

THINKING OUTSIDE THE SANDBOX


How regulatory relief and learning can promote innovation

Dr Bryan Cheang

February 2024

With Duncan McClements

Edited by Dr Simon Kaye



ABOUT *REFORM*

Reform is established as the leading Westminster think tank for public service reform. We believe that the State has a fundamental role to play in enabling individuals, families and communities to thrive. But our vision is one in which the State delivers only the services that it is best placed to deliver, within sound public finances, and where both decision-making and delivery is devolved to the most appropriate level. We are committed to driving systemic change that will deliver better outcomes for all.

We are determinedly independent and strictly non-party in our approach. This is reflected in our cross-party Advisory Board and our events programme which seeks to convene likeminded reformers from across the political spectrum.

Reform is a registered charity, the Reform Research Trust, charity no. 1103739.

ABOUT *REFORM* SCHOLARS

Reform Scholars aims to bridge the gap between policymakers and the expertise and analysis that exists in academia.

Decision makers often have little access to the new thinking that emerges from the world of academia. This means that valuable insights – insights that could lead, via better policy, to better outcomes for citizens – never get beyond academic circles. And it makes it harder to break the groupthink and confirmation bias that too often pervades the policy world, limiting the quality of decisions and the range of ideas that are considered.

This unique network for academics seeks to address that. Through the programme, *Reform* is providing a platform for early-to-mid career academics to explore the public policy implications of their research, and to bring their findings to bear against the complex policy challenges of the coming years.

For further information on *Reform* Scholars, please contact programme lead and Director of Policy, Dr Simon Kaye, at simon.kaye@reform.uk.

ABOUT THE SCHOLAR

Bryan Cheang is the Assistant Director at the Centre for the Study of Governance & Society at King's College London, and a Research Fellow at the London School of Economics. He received his PhD and MA in Political Economy from King's College London and is a graduate of the National University of Singapore.

His research interests pertain to the political economy of development and applied economic policy. He is broadly interested topics regarding state-market relations, comparative political economy and particularly, the challenges of successful industrial policy interventions. He is currently researching into the epistemic challenges faced in industrial policy schemes.

Table of contents

REFORM FOREWORD.....	4
RECOMMENDATIONS.....	5
1 INTRODUCTION: GENERATING GROWTH THROUGH INNOVATION.....	6
2 THE LIMITS OF MISSION-LED GOVERNANCE.....	8
3 WHY REGULATORY SANDBOXES?.....	9
3.1 The benefits of sandboxes.....	9
3.2 Why not general deregulation.....	10
3.3 Achieving ‘adaptive regulation’.....	11
3.4 Why industry neutral?	11
4 DEMONSTRATING THE IMPACT OF GENERAL PURPOSE SANDBOXES.....	13
4.1 Estimating the possible value of sandboxes.....	13
4.2 The Japanese example.....	13
4.3 The USA example.....	15
5 ESTABLISHING A NEW MODEL.....	17
5.1 Application, eligibility and process.....	17
5.2 Evaluation process.....	21
5.3 Regulatory learning, relief and assessment.....	21
6 CONCLUSION.....	23
APPENDIX: A SIMPLE MODEL OF THE POSSIBLE GAINS FROM A GENERAL PURPOSE SANDBOX.....	24
BIBLIOGRAPHY.....	28

Reform Foreword

In the ongoing struggle to boost the productivity of the British economy, every option should be explored. That is why we are delighted to publish ‘Thinking outside the sandbox’, the latest policy paper from *Reform*’s first-ever cohort of *Reform* Scholars.

This paper not only sets out an ambitious policy idea, it explores some of the fundamental questions that underlie policymaking. Against the contemporary trend of advocating for greater state activity to drive outcomes, stimulate innovation, and promote economic growth, it offers an alternative perspective. Instead of calling upon the State to identify the right priorities, it suggests creating greater space for markets to respond to consumer preferences. Rather than depending on innovations being generated as the by-product of government-directed missions, it suggests embracing the potential for innovations that may emerge when economic actors are less constrained by regulation.

The core policy mechanism proposed in this paper is that the UK should become one of only a handful of countries worldwide to introduce a general purpose sandbox: an approach where companies can apply to operate without the regulations that might otherwise impede their innovations or prevent their entry to the market. By learning from the way that organisations operate within such a sandbox, valuable lessons for wider regulatory reform can be learned.

Underpinning this approach is a recognition of the *knowledge problems* that can make a mess of the best-laid plans of government. Policymakers, in general, do not reflect often enough on the way that the information relevant to their decisions might be distributed, sometimes beyond the possibility of deliberate gathering. In a complex system, this can lead to unintended consequences – and the stifling of innovation.

Whatever your position on the best role for the State in driving innovation, or whether ‘mission-led’ approaches can transform our country, this fascinating paper is worthy of your attention. We are proud to give it a home at *Reform* through our Scholars Programme.

Dr Simon Kaye

Policy Director

Recommendations

Recommendation 1: Establish a new interdepartmental Regulatory Relief Unit. This new unit should be staffed and jointly operated by the Cabinet Office and the Department for Business and Trade. It should be empowered to consider specific cases for regulatory relief and participation in a general-purpose sandbox by different applicants. It should also be designed to learn from sandbox experiments with the objective of setting guidelines for further government-wide adoption, supported by a range of sector-specific experts.

Recommendation 2: Application and evaluation processes for sandbox applications should be significantly streamlined. Government should implement a rolling application system with no specific deadlines to encourage continuous innovation, and establish a two-round evaluation process involving generalists and technical specialists.

Recommendation 3: Take steps to inculcate a new governance culture for innovation policy that is not dominated by top-down or mission-led models but reflects the complexity of the innovation landscape. This would mean a new, sector-neutral way of thinking about regulation to promote ‘permissionless innovation’, reducing the burden on central policymakers and maximising the scope for experimentation across different industries. As a first step, a new overarching regulatory framework and guidance should be issued, instructing regulators to aim for the development of fewer, simpler, and less sector-specific regulatory rules.

Recommendation 4: Ensure public disclosure of all approved sandbox applications, including broad program descriptions, on the Regulatory Relief Unit’s website.

Recommendation 5: Shift from providing temporary regulatory relief to incorporating a comprehensive system of regulatory learning and adaptation, where findings from sandbox ‘experiments’ are comprehensively recorded, studied, and used to inform broader regulatory reform. Systematically testing regulators through these sandboxes will then enable a higher level of adaptation and learning within regulatory agencies.

1. Introduction: Generating growth through innovation

The UK's economy is stagnating.¹ Productivity growth has averaged only 0.7 per cent a year between 2008 and 2022, the second lowest in the G7, while take-home pay is predicted to be lower in 2027 than 2022 due to high inflation and rising taxes.² It is in this context that scholars and analysts have proposed numerous reforms that harness the power of innovation.³

For policymakers, the question is what the role of the State is in promoting innovation. One leading school of thought is Mariana Mazzucato's "entrepreneurial state" thesis.⁴ Closely related is the proposal for "mission-led" governance, where states define an ambitious policy mission and mobilise stakeholders around the pursuit of it.⁵ A central plank of this perspective is the use of state-driven industrial strategy to not only achieve economic innovation, but to address grand social challenges.

The UK has recently adopted these principles in its industrial strategies, which have been primarily focused on addressing regional inequality through policies to increase the rate of growth outside of the South-East. This has included Local Enterprise Partnