual reports of the three agencies (2011–2021)

Discussion

In this section, we delve into a discussion and interpretation of our findings. The data presented in Tables 2, 3, 4, 5 indicate that both evaluations themselves and the way government agencies reference these evaluations lean toward a positive perspective. As a result, government agencies are portrayed in a favorable light.

These outcomes align with the principles of public choice theory, which asserts that policymaking occurs within a framework of distributed agency, wherein the involved actors strive to maximize their own interests. According to public choice theory, government agencies typically prefer to avoid budget cuts and instead aim for budget expansion. With a growing budget, each manager's relative importance expands, enabling the agency to undertake more activities it deems important. Armed with asymmetric information and motivated to advocate for additional resources, government agencies are typically capable and willing to take actions that sustain their revenues and promote organizational growth. We discuss various aspects of this behavior in the coming sub-sections.

Evaluations Are Positive but Lack Evidence

Starting with Table 2, we see that the vast majority of evaluations of innovation policy are positive. As reported in Collin et al. (2022), the National Audit Office made the following statement about these evaluations of innovation policy (NAO 2020, p. 4):

There are considerable weaknesses in the effect evaluations of industrial policy that have been carried out by government agencies: only 2 out of 37 studied evaluations fulfill all three elementary criteria set up by the NAO regarding credible evaluations.

When combining this statement with the fact that a collection of publications utilizing counterfactual evaluations presents a significantly less positive impression (e.g., Daunfeldt et al. 2016; Gustavsson Tingvall and Deiacco 2015; SAGPA 2019), it suggests that the positive impressions conveyed in these evaluations might be exaggerated. However, assessing the extent of this exaggeration falls beyond the scope of this paper. It can be argued that government agencies have an interest in receiving positive evaluations of their various innovation support programs.

Dependent Evaluators Are More Positive in Their Evaluations

From Table 2 it is clear that the few negative and critical evaluations are published by research groups and other government agencies responsible for conducting evaluations. The data in Collin et al. (2022) do not clarify whether researchers receive funding from the agencies they evaluate or not. Nevertheless, it is evident

that both consultants and self-evaluations are reliant on the government authority being evaluated. These two categories did not publish any negative reports at all. Consulting firms that work for an agency assigned to evaluate are dependent on the government agency for ongoing business, while self-evaluations are conducted by employees who are reliant on their employer. Hence, these results are also consistent with the assumption of government agencies acting in their own self-interest.

Evaluations Are Referred to in a Positive Manner

Regarding references to evaluations, our study of 33 annual reports yielded a total of 654 instances where government agencies refer to evaluations. As indicated in Table 2 and Fig. 3, the overwhelming majority of these evaluations are positive (84%), with few being neutral (12%) and only a small percentage being negative (4%). Once again, it is noteworthy that evaluations are utilized to portray the agencies' activities as successful and efficient, further reinforcing positive impressions among policymakers and other stakeholders.

One could argue that annual reports of government agencies, much like corporate annual reports, tend to convey a more positive impression as a means to present a holistic view of the organization. Government agencies thus utilize annual reports to explain and legitimize their operations, in a way similar to how this is done by firms. It should come as no surprise that such reports tend to be more positive than negative, serving to provide a favorable impression of the organization.

Some of the assertions found in the annual reports are conspicuously strong and positive to the extent that they appear blatantly unrealistic. Here are three examples from the Innovation Agency's (2014) annual report for 2013:

An evaluation of companies with financing from the *VINN NU* program shows that they have increased their turnover and employment more than twice as much as companies in a control group. (p. 40)

To summarize, the evaluation shows that the companies granted funds attract more capital (14–15 times), increase their turnover (3 times) and the number of employees (2.5 times) more than a control group, 7 years after they have been granted *VINN NU* funds. (p. 40)

An evaluation of the companies financed in 2002–2004 under the *VINN NU* program, which is aimed at start-up companies, shows that they increased their turnover 19 times on average between the year of financing and the measurement point in 2012. (p. 11)

Critical Evaluations Receive Little Attention

As previously mentioned, several evaluations indicate that innovation policies and the various support programs implemented by these three government agencies have yielded limited positive effects (Daunfeldt et al. 2022; Gustavsson Tingvall and Videnord 2020; Gustafsson et al. 2016; Gustafsson et al. 2020; Gustavsson Tingvall

and Deiacò 2015; SAGPA 2014, 2015, 2019). However, in the examined annual reports of these government agencies, we find virtually no mention or discussion of those evaluations. Instead, attention is mostly given to positive evaluations conducted by hired consultants and self-evaluations.

It becomes clear that evaluations are utilized in the annual reports to defend government agencies against criticism. In cases where critical evaluations are indirectly or directly referenced, it appears to be done with the aim of safeguarding the government agency's reputation. One such instance pertains to the evaluations indicating that the Innovation Agency's support programs *VINN NU* and *Forska & Väx* have had no discernible impact on employment, turnover, growth, or innovation. In the Innovation Agency's 2014 annual report (2015), these evaluations are briefly mentioned and discussed:

In 2014, two impact evaluations of *Forska & Väx* were completed. One was conducted by the research institute Ratio on behalf of Growth Analysis and the other by the Innovation Agency. (p. 37)

The authors of the former report believed that no significant effects on, for example, growth and employment of the Innovation Agency's initiatives could be established with the method applied. (p. 37)

While these government agencies tend to ignore evaluations that are not positive, evaluations that have received a lot of attention may necessitate some reaction. In the same annual report, the Innovation Agency also defends its programs:

The Innovation Agency's assessment is that the evaluation was carried out too shortly after the end of the projects and did not take sufficient account of either company dynamics or the functioning of innovation processes to be able to draw clear-cut conclusions. (pp. 37–38)

Subsequently, the Innovation Agency also asserted that when analyzing other materials, positive returns could be identified:

At the project level, the evaluation indicated a positive return on the Innovation Agency's investments that exceeds the Innovation Agency's costs for the projects. (p. 38)

A similar discussion can be found in the Agency for Regional and Economic Growth's (2016) annual report for 2015:

The study presented in 2015 shows that the companies that were granted regional investment aid in 2010 have a worse profit development than both a control group and the group of companies in Sweden. (p. 43)

On the same page, this observation is countered using the following statement:

However, the value added in the supported companies improved more than in the other groups. (p. 43)

In other annual reports, government agencies argue that their innovation grants function as a quality stamp. The Energy Agency (2016) made one such assertion in its annual report for 2015:

The case studies show that the support from the Swedish Energy Agency acts as a quality stamp and makes other actors dare to participate or co-finance. (p. 75)

A similar claim can be found in the Innovation Agency's (2014) annual report for 2013 concerning its support program *VINN NU*:

VINN NU gives companies a quality stamp and signal value that makes it easier for them to attract customers, capital, and talent than for those who have not received it. (p. 40)

A series of initiatives funded by the Energy Agency have resulted in significant failures. One notable example is the well-documented case of Sekab in Örnsköldsvik (extensively discussed in Sandström and Alm 2022). This case sparked a major scandal in Sweden, as a small municipal company engaged in the construction of factories in Hungary and Poland while establishing sugar plantations in Tanzania for ethanol production. These endeavors were supported by approximately SEK 1 billion from the Energy Agency.

In their 2011 annual report, the Energy Agency (2012, p. 42) asserted the following concerning Sekab:

The evaluators recommend additional support from the owners and from the Swedish Energy Agency on a level and with a time frame that makes it possible to finish negotiations with partners and potential investors.

Regarding the scientific evaluation, the Energy Agency asserts (p. 42) that it “was an excellent program and a continuation at least on the same level as during the past years is strongly recommended.”

In those instances, the Energy Agency affirms that these conclusions are based on a scientific evaluation, yet they do not provide any specific source to allow for easy access to the evaluation. Considering that the Sekab case had already gained significant notoriety in Sweden by 2011–2012, one could infer that the aforementioned statements in the annual report were aimed at shielding the government agency from criticism.

Government Agencies as Special Interests

Our findings are consistent with the predictions that can be derived from a public choice perspective. The overall impact of these evaluations and the way they are mentioned in the 33 annual reports we analyzed is that a positive image of the government agency's endeavors is conveyed. It is consistent with Muldoon and Yonai's study (2023, p. 3) that the mission-oriented innovation policies and the research conducted by Mazzucato and her colleagues

conjures an image of disinterested and competent technocrats who make decisions based on knowledge, with their sole motivation being the common good. In addition, because these technocrats are nonpartisan and not self-interested, their motivation will be in the long-term good.

Also, the government is depicted as “a dynamic, thoughtful body that makes decisions based on relevant information” (p. 3).

Upon uncovering how government agencies responsible for implementing mission-oriented innovation policies utilize evaluations and present their own activities, our findings raise doubts about the assumption of competent and altruistic government agencies. The behavior we observe aligns with Bednarczuk's (2022) findings, which showed that government officials favor increases in the size of government as long as their own agency receives more funding.

Applying the public choice perspective, we propose that part of this behavior can be attributed to the fact that the three agencies operate under the Ministry of Climate and Enterprise and, in a sense, compete for the same budget. If one agency were to hire evaluators who are significantly more critical and subsequently present these critical findings in their annual reports, they would appear less capable and significant compared to the other agencies, consequently facing the risk of receiving fewer resources.

Our findings have significant implications for the implementation of innovation policies that place the government at the helm of the economy. As government agencies overseeing innovation support programs acquire greater funding and resources, their relative status and influence grow. Consequently, more resources will be allocated to legitimizing the presence of mission-oriented policies, particularly since these innovation agencies often sponsor academic research. Conversely, scholarship that critically examines and questions mission-oriented policies is likely to be met with hostility from both the government agencies benefitting from a magnified role in the economy and from politicians who put these policies in place.

Conclusions, Implications, and Future Research

In this chapter, we have explored the actions and motivations of three government agencies responsible for implementing mission-oriented innovation policies. While prior literature has generally portrayed these actors as competent and altruistic (e.g., Mazzucato 2021), few studies have investigated their incentives and behaviors. Our contribution lies in unveiling the inner workings of innovation agencies and examining their incentives and actions.

Through our analysis of 654 instances where government agencies refer to evaluations in their annual reports, we find that the majority of these references are positive (84%), some are neutral (12%), and very few are negative (4%). The pattern is stable over time and across the three agencies, except that the tendency is somewhat stronger for the Innovation Agency.

In line with public choice theory, it appears that government agencies employ evaluations and references to create a positive image of their activities rather than conducting an inquiry into the efficiency and effectiveness of resource utilization for the government and taxpayers. These findings suggest that government agencies exhibit behavior more in line with self-interested and revenue-maximizing actors (Niskanen 1994) than with altruistic and competent organizations working for the collective welfare of society (Mazzucato 2021).

Our results highlight the contextual factors and diverging incentives surrounding the implementation of mission-oriented policies (Muldoon and Yonai 2023). Government agencies entrusted with administering funds for these purposes are also driven by self-interest. Furthermore, evaluations are referenced in a manner that justifies the allocation of resources toward these objectives. Critical reports and evaluations receive less attention, thereby creating an illusion of higher efficiency and effectiveness in mission-oriented innovation policies than may actually be the case. As mission-oriented policies place the government and its agencies at the helm of the economy, it is likely that government agencies will support these policies. In many countries, including Sweden, government agencies responsible for mission-oriented innovation policies also finance research on innovation policy and industrial dynamics.

While our chapter provides an initial exploration of government agencies tasked with implementing mission-oriented policies, we acknowledge several limitations in our research and welcome further scholarly endeavors in this field. This study relies solely on secondary data from annual reports. Future research could benefit from a combination of interviews, secondary data, and other archival sources. Specifically, exploring the relationship between government agencies and ministries in the resource allocation process would be of great interest.

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Learning from Overrated Mission-Oriented Innovation Policies: Seven Takeaways



Magnus Henrekson, Christian Sandström, and Mikael Stenkula

Abstract This chapter integrates findings from several different case studies on mission-oriented innovation policies (MOIPs) and makes use of the existing literature to briefly describe three other missions: The War on Cancer, homeownership in the United States, and the Swedish Million Program. Together with the analyses in the other chapters of this volume, seven takeaways regarding mission-oriented innovation policies are developed and described: (1) wicked problems cannot be solved through missions, (2) politicians and government agencies are not exempt from self-interest, (3) MOIPs are subject to rent seeking and mission capture, (4) policymakers lack information to design MOIPs efficiently, (5) MOIPs distort competition, (6) government support programs distort incentives and result in moral hazard, and (7) MOIPs ignore opportunity costs. These seven takeaways are illustrated using the cases described in this chapter and elsewhere in this volume.

Keywords Mission-oriented · Innovation policy · Rent seeking · Failure · Public choice

JEL Codes H50 · L26 · L52 · O31 · O38 · P16

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Introduction

Large-scale government programs and interventionist industrial policies specifically tailored to mobilize innovation to address well-defined societal objectives—so-called mission-oriented innovation policies (MOIPs)—are currently being implemented in many Western countries with little prior critical inquiry. There is also a shortage of academic studies devoted to how and why MOIPs may fail.

Part III of this volume contains three detailed accounts of failed MOIPs: The US efforts to end homelessness (Lucas and Boudreaux 2024), foreign aid and nation building (Waldron and Coyne 2024), and the Brazilian government's effort to create a domestic shipbuilding industry (Alves 2024). It also includes an analysis of the empirical evidence invoked to justify missions (Yerger 2024a, 2024b), a review of evaluations of 49 other MOIPs (Batbaatar et al. 2024), and an exploration of government agencies implementing MOIPs and how they evaluate their effectiveness (Björnmalm et al. 2024).

In this chapter, we explore what we consider to be the most essential aspects of three historical cases of failed or overrated MOIPs and combine insights from these cases with insights from the other chapters in Parts II and III of this volume. This results in seven takeaways.

The next section contains short descriptions of three MOIPs that did not meet expectations or for which the consensus interpretation can be questioned. Next, the takeaways are described in further detail, and for each one, some illustrative examples are provided. The concluding section summarizes the seven takeaways and vents our concern for the current trend toward the increased use of MOIPs around the world.

Learning from Historical Missions

Beyond the examples described in this collective volume, there are other cases of failed or overrated MOIPs throughout history, which have resulted in economic downturns or the impeding of important development activities. Three such cases are covered below, starting with the War on Cancer (WoC), followed by the program to boost homeownership in the United States, and finally the Swedish program to build 1 million new housing units in 10 years. Tables 1, 2, 3 demonstrate that all three cases fulfill the criteria for being defined as a mission. The cases were chosen partly as they fulfill the criteria stipulated by the OECD. Beyond this definition, we would argue that these cases are of a more general interest for public policy as they concern important historical events.

The War on Cancer was inspired by the moonshot, and interestingly President Biden has put in place a “Cancer Moonshot” with the goal of curing cancer through moonshot policies. Insights into the workings of the War on Cancer may therefore give valuable insights into the function of MOIPs.

Table 1 Criteria for a mission-oriented policy specified by the OECD (2021) applied to the War on Cancer in the United States

Mission criteria	The War on Cancer
Involves actors from different fields and sectors	Involved academia, pharmaceutical firms, government departments
Addresses a grand challenge or a wicked problem	Cure cancer
A defined deadline that is medium- or long-term and clear measurable milestones	Cure cancer by the US bicentennial in 1976
Involves an element of risk	Involves extensive research and development, with elements of uncertainty and risk of failure

Table 2 Criteria for a mission-oriented policy specified by the OECD (2021) applied to homeownership in the United States

Mission criteria	Homeownership in the United States
Involves actors from different fields and sectors	Fifty-six actors in diverse sectors such as finance, government, construction, and housing
Addresses a grand challenge or a wicked problem	Increase homeownership especially among minorities in the United States
A defined deadline that is medium- or long-term and clear measurable milestones	Clinton: Accomplish 67.5% homeownership by the year 2000 Bush: Increase the number of minority homeowners by 5.5 million families by 2010
Involves an element of risk	Financial risks related to lending money to the subprime segment of the market

Table 3 Criteria for a mission-oriented policy specified by the OECD (2021) applied to the Million Program for housing in Sweden

Mission criteria	The Million Program in Sweden
Involves actors from different fields and sectors	Involved the state and several large enterprises such as Riksbanken and SIAB
Addresses a grand challenge or a wicked problem	Eliminate Sweden's housing shortage
A defined deadline that is medium- or long-term and clear measurable milestones	Build 1 million housing units in 1965–1974 by completing 100,000 units per year
Involves an element of risk	Extensive 10-year plan involving considerable economic and political uncertainty

Homeownership in the United States is clearly related to the financial crisis in the United States, which in some regards paved the way for more MOIPs and the renaissance of interventionist industrial policies. If MOIPs related to homeownership had a role in fueling the housing bubble and subsequent crash of 2008–2009, such mechanisms are important to document and uncover.

Last, the Million Program in Sweden is interesting as it has been described by Mazzucato and Sweden's Innovation Agency, Vinnova, as a success story. This

interpretation has been questioned by many scholars historically, and therefore this example deserves to be further scrutinized.

We acknowledge that these three cases are not failures in all regards, and we do not aim to draw general conclusions based upon only these cases. Rather, our goal is to explore them to both inform policymakers and make use of these cases along with the empirical material in this volume to develop a set of takeaways regarding challenges in implementing MOIPs.

Nixon's War on Cancer

The War on Cancer (WoC) was launched by President Nixon in the United States and contains many valuable lessons, particularly bearing in mind that President Biden used the 60th anniversary of President Kennedy's historical moon landing speech to reignite "the Cancer Moonshot."¹ As Table 1 shows, the WoC fulfils the OECD criteria for a MOIP.

The launch of Nixon's WoC is full of references to the moonshot. The WoC had been preceded by extensive campaigns, notably featuring Sidney Farber, former President of the American Cancer Society, asserting "[w]e are so close to a cure for cancer. We lack only the will and the kind of money and comprehensive planning that went into putting a man on the moon" (Coleman 2013, p. 32). Today, it is widely regarded as a failure (e.g., Faguet 2005).

There are many reasons why high expectations to find a cure for cancer were not met. At the onset of the WoC, there were already disagreements regarding what strategies to pursue. Cancer biologists and other scholars were asking for research that targeted cancer prevention, while the President and policymakers used the term "cure" instead and continued to frame the efforts as a "war," i.e., a battle that is either won or lost.

On the 40th anniversary of the National Cancer Act in 2011, the NCI's director, Dr. Harold Varmus, rejected the fundamental philosophy of the WoC by saying "cancer is a complex group of diseases arising from fundamental aspects of our biology." Similar observations were made as early as 1975 by a senior official at the Department of Health, Education and Welfare, Charles Edwards (MD), who wrote that the cancer program was based on:

[t]he politically attractive, but scientifically dubious premise that a dread and enigmatic disease can, like the surface of the moon, be conquered if we will simply spend enough money to get the job done. (Schmeck 1975, p. 61)

The trend toward combating disease rather than looking for causes has persisted. In the time period 2000–2010, the National Cancer Institute's (NCI) budget increased

¹White House (2022).

from USD 3.3 billion to USD 5.1 billion, but the share devoted to prevention declined from 11 to 7% during these years.²

Many scholars were skeptical of this massive political campaign against cancer, especially as little was known at the time about the microbiology of cancer. Sol Spiegelman, Director of the Institute of Cancer Research at Columbia, favored more focus on prevention than on fighting disease: “An all-out effort at this time [to find a cure for cancer] would be like trying to land a man on the moon without knowing Newton’s laws of gravity” (Coleman 2013, p. e33). It has also been argued that a large share of the WoC budget was captured by those researchers and interest groups who primarily looked for viral causes of cancer (Coleman 2013; Surh 2021).

Epstein (1990) summarizes the failure of Nixon’s War on Cancer. He also highlights the idea that more focus on prevention and identification of the underlying causes of cancer would have been a more viable approach. Instead, government, industry, and a small circle of scientists combined to stymie efforts to introduce preventive measures, such as strict pollution control standards. In 1992, 68 established scientists gave a press conference, releasing a statement on the WoC where they noted that it had not managed to stop growth in either cancer rates or cancer deaths.

The WoC and the National Cancer Act of 1971 were not failures in all regards. These efforts set the direction for some substantial advances in basic cancer research and treatment. Knowledge in molecular biology and genetics related to cancer has grown exponentially over the past decades, but according to many scholars, improvements for patients have not occurred at a similar pace (Surh 2021).

In hindsight, many scholars still regard the WoC as a failure and attribute this failure to a disregard for prevention, a belittling of screening, and an over-reliance on inefficacious, nonspecific cancer drugs (Faguet 2014). Not everything can be solved simply by spreading more government funds over praiseworthy missions.

Boosting Homeownership in the United States

The financial crisis of 2008–2009 is often interpreted as an example of how untamed market forces and unregulated speculation may threaten economic and financial stability. There is certainly some truth to that interpretation, yet several scholars have also emphasized the role of state involvement and the formulation of socially desirable goals by policymakers as well as the creation of public-private partnerships or semi-public entities such as Fannie Mae and Freddie Mac as factors behind the crisis. Thompson (2012, p. 415) writes:

Analysing the financial crisis primarily in terms of neo-liberalism and free-market fundamentalism ignores the part played by the state–finance constellation around Fannie Mae and Freddie Mac in the crisis.

²<https://www.cancer.gov/about-nci/budget/fact-book/archive>.

In line with numerous other scholars, McDonald (2012, p. xiii) places a large share of the blame for the financial crisis not only on Fannie Mae and Freddie Mac but also on efforts by politicians to use the financial sector to accomplish various political and social goals:

Above all, it was the distortion of the banking sector to achieve political ends that ultimately caused the crisis. Politicians, with their unthinking political stances, must, perhaps for the first time, take the lion's share of the responsibility.

Homeownership and government housing policies had been part of the political agenda for several decades. Homeownership had been growing for decades, from 43.6% in 1940 to 65.6% in 1980, partly as a function of various subsidized loan programs funded by agencies such as the Federal Housing Administration and the Veterans Administration. It declined slightly in the 1980s, and upon taking office, President Clinton lifted the long tradition among policymakers to support homeownership to a higher level as he initiated a National Homeownership Strategy. The approach is consistent with Mazzucato's (2021, p. 6) recommendations to set targets that are not only ambitious "but also inspirational, able to catalyse innovation across multiple sectors and actors in the economy." As Table 2 shows, the National Homeownership Strategy also fulfils the OECD criteria for a MOIP.

The Clinton administration formulated a socially desirable goal to increase homeownership, and 56 actors across all sectors of society signed an agreement to become "Partners in the American Dream."³ These included the American Bankers Association, the Federal National Mortgage Association, Fannie Mae, Freddie Mac, and the US Department of Housing and Urban Affairs. President Clinton also formulated a measurable goal for this strategy: by the year 2000, homeownership would reach a level of 67.5% (McDonald 2012). The goal to increase homeownership was framed as a mission that resonated with American ideals related to family, ownership, and the American dream. The Bush administration continued to support the homeownership agenda, asserting that it "is in our national interest that more people own their own home. . . . if you own your own home, you have a vital stake in the future of our country" (White House 2003). Hence, the support for the homeownership agenda and related activities was strong in both the Republican and the Democratic parties.

The political objective to increase homeownership implied that the two government-sponsored entities (GSEs)—Fannie Mae and Freddie Mac—were used to provide cheaper credits to minorities. Most importantly, this was achieved by guaranteeing the timely payment of principal and interest on mortgage-backed securities they issued. This guarantee made such securities more attractive to investors because it reduced credit risk and helped maintain liquidity in the secondary mortgage market.⁴

³US Department of Housing and Urban Development (1995).

⁴For a detailed account of Fannie Mae and Freddie Mac's undertakings in the process culminating in the 2008 financial crisis, the reader is referred to McDonald (2012).

Wallison and Calomiris (2009) argued that these GSEs had an important role in the financial crisis as they faced dual objectives that conflicted with each other. On the one hand, the government had commissioned Fannie and Freddie to increase homeownership, especially in minority groups, which in turn meant taking on more risk. On the other hand, simultaneous demands for profitability put the GSEs in a position where they had to exploit government subsidies to increase profits. In doing so, while simultaneously expanding loans in the subprime segments of the market, they were taking on risks so significant that the stability of the entire financial system was jeopardized.

Thompson (2012, p. 416) summarizes the homeownership mission as follows:

That a state-encouraged subprime boom happened in the U.S. rather than anywhere else is neither a coincidence nor a simple function of deregulated American financial markets. It was a historically rooted political phenomenon. Subprime lending, subprime securitisation and the under-regulation of, and latitude given to, Fannie Mae and Freddie Mac served a particular set of political purposes.

Homeownership increased in the United States from 64% in 1995 to 69% in 2005. In the wake of the financial crisis, homeownership reverted to the level of the mid-1990s (US Census Bureau 2016). In effect, the mission not only failed to increase homeownership, but it also contributed to one of the deepest recessions in modern history.

This US homeownership mission clearly underlines the fact that good intentions are never a sufficient condition for achieving social progress and enhanced social welfare. On the contrary, it can give rise to unintended and dire negative consequences.

The Swedish Million Program

In the 1960s, the Swedish government implemented a large program to end the housing shortage that had plagued the country for decades. As early as 1963, economist Assar Lindbeck had argued that Sweden's persistent housing shortage was a consequence of rent control (Bentzel et al. 1963). As it proved politically difficult to end rent control, the Million Program was launched. This was an attempt to address Sweden's housing shortage through a centrally planned mission to build 1 million housing units in the 10-year period 1965–1974 by completing 100,000 units per year. The enormous size of the mission becomes obvious if one considers that the Swedish population was a mere 7.5 million when the mission was announced. As Table 3 shows, the Million Program fulfils the OECD criteria for a MOIP.

In a publication by Vinnova, Sweden's Innovation Agency, this "Million Program" is described by Dan Hill, Mariana Mazzucato, and co-authors as a success:

Running from 1965, the Million Programme (*Miljonprogrammet* in Swedish) public housing programme set a "mission" of building one million affordable new dwellings within a

decade. The mission was broadly successful, with 1,006,000 dwellings being built by 1974. “Affordable” was defined in understandable terms, relating to the wage packets of average workers. Miljonprogrammet produced a rich diversity of dwellings, with the majority being small houses despite the popular allusion with larger housing blocks typical of the age. (Hill 2022, p. 54)

In the same report, the authors make comparisons between this Million Program and Project Apollo, and the Million Program is described in a positive way, with parallels not only to Project Apollo but also to D-Day:

Not every country has “a Vinnova,” however. And Sweden has a very particular history. Everyday life here is imbued with living memories of the Million Programme and Vision Zero—missions *avant la lettre*, perhaps—as well as its many decades of progressive and equitable societal action. As this book explains, that has directly informed the possible “plays.” (p. 14, this passage written by Mariana Mazzucato)

Yet *Miljonprogrammet*’s results arguably deserve to be seen in the same light as Apollo. The public policy terrain of housing policy is just as complex as that of space travel. (pp. 54–55)

In this, it is already making clear that this mission-oriented innovation is a process to be performed, or a culture to create. A mission, whether Apollo, D-Day, or *Miljonprogram*, implies a journey as much as a destination, and this initial stage is not far past “Base Camp One” in that journey. (p. 187)

The Million Program was plagued with several difficulties. While some of these issues such as “poor-quality construction and insufficient focus on community-building and participation” are acknowledged in Hill (2022, p. 55), there were several other challenges related to the Million Program. Apartments were mass produced with little regard for quality and with a functionalist Le Corbusier-inspired style that many found unattractive. In the early 1970s, about 20,000 apartments were vacant despite the housing shortage at that time. Later, many apartment buildings were leveled to the ground again—with the support of public money (Jörnmark 2007). Furthermore, many apartments in the remote countryside were filled up with immigrants during the refugee crisis in the 2010s. These apartments were completed only years before the population in those towns began to decline due to dwindling employment opportunities and acceleration of the movement of people and jobs to the larger cities and metropolitan areas. Unsurprisingly, the massive influx of non-European immigrants to these towns has fueled social problems and ethnic conflicts on an unmanageable scale.

It did not take long before crime and social unrest increased in the Million Program suburbs. Three years before the completion of the program, economist Assar Lindbeck (1972, pp. 75–76) had already pointed to this risk:

What has also perhaps not been adequately recognized is that some of the shortcomings of today’s housing market have effects far into the future. This is, of course, particularly true of the effects on housing production. If, during periods of rent control, there has been a strong divergence in the direction of investment from consumer preferences, then the rent-controlled housing market has in fact made a huge misinvestment. Personally, I believe that this is the case, in the sense that households would have preferred a much stronger focus on single-family houses, with land contact for the residents, if household preferences had been allowed to determine the direction of production in the same way as happens in

commodity areas with equilibrium pricing. In that case, our country would have had a living environment that most people considered far more “human” than the one that exists today.

Sune Lindström, professor of city planning at Chalmers University of Technology, wrote in 1977 that the Million Program was a “newly built slum, of a never seen proportion. A slum that by its very existence makes future planning and housing politics an inaccessible swamp” (Lindström 1977, p. 203). Unfortunately, Lindbeck’s and Lindström’s prophecies turned out to be accurate, and the outcome is far from the rosy picture depicted in Hill (2022). In a 2015 report concerning organized crime in Sweden, the Swedish Police (2015, p. 8) underscored the connection between crime and the Million Program: “The vast majority of the audited areas were built between 1965 and 1975 as part of what came to be known as the Million Program.”

Learning from Mission Failure: Seven Takeaways

While the mission-oriented approach to innovation policy has gained significant popularity in recent years, particularly among policymakers, some academics have started to critically examine these ideas (e.g., Wennberg and Sandström 2022), leading to the identification of several challenges. The chapter contributions in Part III of this volume together with the additional missions reviewed above shed a new light on the risks associated with implementing mission-oriented innovation policies. Below, we synthesize theoretical arguments and empirical observations into seven takeaways that together call into question the usefulness of MOIPs.

1. Wicked Problems Cannot Be Solved Through Missions

A common trait of many of the MOIPs discussed in this volume is that they in some way or another try to solve a “wicked” problem, i.e., problems that are complex, systemic, and span several policy areas (Nelson 1977). This is no coincidence and in line with the idea behind launching MOIPs. As is well illustrated among all examples in this volume, it is also inherently difficult to “solve” these often important but complex problems in any profound way through grand politically initiated projects—despite good intentions and, occasionally, abundant public spending.

Lucas and Boudreaux’s (2024, pp. 146–147) chapter about the US efforts to end homelessness provides a good illustration of how difficult it can be to address wicked problems:

But despite a clear mission, good intentions, bipartisan political support, evidence-based innovations, major funding increases, thorough stakeholder engagement, and unequivocal state leadership, the results during this period were underwhelming at best. A more-than-doubling of federal expenditures and the widespread diffusion of evidence-based practices saw a mere 9 percent reduction in total homelessness; in fact, the downward trend stalled

early, with no single year-over-year decline in homelessness since 2016. Not one of the four objectives initially outlined in 2010 were met, and each one was eventually delayed, revised, or dramatically curtailed.

In a similar way, other social problems described in this chapter and throughout this volume, such as homeownership in minority groups in the United States (this chapter) or foreign aid (Waldron and Coyne 2024), are complex and wicked by nature and hard to solve in any meaningful way.

Richard Nelson, the doyen of evolutionary and innovation economics, contends that grand societal challenges and the wicked problems of today cannot be effectively addressed through a mission-oriented approach because these challenges (Nelson 2011, p. 1697)

are all very different than the challenges faced and met by Manhattan and Apollo. These programs were aimed to develop a particular technological capability, and the achievement of their technological objective signaled the end of the program.

This conclusion is repeated in another piece, written together with two co-authors, arguing that mission-oriented policies “are not the right models for new programs aimed at the challenges we now face” (Foray et al. 2012, p. 1697).

Mazzucato (2021, p. 108) refers to Nelson’s conclusion—wicked problems cannot be solved through MOIPs as they are much more complex and systemic by nature—and states that “Nelson was right.” Instead, she argues that wicked problems require another form of missions which are much more systemic and span the entire economy. To reform and restructure several different, interdependent sectors and policy areas across society are clearly sizable challenges, and it is difficult to see how Mazzucato or other advocates of MOIPs can counter Nelson’s stance. Our conclusion stands: Wicked problems cannot be solved through missions.

2. Politicians and Government Agencies Are Not Exempt from Self-Interest

The findings in this volume—as well as in other case descriptions of failed missions—show that self-interested behavior among government actors is often a part of the story and may be one important factor to bear in mind when exploring the reasons why MOIPs fail to achieve their mission. Lucas and Boudreaux (2024) suggest, in their chapter about homelessness, that actors may twist and bend the arguments and evidence for a specific policy in order to safeguard their own private interest.

Within the field of public choice, self-interested action is an essential idea used to analyze outcome and behavior of policymakers, and several contributions in this volume make use of this notion, notably Holcombe (2024) and Björnemalm et al. (2024). For example, the latter show how government agencies implementing innovation policy act in their own interest and regularly describe their own operations in an overly positive way, ignoring less positive evaluations. It has also been

shown that these government agencies systematically rely on external evaluations that tend to be positive without having evidence for such assessments (Collin et al. 2022). Such behavior can be explained by the assumption that both elected politicians and government officials are governed by some degree of self-interest.

Politicians also benefit from MOIPs as inaugurations of large programs, and projects are likely to result in positive publicity. President Nixon benefited from positive publicity upon launching the War on Cancer in 1971 and by referring extensively to the moonshot. Five decades later, President Biden repeated Nixon's effort and rhetoric when initiating his Cancer Moonshot. When Biden's Cancer Moonshot is implemented, the President appears to be taking decisive action against something people fear and dread.⁵ As a politician, Biden is likely to benefit from such an initiative where a strong negative outcome can ostensibly be avoided, and he will most likely receive positive publicity and gain in popularity.

Mazzucato (2021, p. 34) explicitly refutes public choice theory and states that:

No empirical evidence was advanced to support this idea. It was just assumed that social, constitutional and ethical concerns never motivated bureaucrats and politicians. And it was assumed that the public and private sectors were competitors and one side or the other could be a loser.

While it is certainly plausible that both politicians and government officials are not *only* driven by pure economic motives as actors in the market, it would be naïve to assume that policymakers are completely exempt from self-interested behavior. On this issue, Muldoon and Yonai (2023, p. 3) conclude that the literature on MOIPs

[c]onjures an image of disinterested and competent technocrats who make decisions based on knowledge, with their sole motivation being the common good. In addition, because these technocrats are nonpartisan and not self-interested, their motivation will be in the long-term good.

The same authors maintain that research on MOIPs depicts the government as “a dynamic, thoughtful body that makes decisions based on relevant information” (p. 3). MOIPs are therefore likely to be appreciated by policymakers as they are portrayed as visionary, altruistic, and competent actors at the steering wheel of society. The chapters in this volume have clearly shown that this is a view of the actors involved in MOIPs that is too naïve and rigid.

⁵By using the universal tendency to loss aversion among the population and by strongly emphasizing a potentially very bad outcome if no political action is taken, politicians can create what Schnellenbach (2024) denotes a “loss frame.” This makes the general public more willing to accept grand political projects and the ensuing spending. Exploiting this kind of bias makes the stated objectives of missions normatively appealing, and politicians may eschew the need to weigh in the efficiency of the proposed measures. This method of argumentation has, according to Schnellenbach (2024), been used to implement numerous other missions, including DARPA and the original Apollo project.

3. MOIPs Are Subject to Rent Seeking and Mission Capture

Above, we stressed that many government actors, like other actors in the economy, are not omniscient altruists but may be less informed and partly driven by self-interest. Besides politicians and government agencies pursuing their own agendas, there are other interest groups which exert pressure on the political sector to receive (financial) benefits—a phenomenon often referred to as rent seeking. Hence, powerful and concentrated interest groups, such as large corporations, labor unions, and industry associations, may leverage their relational and financial resources—often combined with asymmetric knowledge—to influence policymaking. As a result, they may shape regulations, compensation schemes, and tax structures to their advantage—an idea elaborated by Holcombe (2024) in this volume.

Several of the failed missions covered throughout this volume and in this chapter can be understood through the lens of rent seeking and regulatory capture. Alves (2024) shows how attempts to revive Brazil's shipbuilding industry were influenced by labor unions in such a way that large supportive measures were directed toward domestic suppliers, which were not competitive in the global marketplace. Waldron and Coyne (2024) also stressed that foreign aid made many economic areas highly politicized in the receiving country, substantially increasing the scope for and extent of rent seeking. The description of the US financial crisis in 2008–2009 highlights how powerful interest groups were able to exert influence on policymakers. In particular, Fannie Mae and Freddie Mac were extremely effective in their lobbying efforts. In hindsight, the combination of access to government funding, de facto guarantees, strong political connections, and shareholder demands on growth and profits made it very difficult to stop Fannie and Freddie from blowing a credit bubble. The War on Cancer is another case in point illustrating how interest groups captured the agenda. The quest for a cure, related patents, and monopoly profits gained the upper hand vis-à-vis an alternative approach focusing more on prevention. Prevention would arguably have resulted in a stronger emphasis on research concerning the toxicity of various chemical substances and their effects on humans, something that would have threatened vested interest groups.

The rent-seeking argument has been applied to the study of MOIPs by several other scholars as well (e.g., Muldoon and Yonai 2023). OECD (2021) uses the term “mission capture” to highlight the risk that MOIPs become captured by vested interests. As MOIPs are formulated in interaction with established stakeholders, they are also likely to exert disproportionate amounts of influence. It has been argued that missions tend to favor vested interests rather than supporting new entrants or institutional entrepreneurs (Bergkvist et al. 2022), because it is difficult to bar incumbent actors and already existing infrastructures from dominating the implementation of the mission (Begemann and Klerkx 2022). Economists such as Bloom et al. (2019, p. 179) also emphasize this point, asserting that missions “may be more likely to favor sectors or firms that engage in lobbying and regulatory capture, rather than the most socially beneficial.”

All these examples are in line with public choice scholars such as James Buchanan and Gordon Tullock (1965), who assume that actors in the policymaking process behave as economic agents, aiming to maximize their own utility. But this conclusion should not be overly surprising—why should the design of MOIPs be an exception to the pattern described by the public choice scholars?

4. MOIPs Distort Competition

MOIPs emphasize the importance of collaboration, both between businesses and between the public and private sectors. It has been argued that the state should set “a direction that can foster and catalyze new collaborations across multiple sectors” (Mazzucato 2021, p. 53).

Certainly, innovation is in many regards a collective effort. This fact is acknowledged and further developed by the Collaborative Innovation Bloc (CIB) perspective (e.g., Elert and Henrekson 2022), which is inspired by Schumpeter’s assertion that the entrepreneurial function “may be and is often filled cooperatively” (1989 [1949], p. 261). Many key contributions to the literature on innovation and entrepreneurship explicitly or implicitly acknowledge these collaborative elements (e.g., McCloskey and Klamer 1995; Garud and Karnøe 2003; Sarasvathy 2008). Innovative entrepreneurship is therefore largely about attracting and mobilizing resources in novel directions.

Still, the fact that innovation is largely a collaborative effort does not imply that there are no elements of competition. Other scholars have put more emphasis on the competitive elements of capitalism that result in innovation. Baumol (2005), for instance, depicts mature capitalism as a form of oligopolistic competition where fairly few firms try to outsmart each other through innovation, thereby fueling a process of renewal. Even entrepreneurs who mobilize resources toward collaboration compete with alternative usages of such resources.

When one regards innovation and entrepreneurship in the modern economy as both a process of competition and collaboration, it becomes clear that MOIPs can thwart competition and raise barriers to entry. Yerger (2024a) discusses how, for example, collaboration between the public sector and incumbents may obstruct free entry and induce “expert failure” (Koppl 2018) through a lack of rivalry.

In other settings, there may also be different alternative paths to accomplish a certain mission. The War on Cancer described above, for example, illustrates how preventing cancer would have been one approach but that policymakers instead prioritized the quest for a cure. The aforementioned Million Program provides another illustration of how other more welfare-enhancing solutions to a problem are crowded out by the mission. Policymakers could have tried to end Sweden’s housing shortage by removing the primary cause—rent control—but instead opted for a centralized large-scale effort that benefited both government-owned companies and private construction companies. Similar scenarios can be discussed regarding the reduction of CO₂ emissions, to name one topical example. Would nuclear power,

wind power, solar cells, or hydroelectric power be the most efficient way forward and what balance between these alternatives is ideal?

There are certainly many historical examples of how groundbreaking innovations have been developed in close collaboration between companies and customers. Consider, for example, Ericsson's close partnership with Sweden's telecommunications monopoly—the government agency Televerket—and the development of both electronic switches in the 1970s and the first generations of mobile telephony in the late 1970s and 1980s. However, assuming that innovation only involves collaboration would be an oversimplification. For example, consider once again the historical case of telecommunications in Sweden. The same collaboration that was described above as critical for development of new technology became a threat to free and fair competition in the 1980s. The government monopoly was now barring innovative competitors from entering the market, partly by building strong connections to dominant companies such as Ericsson. In such a setting, MOIPs reduce competition and the innovative activity that it fuels (Eriksson et al. 2019).

5. Policymakers Lack Information to Design MOIPs Efficiently

If MOIPs present an inherent risk of distorting competition between technologies and companies, it is critical to further investigate how MOIPs are designed. The examples given in this volume suggest that policymakers often lack the required information to design MOIPs in an effective and efficient way. In the 1970s, cancer research was still relatively underdeveloped by today's standards, making it virtually impossible to design a mission against the disease in 1971 when President Nixon signed the National Cancer Act. The chapter by Lucas and Boudreaux (2024) is another case in point where politicians continued to spend money on a mission to eradicate homelessness that in the end turned out to be a complete failure, underlining that “many obstacles to success are only observable *ex post*” (p. 165). Even people with “well-meaning” interests have limited knowledge, something that, once again, underscores the notion that good intentions are not enough to succeed in solving a grand challenge.

In line with this argument, Waldron and Coyne's (2024) chapter is a good illustration of the “knowledge problem” associated with political control in general and state-guided missions in particular. With Mazzucato's principles in action, the authors show how difficult it is to succeed with foreign aid missions without sufficient information and feedback loops, a condition that is fertile soil for unintended consequences. At worst, these may even do more harm than good.

André Alves' (2024) chapter on the Brazilian government's mission to create a flourishing domestic shipbuilding industry provides another illustrative example and concludes that the associated policies were not in harmony with the industrial and economic landscape of the country (p. 185):

The misalignment between policy intent and the real possibilities of market creation that considers the concrete availability of technological and organizational capabilities at any given time results in policy ambiguity that hinders the successful implementation of missions.

These arguments are not new. When Nelson revisited his 1977 book in 2011, he emphasized that a key argument in his book was still valid, namely, the lack of knowledge to make sound decisions was “not so much political, as a consequence of the fact that, given existing knowledge, there were no clear paths to a solution” (Nelson 1977, p. 685).

6. Government Support Distorts Incentives and Creates Moral Hazard

Once missions are put in place, they usually contain substantial amounts of resources that the government makes available, either via inexpensive loans, R&D grants, various subsidies, or other even more protectionist measures. The availability of these resources is likely to affect the behavior of businesses in the long run. Many (large) companies may systematically exploit such government resources and become less prudent in their investment decisions—a scenario often referred to as moral hazard. Moral hazard may arise when an actor has incentives to increase its risk exposure because large part of the cost of that risk is born by someone else.

This volume illustrates the problems with distortions in incentives in several ways. Waldron and Coyne (2024) show how public funds may distort the incentives concerning nation building due to foreign aid programs. The authors emphasize how these programs result in several odd incentives and related behaviors (p. 200):

[C]onsider how influxes of foreign aid can incentivize wealth-destroying behavior, as individuals recognize profit earning opportunities from lobbying for additional aid and shift resources into the political realm. Instead of focusing on the productive creation of economic wealth, individuals and firms choose to compete for political favors, diverting resources better used elsewhere and rewarding corruption for those in positions of power over how foreign assistance is spent.

The behavior of the government-sponsored enterprises (GSEs) Fannie Mae and Freddie Mac in the US financial crisis is, in the same manner, a clear example of moral hazard. While being directed through policies to increase lending to minority groups while at the same time delivering profits to shareholders, Fannie and Freddie delivered on those two objectives by taking on so much risk that the stability of the entire financial system was threatened. In hindsight, it is clear that they did so because the risk was born by taxpayers.

If companies can access resources via grant applications instead of by delivering valuable goods and services to customers on a competitive market, they will devote progressively more time and effort toward unproductive activities such as applying for grants and subsidies. In effect, they become “subsidy entrepreneurs” (Gustafsson

et al. 2020), i.e., businesses that systematically exploit various grants and subsidies awarded by the government. Using a sample of small- and medium-sized firms, Gustafsson et al. (2020) show that those that systematically apply for and obtain grants from the government tend to both pay higher wages and, simultaneously, experience lower productivity. They spend their time and efforts applying for money, meaning that productivity is lower, but they are still able to pay high wages. Firms receiving “free money” for various high-risk technological endeavors become immune to risks and begin to engage in wasteful projects and “pet” projects, losing significant amounts of money pursuing technological trajectories with scant long-term potential.

Other examples of distorted incentives and technological efforts which bore no fruit, besides those depicted in this volume, include ethanol from corn cobs in the United States, ethanol from cellulose in Sweden, and methane from tree branches (Sandström and Alm 2022). Without large grants from government agencies and the European Union, these efforts would not have been made, and resources could have been saved.

All the cases depicted above show that incentives matter and may result in problems in the real world. Ignoring these difficulties turns explicit missions intended to solve grand challenges into nothing more than pipe dreams.

7. MOIPs Ignore Opportunity Costs

The results reviewed in this chapter show that MOIPs are generally implemented and evaluated with little concern for opportunity costs. Yerger (2024b) argues that the Global Positioning System (GPS), e.g., cannot be evaluated without taking the opportunity costs into account but central planners (often) do not have the ability to assess these costs. The literature review by Batbaatar et al. (2024) showed that of the 33% of MOIPs that were assessed by researchers as successful, none of them reached that conclusion after having looked at actual costs or discussing any alternative usage of the resources in question.

The Million Program for housing in Sweden serves as an example of this problem. The goal to build 1 million dwellings was reached. Yet the shortage of housing was still a problem because of strict rent control and the fact that many of the Million Program projects were executed without paying much attention to consumer preferences. Needless to say, the capital and effort that went into the Million Program could have been better utilized.

Kantor and Whalley’s (2023) study of the moon landing project is one of the first studies of the actual effects of MOIPs that seeks to compare this initiative with alternative forms of government spending. As they find that effects of the moonshot are not greater than for other government expenses, their results call into question a considerable share of the anecdotal evidence used to justify MOIPs. These findings are in line with the observations made by Batbaatar et al. (2024) regarding current implementations of MOIPs. Most MOIPs or assessments of their effects do not take

opportunity costs into consideration. As a result, they convey an overly positive impression of their effects. This is not a coincidence; a disregard of costs and lack of attention to the resources used seems to be a prevalent approach in the literature on MOIPs. Mazzucato (2021, p. 122) is crystal clear regarding this aspect:

[The mission] . . . can be evaluated by asking a single question: “Did we achieve it or not?” This is how to determine the success or failure of a mission and measure progress along the way.

If policies are assessed merely by looking at the benefits without discussing costs, it would be strange if those policies would not be considered beneficial. To measure success only in terms of whether the goal was realized means that the opportunity cost, including the actual monetary expenses, would be ignored. Given that this is the approach to costs and expenses, the whole idea of MOIPs must be considered thoughtless—no matter how urgent and benevolent the missions to be achieved may be.

Concluding Remarks

In this chapter we have synthesized theoretical arguments and empirical observations into seven takeaways that question the usefulness of mission-oriented policies (MOIPs):

- 1) Wicked problems cannot be solved through missions.
- 2) Politicians and government agencies are not exempt from self-interest.
- 3) MOIPs are subject to rent seeking and mission capture.
- 4) MOIPs distort competition.
- 5) Policymakers lack information to design MOIPs efficiently.
- 6) Government support distorts incentives and creates moral hazard.
- 7) MOIPs ignore opportunity costs.

The seven takeaways summarize our findings explaining why MOIPs may result in disappointing outcomes. While several of these observations have been made in each of the chapters and elsewhere in the literature on missions, innovation policy, and political economy, this chapter provides illuminating illustrations and summarizes these insights in the form of seven takeaways. These takeaways are grounded in various social science theories and are illustrated with different cases of failed missions.

A couple of implications emerge from this chapter. First, given the evidence reviewed in this chapter and throughout this volume, and considering the many criticisms of MOIPs, it is a matter of grave concern to observe how MOIPs are being implemented around the world to address environmental challenges and health issues such as cancer. Bear in mind that some of these areas have already been subject to failed missions historically.

Second, our analysis implies that MOIPs should be assessed and evaluated properly by taking opportunity costs into consideration. Evaluations need to look at both costs and benefits. So far, such studies are virtually non-existent.

Finally, we see a need for further articulations of alternative approaches to accomplish development and renewal of our economies. The fourth part of this collective volume is explicitly concerned with how this can be done.

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Part IV
Alternative Paths

The Entrepreneurial State Cannot Deliver Without an Entrepreneurial Society



Mark Sanders, Erik Stam, and Roy Thurik

Abstract In *The Entrepreneurial State* and *Mission Economy*, Mazzucato argues that the state should adopt a proactive and entrepreneurial approach, setting ambitious missions that inspire collective action nurtured by emotions of urgency. By defining clear goals, the state can mobilize resources and talent from both the public and private sectors. We do not challenge Mazzucato’s facts or discredit her analysis. We agree that states successfully have and perhaps should continue to play a role in mobilizing talent and other resources around urgent societal challenges. Healthcare, climate change, and inequality are not problems that “markets” will solve on their own, and relevant and competent government organizations are an essential tool in our toolbox to address them. We would even agree that the state would do well to formulate clear missions and approach them in an entrepreneurial fashion. That is, experiment with an open mind and be willing to fail and learn, rather than develop interventions on the drawing board and then stick to them because of bureaucratic or political lock-in. But all that effort will only pay off, often in many unexpected ways, if we do not succumb to the fallacy of hindsight. That is, a well-defined and entrepreneurially executed state-led mission can only succeed in also generating a

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stream of valuable but largely unanticipated spin-off innovations, if the conditions for acting on such opportunities are right.

Keywords Entrepreneurial Society · State-led mission · Grand societal challenges · Spin-off innovations

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Prologue

Many, if not all, important innovations of the twentieth and twenty-first century can be traced to their origins in public investments in knowledge and education. Companies in semiconductors, chemicals, logistics, aviation, energy, fertilizers, biotech, pharma, and steel would not be where they are today if it had not been for governments investing in universities, basic research, and public education. Clearly, some innovation projects are too big, too daunting, and too uncertain for the private sector to engage in. Then government can and has always played an important role.

Mariana Mazzucato carefully and convincingly establishes this in *The Entrepreneurial State* (Mazzucato 2013), and in *Mission Economy* (Mazzucato 2018, 2021), she argues that the state should set clear goals on the priority areas of innovative development to actively push research and business in the right direction. Taking her inspiration from the “moonshot” space program of the 1960s, Mazzucato calls for the same level of bold state coordination of private and public sector resources to be applied to the biggest problems of our time.

There is nothing that prevents a government with a clear purpose or mission, from mobilizing the talent, resources, and energy to tackle great societal challenges. What is problematic in this approach, however, is copy-pasting the approach of the “man-on-the-moon” mission to the twenty-first century’s gigantic problems. Many, if not all, examples of successful government mission-driven innovation are intricately connected to (hot or cold) war and natural disasters, involving an urgent battle for survival. Moreover, the successful missions of the past were complex engineering problems, not complex societal ones (Nelson 1977). Government-led missions of the past therefore had a clear focus and obvious urgency. And both were essential to justify the state engaging, in an entrepreneurial fashion, in uncertainty and experimentation with public resources. The present time is different.

Looking back in history has significant risks and creates important blind spots. In retrospect, the winding road from initial ideas to successful products, services, businesses and markets often looks obvious. Every outcome can be traced back to its antecedents as if a river is followed upstream until one reaches its sources. But innovation is not like water flowing down a mountain. It is not gravity that determines the course of history. Rather it is entrepreneurship, which we define here as the act of challenging the status quo. Indeed, it is such entrepreneurship in the public

or the private sector that brings innovation and subsequent progress. But this implies that at every hurdle, turn, and fork in the road it is people that decide how history unfolds. And their successes and failures are highly contingent on their character, the resources they can mobilize in the institutional framework they find themselves in, and their complementarity with the other people in their—often growing—organizations. In fact, success and failure depend on a host of factors that combine into such a complex, idiosyncratic, and chaotic cluster that we may as well call it “fate” or “luck.” The road from initial ideas to ultimately successful ventures is littered with false starts, failures, dead ends, and lucky strikes that often go unrecorded and were and are impossible to predict and engineer *ex ante* because entrepreneurs in the public or private sector engage in what Frank Knight (1921) referred to as uncertainty. Innovation is more like making your way through a dense jungle. Looking back, one can see the path taken, but going forward, there is no telling what path will lead to success and what path ends in ruin and disaster.

We may refer to this as the fallacy of hindsight. Hindsight suggests a linear, teleological evolution to a clear final goal that in reality is an experimental, interactive, holistic, fuzzy process, in which goals and means change over time. Mazzucato, in her books *The Entrepreneurial State* and *Mission Economy*, is clearly aware of this, but in her conclusions, and even more so in the reception of her work by others, this point is ignored. Policymakers in Europe and around the world are quick to formulate ambitious missions to address urgent societal challenges and mobilize private and public resources on inventing and scaling up the required solutions. But they forget that any road to successful innovation is necessarily littered with failure and learning.

It is interesting, and even ironic, that an established evolutionary economist such as Mazzucato should overlook this most important lesson in the work of the founder of that field. As Schumpeter (1934, 1942) carefully elaborated, the essence of innovation and the engine of capitalist system dynamics is *not* invention, but innovation (Henrekson et al. 2024). And he defined innovation as taking ideas and working them into successful products by building the organizations to make them available to the population at large. The hard work is not in creating new ideas, but in developing them into viable ventures.

The value of new knowledge to society at large manifests itself only when innovation is successful and the benefits to society emanate in the form of a ubiquitous availability of that innovation. Not only to solve a specific problem but also to help develop further innovations that solve further problems (Holcombe 2003). The social value of smartphones is not the annual profit or stock market value of Apple, but rather the unmeasured consumer surplus, that (as buying a smartphone is a voluntary act) must exceed the cost price plus the margin charged by Apple by a multiple. And that consumer surplus does not include the social value generated in the multitude of new applications that have been developed because creative venturers jumped on the new opportunities offered by the ubiquitous availability of smartphones and networks.

This brings us to an important amendment to Mazzucato’s mission-driven moonshot guide to industrial policy. The knowledge created while addressing urgent

societal challenges should not be appropriated by the government, and taxing successful innovators that bring knowledge developed in such government programs to the market in anticipated and unanticipated forms should not be seen as a source of finance for more government-funded invention, mission-driven, or otherwise. Taxing successful innovation through retaining IP rights or taxing away the rents that motivate and finance entrepreneurial venturing is a self-defeating strategy. We argue that to develop the full potential of new ideas and knowledge, private ownership of factors of production and free access to that knowledge remain crucial prerequisites to ensure that creative entrepreneurial people can organize resources to develop innovations in open competition with those who would use them for alternative ventures.

Mazzucato's mission maps are popular in policy circles for understandable reasons. Politicians can dream up elaborate sets of related missions that address their constituents' urgent problems, while the private sector, in close collaboration with an experimenting and knowledgeable civil service, is there to subsequently deliver. But the preconditions for delivering such results are usually absent. And mission-dreaming politicians do not wish to be responsible or held accountable for creating or maintaining these preconditions.

Moreover, modern missions are very different from the successful ones of the past. The missions for policymakers today are not life-and-death struggles of the nation to preserve its way of life, but instead life-and-death struggles of humanity to convince entrenched national groups to abandon their way of life for the benefit of anonymous future generations and poor people far away. It is the right thing to do, but the reasons to engage lack the urgency of an existential struggle and the prestige of a national victory over formidable adversaries or technological challenges. Mission-driven industrial policy is simply not a very appealing proposition to the people that need to make the sacrifices our policymakers dream up.

That is not a plea to accept the status quo. As much as preventing the government from appropriating or clawing back the returns on innovation, one should also inhibit private companies appropriating publicly financed knowledge and/or using their exclusive rights to knowledge to block further innovation and development. We should not thwart new monopolies from arising, but we should prevent established ones from becoming uncontestable and permanent. We should combat the natural tendency of a capitalist system to "close" itself (Audretsch et al. 2001). At the same time, we should not expect it to ever reach a state where, even a democratically legitimized, bureaucracy can take the place of private sector entrepreneurs who risk their wealth, their health, their talent, their resources, and their energy on ventures that a government does not know society needs or wants.

Therefore, an Entrepreneurial State should complement its own, more active role in guiding and financing knowledge creation, with policies that promote and maintain an open, experimenting Entrepreneurial Society. It is people that need to feel the freedom to challenge the status quo (which includes the government itself) and have access to the resources to follow their personal drive to develop innovations that create new value for themselves and for society at large (Baumol 1990). Work on what constitutes a hospitable and enabling ecosystem for entrepreneurs to be

successful has been summarized in Wurth et al. (2022), and concrete proposals on how to achieve and safeguard such open ecosystems were published in Elert et al. (2019). We further develop the argumentation above in three steps which we term “The fallacy of hindsight,” “Mazzucato meets Schumpeter,” and “No Entrepreneurial State without an Entrepreneurial Society.”

The Fallacy of Hindsight

In *The Entrepreneurial State* and *Mission Economy*, Mazzucato presents a prima facie compelling case for redefining the role of the state in driving economic growth and innovation. Mazzucato argues that the state should adopt a more proactive and entrepreneurial approach, setting ambitious missions that inspire collective action nurtured by emotions of urgency. These missions should tackle pressing global issues such as climate change, healthcare, and inequality. By defining clear goals, the state can mobilize resources and talent from both the public and private sectors.

One of the key examples discussed in the latter book is the moon landing mission. Mazzucato emphasizes how the Apollo program of the 1960s brought together various stakeholders, including government agencies, private companies, and academic institutes, to achieve the audacious goal of landing a human on the moon and bringing him safely back to Earth. The Apollo program grew out of the space race, a contest that began in 1957 between the capitalist United States and the communist Soviet Union over superiority in space. The mission not only demonstrated the state’s ability to drive innovation but also generated significant technological advancements with broad societal benefits.

In her description of the moonshot mission, Mazzucato positions these broad societal benefits as an almost inevitable and automatic outcome of the mission itself. The state-led mission undeniably generated the knowledge that was essential to develop the new products and services that benefitted society at large. But to exclusively credit the mission with these benefits largely ignores the time and effort that was spent by private actors to develop the ideas and knowledge into commercial and viable products and services for large groups in society. Mazzucato then goes on to call for a paradigm shift, urging policymakers to adopt a mission-oriented approach that promotes sustainable and inclusive economic growth. By setting ambitious goals and actively participating in innovation, the state is expected to drive transformative change and create a more prosperous and equitable society.

We do not want to challenge Mazzucato’s facts or discredit her analysis. We agree that states successfully have and perhaps should continue to play a role in mobilizing talent and other resources around urgent societal challenges. Healthcare, climate change, and inequality are not problems that “markets” will solve on their own, and relevant and competent government organizations are an essential tool in our toolbox to address them (cf. Stam and Vogelaar 2023). We would even agree that the state would do well to formulate clear missions and approach them in an entrepreneurial fashion. That is, experiment with an open mind and be willing to fail

and learn, rather than develop interventions on the drawing board and then stick to them because of bureaucratic or political lock-in. The world of venture capital fully understands that spreading risks by financing many diverse ventures is a better option than going with the naïve strategy of financing only similar ventures. Such a portfolio approach can be adopted by a public sector that discriminates between a clear mission and a diverse and flexible operationalization.

But all that effort will only pay off, also in many unexpected ways, if we do not succumb to the fallacy of hindsight. That is, a well-defined and entrepreneurially executed state-led mission can only succeed in also generating a stream of valuable but largely unanticipated spin-off innovations, if the conditions for acting on such opportunities are right. That was evidently the situation in the United States in the 1960s, but it was not the case in the Soviet Union at that time. And it is highly doubtful that the governments that now eagerly adopt Mazzucato's recipes are more like the former than the latter.

Mazzucato Meets Schumpeter

We would join Mazzucato (2013) and others who argue for an Entrepreneurial State (Ebner 2009). Schumpeter's work on entrepreneurship and innovation indeed places entrepreneurship at the center stage of capitalist societies. According to Schumpeter, it is the entrepreneur's disruptive actions and ability to introduce new combinations of resources that propel economies forward. The willingness of entrepreneurs to take risks, experiment with new ideas, and pursue novel opportunities leads to economic progress and growth. By constantly seeking innovative solutions, entrepreneurs drive the wheels of creative destruction. In principle, there is nothing that would prevent the state, as the most important vehicle and instrument to formulate and address our collective challenges, from also operating in that way. In fighting our wars, in establishing and maintaining the rule of law, and in protecting our lives, property, and rights, we turn to the state and expect it to act on our behalf, if need be, in an entrepreneurial fashion. And our democratic political institutions ensure that the state remains accountable and that the status quo can always be challenged to act on new opportunities and respond to changing realities.

Importantly, however, Schumpeter also saw the state as a potential barrier to entrepreneurial dynamism. Not because the state is somehow inherently less efficient or less dynamic or more risk averse and conservative than the private sector. Mazzucato convincingly shredded those myths in *The Entrepreneurial State*. Rather, Schumpeter cautions against the entrenchment of power, whether by the state or private entities, as such entrenchment hampers the openness and contestability necessary for entrepreneurial people to thrive. Schumpeter argued that excessive concentration of power stifles competition, promotes rent seeking, discourages innovation, and ultimately hinders the overall development of the economy. He was thinking of large incumbent firms, but the same applies to large, incumbent governments. Hence, an Entrepreneurial State is not theoretically impossible but in

existing government agencies hard to achieve in practice. This has to do with the dynamics of democracy. Mistakes will be held against the incumbent politicians, weighing more heavily than successes. Political opponents will use state-run innovation failures to criticize incumbent politicians, saying that it is a sign of their incompetence and that they should be replaced. It will rarely suffice for incumbents to point to successes. Or to say that it is normal that many entrepreneurial projects fail. So, what is normal in private markets where private firms and individuals risk their own money is not equally acceptable in a system that is democratically governed using taxpayers' money. As a result, it becomes rational for politicians and government agencies to be risk averse.

In *Capitalism, Socialism and Democracy*, Schumpeter (1942) goes as far as to argue that a socialist, centrally planned state can and should replace capitalism and private business ownership. But only when all innovation activity in the economy has been fully routinized and is conducted in professionally and bureaucratically managed R&D labs of large corporations. From all his earlier oeuvre, it is clear that Schumpeter did not really believe that such a state would ever materialize. Mazzucato's modern-day societal challenges are a clear illustration that he was right. The world will never be predictable and will keep putting new and unexpected problems and challenges on our path. Therefore, innovation can never be reduced to routine, and we can never do without entrepreneurs, who challenge the status quo, even when most of us cherish the current state of affairs.

To maintain a steady pace of economic progress, Schumpeter suggests that governments organize society in a way that ensures that positions of power, wealth, and prestige remain contestable, both in the public and the private spheres. Only then will better ideas continue to replace the good ones of the past. This means implementing policies that foster competition, reduce barriers to entry, and promote an environment conducive to public and private entrepreneurship. By encouraging a level playing field and providing support for experiments, challengers, and entrants, governments can nurture the entrepreneurial spirit in society and keep innovation going. They can then also contribute to Mazzucato's concrete and well-defined government-led missions and help address urgent societal challenges. But ensuring a vibrant, open, Entrepreneurial Society is essential to create and act on new opportunities to realize the many unanticipated and broad societal benefits that Mazzucato so casually attributes to the state-led missions themselves.

The moonshot mission was a success in generating many broad societal benefits in the United States, where the initially more advanced Soviet space program was much less successful in that respect. No doubt, the space race innovations in the Soviet Union benefitted the army and hence the Communist Party. But resources and incentives to develop civil applications were not available. And while we have no doubt that the Chinese will put a man on the moon by 2030, it remains to be seen what the broader societal benefits of that mission will be. These examples illustrate how ambitious missions in more closed, less entrepreneurial societies can fail to generate the impressive list of unanticipated but highly valuable private sector innovations that a clear state-led mission can help launch. The problem is that bureaucratic governments, even democratic ones, have a hard time to see the value

of unanticipated innovations. This is not inherent to the state, but to bureaucracy. The statements by IBM that the global market for mainframe computers was about to be saturated or the failure of Kodak to see the potential of digital photography until it was too late are famous examples in the private sector, where mission-driven managers failed to recognize the value of adjacent inventions and entrepreneurs stepped in to realize their potential.

Taken together, a precise reading of Schumpeter's work underscores this central role of entrepreneurship in driving dynamics and innovation in capitalist societies, where property is privately owned and fortunes can be accumulated. The latter is essential to incentivize but, even more importantly, to fuel the development and diffusion of new ideas that develop inventions into innovations that ultimately benefit society at large. Schumpeter emphasized the disruptive actions of entrepreneurs and their role in challenging existing structures. Such challenges are typically not appreciated in mature, bureaucratic organizations, whether they are big corporations or governments. As we read Schumpeter, he does not adhere to the public vs. private sector myths that Mazzucato effectively debunks in her work. But he does caution against the concentration of power, whether by the state or incumbent private firms, and argues that governments should foster open, contestable environments to encourage entrepreneurship and innovation in society at large.

No Entrepreneurial State Without an Entrepreneurial Society

Those who read in Mazzucato's work a justification for more ambitious and directive government interventions are likely to overlook the important policy implications that decades of entrepreneurship research entail. We summarize this in the claim that an Entrepreneurial State without an Entrepreneurial Society will not deliver. An Entrepreneurial Society can be defined as a society where challengers of the status quo serve as the critical force driving progress, prosperity, and competitiveness in global markets and where institutions and policy have a focus on facilitating and generating such entrepreneurial activity (Audretsch 2007; Elert et al. 2019). In short, it is a society in which challenging the status quo is both encouraged and facilitated. Missions will deliver better outcomes if they are contestable and open to challengers themselves. The risk of too powerful mission-driven Entrepreneurial States is that they use the power and resources of the state to block, rather than nurture, such challengers. As many of the benefits that resulted from historical missions were unintended and provoked by challengers from outside, ensuring that the modern missions remain open to challengers is an essential ingredient for their success.

It is possible to have a benevolent dictator mobilizing public and private resources to a worthwhile mission. In fact, in ancient Greece and Rome, dictators were elected in times of crisis. And we understand the temptation of doing the same, as urgent global challenges confront us with existential threats. For that reason, we see those

that are worried most about the future of our planet, continent, and country most willing to suspend liberal democracy in the political realm and market capitalism in the economic realm. When the end justifies the means, mission-driven policies implemented by a strong Entrepreneurial State, may seem like a good idea. But as the early successes of the Soviet Union in the space race have shown, succeeding on the goals of the mission itself is not a sufficient condition for successful mission-driven innovation policy. And even today, there is an interesting debate on whether an Entrepreneurial Society can thrive under a very powerful Entrepreneurial State (Audretsch and Fiedler 2023).

Adopting a mission-driven innovation and industrial policy without carefully considering the environment in which that mission is to be implemented risks losing many of the potentially life-altering improvements in other domains. More importantly, it will make mission-driven industrial policy fall short of its promises and may end up discrediting an approach that has many merits from the start.

The essential amendment we would like to make to the Mazzucato recipe is therefore that the private sector be allowed to run off with the ideas and to basically “steal” them for private gain. While government intervention and public investment can play a crucial role in catalyzing invention, it is important not to stifle market competition and dynamism in the successive stages of the innovation process. Excessive control and central planning on mission objectives may discourage entrepreneurial activity and impede the ability of challengers to (re)allocate resources efficiently. Especially the suggestion that private sector profits should be taxed to finance future missions and innovation is short-sighted and potentially devastating. We do not only fear the often-claimed disincentive effects that such taxation would reduce entrepreneurship. Many, if not most, of the best and most talented entrepreneurs are not in their business primarily for the money. But what siphoning off private revenues from growing ventures would do is to starve successful challengers of the resources that are much needed and will be allocated to disseminate the innovation and fitting new ideas to new, bigger, and more profitable markets and domains. Ensuring an open system of innovation where ideas can compete on a level playing field requires careful reconsideration of ownership structures, intellectual property rights, and the distribution of profits, but not in the direction that Mazzucato seems to advocate.

This means that a sharp eye needs to be kept on the long run. While government interventions can provide a short-term boost to innovation and economic growth, long-term sustainability requires the build-up and nurturing of a broader ecosystem that encourages private sector, bottom-up entrepreneurship. It is crucial that policies be focused on fostering a supportive environment for startups, improving access to finance, enhancing education and skills, promoting research and development collaborations, and creating robust institutions and legal frameworks. Most importantly, however, those institutions should focus on allowing challengers of the status quo, inside and outside the state, to compete for the resources they need to make their challenge a success. Ventures should fail because they are based on bad ideas, not because they are starved of resources by institutions that favor incumbents. Mission-driven industrial policy in the hands of lobby-sensitive politicians seriously risks

moving us in the latter direction. Policymakers, including those that now embrace Mazzucato's ideas, love to tilt the playing field in favor of organizations that contribute to the missions they have formulated. It is much harder for them and much more important for creating long-term sustainable progress that they level the playing field, also for those that challenge their policies.

By considering this amendment, those who advocate ambitious and directed government interventions, as inspired by Mazzucato's work, can warrant that the promised societal benefits are realized in a balanced and sustainable manner. It is important to strike a careful balance between government intervention and market forces, between public and private initiatives and between competition and accountability. To make the Entrepreneurial State a success, it needs to operate in an Entrepreneurial Society, nurturing an ecosystem that enables entrepreneurship and private sector participation.

Epilogue

The essential role of entrepreneurship in "grand societal missions" such as improving healthcare, containing climate change, and bringing down inequality leaves little room for the view that the Entrepreneurial Society is over. It is hard to imagine that the increasing domination of megafirms and large government with fading entrepreneurship in a world where the lowest caste consists of self-employed persons and freelancers (Schumpeter's socialism) will help overcome the challenges of the day. Market capitalism and liberal democracy have not yet become sclerotic (Thurik et al. 2023); our best chance is to revitalize these engines of progress that have proven their worth in the past.

There is certainly no "end of history" (Fukuyama 1992), but despite many challenges from both the right and the left, liberal democracy and capitalism remain the systems that best ensure an open society (Popper 1945). An Entrepreneurial Society built on inclusive institutions that channel resources to challengers experimenting and scaling new ideas to increase prosperity ensures a capitalism that works best and benefits people the most (cf. Acemoglu and Robinson 2012). Together, democracy and entrepreneurship ensure the effective launch of state-led missions that are both legitimized and realize their economic potential.

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Overcoming the Siren Song of Central Planning



David C. Rose

Abstract The concepts of *state entrepreneurship* and *mission economy* are the latest attempts to justify greater central planning despite the explosion of human flourishing in free market societies over the last few centuries. This is a puzzle. Why do we keep falling for this old wine in new bottles? I argue that our genes predispose us to be too skeptical about having faith in complex and evolving systems involving large numbers of people. This is because we fail to recognize that there are two different ways to control evolution. I then briefly discuss how moral beliefs might overcome this predisposition.

Keywords Moonshot economics · Market failure · Central planning · Evolution · Group maladaptation

JEL Codes A13 · B52 · L26 · L50 · O21 · O32 · P11 · Z10

Introduction

Like wines that improve with age, there are ideas that never stop being relevant for cultivating human flourishing. Like wines that worsen with age, there are ideas that may have once been helpful but no longer are. When all humans lived in small groups, for example, robust central planning was necessary, just as it continues to be within families and firms for the reasons laid out almost a century ago by Ronald Coase (1937). But when applied across the large societies we now live in, the more centrally planned economic activity is, the worse the outcome.

I thank Melvin Schut for helpful discussions about the basic argument.

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Our distant ancestors were excellent central planners because in the small groups within which they lived it improved group fitness. It is therefore now a part of the genetic recipe we all share. But recently in our evolutionary history, groups began to compete on the margin of size because, in addition to the obvious martial advantages, Adam Smith (1981 [1776]) was right about the economic power of scale. Market pricing came to effectuate socially efficient decision-making in contexts for which central planning could not for the reasons laid out by Friedrich Hayek (1945, 2002 [1968]). Unfortunately, our small group genes do not equip us to readily appreciate the social benefits of market pricing.

Few economists have enjoyed the level of public policy influence that Marianna Mazzucato has enjoyed in the last decade, but her work is unconcerned with this harsh reality. She came to prominence by arguing that innovation is often driven by government involvement. But despite providing numerous examples, she does not provide an explanation for why such efforts were necessary. Saying they were too risky to have happened otherwise is an assertion, not a fact, since no one can know the counterfactual outcome.

She doesn't call for destroying the price system, but she and her co-authors do seek to reshape it significantly.¹ To what ends and why? Her calls for using government power to better achieve social objectives provide no economic rationale for why such objectives (e.g., development of green technologies) are in the right proportion relative to other social objectives.

I submit that she and her growing number of followers are mostly responding to genetic predispositions we all share, predispositions that make us favor controlling how the economy evolves. More to the point, I shall argue that her calls for having an entrepreneurial state or a mission-based (moonshot) economy (Mazzucato 2015, 2021) amount to little more than new justifications for greater central planning, a case of old wine in new bottles.

Mazzucato and those who share her views would not agree, perhaps because they think of central planning as the polar opposite of market pricing, and they are clear about not being against market pricing. But Hayek's demonstration of how value is created by markets in contradistinction to central planning does not imply that if markets exist then central planning does not exist, either. Few would quibble with the observation that perfectly centralized and perfectly decentralized planning are on opposite ends of a broad continuous spectrum. Mazzucato's calls for "market shaping" obviously don't call for the end of market pricing, but they also don't imply that her views are closer to comporting with decentralized planning than central planning.²

¹In their own words:

The role of the state is key here since it is the only institution with *the power to shape markets* and direct economic activity in socially desirable directions—or "missions"—to achieve publicly accepted outcomes. (Kattel et al. 2021, p. 19) [emphasis added]

²Moreover, her calls for increased government intervention clearly involve greater central planning. She and her co-authors state, for example:

There is already ample criticism of central planning in general and these new versions of it in particular. I will neither add to, review, nor synthesize this important work. Instead, I will attempt to address the following puzzle: Why is the pull of central planning so powerful? The short answer is that the genes that served us so well for so long make us desire control. This gene-based conception of control, however, is not the kind of control that best supports flourishing in the kinds of societies we have built for ourselves.

In what follows, I offer an explanation for why our desire for control and our failure to appreciate that how it is effectuated makes all the difference has led to a greater fear in market evolution than is warranted. I then argue that certain kinds of moral beliefs shape thinking in a way that makes us more likely to overcome this bias, allowing us to have more faith in the free market system than otherwise. In the West, the evolution of such moral beliefs helped inoculate democracy from providing political support for central planning to produce specific moral outcomes. The waning of these beliefs opens the door for a resurgence of support for central planning in the very societies that have already benefitted greatly from decentralized planning.

The Siren Song of Control

Until very recently in the story of humans, a matriarch, patriarch, or small group of elders was in charge of making decisions that affected the welfare of the group. Examples of such decisions would be where to move the tribe if area resources had become depleted or whether to make friends with a neighboring tribe or destroy it. In the small groups within which we lived, such top-down control was very efficient.³ The spontaneous order of the market didn't even rise to the level of a foolish fantasy because it was as unfathomable as it was impertinent.

Rising intelligence led humans to become increasingly forward looking over time rather than merely reactive to immediate circumstances. So they increasingly went beyond adapting to the local environment to proactively trying to shape it, both physically and socially. Human genes therefore now produce feelings of anxiety when things seem out of control to induce us to bring them under control. Just letting things happen seems foolish and irresponsible.

In most circumstances humans therefore favor someone or something being in control. This *control bias* makes us suspicious of letting anything run on autopilot,

... *governments*. . . need to set medium-term targets with time horizons of 10–30 years. . . and develop detailed policy pathways for achieving these *targets*. [emphasis added] (Sachs et al. 2019, p. 811)

³My father fondly remembered how his grandmother “ran the family.” He was referring to the extended family and her power to direct decisions in ways that would be out of bounds today, like telling a grandchild to lend money to another family member (see also Brooks 2020).

let alone letting things evolve over time without attempting to exert some measure of control over the path of change. The problem is that some of the mechanisms that produce efficient control in small group settings fall apart outside of the milieu within which they evolved.

A small group's central planning leader can directly control who does what under varying circumstances, but to do this efficiently, he or she must account for all of the costs and benefits involved. This requires an acute sense of empathy. It would be inefficient, for example, to put someone who is afraid of heights in charge of climbing trees to gather coconuts for the group. At the same time, our capacity for empathy helps keep opportunism in check. Even if we know we can get away with it, if we are opportunistic at the expense of a small group, we know we will empathize with the harm done to individuals in the group, so we will expect to feel guilty. This internalizes the cost of such actions and thereby discourages them.

But in a large society, the harm caused by opportunism is often spread over so many people that there is no actual person with whom to empathize. This removes the trigger that normally actuates guilt that thwarts opportunism. This hardwired capacity for *harm-based* restraint therefore doesn't scale up. So opportunism was not nearly as big a problem for our distant ancestors as, say, cheating the IRS is in America today (Rose 2011).

A better-known problem is the effect of group size on the localization of knowledge (Hayek 1945). Larger groups are far more productive because they enable greater specialization that increases productivity (Smith 1981 [1776]). The more specialized economic activity is, the truer it is that most people will know a great deal about what they do and the ever-changing details of time and place that affect how they do it, while knowing nothing about what everyone else does. In very small groups, this is never a problem, so our small group genes are ill-equipped to deal with this problem.

In his Nobel acceptance lecture, Hayek explained why, in large societies especially, we should not infer from improved scientific and theoretical understanding of the broad causal relationships in economies that we therefore know enough to engage in efficient central planning.⁴ Every bit as important is localized knowledge about the details of time and place. This distributed knowledge requires a mechanism, such as is provided by the price system, if it is to be fully put to socially beneficial use.

In large groups the localization of knowledge makes efficient direct management of what people do impossible. By explaining how this problem grows exponentially with group size, Hayek (1945) was able to explain how the price system creates value for society. With market pricing, no one needs to know what others are doing, how they do it, or how relevant conditions have changed because market prices force

⁴“The pretense of knowledge” was the title of Hayek's Nobel Prize lecture, but parts of this general argument are themselves distributed over a number of his writings. Consider this well-known quote from his book *The Fatal Conceit* (1988): “The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design.”

everyone to bear the social opportunity cost of using any resource they might use. This implicitly assumes that any market failure problem that might drive a wedge between the market price of a resource and the true social opportunity cost of using it has been addressed.

This means that as individual persons or firms do their best with the local knowledge they possess, society doesn't suffer from resources failing to be used where they will create the greatest social value. If there is another more highly valued use, that would drive up demand, which would drive up price, which would induce those using the resource who valued it less than this new, higher price to look for alternatives. This is exactly what a central planner who was trying to best promote the common good would do *if* he could do it.

Hayek's insight is one of the most important ideas in economics. But it does not comport with our hardwired intuitions. It suggests that society works best when we don't try to control the flow of economic activity, when we instead let those with local knowledge act on it as they see fit as long as they pay market prices for the resources they use and play by the rules of civil society. Unfortunately, most people simply cannot believe that it is possible for society to do well if no one is in direct control of all but the least consequential of economic activities.

Because we evolved in very small groups, faith in the free market system working us to better outcomes is not something that our innate scientific intuitions prepare us to believe. Quite the opposite is true since for most people the proposition that we don't try to centrally plan economic activity seems ridiculous on its face. So just as gravity never stops pulling on Newton's apple, we never stop hearing the siren song of our small group genes calling for someone or something to be in control to avoid disaster.

I suspect that so many economists today have so little faith in the free market system because of their own control bias about which they are unaware. To my knowledge this problem has never been carefully studied. But it seems unlikely that this bias does not exist, and it seems rather likely that it explains why most people – especially very responsible people – are instinctively incredulous about the desirability of decentralized planning.

The Power of Evolution

Before the neoclassical revolution economists had a more organic view of the economy and economic behavior than they do today (Rose 2019b; Smith and Wilson 2017). With the rise of neoclassical economics near the end of the nineteenth century came an increasing preoccupation with precise mathematical modeling of nearly all economic phenomena. This naturally led to a more mechanistic way of thinking of the economy and economic behavior (Mirowski 1988).

This ushered in the rise of Keynesianism, which envisioned a more activist role for government based on the presumption that economists now had a sufficiently clear understanding of how the economy worked to make such intervention fruitful.

Before long an unwillingness to intervene came to be viewed as foolish, even immoral. Interventionism began with discretionary fiscal and monetary policy aimed at smoothing business cycles. It became fashionable to believe that through scientific reductionism the economy could be effectively disassembled, reverse engineered, and improved upon through policy. This led to broader regulation of economic activity to effectuate various forms of social engineering. We now live in the age of the economic policy wonk.

Unfortunately, market economies are much more like constantly evolving biomes than toasters. Just as biological evolution has produced an incredible variety of life, the evolution of market societies has produced an incredible variety of goods, services, technologies, and institutions. Until very recently, little of this was centrally planned. The pace of change often led to great disruptions (e.g., the migration of labor from the agricultural economy to the industrial economy), but the rate of economic growth was so great that the word “progress” was viewed by most as inherently positive.

Near the end of the nineteenth century, there were growing concerns about the social cost of industrialization, which undermined the presumption that progress is inherently good. Then came spectacular successes of central planning to achieve victory in two world wars and a series of successes in the space program. Far too many economists failed to recognize that central planning in exceptional circumstances atop economies that are already well developed because of decentralized planning is hardly evidence of the general efficaciousness of central planning.

An increasing proportion of economists began wondering if unbridled capitalism was such a good idea after all. Marx had little influence initially, but his work began to find purchase with the intelligentsia and in the academy. The idea that some form of central planning would be wiser than pure capitalism gained momentum in part because our innate control bias made our minds receptive to such arguments.

None of this was news to economists who understood the theory of market failure.⁵ There are circumstances for which flourishing will almost certainly fall short of what is possible without government intervention. No one who understands the theory of market failure believes that unfettered capitalism is a good idea. Over the second half of the twentieth century, central planning advocates increasingly invoked the theory of market failure to justify intervention.

Recently, however, a growing number of central planning advocates believe that rectifying market failures but otherwise having faith in the evolution of society is foolish. The presumption is that with more proactive planning to guide the course of economic change, governments could do much more good. Increasingly, rectifying market failures came to be viewed as necessary but far from sufficient for sustainably

⁵This body of knowledge goes back at least as far as Pigou's (1920) analysis of how externalities can be addressed indirectly through the price system with excise subsidies or taxes rather than through direct regulation of behavior by government. The theory of public goods, broadly construed, is another area of major focus in the theory of market failure. The economic polymath Paul Samuelson (1954) provided the first rigorous analysis.

maximizing social welfare over time. For an extended counterargument to this position, see Rose (2024).

If there are compelling theoretical reasons for this shift, members of this *post-market failure movement* have not spelled them out. Simply arguing that active intervention in the past produced success and asserting that we can do better by putting more effort into overt central planning are not compelling arguments for supplanting market evolution with central planning. They simply express incredulity about putting faith in the free market system. Neither demonstrates how we can know central planning will do better than the counterfactual outcomes that would have otherwise arisen from evolution amidst appropriately addressed market failure problems. This is remarkable given ample evidence of social progress that came on the heels of market evolution arising through decentralized planning in the private sector over the previous three centuries in the West.

Guided Versus Girded Control and Evolution

Control is normally thought of as the direct regulation of something like setting the water temperature for a shower or driving a car in a precise path down a road. But control can also be effectuated indirectly. It can take the form of girding, for example, like having an anti-scald valve on the shower's water supply or having guardrails to keep the car on the road.

Whereas guided control charts a specific path forward through time, girded control simply puts constraints on where that path can go. Unless it is so suffocating that it creates de facto guiding, girding is a lower level of control.⁶ But that does not mean it is less important. Girding allows for the elimination of actions that cause problems for society while not otherwise removing discretion from private actors. It therefore leaves the lion's share of control in the hands of individual persons or organizations which, in turn, gives behavior room to evolve in a multitude of ways.

When government power is used to effectuate precise control to directly guide the path of change, this has the effect of forbidding all other ways forward. It therefore forecloses a great deal of potential future directions of progress that might have been taken if evolution had been allowed to proceed within the limits of girded control. There are profound benefits to having systems in place that allow evolution to produce a variety of possible avenues of change that can allow those who possess local knowledge to use it to adapt and create. Such efforts often lead to the serendipitous discovery of new knowledge. Thinking of competition as a discovery procedure through the price system (Hayek 2002 [1968]) helps prepare the mind to

⁶Suppose there are three possible actions. Having behavior guided in the sense of having only the first action allowed is no different from having behavior girded in the sense of prohibiting the second and third actions.

be receptive to the idea of thinking of girded evolution as fostering its own kind of knowledge discovery procedure.

When evolution is girded but not guided, only specific actions are redacted from what individual persons or firms can choose (Rose 2011, 2019a). It is natural to view the complement of this redacted set as an equally well-defined and bounded set. But in reality, this set cannot be fully known and is constantly changing, so it is effectively unbounded. Most importantly, when evolution is only girded, this ever-changing and growing complementary set of actions automatically falls under the discretion of private actors.

In contrast, the truer it is that evolution is precisely guided by government, the smaller is the set of actions that fall under the discretion of private actors. This forecloses the use of the distributed local knowledge possessed by individual persons and firms for adapting and creating. By the very definition of local knowledge, using this knowledge *cannot be* replicated by the central planner. This produces many fewer lines of evolution that reach into the future, thereby reducing a society's ability to benefit from evolving knowledge.

Girded market evolution is not evolution that is solely driven by random mutations as it is in biology because those who possess local knowledge are not merely making random guesses about how to use it. They are positing educated conjectures in light of what they already know, much of which central planners cannot possibly know. So the problem isn't just fewer experiments going forward through time; it is also that the presumed best approach chosen by central planners could not have been conceived through consideration of all the possible ways forward arising from the variety of perspectives that localized knowledge affords.

Guided evolution is not much of a problem in a very small group. But the larger a society is and therefore the more dispersed and varied local knowledge is, the greater is the cost of guiding change to take one particular course forward. As our society gets larger and more specialized, it produces more lines of evolution at any point in time which causes cross-fertilization of knowledge to expand exponentially through time.

Those who possess local knowledge do not know which way forward is best, either. But unlike the central planner, *they don't have to*. With girded evolution decision-makers simply adapt and create the best they can with the local knowledge they possess, knowing that foolish efforts might produce bankruptcy, while brilliant ones might produce spectacular riches.

We do not know that this process will result in discovering specific knowledge. This fact about the nature of evolution produces angst among some people, and I suspect this helps explain the allure of meticulous central planning over evolution. But it is fallacious to look to the past and point to discoveries that were made under central planning that might not have been made without it and then to worry what the world would look like without such control. This is because such discoveries, no matter how remarkable, cannot be compared to counterfactual outcomes that could never see the light of day from having resources driven to the efforts determined by the central planner.

All parents know this feeling. They cannot imagine a world with different children than the ones they have. But most are able to understand that this feeling arises from temporal confusion as is evidenced when they urge their children not to have children until after turning 30, even though their first two children were born to them when they were in their 20s.

Employing knowledge fuels the discovery and creation of new knowledge. The greater the scale and scope of knowledge, the greater the rate of creation. Knowledge – specifically durable scientific ideas – is a perfect form of social capital. The essence of this type of capital is that it is used but not used up in the process. Whereas all other inputs are either used up (like flour when making cakes) or disappears (like the baker's time) or wears out (like the batter mixer), knowledge has the peculiar property of not being subject to any of these effects. If anything, it gets stronger with use. But the adjective social is also meaningful since knowledge tends to produce spillovers.

Paul Romer (1986, 1990) was awarded the Nobel Prize in economics for introducing endogenous growth theory to economics. His work stresses that knowledge tends to build on itself, to compound over time, to grow exponentially. From existing knowledge, with effort we can create new knowledge and that new knowledge can create yet more new knowledge. Political economic systems that recognize the power of knowledge are therefore systems that can produce an astonishing rate of intensive economic growth that is the only path to improving the quality of life over time for everyone.

One reason why not guiding evolution is so important is that evolution serves as a mechanism for discovering knowledge we might not otherwise acquire, at least not as quickly. It therefore helps increase not just the volume of knowledge, but its diversity. The more diverse the set of ideas over which competition is unleashed, the better the best we end up with will be. But greater diversity also increases the rate of compounding by providing new starting points for subsequent knowledge creation. The compounding nature of economic growth ensures that static efficiency gains from not having multiple efforts, most of which will fail, will be more than offset by the gains resulting from the largest possible set of competing approaches rolling forward through time with compounding returns.

Even when new things are tried that fail, often something is still learned that produces benefits to others. But such knowledge would not have been discovered without having tried the failed approach. Genuine entrepreneurs who understand the value of quick and creative action have every incentive to pounce on such knowledge. But the more that government guides evolution through central planning, the fewer experiments there will be and therefore the fewer serendipitous knowledge discoveries there will be that no one could have ever imagined *ex ante*.

With girded evolution decision-making by individual persons and firms is guided primarily by economic forces. But the more government attempts to guide evolution through central planning, the more the course of change will be determined by political forces. This means that political agendas will sometimes dictate the direction of change over value creation. This is how we can end up with giant white

elephants from managed industrial development schemes for which failure produces a doubling down, rather than a termination, of the flow of resources.⁷

Although it is foolish to demand guided evolution – in the extreme, an oxymoron – it is not foolish to be skeptical of ungirded evolution. As freer societies became the norm in the West, private sector-driven evolution produced a roller coaster ride of change. Part of the thrill of riding a roller coaster is not knowing what’s coming next, and so it is with social, political, and economic progress. But even the staunchest thrill seeker wants to be assured that any given roller coaster is reasonably safe.

Imagine a world in which this assurance was derived by a particular “best” design for all roller coasters rather than by boundary conditions that constrain how roller coasters can be built and operated. There would be very few roller coasters indeed, for who wants to ride the same roller coaster over and over? The way to have lots of different roller coasters while knowing they are all reasonably safe is to understand the need to gird the evolution of roller coaster design, construction, and operation. Only a fool advocates for completely ungirded evolution of society. But girded how?

What should and should not be on the list of things that should gird social, political, and economic evolution is too large of a question to be addressed here. The point here is not to debate the appropriate set of constraints to effectuate girding; it is to draw attention to the need to distinguish between girded control and guided control so it is easier to see that when central planning moves us increasingly into the realm of precisely guiding how the economy evolves over time, it is destroying benefits that only the girded market evolution process can provide.

Utopianism

What can explain this preoccupation with controlling the flow of resources into the future? I submit it is, most likely, that there is a primal fear of heading into the unknown. Unless one has already learned a great deal about how evolution and free market societies work, having “faith in the system” to produce “progress” that is presumed to best promote the common good is impossible. All of this messiness can be avoided by defining a destination *ex ante* and then working to ensure that social, political, and economic change heads inexorably toward it.

Shades of utopianism can be found in all human societies. The ubiquity of utopianism is hardly surprising when we recognize how closely related it is to control bias arising from genes that we all share. For the most part, humans try to

⁷Consider innovations to teaching in public education. Success means you need fewer resources going forward. Failure normally means you can argue that the new approach wasn’t tried fully enough, so failure increases the flow of resources. This is precisely the opposite of what happens in the private market.

make sure things head in the direction they want most, the direction required by their definition of utopia. But there are at least two problems with this.

As Robert Nozick (1974) explained many years ago, if you want a society that maximizes liberty you can have that, but you'll have to give up on utopia. This is because millions of cats going off in their own directions will not support the execution of any particular plan. And if you want a utopia you can have that, too, but then you'll have to give up on liberty. This is because all action will have to be subordinated to making progress toward the plan. Those who are preoccupied with utopianism need to understand that the price tag of any utopia is the loss of liberty unless one's definition of utopia is the free society.

The second problem is that utopianism is antithetical to evolution. This is devastating when one tries to imagine an alternative mechanism through which to produce the array of life we now have on our planet. We live the good life now in large part because systems evolved that allowed us to have our cake and eat it, too. They did this by girding evolution to limit the downside risk, but by not guiding it, they left evolution's substantial upside. Utopianism is based on the naïve and arrogant presumption that we already know what is best given our known resource constraints, so knowledge discovery processes are both superfluous and wasteful.

With the knowledge discovery process made possible by girded but not guided evolution, the more diverse knowledge is, the more rapidly the stock of total knowledge grows and, with it, a society's ability to support mass flourishing. Such knowledge can be subject to a kind of infinitely repeating feedback loop that, unlike anything else, has no particular reason to be subject to diminishing returns. It never stops compounding. In most cases this new knowledge produces spillover benefits since knowledge is famously hard to make fully excludable.

This process creates unimaginable treasures along the way. But we don't know what exactly will be in each new treasure chest we discover. We only know from experience that in the past those societies that let the knowledge genie of girded but not guided evolution out of the bottle enjoyed rapid progress toward mass flourishing. But this story never gets off the ground if the path going forward is forced back to a predetermined plan to achieve a particular view of utopia.

Market Failure

When government addresses market failure problems as narrowly and unobtrusively as possible, the problem is normally rectified while not impeding the efficient function and subsequent evolution of society. This is most obvious with subsidizing basic research.

It is well-known that basic scientific research has the potential to produce tremendous positive spillovers. Since no one can know what all of those spillovers might be, and therefore the extent to which they might be adequately captured to assure a socially optimal level of investment, the expected benefit to society can be high, while the expected gain to any individual person or firm is only modest. This is

because social benefits sum all distributed benefits no matter where they land. Private incentives for funding basic research are therefore too weak for the private sector to invest as much as would best promote the common good.

Members of the *post-market failure movement* view policies designed to address market failures as necessary but not sufficient for best promoting the common good. They attempt to demonstrate this by showing that economies like the United States have already done well with de facto state entrepreneurship efforts in the past. What is required is more of both, which begins with not letting the private sector take all of the credit for what the government has already made possible.

But their examples of these prior successes are, in fact, rather poor examples of state entrepreneurship. These examples include but are not limited to the discoveries that made possible new drugs, the Internet, smart phones, ancillary smart phone technologies like SIRI and GPS devices, and so forth (Mazzucato 2015, 2021). These are poor examples of the earlier success of state entrepreneurship because the entrepreneurial part of the exercise had nothing to do with the state part (Yerger 2024).

The state's role was to fund basic research. The entrepreneurial part of the story was individual persons and firms *later* taking these findings, whatever they might end up being, and applying them in practical ways to create value. In other words, the truer it is that what we are considering is genuine basic research, the less likely that such work was undertaken by entrepreneurs or even promoted by entrepreneurs. Contrary to the suggestion of those who favor state entrepreneurship, evidence of technological advance driven by basic research paid for by government is not evidence of the virtues of state entrepreneurship (Holcombe 2024).

These are actually good examples of the social benefits of enlightened American application of the theory of market failure through its funding of basic research that would have otherwise been underfunded in the private sector. They are also good examples of how well creative entrepreneurs have put new knowledge to work in ways no one could have imagined possible, in ways that had nothing to do with achieving a particular plan for society in the future. Basic research has been frequently justified by the theory of market failure precisely because the ultimate ends to which such research might be put are known to be unknown.

So what can possibly explain all of this effort to garner support for state entrepreneurship given the success of truly private entrepreneurship fueled by state subsidized basic research that was justified through the theory of market failure? Perhaps their real concern is not the failure of the theory of market failure, but it is success through the unguided evolution of economic activity. Such an explanation makes sense if what is really driving the movement is having control over the direction in which the economy evolves.

How Moral Beliefs Can Defeat the Siren Song of Control

My purpose has not been to argue that members of the *post-market failure movement* are advocating central planning in a deceptive way. But the practical effect of doing what they recommend nevertheless pushes our society in the direction of greater central planning. They can resist that label, but there is no denying that if we do as they suggest, much more control will be exerted over how future economic activity unfolds.

My purpose has been, instead, to offer an explanation for why we are so willing to accept policies that result in greater central planning. In short, our genes lead us to think that someone or something needs to be in control of society, not just in terms of day-to-day operation but also in terms of how it evolves. Our genes are right about this for societies that are not much larger than the groups within which they evolved.⁸ But now that we live in very large societies, using central planning to efficiently control society is a pipe dream. Understanding why this is true should be a lesson taught to all future voters.

I will now argue that when moral beliefs have a certain kind of logical structure, they frame moral thinking in a way that makes it more likely citizens will be willing to accept the unpredictability of change that goes with evolution and therefore not be so susceptible to policies that promise to alleviate such fears by more directly managing the economy. This may have helped some societies evolve in directions that led to an increasing level of decentralized planning and therefore rising general prosperity.⁹

I submit that this new logical structure took the form of a wall in the mind with the moral don'ts on one side and the moral dos on the other. Not doing the don'ts became increasingly treated as an absolute moral duty. Doing the dos became increasingly treated as merely being something to be valued but not compelled (Rose 2011).

This *duty-based moral restraint* arises from moral beliefs that attach guilt directly to negative moral actions rather than their effects on others. This allowed us to overcome the problem of waning harm-based moral restraint with increasing group size. The stronger the expectation of guilt from taking any negative moral action, the more that moral restraint takes on the quality of a moral duty and vice versa. Finally, since duty-based moral restraint calls for inaction, it does not run up against resource constraints so all can be expected to obey it.

⁸“Dunbar’s Number” (150 persons) was propelled into the lexicon in Malcom Gladwell’s *The Tipping Point* (2002). Robin Dunbar (1992, 2016) demonstrated the existence of a strong correlation across species between the neocortex, adjusted for body mass, and the size of groups they normally live in. Applying his estimated model to humans produced 150. In other work he has shown how this multiple arises again and again in the organization of human activity.

⁹Although there is no question that some specific moral values and beliefs helped drive the rise of market societies (McCloskey 2006), moral beliefs were also coevolving with increasing decentralization in a way that was also producing a new logical structure that changed how moral values related to one another (Rose 2016, 2019b).

But duty-based moral restraint alone is not enough. Doing the moral dos must also *not be* viewed as a duty. Positive moral actions normally require resources. So if *duty-based moral advocacy* exists, it might very well involve having to do a set of dos that cannot be done without violating duty-based moral restraint. This will produce conflicting duties. If, for example, you believe it is your moral duty to give at least USD 10 to all homeless persons you see, then unless you are very rich you will need to steal some money, which would violate duty-based moral restraint, or else fail to fulfill your positive moral duty. The only way to avoid the erosion of duty-based moral restraint is to not have duty-based moral advocacy.

This means that moral restraint, without which a large high trust and therefore low transaction cost society is impossible, must take precedence over moral advocacy, lest being required to do the moral dos undermine the duty-based moral restraint. This does not mean we should reject moral advocacy. It only means that positive moral acts must ultimately be left to the judgment of the individual who can weigh the relevant costs and benefits.¹⁰

This was increasingly echoed in and reinforced by other ideas that were shaped by this new way of thinking about morality. These other ideas induced us to construct new frameworks for government such as the US constitution.¹¹ In America this moral foundation took hold most fully, so institutions began to echo it in a vision of the rule of law that was not undermined by the legacy of monarchical discretion, but was instead reinforced by a constitutionally limited government and a Tocquevillian preference for cultural regulation of behavior over government power.

But what does all this have to do with evolution?

Utopian plans share a deep problem with duty-based moral advocacy. Unless explicitly built in, utopian plans also have no particular reason to be feasible within existing resource, legal, and moral constraints. Because of this, they often create pressure to rationalize the violation of these constraints. In contrast, economic evolution that is only girded can commence and continue to abide constraints.

A utopian plan – the very antithesis of evolution – is like a young adult who first says to himself that not having a new sports car is unacceptable, so he buys one he can't really afford. It is easy to see how this leads to ruin. In contrast, girded evolution is like a person thinking about buying a house by first saying to himself that, given his financial circumstances, he cannot spend more than USD 1500 a month on a mortgage. He does not begin with "I will not settle for anything less than a 2500-square-foot home in Malibu." He begins with what he can afford. Because of that, he chooses among alternatives that won't require that he spend more than he can afford.

¹⁰The Judeo-Christian ethic frequently stresses not doing the don'ts over doing the dos. As Hillel the Elder famously stated: "That which is hateful to you, do not do to your fellow [man]. That is the whole Torah; the rest is the explanation; go and learn."

¹¹Note how the way was paved for the US constitution by the Declaration, which was an extended argument to the effect that the colonies had the moral authority to leave the empire because of the abuse of power by the crown.

No one can possibly know which house he will ultimately choose. It's unlikely, of course, that a single 2500-square-foot home in Malibu will exist within the constraint of USD 1500 a month, so such a dream never sees the light of day. So while the "utopia first" approach will start with a clear vision of the final outcome that may very well be impossible or unsustainable, the "constraint first" approach seeks to discover that which is best within the set of what is possible and sustainable.

In societies we live with others, and if those others also start with constraints, as all genuine adults should do, none of them will be able to predict what their final decision will be, and no one will be able to predict the final outcome for society that will arise from the combination of these unknown choices. But we can predict that they will not be on an unsustainable path.

Central planning driven by any kind of idealized plan in the context of the large societies we live in today therefore virtually guarantees disaster even if we set aside Hayek's argument that we need a price system for the efficient use of local knowledge. When citizens don't understand the dangers of utopia-driven central planning, political competition inevitably unleashes a utopian arms race whereby votes are garnered with ever more grandiose conceptions of utopia.

It is instructive to consider how these arguments might be interpreted over an individual's life cycle. Children have genes that predispose them to expect to be taken care of by their parents while also being willing to accept a high level of control. All human children expect to be taken care of and not through a vague faith in the system. They expect that very specific things will happen, every day, like having milk with cereal, heated air in the winter, and protection from dangerous people. This will happen because it is driven by the power of love that their genes have also prepared them to believe that their parents and other close kin have for them.

Such love carries the same force as inviolate duty. So parents provide, no matter what. But love evolved alongside the practical realities of the day-to-day life of our species in the small group milieu within which we lived. This means love for children closely related to us asks for no more than we can usually provide.

Just because our genes prepare us as children to expect to be taken care of does not mean we always are. A staggering proportion of children died over the last million years, sometimes from insufficient resources and sometimes from inadequate parenting, but none of those children were able to reproduce. There is no reason for the genes we possess to prepare us for an outcome that is only relevant if our genes become irrelevant. So we, as children, expected to be taken care of as will all of our descendants.

Political competition in a democracy can induce the state to make unilateral commitments to undertake positive moral actions that will result in our being taken care of as adults as part of a promised utopia. All of us "childhood survivors" are inclined to see the benefit of that. This is effectively living in a world in which prevailing moral beliefs include duty-based moral advocacy made possible by the exercise of power by the state. The ordinal nature of political competition suggests that this will often result in the state eventually needing to undertake negative moral acts as a means to that end.

Moreover, Robert Nozick has not stopped being right about utopia necessarily coming at the cost of liberty. But we are enchanted by utopia and therefore accept the central planning needed to effectuate it, because we don't understand how costly it is. I have argued above that one cost that too few economists recognize is the throttling of the process of knowledge discovery through evolution that is only girded to stay within the guardrails of civil society (e.g., no genocide, ever).

Even within free societies today, echoes of Nozick's thesis can be seen over the life cycle of individuals. Children expect and indeed are provided for in very specific ways, and they presume this will happen in their little utopia they take for granted without question so much so that if this ends up not being true, they are scared for life. But these children are most definitely not free.

As adults they become free, but this is only a sustainable condition in societies where they understand that the unilateral commitments that their parents made to them do not transmute into an equal level of assurance from the state. If they cannot accept this or they have been convinced by moral narratives that infantilize them enough to reject this, then they will expect to be taken care of by the state. The result is a state through which adults are increasingly infantilized to be willing to be less free, little by little, over successive generations.

When we don't understand these harsh realities, and the role played by modern, Western, moral beliefs in framing adult expectations about what can and cannot be expected of the state under the condition of liberty, democracy will inevitably produce policies that are not time consistent. Democracy is as dependent upon culture, through moral beliefs, as it is dependent on institutions.

So what seems to be a purely economic issue about development is also a moral one both in terms of cause and effect. Moral beliefs that produce an ethic of duty-based moral restraint without duty-based moral advocacy make the high trust society possible and, by managing expectations, make the unpredictability of evolution tolerable. As for effect, such moral beliefs avoid impoverishing future generations through profligatory actions in the present by putting constraints first. This moral outcome is a good trade for those who understand Nozick's tradeoff and the ever-growing power of ever-growing knowledge made possible by girded evolution.

Minds that are already accustomed to viewing moral constraints as duties while treating positive moral action as only legitimately undertaken within those constraints are minds that are better prepared to accept the roller coaster ride of girded but not guided evolution as simply a part of the inevitable drama of living in a flourishing society. Such minds are also less likely to endorse the level of management of economic development envisioned by Mazzucato and others in the *post-market failure movement*. Such minds are, therefore, less likely to fall for old wine in new bottles that will inevitably make them less prosperous and less free.

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R&D Tax Incentives as an Alternative to Targeted R&D Subsidies



Roger Svensson

Abstract Governments can provide targeted R&D subsidies and/or tax incentives to spur innovation and growth in the business sector. This chapter analyzes the theoretical pros and cons of these policy instruments and their practical implications according to the empirical literature. Tax incentives have low administrative costs, enable market agents to choose R&D projects, and can be provided to many firms. However, they entail the risk that governments might finance R&D that would have been undertaken anyway (deadweight loss) and that firms may relabel other costs as R&D costs. Targeted subsidies are preferable for projects with high uncertainty and those that require a long time to achieve a finished product and for contexts in which the government wishes to allocate resources to specific sectors. However, such subsidies have high bureaucratic costs, distort competition, and favor grant application experts. The greatest disadvantages of targeted R&D subsidies are that they are mainly allocated to large firms and are often used as covert industrial subsidies.

Keywords Targeted R&D subsidies · Tax incentives · Spillovers · Imperfect appropriability · Financial restrictions · Small business · Innovation · Government policy

JEL Codes O31 · O32 · O33 · O34 · O38

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Introduction

Several literature reviews have concluded that new knowledge and technology, created through research and development (R&D), are regarded as the main factors of growth and productivity in the economy (Wieser 2005; Hall et al. 2010). However, there is a consensus in the literature that in a free market, companies invest in R&D to a degree that is less than socially optimal. Due to imperfect appropriability, companies carrying out R&D cannot reap the full benefits of their efforts (Jaffe 1998). Since companies consider solely their own returns and ignore spillover effects to others when determining how much to invest in R&D, the socially optimal level is not reached (Arrow 1962). Underinvestment in R&D also occurs due to asymmetric information about the commercial prospects of projects, which leads to high transaction costs and imperfect capital markets. This can cause a financial gap, especially for small, early-stage, and risky R&D projects (Kaplan and Strömberg 2001; Carpenter and Petersen 2002). Thus, there is a crucial difference between these two reasons for market failure with respect to firm size. While imperfect appropriability applies for R&D-performing firms of any size, financial restrictions are a problem faced primarily by new ventures and small firms working in early phases of high-tech projects (Lerner 2009).

To address these market failures, governments have developed a toolkit of instruments for intervening in the market (Bloom et al. 2019).¹ Examples include exclusive intellectual property rights in the form of patents and copyright, innovation support in the form of government loans and venture capital, education of trained scientists, and improved market conditions for entrepreneurial firms.

While scholars are largely in agreement concerning the general importance of R&D to handle market failures as described above, the policy measures used to handle this issue have varied over time. Mission-oriented policies, such as those advocated by, e.g., Mazzucato (2021, 2022), have underscored the importance of a proactive government making targeted and bold efforts in certain sectors of the economy. Mazzucato (2022, p. 93) asserts that:

Governments play a critical role in catalysing and coordinating both public and private investment around common goals, not least transitioning to a green economy. [...]

Key here is to use the full range of levers available to governments—from supply-side interventions, with the state acting as an investor of first resort (rather than lender of last resort) and as a funder and regulator with clear direction, to demand-side interventions, with the use of dynamic procurement policy to incentivize innovative solutions in domains ranging from public transport to housing.

These statements and related innovation policy research point to the importance of directionality, i.e., that governments should set directions for technology

¹These methods are designed to promote the dissemination of technology and create new and improved products that will benefit consumers. Thus, welfare is expected to increase, given that overall, the cost is lower than the positive effects.

development (e.g., Schot and Steinmueller 2016) rather than backing away from interventions in the economy.

Recent discussions concerning the effects of such mission-oriented policies would benefit from a thorough review of the various advantages and disadvantages of different policy measures. As policymakers throughout the Western world are implementing large-scale industrial policies aimed at leapfrogging the entire sectors into a more “sustainable” state through “green deals,” there is a need for structured analysis of the effects that are associated with direct subsidies and tax subsidies.

In this chapter, one of the main policy instruments will be analyzed: government subsidies for business R&D.² Such subsidies can take the form of targeted R&D subsidies or R&D tax subsidies.³ Targeted subsidies imply that the government subsidizes the R&D that is conducted by companies. R&D tax subsidies indicate that the government subsidizes the R&D performed by companies by lowering their taxes. The idea is that this incentivizes companies to increase their R&D investments.

Most OECD countries allocate 10–20% of their annual public R&D budget to the business sector (OECD 2022). Government support for business R&D increased from 0.14 to 0.22% of the total GDP between 2000 and 2020 in the OECD area (OECD 2023b). However, statistics show that the distribution of this R&D support through targeted subsidies and tax incentives varies substantially across countries (see Fig. 1). In 2020, approximately 55% of the total R&D support given to the business sector in OECD consisted of R&D tax subsidies (see Fig. 1).⁴ Furthermore, there has been a clear shift from targeted subsidies toward tax subsidies in OECD countries in recent decades (Güceri et al. 2020; OECD 2023b). In 2022, 33 out of the 38 OECD countries provided R&D tax incentives for business R&D expenditures compared to only 19 OECD countries having done so in 2000 (OECD 2023b).

The current trend toward provisioning more R&D tax subsidies might depend not only on the economic factors that are analyzed in this chapter but also on political factors. Carvalho (2012) argues that the Lisbon Agenda and the Action Plan to fulfill the Barcelona objective have stimulated a growing interest in R&D tax incentives among politicians. The political goals of increasing the level of innovation and business R&D enhance the international competition for scarce R&D resources and can only be achieved when more companies are incentivized to undertake R&D and subsequently perform it. Therefore, the best instrument that governments have at hands is the provisioning of R&D tax subsidies.

The main purpose of this chapter is to examine the *economic* pros and cons of targeted R&D subsidies and tax incentives based on the theoretical and empirical

²Government R&D financing is also provided to universities and government laboratories. Archibugi and Filippetti (2018) have analyzed how public-funded R&D should be carried out among different recipients (universities, government laboratories, and firms in the business sector).

³The expression “targeted R&D subsidies” is used here because the government usually specifies in which sector the R&D project is to be carried out and specifies numerous other conditions for funding to be granted.

⁴In the OECD area, R&D tax subsidies surpassed targeted R&D subsidies in 2016.

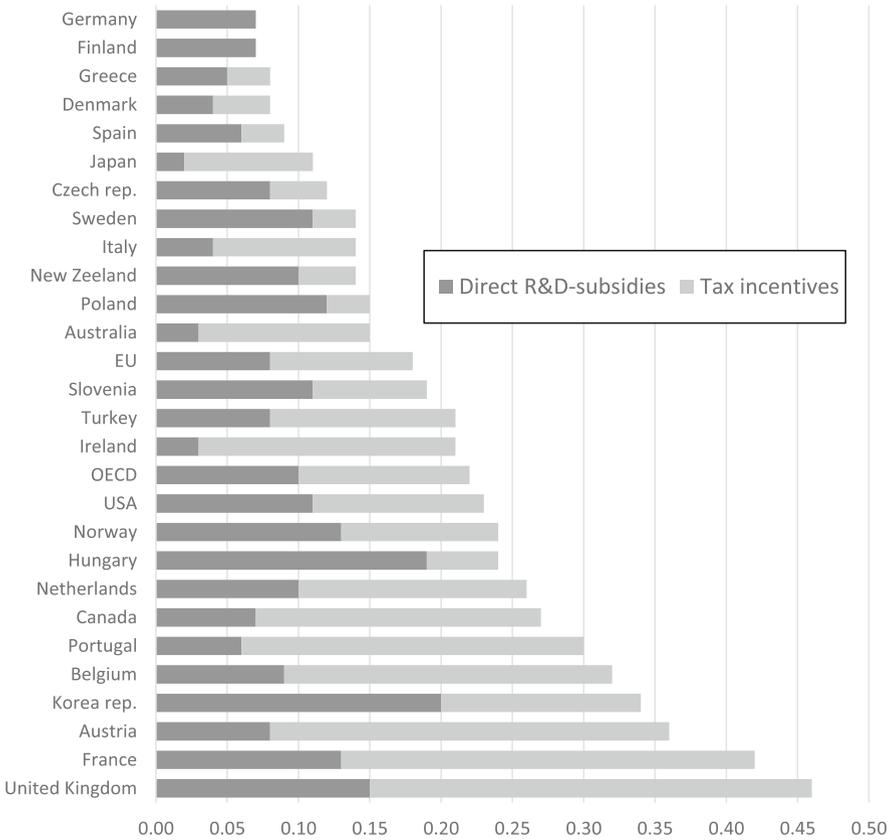


Fig. 1 Direct subsidies and tax subsidies for business R&D among high- and middle-income countries in 2020 as a percentage of GDP. *Source:* Countries selected from OECD (2023a)

scientific literature. Are these policy instruments substitutes or complements? How should they be designed to work efficiently?

The analysis shows that there are several pros and cons of both targeted R&D subsidies and tax incentives. Targeted subsidies are preferable for projects with high uncertainty, when it takes a long time to deliver a finished product and when the government wishes to allocate resources to specific sectors with high spillovers (e.g., the environment and energy sectors). However, targeted subsidies have high bureaucratic costs, distort competition, and favor organizations that are application experts. The greatest disadvantages of targeted R&D projects are that they are allocated mainly to large firms and that they are often used as covert industrial subsidies.

Tax incentives are mostly competition neutral, have low administrative costs, let market agents choose R&D projects, and provide continuous support. However, there is a risk of governments financing R&D that would have been undertaken anyway (generating dead-weight losses) and of firms relabeling other costs as R&D costs.

Furthermore, my analysis reveals that targeted R&D projects and tax subsidies are complementary in several senses: Targeted subsidies are often allocated to projects that require a lengthy period to reach a finished product, while firms choose short-term R&D projects when they are financed through R&D tax subsidies. Targeted subsidies should be used when the government aims to increase R&D efforts in specific sectors, while R&D tax subsidies are preferable when the aim is to increase total business R&D investments. However, increased efficiency can be achieved if the government uses a specific form of tax subsidies called “R&D payroll tax subsidies” that have a cap per firm. The subsidies can then be directed where they are most efficient—to small businesses and entrepreneurs. The reason for the increased efficiency is that market failures related to both imperfect appropriability and imperfect capital markets can then be considered.

The chapter is structured as follows. Section “Public Support of Private R&D” analyzes the theoretical pros and cons of direct R&D subsidies and R&D tax incentives in the business sector. The empirical literature is reviewed in Sect. “Empirical Research on the Efficiency of the Instruments”. Section “Conclusions and Implications for Mission-Oriented Policy” spells out the main conclusions.

Public Support of Private R&D

Jaffe (1998) argued that government R&D financing in the business sector should be focused on projects with large spillover effects and a low risk of displacing private R&D. However, government financing of business R&D for the purpose of creating spillovers is problematic since profit-maximizing firms actively attempt to avoid disseminating R&D results to competitors. Companies therefore try to protect the results of their R&D through secrecy, lead times, or IPRs. However, in the case of patents, the basic knowledge about R&D results is disseminated, as patent authorities publish basic information about the inventions in patent documents. When there is a commercial potential with a fairly high private return but still significant spillover effects, the government can subsidize R&D in the business sector—either directly or indirectly.⁵ The government may then set up appropriate dissemination criteria, such as requiring the company to cooperate with universities or other companies. Other requirements may be that the company hires a certain number of people or that the R&D results be partially published (patent requirements).

⁵There are other reasons than imperfect appropriability and financial restrictions why governments finance R&D in the business sector instead of at universities or government research laboratories. The business sector may have better R&D equipment than the public sector. The government may be interested in increasing the competitiveness of its own country’s companies. There may also be expectations that an injection of government funding will stimulate companies to increase their own R&D.

Targeted R&D Subsidies

Direct R&D subsidies are usually allocated through a call for proposals by government agencies or research councils. Targeted calls are used almost exclusively for direct R&D subsidies to the business sector, while open calls are rare. Thus, the government authorities determine in which sectors R&D projects should be undertaken and also specify other conditions that must be fulfilled. Companies then compete for grants. As a rule, the grant applications are reviewed and evaluated by an audit committee consisting of internal and external experts from industry and academia. The government can try to estimate the quality and objectives of R&D projects in advance and select projects that promise a social return that significantly exceeds the private return. Examples include projects that promote the government's own public goals (defense, the environment, and health care) or early-stage projects in technology-intensive industries with no access to capital markets due to information asymmetries. Furthermore, targeted R&D subsidies can be tied to fulfilling certain obligations. Companies might, for example, be forced to patent their inventions, publish parts of their R&D results, create a certain number of new jobs, or collaborate with universities or other private companies.

R&D Tax Incentives

Most OECD countries allow R&D costs (including R&D capital expenditures) to be written off as current expenditures in the same year in which they are implemented. Thus, R&D expenditures are treated more generously than investments in plants and equipment, which must be written off over a longer period.

The most common R&D tax subsidies are tax allowances and tax credits, which are normally available for all firms performing R&D. Governments can allow an accelerated deduction (of more than 100%) of R&D costs from taxable income (tax allowance) or from payable income tax (tax credits). Tax deductions reduce companies' marginal cost of R&D and thus should stimulate more R&D (Hall and Van Reenen 2000).

Tax allowances imply that firms may deduct more R&D costs from their taxable income than they actually spend on R&D, while tax credits are a percentage of R&D expenditures that can be deducted from payable income tax (OECD 2023b). A difference between tax allowances and tax credits is that the value of a tax allowance depends on the corporate income tax rate, while a tax credit does not. Another difference is that unused tax allowances (for unprofitable firms) may be postponed, offsetting future taxes under normal loss carryforward provisions. However, the carryforward of unused tax credits requires a special pool to track unused credits; otherwise, unprofitable firms cannot use credits.⁶ Since many unprofitable

⁶Many OECD countries allow tax credits to be claimed against future income tax (OECD 2023b).

companies are small firms or new ventures, a carryforward of unused tax credits increases the value of tax credits for such firms.

Most tax subsidies for R&D in OECD countries are volume-based, which means that all R&D carried out by companies is covered by subsidies. This generous system is easy to administer but means that the government subsidizes a large amount of R&D that companies would have undertaken without the subsidies. Some countries have incremental schedules of their tax incentives, i.e., companies receive more tax subsidies if they increase their R&D expenditures relative to those in a base year. This process avoids financing R&D that companies would have performed without the subsidies, but it is administratively demanding (OECD 2010a; SOU 2012). Many OECD countries have thresholds or upper ceilings for the eligible R&D volumes that qualify for R&D tax subsidies (OECD 2023b). This means that SMEs often are favored over large firms. For R&D tax credits/allowances, SMEs receive a 20% subsidy on eligible R&D expenses on average, as compared to 16% for large firms (OECD 2023b).

The third kind of tax incentive system is reduced wage or payroll taxes for R&D staff. Such a system (the WBSO system) has been applied in the Netherlands since 1994 and benefits labor-intensive R&D.⁷ Furthermore, unlike under traditional tax allowance and tax credit systems, unprofitable firms can benefit from payroll tax subsidies directly. Three countries that had not previously had R&D tax subsidies—Sweden, Germany, and Finland—also introduced such payroll tax subsidies in 2014, 2020, and 2022, respectively.

The Pros and Cons of the Policy Instruments

There are several advantages and disadvantages associated with R&D tax incentives and targeted R&D subsidies (see Table 1).

One obvious advantage of tax subsidies is that they are mostly competition neutral and often available to all companies conducting R&D. Support is given irrespective of firm size, sector, type of R&D, and the objective of the innovation activity (van Pottelsberghe et al. 2003; CREST 2006). However, there might be thresholds or ceilings, as mentioned in the previous section, which favor SMEs. Furthermore, the design of the R&D subsidies might favor profitable firms (tax allowances and tax credits) since non-profitable firms must carry their subsidies forward until they become profitable (OECD 2023b). Targeted R&D subsidies obviously distort competition, as the government decides to which companies the support should be directed. Only projects and companies that receive support can benefit from it.

Furthermore, tax subsidies have lower administrative costs than targeted R&D subsidies (van Pottelsberghe et al. 2003; CREST 2004, 2006). Politicians and

⁷The WBSO has been changed several times since its introduction in 1994.

Table 1 Pros and cons of targeted R&D subsidies and tax incentives

	Targeted R&D subsidies	R&D tax incentives
Pros	<ul style="list-style-type: none"> • Suitable under considerable uncertainty and a lengthy time requirement for realizing a finished product • Suitable if spillovers can be identified • Suitable for R&D in specific public good sectors • Good budget control for the government • The government can stimulate spillovers by enforcing patenting and cooperation among other companies and universities 	<ul style="list-style-type: none"> • Suitable for applied R&D that is close to realizing a finished product • Suitable for financing projects that are on the margin of being commercially profitable • Often competitively neutral since companies in all sectors can receive support • Low administrative costs • Suitable for stimulating business R&D in general • Both the market and companies are efficient at selecting appropriate R&D projects • Continuity that is good for long-term R&D efforts • Does not benefit application experts
Cons	<ul style="list-style-type: none"> • Distorts competition and assists only selected companies • High administrative costs • Impractical for stimulating business R&D in general • Difficult for the government to identify suitable projects • Non-continuous project-based support • Benefits application experts 	<ul style="list-style-type: none"> • Poor budget control for the government • Entails the risk of financing R&D that would have been performed even without the support (volume-based subsidies) • Companies are incentivized to relabel other costs as R&D costs to benefit from tax reduction • Companies choose R&D projects with high private returns rather than a high social return • Patent boxes are available only for profitable companies

bureaucrats do not need to select firms, sectors, or regions. In the case of targeted subsidies, one must identify interesting sectors, announce projects, evaluate applications, and try to pick winners. This means that targeted R&D subsidies are impractical and costly to use when the government is aiming to increase business R&D investment in general (CREST 2006). In that context, R&D tax subsidies are the least costly option (Veltri et al. 2009; Carvalho 2012).

Another advantage of tax incentives is that they are continuous and support companies' long-term R&D investments. Targeted R&D subsidies are usually linked to individual projects and can be used for a project only until it has been completed (Carvalho 2012). Finally, tax incentives prevent the emergence of so-called application experts who specialize in winning most of the grants. Targeted subsidies not only favor such application experts (Freeman and Soete 1997; Hall and Van Reenen 2000; Lerner 2009) but can also be influenced by political pressure, bureaucratic structures, and lobbying from companies (Czarnitzki et al. 2011).

In general, targeted R&D support is considered appropriate if there is great uncertainty about R&D investment and if there is a long waiting time until a product's development is completed (CREST 2006; Veltri et al. 2009). Targeted R&D support is also appropriate when large spillovers are expected (van Pottelsberghe et al. 2003) and when R&D is to be directed at specific public sectors, e.g., the environment and defense (CREST 2006; Veltri et al. 2009). Tax subsidies are considered more suitable for applied R&D and for products that can be completed quickly (OECD 2010b) because tax subsidies stimulate R&D projects that are on the margin of being profitable for the private sector. Government authorities have problems selecting winners (van Pottelsberghe et al. 2003), while companies are more efficient in selecting appropriate and profitable R&D projects (Hall and Van Reenen 2000; CREST 2004, 2006; Atkinson 2007). In fact, one risk in regard to R&D tax subsidies is that companies might choose projects with a high private return rather than those with a social return (Hall and Van Reenen 2000; van Pottelsberghe et al. 2003).

There are some disadvantages of tax incentives. The subsidies may go to R&D that the companies would have carried out even without the subsidy (i.e., the subsidies are characterized by non-additionality) (CREST 2004). This is especially the case if the tax subsidies are volume based (R&D is subsidized from the first cent that is spent) (David et al. 2000). Furthermore, as all types of tax incentives in some ways are linked to the expenditure side, it may be problematic to classify which costs are actually related to R&D. There is a risk that companies will try to relabel other costs as R&D costs to benefit from the support (CREST 2004; Veltri et al. 2009). Finally, government budget control is reduced when direct R&D support is provided, which is not the case with R&D tax subsidies (van Pottelsberghe et al. 2003).

Because profit-maximizing companies do not want to disseminate their R&D results, the government may set up appropriate dissemination criteria, such as requiring the company to cooperate with universities or other companies (Veltri et al. 2009). Other requirements may be that the company hires a certain number of people or that the R&D results be partially published (patent requirements). However, such requirements can usually be met only under a targeted R&D subsidy system and seldom under an R&D tax incentive policy.

Empirical Research on the Efficiency of the Instruments

Several review studies have concluded that the social returns on private R&D are significantly higher than the private returns, i.e., the spillover effects are significant (Wieser 2005; Hall et al. 2010). Spillover effects can occur both within and between industries and between countries, which is particularly important from an economic-political perspective, as spillover effects primarily motivate public actors to finance R&D.

The research literature shows that publicly funded R&D carried out by companies has a positive effect on productivity and growth, but the effect is weaker than when

companies finance their own R&D (Wieser 2005). This may occur because public authorities are not as skilled as market agents in terms of identifying promising R&D projects to finance, and the authorities do not invest their own money. Defense-related R&D that is implemented in the business sector and funded by the government has a negative effect on productivity and growth (Poole and Bernard 1992; Guellec and van Pottelsberghe 2004). There are two explanations for this negative effect. First, this type of R&D is sometimes accomplished through contracts where the financier (government) owns the result. Therefore, the company has a weaker incentive to carry out R&D efficiently. Second, the defense industry is hampered by export restrictions, which means that R&D has a smaller effect on productivity and growth. However, defense R&D can have desirable positive effects; for example, the well-being of society may improve because it has a stronger defense system in place.

Several studies have analyzed whether public subsidies have a positive effect on companies' self-financed R&D and create so-called additive effects (David et al. 2000). In this case, there is a risk that public R&D funding will create problems. First, publicly funded R&D can displace privately funded R&D by raising the cost of R&D—mainly the cost for scarce R&D staff. Second, publicly funded R&D can simply replace privately funded R&D. Companies may replace their own financing with public financing and maintain their current level of R&D. The third problem is that the government often does not allocate resources as efficiently as market participants, thereby creating distortions in the market.

Targeted R&D Subsidies

Early studies show that direct R&D subsidies have both positive effects and crowding-out effects on companies' R&D (see reviews by David et al. 2000 and Garcia-Quevedo 2004). However, David et al. (2000) criticized early studies due to biased sample selection; firms with no R&D were excluded from the samples. As R&D-intensive companies are more likely to apply for R&D support, it is probable that these companies would have made some of the R&D investments even without support. Therefore, these studies tend to find displacement effects.

More recent studies use econometric methods that account for this biased sample selection problem and have therefore found more positive effects on business R&D supported by direct R&D subsidies. This result is confirmed by studies that analyze R&D subsidies in numerous European countries (Aerts and Schmidt 2008; Czarnitzki and Hussinger 2004; Duguet 2004; Hussinger 2008; Özcelik and Taymaz 2008; Carboni 2011; Cerulli and Poti 2012; Bloch and Graversen 2012).

R&D Tax Incentives

There are two main groups of studies that analyze the effect of R&D tax subsidies on R&D investments at the firm level: studies using the structural approach and studies using the direct approach (Blandinières and Steinbrenner 2021):

Structural approach. In the studies using a structural method, the impact of the tax incentives is captured via an R&D user cost, which accounts for the reduction in R&D costs, and the dependent variable is the firm's R&D expenditures in a log-log specification. Thus, these studies estimate an elasticity, namely, how a percentage decrease in the R&D user cost affects the percentage change in R&D investments. According to a literature review by Becker (2015), recent studies have established that tax incentives have relatively stable effects on companies' R&D. The elasticity is approximately -1 (i.e., if the tax decreases by 1%, companies' R&D increases by 1%), but there is some variation across countries and periods (Bloom et al. 2002; Parisi and Sembenelli 2003; Koga 2003; Bernstein and Mamuneas 2005; Baghana and Mohnen 2009; Harris et al. 2009; Lokshin and Mohnen 2012; Mulkey and Mairesse 2013).

Direct approach. In studies using a direct approach, the tax subsidy is measured either as a dummy or in absolute terms, i.e., the amount of R&D subsidy received, and compared with firms' R&D expenditure. The dummy can be interpreted either as a treatment effect on the firm or as a reflection of whether the firm is eligible for the subsidy. Some recent studies using a direct approach rely on difference-in-difference or matching methods to correct for selection bias and to compare the effect across treatment and control groups. Most studies conclude that tax credits increase R&D spending or R&D intensity (Paff 2005; Yang et al. 2012; Kobayashi 2014; Crespi et al. 2016; Güceri and Liu 2019; Agrawal et al. 2020; Stavlöt and Svensson 2022). Notably, many of the studies taking the direct approach have found that small firms or firms with liquidity constraints respond more strongly to tax incentives (Kobayashi 2014; Güceri and Liu 2019; Agrawal et al. 2020).

Other approaches. Some studies use dependent variables other than firms' own R&D investment. This choice might arise from the fact that data on firm-level R&D expenditures are not available or that the authors wish to estimate the effects on other goal variables. One study in this vein worth emphasizing is that of Czarnitzki et al. (2011), who use a matching method to estimate the effects of Canadian tax credits on a series of innovation indicators (number of new products, sales of new products, originality of innovations, etc.). The authors conclude that recipients of subsidies score better on most indicators than a control group. Furthermore, they find that the tax credit has a positive impact on firms' decision to conduct any R&D at all.

Using data on Belgian R&D tax subsidies for R&D wages, Neicu et al. (2016) find that increasing the subsidies cause behavioral additionality effects among R&D conducting firms. Companies do not undertake similar R&D projects as they did before (scale), nor do they conduct projects with a higher speed, but they rather place greater focus on research than development and initiate new R&D projects. Since "research" is more intricately linked than "development" to market failures, the

provisioning of additional volume-based R&D tax subsidies is therefore supported from a policy-perspective.

Targeted Subsidies vs. Tax Incentives

Few studies have empirically compared tax incentives with direct subsidies. However, Neicu et al. (2016) find that companies that also receive direct R&D subsidies are more strongly affected by the above-mentioned behavioral additionality effects that arise from R&D tax subsidies. Becker (2015) reviews the literature assessing how direct support and tax incentives affect private R&D in the short and long terms. In the short run, tax incentives have significant effects, which then diminish. Direct support, on the other hand, has small effects in the short run but greater long-term effects (see Table 1). These observations depend on the fact that companies are more likely to choose profitable projects that are relatively close to being finished and marketed. Furthermore, in the case of direct support, public authorities choose which R&D projects to carry out. These projects are often in the early R&D phases and focus on specific sectors (e.g., public needs). Such R&D projects can therefore create new opportunities and induce companies to start R&D projects in later phases. These results suggest that tax incentives and direct support should be coordinated.

Görg and Strobl (2007) conduct a firm-level investigation on how the amount of public R&D support to domestic and multinational manufacturing companies in Ireland affects firms' self-financed R&D. For domestic companies, low levels of R&D support for firms have positive effects on private R&D, but high levels of support crowd-out companies' own R&D. For multinational companies, government support has neither positive nor negative effects, regardless of the size of the support. Hsu and Hsueh (2009) examine the effectiveness of public R&D assistance provided to Taiwanese companies. They find that providing a high level of government R&D support for companies' R&D is ineffective. Similar to Guellec and van Pottelsberghe (2003) with respect to the macro-level, both Görg and Strobl (2007) and Hsu and Hsueh (2009) conclude that at the micro-level, the effects of public R&D support on companies' R&D correspond to an inverted U-shaped curve. Becker (2015) interprets this result to imply that a high level of R&D support increases the probability of the government financing R&D activities that companies would have performed even without government support. In such cases, it is better for the government to provide lower amounts of R&D support to many companies rather than large amounts to a few companies.

An increasing number of empirical studies show that public R&D support can increase private R&D more effectively in small firms than in large companies. The theoretical argument is that small and young companies are more financially constrained. Public R&D support acts as a signal to other financiers that the project is worth investing in and should thereby attract more external financing. Lach (2002), González et al. (2005), Hyytinen and Toivanen (2005), and Hall et al. (2009) find that R&D subsidies have a greater effect on R&D performed in small

companies than on that performed in large companies, especially if the companies have not performed any R&D before receiving support. Howell (2017) finds that one-time direct subsidies provided to small firms have a significant impact on firm R&D/innovation since they fund prototype technologies and reduce uncertainty. However, multiple grants awarded to the same firms are not as efficient. Studies show that in practice, most public direct R&D subsidies go to larger companies (Czarnitzki and Ebersberger 2010). For example, it has been estimated that 85% of the public targeted R&D subsidies (SEK 5.3 billion) provided to the Swedish business sector are allocated to large companies (Vinnova 2019). The picking-the-winner and application expert theories (see the next section) can partly explain this phenomenon.

Theories about the Skewed Distribution of Direct R&D Subsidies

There are two theories used to explain why the allocation of targeted R&D subsidies is often skewed. The first theory is the “picking-the-winner” theory (Stiglitz and Wallsten 2000), which implies that public R&D financiers prefer to finance R&D projects that have a high probability of success and a lower expected return rather than projects with a low probability of success and a high expected return. There are several explanations for this phenomenon (Cantner and Kösters 2012; Antonelli and Crespi 2013). First, R&D projects are risky and have a high probability of failure. The public choice literature argues that strong political commitments are needed to justify the provision of subsidies for many failed projects. Second, direct support distorts competition. Subsidized companies have an advantage over nonsubsidized companies. By subsidizing good/efficient companies rather than bad/inefficient ones, the distortion is minimized (Shane 2009).

The second theory concerns application experts. Companies that have experience with previous support or applications seem to have an advantage over inexperienced companies (Lerner 2009). For each application submitted, companies gain insight into how the authority’s selection of subsidized companies works. Experienced applicants should therefore be more likely to receive direct subsidies. The risk is that—in the end—some companies specialize in obtaining support from many different authorities. The “Matthew effect” can also explain why there is continuity in how direct R&D subsidies are allocated (Merton 1968; Antonelli and Crespi 2013). According to this principle, successful researchers receive a disproportionate amount of attention for their research and thus obtain more funding.

Conclusions and Implications for Mission-Oriented Policy

This chapter addresses the pros and cons of tax incentives and targeted subsidies, as the government finances R&D in the business sector. Targeted subsidies have certain advantages: the government can allocate support to specifically selected sectors, and this action works well under high risk, and it takes a long time to achieve a finished product. However, there are significant disadvantages in the form of distorted competition, and bureaucrats have difficulty knowing which R&D projects will be commercially viable in the long term. Targeted subsidies also favor application experts. In addition, bureaucrats do not distribute their own money but that of taxpayers and may therefore be less careful when choosing appropriate R&D projects. Above all, targeted subsidies are costly, as projects must be identified and announced, and applications must be evaluated. However, the largest disadvantages of targeted R&D projects are that they are allocated mainly to large firms and are often used as covert industrial subsidies.

Tax deductions also have disadvantages. There is a risk that the government finances R&D that companies would carry out even without support, and companies reclassify other costs as R&D costs to benefit from tax deductions. On the plus side, tax incentives are mostly competition neutral, and more companies can benefit from this type of support, especially innovative small companies and entrepreneurs. Tax deductions reduce the administrative cost for the government, and opportunists who specialize in applying for support do not overly benefit. Finally, companies are allowed, to a greater extent, to decide which R&D investments to carry out, as market participants are considered more efficient than bureaucrats in allocating the support where it is most useful, and companies must co-finance the R&D projects they choose.

The analysis shows that targeted R&D projects and tax subsidies are complementary: targeted subsidies are often allocated to projects where there is a long time to a finished product, while firms choose short-term R&D projects when financed through tax subsidies. Furthermore, targeted subsidies should be used when the government aims to increase R&D efforts in specific sectors, while R&D tax subsidies are preferable when the aim is to increase the total level of business R&D investments. However, increased efficiency can be achieved if the government uses a specific form of tax subsidies called “R&D payroll tax subsidies” that has a cap per firm. The subsidies can then be directed where they are the most efficient—to small businesses and entrepreneurs. The reason for the increased efficiency is that market failures related to both imperfect appropriability and imperfect capital markets can then be considered.

The findings in this literature review have implications concerning the efficiency and effectiveness of mission-oriented innovation policies. While the mission-oriented approach can be implemented in different ways, in many cases, it becomes a large-scale program aimed at a specific transformation of an entire sector of the economy, e.g., transitioning industries such as steel or cement into making use of hydrogen gas instead of previously dominant production methods (Sandström and

Alm 2022). These missions usually involve large sums of R&D subsidies that firms can apply for.

This literature review highlights a set of challenges that are related to mission-oriented innovation policies. First, large targeted R&D subsidies face an inherent risk of resulting in distorted competition, as only a few selected companies end up receiving support, an argument that has been previously applied to mission-oriented innovation policies (Bergkvist et al. 2022).

There is also an apparent risk that government officials end up supporting the wrong technology. Allocation of support does not happen in a vacuum; in contrast, such processes take place under the influence of various stakeholders. In Sweden, an attempt to transition cars into using ethanol instead of gasoline as fuel resulted in a spectacular failure. Ethanol was not a competitive fuel, neither for the environment nor for the economy, but nevertheless gained political support because a farmers' lobby association was historically a strong supporter of ethanol (Sandström and Björnemalm 2022).

The presence of large pools of public R&D support earmarked for specific technologies also results in considerable administrative costs. An industry for application experts emerges and results in a form of unproductive entrepreneurship aimed at writing and obtaining grants. Previous research has shown that firms that receive more R&D support tend to be less productive and pay higher wages, effectively becoming subsidy entrepreneurs (Gustafsson et al. 2020).

The review in this chapter suggests that targeted R&D subsidies may be warranted if large and long-term investments are required, if there is high uncertainty, and if the positive externalities are deemed to be substantial. However, there is an inherent risk that such subsidies could lead to misallocation of resources due to lobbying by interest groups and the pursuit of narrow self-interest among political decision-makers.

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Bottom-Up Policies Trump Top-Down Missions



Magnus Henrekson and Mikael Stenkula

Abstract Mission-oriented innovation policies are becoming increasingly popular among policymakers and scholars. We maintain that these policies are based on an overly mechanistic view of innovation and economic growth, suggesting that a more bottom-up approach is called for. By invoking an entrepreneurial ecosystem perspective, we point out that innovative entrepreneurship requires many other actors—besides the entrepreneur—whose skills and abilities are necessary to realize an entrepreneurial project. When mission-oriented policies play a large role in the economy, connections between actors in the ecosystem risk becoming distorted. An efficient and well-balanced entrepreneurial ecosystem requires instead an institutional framework that levels the playing field for potential entrepreneurs and encourages productive entrepreneurship. To promote this kind of system, we discuss in more detail eight key areas where appropriate horizontal or bottom-up policy measures can foster innovation and, in the end, the welfare-enhancing productive entrepreneurship policymakers and scholars strive for.

Keywords Collaborative innovation bloc · Entrepreneurial ecosystem · Entrepreneurship policy · Institutions · Public choice

JEL Codes H50 · L26 · O31 · P16

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Introduction

As the European Union, national governments and regional policymakers have been elevated to the forefront of the innovation process, a growing body of policies are being put in place with larger budgets and higher expectations on their net contribution to innovation and renewal. This development has been inspired by what at times is referred to as the third generation of innovation policy.

Over time, the literature on innovation systems has become increasingly concerned with *directionality*, i.e., the idea that governments need not only create conditions for innovation and entrepreneurship but also set the overall direction for effort and resource mobilization. Several scholars have paved the way for the emergence of this approach. Schot and Steinmueller (2016) used the term “transformative change,” Borrás and Edler (2014) wrote about “socio-technical systems,” and Geels (2004) introduced the notion of “system innovation.”

These ideas were synthesized and popularized by Mariana Mazzucato (2018, 2021), who forcefully disseminated the vision of a so-called mission-based economy guided by a proactive state, a message that has received worldwide attention and gained influence among policymakers and economic researchers alike. Her main argument is based on the notion that a sustainable, inclusive, and well-functioning economy requires a potent and committed state that fosters innovations by shaping markets and guiding the economy in ways that aim to achieve bold common goals at the societal level—an entrepreneurial state. By using the term *missions*, she manages to imbue her message with an almost spiritual sense of urgency—government-initiated endeavors are the only way forward for solving the Grand Challenges faced by nations and, indeed, the world.

According to Mazzucato, this is not only the way forward for progressive states in the present day but also the way many Western states through history have acted successfully (before cynical ideologies and theories with questionable agendas cast doubt on the legitimacy and efficaciousness of the political sector). This claim is supported by empirical cases, ostensibly showing the key role the state has played in implementing new successful technologies and extraordinary innovations, debunking the myth of the inefficient and bureaucratic state. Mazzucato’s reasoning paves the way for a more proactive and interventionist state, which steers economic development by means of top-down or vertical industrial policies. Based on Mazzucato’s influence as a worldwide expert, this perspective is now also high on both research and policy agendas.

Until recently, Mazzucato’s ideas remained largely unquestioned. This is no longer the case. Her reasoning and the ensuing policy conclusions are beginning to face serious critique from both a theoretical and empirical point of view (Wennberg and Sandström 2022). Critics have, for example, pointed out that her historical examples are either exaggerated (Yerger 2023) or grossly misleading (McCloskey and Mingardi 2020) or that her underlying vision ignores or greatly underestimates fundamental challenges faced by the political sector, including

knowledge and incentive problems (Muldoon and Yonai 2023; Karlson et al. 2021; Bergkvist et al. 2022; Schnellenbach 2024).

An innovative idea or creative vision that is flawed should of course be duly criticized, but unless a more viable alternative is presented, the flawed idea is unlikely to be phased out. Presenting such an alternative is the prime purpose of this chapter. It thus takes a positive approach, complementary to the critical dissections of Mazzucato's body of work presented in other chapters of this volume and elsewhere.

A flourishing economy requires, and in fact stems from, a well-balanced entrepreneurial ecosystem. Hence, in this chapter we discuss what we consider to be the most important points for supporting a well-functioning ecosystem and identify the key institutions and policy measures that facilitate the emergence of an entrepreneurial economy without relying on an interventionist top-down or even *dirigiste* approach. The pertinent policy measures cover a wide array of issues. More specifically, we will, in more detail, discuss eight important institutional areas and how their design affects the driving forces for productive entrepreneurship. This will be contrasted with Mazzucato's notion of a top-down, mission-oriented approach. Except in extreme cases such as war and other acute existential threats, our conclusion is unequivocal: bottom-up policies trump top-down missions.

Top-Down Missions

Numerous scholars have already reviewed and critically evaluated Mazzucato's views regarding optimally efficient management of the economy.¹ In short, she asserts that society is held back by a flawed ideology ("conventional wisdom") restricting the economic role of the government. Instead, a prosperous future requires the government to assume a more active role in guiding the economy in the "right" direction through a top-down, mission-oriented approach.

Using the traditional political tools—adjusting the total level of taxes, government expenditures, or money supply through fiscal and monetary policy—is said to be "rudderless" and too passive as it has no explicit direction. How the resources in the end will "trickle-down" through the system will, in this case, rely on the spontaneous market process, implying that the end result may be unsustainable and inappropriate.

What is needed is a political sector controlling the direction of the economy in combination with civil servants actively working together with economic agents, shaping new markets, and co-creating value in existing markets. In this way, a more political and planned agenda can, according to Mazzucato, be driven by public-interest consideration rather than profit where growth is better balanced and resilient and where risks and rewards are more equally shared.

¹See, e.g., the contributions in this volume and in Wennberg and Sandström (2022).

The government and public sector must thus be more active, transforming itself into an “innovation organization”—an entrepreneurial state energizing the economy and working as a catalyst for investment, innovation, and collaboration, making it possible to achieve bold objectives and deliver on ambitious outcomes. The state must reclaim its capabilities and privilege to shape markets and guide the economy in ways that target necessary and urgent common goals, i.e., missions. According to Mazzucato, the government can always increase public expenditure to the extent required to achieve the alleged missions—an idea she denotes as the government functioning as an “investor of first resort” in a travesty of the more widely accepted economic idea of “lender of last resort.”²

Thus, Mazzucato can be said to advocate the increased use of vertical—what we call top-down—innovation and entrepreneurship policies targeted toward specific industries, sectors, or even certain companies to encourage innovation in particular fields or areas. By contrast, horizontal—what we call bottom-up—policies apply broadly across all sectors of the economy, focusing on improving the overall conditions for innovation, rather than targeting specific sectors.

Our view of how innovations come about and the role of the state differ in fundamental ways from that of Mazzucato. To expound our view, we will begin by discussing the functioning of the entrepreneurial ecosystem, which enables a better understanding of how the economy creates and explores valuable knowledge. In the subsequent section, we will discuss in some detail a number of key areas where appropriate horizontal or bottom-up policy measures can foster innovation and welfare-enhancing, productive entrepreneurship.

The Entrepreneurial Ecosystem

Developing socially beneficial innovations requires entrepreneurship. But entrepreneurs do not act in a vacuum. The development of entrepreneurship requires an *entrepreneurial ecosystem*, i.e., a system or environment in which entrepreneurs, startups, and growth-oriented businesses can flourish and grow. This system comprises a variety of interconnected elements, both formal and informal, that collectively support and shape the entrepreneurial journey. Several of those elements are either (wholly or partly) financed by the government or a result of government

²This idea is based on the heterodox theory, denoted modern money theory (MMT)—also explicitly referred to by Mazzucato (2021, pp. 183f)—claiming that the government does not have any budget restrictions as it is backed up by a central bank that can “create” any amount of money for the mission at hand. This idea has already been debunked several times by the (mainstream) economics profession. See, e.g., Drumetz and Pfister (2021, p. 355), who conclude that “the meaning of MMT is more that of a political manifesto than of a genuine economic theory.”

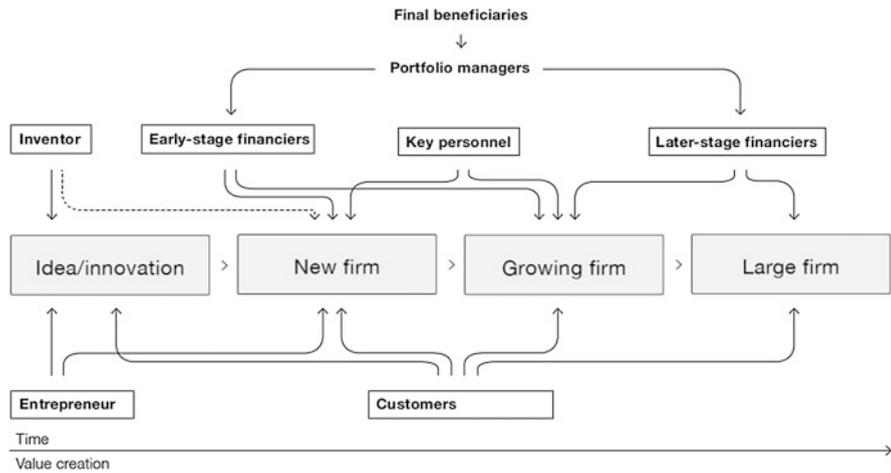


Fig. 1 The collaborative innovation bloc. *Source:* Elert and Henrekson (2021)

decision-making, notably institutions for education, training, and basic research, support organizations, the regulatory framework, and the physical infrastructure.³

The transformation of new knowledge and innovations into real value in new and growing businesses requires private sector agents with complementary skills and resources, what Elert et al. (2017) and Elert and Henrekson (2021) denote a *collaborative innovation bloc*. In addition to the entrepreneur, at least five additional actors with complementary competencies have been identified: inventors, key personnel (managers, R&D specialists, etc.), early-stage financiers (business angels and VC firms), later-stage financiers (buyout firms, institutional investors, etc.), and demanding customers.⁴

If any of the actors or their competencies are missing or are in insufficient supply for some reason, there is a significant risk that innovations cannot be developed to their full potential or perhaps not be realized at all. Figure 1 illustrates schematically what the collaborative innovation bloc looks like—from idea to full-scale industrial production—and how the different actors in the system contribute to the development through the different phases. Although all actors and the functions they perform are needed, the same person may perform more than one function: for example, an entrepreneur may also be an inventor or act as a manager. In order for policymakers and civil servants to design adequate policy measures, they must consider the entrepreneurial ecosystem in its entirety—with all its parts and actors—and try to understand the logic of the system.

³Wurth et al. (2022) provide an in-depth discussion of the various components of the entrepreneurial ecosystem.

⁴Lucas (2019) suggests that the model could be extended with another layer also including those who advocate, write, and enforce the rules that competencies are guided by (such as politicians, regulators, and experts).

It is important to note that no single person “owns” or controls the ecosystem. On the contrary, it is the rule rather than the exception that it emerges spontaneously from below as stakeholders interact on a voluntary basis. No one understands more than a fraction of how the ecosystem works, and no one necessarily feels responsible for ascertaining the efficient functioning of the system. Instead, the development of the ecosystem is highly experimental, and serendipity often plays a role in innovation and subsequent business success.

The opposite approach is to try to resolve Grand Challenges through bold public missions launched by the government where vertical measures tied to the mission are supposed to guide the economy and the various actors toward the desired solution. However, this is not congruent with how an entrepreneurial ecosystem works. In reality, actors search for suitable solutions and forms of cooperation in a trial-and-error process that cannot be efficiently directed from above. It is therefore not possible to ensure a more successful development of innovations by means of top-down command and control measures. The ignorance and uncertainty inherent in all innovation activities are the main reasons why caution and humility are called for.

Hence, the state is rarely better placed than private actors to address failure in the innovation process.⁵ A well-functioning ecosystem simultaneously reduces two related forms of failure (Eliasson 2000). The first type of failure involves rejecting (prospective) winners, often because the entrepreneur or other actors in the ecosystem become too pessimistic. We would argue that the mission-oriented argument draws much of its strength from the fear of this type of mistake—the economy needs a visible hand pushing the economy in the “right” direction that would not take place “spontaneously.” The second type of failure is more subtle and involves allowing failing ventures to survive for too long because of misjudgments regarding competitive conditions and the viability of the innovation. Market forces in the ecosystem tend to systematically eliminate such mistakes because “market experience reveals the unfeasibility of some (hitherto sought after) courses of action and the (hitherto unnoticed) profitability of other courses of action” (Kirzner 1997, p. 71). Collaboration among the actors in the ecosystem is of fundamental importance in identifying and correcting such mistakes early and at the lowest possible cost.

As it is difficult, if not impossible, for politicians and government employees to determine in advance who will be a successful entrepreneur (or what will be a successful business idea), it is misguided to try to support a particular group or a particular type of entrepreneurship. A system based on special benefits and regulations for selected categories also tends to become extremely complicated, with extensive rules, exemptions and exemptions to the exemptions. In turn, significant administration and information costs result, which may make things worse for the very type of company that the measures were intended to benefit. In addition,

⁵ Autio (2016, p. 22) echoes this idea claiming that top-down approaches “build on the assumption that it is possible to identify clear-cut ‘failures’ in the functioning of a given market or an innovation system” and that such failures “can be fixed through top-down intervention.”

cumbersome administrative systems encourage unproductive and destructive entrepreneurship by encouraging extensive lobbying efforts (Baumol 1990). Once politicians begin to grant favors to a particular group, good arguments for increasing the number of beneficiaries will abound.

Hence, it is doubtful whether government early-stage investments can be a recipe for success, as there is no sure method for selecting winners. The evaluation process developed in the private venture capital (VC) industry is complex and relies heavily on tacit knowledge and experience-based judgmental decisions. By contrast, a government agency, which is accountable to its constituents, is not and can never be mandated to act based on tacit knowledge and experience-based judgments. Moreover, VCs have an important screening function and provides management and market expertise (Croce et al. 2013; Landström and Mason 2016). While it is true that, at best, VC actors cannot be said to be more than moderately successful in finding the future winners among all high-risk projects (Svensson 2008; Gompers et al. 2009; Lerner 2020), the VC strategy typically includes investing in many projects to manage this problem.

While it is possible for governments to pool risks as well, the whole purpose of the VC business model is to shift extremely risky projects to a more acceptable level of risk in a diversified portfolio of investments. This harmonizes the incentives for investors, VC partners, and entrepreneurs. If the government is better at pooling risk, it is presumably because it can spread the costs of its failed investments across the entire taxpayer community. While it is unproblematic for private actors to bear high risk, it is difficult to justify, in a democratic setting, that politicians and civil servants take risks with taxpayers' money in the same way. The lack of "skin in the game" also means that the incentives to learn from mistakes are greatly weakened, and a risk that results in "failing to fail" (Lucas 2019).

A far better strategy to tackle Grand Challenges such as climate change is government creation of frameworks that incentivize economic agents to search for efficient solutions. A case in point is a cap-and-trade system for greenhouse gases. Such a system sparks innovation activities across the board to find efficient ways to reduce and eventually stop emissions altogether. In such a system, the crucial selection mechanism remains operative, and a large number of experiments will be made within the framework. Over time, it will become clear which solutions turn out to be most efficient, and none of the original experiments will have been so large that a failure will have disastrous effects (Harford 2011).

At the end of the day, policymakers should, as far as possible, avoid tampering with the market's search process where new ideas are identified, commercialized, and screened. What they can and should do is to design an institutional framework that rewards productive entrepreneurship where a well-functioning entrepreneurial ecosystem is most likely to emerge spontaneously. Next, we will discuss what areas and what policy measures are most likely to be of substantive importance in this respect.

A Bottom-Up Approach

There is no simple and obvious top-down *quick fix* that stimulates and generates more successful entrepreneurial activity regardless of the quality of the ecosystem or the institutional and cultural background. The nature of politics, with its election cycles, tends to encourage campaigns with far-reaching visions based on a proclaimed top-down approach. But the political sector is not guided by an altruistic, omniscient, omnipotent, and enlightened ethos which resolutely aligns its economic policy with the most up-to-date knowledge in relevant areas. Political considerations, knowledge problems, self-interest, and rent seeking imply that society will never attain (or perhaps never even strive for) an ideal world with optimal ways of reaching commendable goals. Moreover, major changes in the regulatory framework will invariably give rise to unintended consequences that are impossible to predict.⁶

Economic reality consists of billions of heterogeneous individuals and firms but lacks an altruistic and omniscient government sector equipped with superior knowledge and forecasting abilities. Therefore, a more bottom-up approach is called for. As it is impossible for private and government actors alike to identify how, where, and when the next successful disruptive innovation will emerge, profoundly altering the development of the economy, the primary objective for policy should be to level the playing field, to ensure that no potential paths forward are unnecessarily blocked, leaving the final selection to the entrepreneurial *society* rather than the entrepreneurial *state* (e.g., Elert and Henrekson 2022; Sanders et al. 2024).

The starting point for this approach is the entrepreneurial ecosystem. Long-term economic development will largely depend on the quality of new entrepreneurial firms and on how well the market selection process works. Entrepreneurship cannot be planned or mandated, but an environment can be created where successful entrepreneurs are more likely to be identified and chosen through a market-like selection process. If politicians and bureaucrats want to increase innovation and entrepreneurial activity, the best way to do so is to create institutional framework conditions that take this into account. Such policies will in general reward

- education,
- knowledge transfer,
- competition, and
- successful productive entrepreneurship,

while penalizing methods of acquiring wealth without contributing to its creation such as corruption and rent seeking, e.g., in the form of lobbying for special benefits and obstructive litigation.

⁶Cf. Lucas (2019), who argues that a discussion about the role of government in the innovation process should include a public choice perspective taking into account the problems and limitations inherent in the political sector.

Below, we will in more detail present a smorgasbord of measures and identify eight policy areas that we consider important for all parts of the ecosystem to promote innovation and entrepreneurial activity.

Rule of Law and Property Rights

Our first policy area involves the legal system itself. An essential condition for the proper functioning of the entrepreneurial ecosystem is the rule of law and protection of property rights. If the rule of law is respected and the judicial system is disinterested and efficient, entrepreneurs will be more willing to invest time and resources on long-term projects, as they can be confident that their assets and potential future profits will not be unduly seized in the future (North 1990; Rodrik et al. 2004). Strong protection of property rights means that potential entrepreneurs and other actors in the ecosystem can expect to keep the lion's share of the surplus they create. Similarly, entering into agreements and carrying out transactions with other parties are less risky. A well-functioning society characterized by the rule of law enables greater specialization and division of labor. Therefore, entrepreneurs can more easily exploit their ideas without having to internalize the entire value chain—in other words, they do not have to do everything themselves. Access to external equity financing and complementary skills can also be gained based on contractual agreements (de Soto 2000).

Without secure property rights, unproductive entrepreneurship develops in the form of crime syndicates and mafia-like organizations that fill the void left by the absence of the rule of law. In such cases there is a significant difference between formal laws and their enforcement in practice.

Taxation

The second aspect involved in a healthy bottom-up approach is the design of the tax system. The taxation of entrepreneurs' income has a major impact on their net worth, but the overall design of the tax system is also important. With all its details, exceptions, and exceptions to the exceptions, the tax system affects the entrepreneur's return in relation to how other actors are taxed and of course also the existence and incentives of the other actors in the entrepreneurial ecosystem.

Tax rates should generally be low or moderate and predictably so. A simple, stable system with few exceptions is preferable to a tax system using targeted exceptions and special rules. For the ecosystem to flourish and for the path from idea to industrialization to work well, the tax system should be as neutral as possible between different ownership categories, sources of finance, firm sizes, and industries.

Taxes should not prevent key employees and entrepreneurs from obtaining a fair stake in the substantial capital value that materializes when a successful business is developed, even if they lack financial resources of their own. This can be achieved through adequate tax rules pertaining to stock options that allow state-contingent contracting and vesting and where capital gains are taxed at a low rate and not until the stock options or the shares received are eventually sold (Braunerhjelm and Henrekson 2024, Chap. 6).

Unless skilled specialists who need to be recruited can receive some of the capital value they are instrumental in creating, they are likely to prefer a career in incumbent firms where salaries are higher and the risk of unemployment is lower. Favorable stock option taxation is also important for the professional VC sector since it provides a much-needed instrument to incentivize both founders and key personnel.

Savings and Capital Formation

The policy debate often highlights the importance of promoting savings and wealth accumulation. However, the type of savings is probably more important than the level itself. Even if there is a high level of savings in the economy, a large part of what is saved in various fund systems is often not available to finance investments in risky entrepreneurial ventures. Many new businesses find it difficult to obtain capital from large institutions and have to rely on other sources (family, friends, personal wealth). Studies often show that the difficulty in accessing capital hampers the entrepreneurial ecosystem (Parker 2018, Chap. 12).

A long-term solution to this problem is to ensure that not all savings are channeled into funds that are barred from investing in unlisted high-risk firms and to allow pension funds (to which a growing share of all savings is channeled) to invest part of their assets in entrepreneurial projects and not only in listed securities and real estate.

As new entrepreneurial firms cannot use debt financing to any significant degree, the regulatory framework should be as neutral as possible between debt and equity financing. Overall, the regulatory framework should encourage private wealth creation and the creation of a dynamic VC sector, especially for early-stage financing.

The public sector may, directly or indirectly, support the VC sector to mitigate the above problems. The state can, e.g., use some of its tax revenues to directly provide the market with venture capital, either through its institutions or together with private actors. However, this type of support presents some cause for concern, as already discussed.

Neither theory nor practice suggests that government agencies will be better able than venture capitalists or business angels to evaluate the future success of a particular firm or a specific project. Existing evidence suggests that public venture capital appears to be less effective at stimulating innovation than private capital or a mix of private and public capital (Bertoni and Tykova 2015; Cumming et al. 2017).

According to Bloom et al. (2019, p. 178), “removing constraints on the development of an active early-stage finance market (like angel finance or venture capital) might be a reasonable policy focus” to stimulate innovation. These sectors have historically faced high barriers in many countries. This was also the case in the United States until a number of reforms around 1980 paved the way for the emergence of today’s VC sector. Without these reforms, the emergence of Silicon Valley would hardly have been possible (Fenn et al. 1995). The reforms that made a difference was, on the one hand, the reduction of both capital gains taxes and taxation of capital gains for stock options in young entrepreneurial firms and, on the other hand, the right of pension funds to invest in high-risk securities including VC funds (Gilson and Schizer 2003).⁷

An appropriately designed tax policy is not the only way the government can support early-stage financing of entrepreneurial firms. For example, public agencies can provide soft loans (loans that do not require collateral or personal guarantees and that, under some circumstances, can be waived) to improve the supply of risk capital in the market. However, the effects of such soft loans are generally disappointing, partly because politicians, for political reasons, may be tempted to establish a number of agencies that are authorized to offer loans that target specific regions and/or industries. A complex maze of terms and conditions, often lacking consistency and encouraging strategic and short-term behavior, thus results.

Based on the reasoning above, it is doubtful whether channeling more government funds into venture capital markets is a successful strategy. VC financing is more likely to be stimulated if the expected returns of innovative projects are higher because of, for instance, reduced corporate or capital gains taxes. The existence of exit opportunities also energizes the VC industry (Da Rin et al. 2006).

Labor Market Regulations and Social Security

The fourth policy area we would like to highlight involves the labor market and financial security for times when workers are not employed. Research shows that labor market mobility is associated with higher rates of innovation (Kaiser et al. 2015; Braunerhjelm et al. 2020). The regulatory framework related to the labor market should be designed to facilitate the recruitment of a suitable workforce with the right skills and not make it unnecessarily difficult to adjust the composition and size of the workforce. High levels of job security, such as strict regulation governing the order of dismissal, make it difficult to recruit key personnel who have secure, salaried jobs in other sectors. Stringent job security mandates also increase the

⁷This view of capital gains taxation can be contrasted with Mazzucato (2021, p. 22), who claims that lower capital gains taxation drives away investments from the real economy, rewarding short-term investment in financial assets.

opportunity cost of switching employers and joining entrepreneurial projects (Ho and Wong 2007; van Stel et al. 2007).

Exempting small businesses from certain employment protection rules may sound like a reasonable measure but will in practice act as a tax on business growth and reduce the willingness of small businesses with potential to grow. Allowing a dual labor market to emerge where temporary workers have no (or greatly reduced) protection while permanent workers have extensive protection is also not a sustainable strategy. Temporary workers with low protection will have weak incentives to acquire firm-specific knowledge and to be loyal to the firm, while those with permanent contracts will be reluctant to change jobs even if it would be socially beneficial. Such dichotomized labor markets tend to be less innovative.

A relatively generous unemployment insurance scheme with extensive retraining opportunities would reduce the need for extensive and strict employment protection (Kreiner and Svarer 2022). Such a “flexicurity” system would facilitate entrepreneurial activity and prevent key individuals or potential entrepreneurs from being “stuck” in a permanent position in an established large firm. In general, social benefits should not be linked to a specific job; instead, benefits should, as far as possible, follow the individual, for example, if he or she leaves a permanent job and becomes an entrepreneur. This would make the labor market more flexible and increase people’s willingness to move between jobs and firms (Audretsch et al. 2002).

Product Market Regulations

Product market regulations and their various forms comprise the fifth policy area which we will address. An extreme form of product market regulation involves granting a monopoly in a market to a specific firm—something that used to be common in the telecom industry and in radio and TV. Other examples include requirements for state licensing, detailed requirements regarding product design, and rules that stipulate which production methods to use. To encourage entrepreneurship, the markets for goods and services must be subject to a regulatory framework that facilitates the search for information and knowledge to discover and create new entrepreneurial opportunities.

Established and dominant market players should not be able to abuse their position, and all markets should, as far as possible, be subject to competitive pressure. This requires that the regulatory framework does not hamper the ability to start new businesses and that protected sectors are opened up to outside competition. Weak competitive pressure reduces the incentives for ecosystem actors to adopt innovations and new technologies. Many rules may create unnecessary barriers to free enterprise, to the detriment of economic efficiency and development (European Commission 2015).

Regulations that reduce the competitive pressure also implicitly blunt incentives to reallocate capital and labor from low-productivity firms to firms with higher

productivity. For instance, such lock-in effects may result from public procurement rules that lock in government institutions and agencies to a specific supplier for extended periods. Because considerable productivity differences exist between firms in a particular industry at a given point in time, high-productivity growth cannot be achieved unless resources can be transferred across firms relatively smoothly. Depending on the industry's composition and the workforce's skills, these effects may vary (Arnold et al. 2011). Nevertheless, growth emanates mainly from churning (firm and job turnover) and restructuring—primarily shifts in production from less to more successful firms within narrowly defined industries, rather than from declining to growing sectors (Caballero 2007).

Insolvency Law

While well-functioning ecosystems minimize the occurrence of mistakes, failures are still both common and inevitable. All entrepreneurial activity is inherently experimental, and it is the rule rather than the exception that some businesses and entrepreneurs end up in financial distress or insolvency. However, entrepreneurial failures need not be seen as a waste of resources; they are a natural part of an entrepreneurial ecosystem built on experimentation, screening, and selection. In fact, they provide important information to the rest of the market about what does not work, i.e., the competitiveness of an innovation or business model. This “process of learning by trial and error [...] must involve a constant disappointment of some expectations” (Hayek 1976, p. 124). Failed businesses must be liquidated as smoothly and quickly as possible so that resources can be transferred to new and better projects (Armour and Cumming 2008). Empirical research shows that faster firm turnover makes the economy more competitive (Brown et al. 2008; Heyman et al. 2019). It also appears that “lowering barriers to failure via lenient bankruptcy laws encourages more capable—and not just more—entrepreneurs to start firms” (Eberhart et al. 2017, p. 93).

There is a difficult balance to strike in the legislation. On the one hand, the regulatory framework must be generous enough to give failed entrepreneurs a “second chance.” Many successful entrepreneurs have experience with unsuccessful projects, giving them valuable knowledge and experience that increases the chances of success with future projects (Ucbasaran et al. 2008). On the other hand, the regulatory framework should not be overly generous, encouraging destructive entrepreneurship, where the entrepreneur uses dubious business restructurings and serial bankruptcies to avoid fulfilling his or her obligations to suppliers and creditors.

R&D and Knowledge Spillovers

Not only Mazzucato but most politicians, regardless of ideology, have often pointed to R&D spending as a route to more innovation and growth. However, R&D expenditure is an input in the production process, not a valuable output. For such spending to result in a welfare-enhancing outcome, it requires a well-functioning entrepreneurial ecosystem that can transform knowledge or inventions into something that is demanded, such as goods and services or more efficient production or distribution methods (Bhidé 2008). This does not happen automatically.

From an entrepreneurial ecosystem perspective, the notion of increased R&D investment to stimulate innovation and sustainable growth appears to be an overly mechanistic view of the functioning of the economic system. Such a notion also neglects other routes to innovation such as learning by doing, networking, and combinatorial insights (Braunerhjelm and Henrekson 2024, Chap. 2).⁸

Significant R&D investments *may* be necessary in a thriving economy but are far from sufficient, and there is no guarantee that policy measures stimulating increased R&D spending will result in more economically valuable knowledge (Da Rin et al. 2006). Spillover effects may also be negative as public R&D can crowd out private R&D. Countries where the share of business R&D expenditure directly or indirectly financed by the government is high have lower R&D expenditure in private firms (Elert et al. 2017). Moreover, public R&D spending comes with a general opportunity cost, since the resources could be used for alternative measures, such as lowering the capital gains tax or investing in other public goods.

Since it is almost impossible for a public agency to “pick the winners,” a spontaneous demand-driven, bottom-up increase in R&D is always better than any top-down designed alternative. Actors receiving public support are also, as already noted, likely to become a politically relevant interest group, using their newfound power to garner resources that could be better used elsewhere.

Instead of focusing on quantitative R&D spending targets or targeting R&D support to individual firms or groups of firms, politicians should create a regulatory framework that makes it easier to start and develop businesses. Much of the societal benefit of R&D arises through imitation and knowledge spillovers, i.e., when ideas and know-how from earlier successful innovations find new areas of application or spread to companies in other parts of the economy (Acs et al. 2009; Klepper 2016). Almost without exception, successful business clusters have emerged spontaneously and cannot be commanded to emerge by means of a centrally issued directive.

⁸Bhidé (2008) even suggests that the process of transforming a prominent idea into a commercially competitive product rarely requires significant R&D.

Incentives for Human Capital Investment

The final policy area involved in our bottom-up approach concerns human capital. Successful entrepreneurs are often highly educated, which underlines the importance of education in facilitating entrepreneurial activity. A well-educated population is also of great importance for the proper functioning of the entrepreneurial ecosystem, as it increases the availability of skilled workers and potential key employees. For companies in high-tech industries, there is a great need for a well-educated workforce, especially in STEM areas (Shavinina 2013).

For the entrepreneurial ecosystem to function as well as possible, learning and acquiring new knowledge must be profitable, whether through formal education or in the workplace. The wage structure and associated tax system therefore play an essential role: it should not be designed to discourage human capital investment at the individual level. The education and training premium varies considerably across nations. Europe's university systems have the advantage of generally low tuition fees, which means that talented individuals are rarely excluded from higher education for personal financial reasons. On the other hand, Europe has few top-class universities (with the United Kingdom being the only real exception).

This educational system should provide incentives for universities and researchers to aim for academic excellence while at the same time, without compromising their integrity, collaborating with industry and adapting their educational offerings to fields for which there is a strong demand in labor markets.

In Sum

An innovation's successful commercialization, production, and industrial distribution require a gamut of complementary competencies. The process is both complex and long-lasting. Obstacles regarding financing and recruitment must be overcome. The entrepreneur plays the key role in this process. Many new firms which initially experience rapid growth fail. However, those that succeed make major contributions to growth, development, and job creation.

Linking the specific skill sets of various agents requires well-designed institutions and policies. Combined with an efficient judicial system, the regulatory framework should efficiently prevent destructive entrepreneurship and fraudulent business practices, preferably without incurring unnecessary costs for firms—costs that become entry barriers for new ones. The legal system must be characterized by transparency, consistency, equal treatment, and swiftness regarding handling of legal disputes between private parties and between the government and individual firms.

Thus far we have, in line with this view, highlighted eight policy areas where appropriate policy can pave the way for entrepreneurial firms by stimulating an entrepreneurial ecosystem that fosters innovation and entrepreneurial venturing—as well as the social welfare it entails. According to our reasoning, this bottom-up

approach is a better and more realistic view than the top-down mission-oriented approach envisaged by Mazzucato.

The framework for economic and industrial policy should promote competition and business activity across the board. It should not be designed to favor certain kinds of firms, industries, or a particular size of enterprise, nor should it legitimize entrenchment and weak competition. The University of Chicago professor Luigi Zingales aptly opines that business policies should be pro-market, not pro-business. Pro-business proponents maintain that the government should encourage and support specific firms and industries through subsidies, tax incentives, or other favorable actions.⁹ Pro-market proponents oppose this view, instead asserting that the government should create a level playing field on which every economic agent can compete on equal terms. When the buyer/consumer no longer decides whether a business succeeds or fails, firms will devote more effort and resources to ensure that they receive benefits from the public sector and less effort in creating value for their customers. Such behavior not only decreases the productivity of a business but also creates fertile ground for corruption and clientelism (Zingales 2012).

Those who doubt that this is a significant problem can consider the Swedish experience with direct public support to stimulate innovation and growth. Gustafsson et al. (2020, p. 439) show that “highly productive entrepreneurs abstain from seeking grants, moderately productive firms allocate a share of their effort to grant seeking, and low-productivity firms allocate most resources to seeking grants.” By contrast, receiving support once had a negative effect on firm productivity, and the negative effect increased for businesses that received support more than once.¹⁰

Unless a significant market failure exists that may be identified and corrected (or mitigated) by economic policy, skepticism toward targeted support is warranted. A policy that aims to promote entrepreneurship should use a broader approach, facilitating the evolution of an economic system that encourages individuals to pursue productive entrepreneurship and business growth. The economic and business policies should, as much as possible, not seek to influence the “natural” development of firm size, growth, or type through targeted subsidies or tax deductions.

It is true that wise public interventions may have spillover effects (or other positive externalities) that benefit all agents in the ecosystem—but there are undoubtedly more ways for this support to fail than to succeed. The failure of most business ideas is, after all, the reason why venture capitalists spread funding across many different initiatives and attempts. The ideas that survive usually do so not because they were perfect from the start or part of a grand mission but because their creators and developers adjusted and customized the project until it became

⁹ A similar argument is developed by Hayek (1948).

¹⁰ A similar result was found by Bergström (2000) in a study of the effects on total factor productivity of public capital subsidies to firms in Sweden between 1987 and 1993. After the first year following the subsidy, the more subsidies a firm had been granted, the worse its TFP growth developed.

competitive in the market and beneficial for society. Providing more (private or public) funding does not change this fact. Without a well-functioning ecosystem, spreading (more) money over the economy will not automatically make missions successful—no matter how noble the missions are.

Mazzucato on the Bottom-Up Approach

Mazzucato is aware of the alternative bottom-up approach and the importance of experimentation and trial and error.¹¹ According to her, this approach is, however, too “narrow” and will not suffice.

One important implication of the bottom-up approach is that policymakers strive to “level the playing field” and avoid distorting the economy in any direction through, for example, favoring specific actors or industries. But the very essence of the mission approach is to tilt the playing field by directing investments to specific areas aimed at fulfilling certain politically determined objectives.

Mazzucato argues that the private VC industry often has too short a time horizon in their investment strategy, thus calling for an active state to compensate for this alleged shortcoming. From an entrepreneurial ecosystem perspective, the “short-termism” of a VC firm is not to be regretted. It is a consequence of specialization and the fact that early (business angels and VCs) and later-stage financiers (buyout firms, etc.) bring different skills and resources adapted to different stages of an innovation-based firm’s development.

One shortcoming of the mission-oriented approach, as discussed extensively above, is the difficulty in picking winners.¹² One likely reason is that government agents base their decisions on political rather than business criteria. Here, Mazzucato maintains that going beyond pure business concerns and profit opportunities is part of the point of mission-driven projects: other considerations should be taken into account. However, the risk of funds frivolously spent on political “pet projects” looms large with this approach.

The fact that the textbook ideal—an economy characterized by perfect competition devoid of externalities—does not exist in reality is invoked by Mazzucato to assert that it is always possible for government policy to improve economic outcomes compared to outcomes resulting from a decentralized bottom-up process. Surely, the business sector may be incomplete and imperfect—but, as we have

¹¹ See, e.g., Mazzucato (2021, p. 178): “[A] theory of innovation needs to be nested in a theory of learning, experimentation and adaption to uncertainty.”

¹² There is some confusion about Mazzucato’s position here. On the one hand, Mazzucato explicitly says that her idea is *not* about supporting specific technologies, firms, or sectors but (only?) about identifying problems and catalyzing and facilitating collaboration across sectors (Mazzucato 2021, pp. 125, 159). On the other hand, she explicitly states that the government and its agencies should “pick winners” (or “pick the willing”) and that the conventional view is too negative to this approach (e.g., Mazzucato 2021, pp. 49ff).

already noted, the same is true for the political sector. Uncertainty and unpredictability are inherent traits of the economy and will not disappear if the economy is subjected to increased political guidance. One might also ask whether citizens in their role as consumers are not better placed than the government to determine what they value.

Mazzucato is, of course, also aware of the public choice literature and its less optimistic view of the political sector. If bureaucrats and elected politicians are assumed to be self-interested utility maximizers, public choice theory predicts, *inter alia*, that bureaucrats may be budget maximizers and that policymakers may be unduly influenced by interest groups and fall into nepotism, cronyism, or corruption. Mazzucato (2021, pp. 32ff) asserts that these notions lack empirical support; they are merely assumed. “Real people” do not optimally react to (price) incentives and are not maximizers of profit or utility. This opens up “a sizeable scope for clever, well-informed regulations” (*ibid.*, p. 142) instituted and directed by the public sector striving for a better world.

Clearly, one can disparage the public choice view as overly negative and lopsided. But in that case one can claim that the opposite “public interest” view, where “policymakers altruistically provide optimal quantities of public goods and create laws solely in the interest of the governed” (Lucas 2019), is just as assumed and unrealistic. In reality, the incentives of government agents and the public-interest seldom coincide, making the entire approach less attractive.

Moreover, as pointed out by Sanders et al. (2024, p. 265), although an entrepreneurial state is not theoretically impossible, it is hard to achieve in practice because of the dynamics of democracy:

Mistakes will be held against the incumbent politicians, weighing more heavily than successes. Political opponents will use state-run innovation failures to criticize incumbent politicians, saying that it is a sign of their incompetence and that they should be replaced. It will rarely suffice for incumbents to point to successes. Or to say that it is normal that many entrepreneurial projects fail. So, what is normal in private markets where private firms and individuals risk their own money, is not equally acceptable in a system that is democratically governed using taxpayers’ money. As a result, it becomes rational for politicians and government agencies to be risk averse.

Of course, this does not entirely inhibit politicians from taking risks (with other people’s money). “However, while they are usually ready to take credit for risky projects when they succeed, they are also ready to blame a scapegoat, usually a bureaucrat, an agency, or ‘the market,’ when projects fail” (Elert and Henrekson 2022, p. 357). This effect adds to our skepticism toward the idea that government agencies can substitute for private agents with “skin in the game” when it comes to entrepreneurial risk-taking and experimentation.

Conclusion

In a diverse and uncertain world with billions of heterogeneous agents possessing complementary capabilities and competencies, lacking an altruistic and omniscient political sector, a system guided by political top-down missions will be problematic. A more bottom-up approach is called for. At the end of the day, fostering innovation and sustainable development of society requires an institutional framework that promotes productive entrepreneurship. When entrepreneurs are seeking to create value, they are greatly influenced by the reward structure they encounter. This structure is primarily determined by the economic system's institutional setup. In this chapter we have discussed the basis for a decentralized bottom-up approach and considered eight key institutional areas and how their design affects the driving forces for innovation and productive entrepreneurship.

We believe that this bottom-up approach, which is about leveling the playing field for potential entrepreneurs and encouraging productive entrepreneurship, is a better and more realistic view of how to organize a society that promotes economic wellbeing. We are keenly aware that our view lacks the grandeur that makes Mazzucato's top-down missions so emotionally appealing as solutions to our most pressing problems. Most likely, our species is genetically predisposed to desire control (Rose 2024). However, the complex market-based economic system that has evolved, which is crucial for our material wellbeing, is totally dependent on a process of decentralized experimentation, selection, and screening to continue to fulfill our needs.

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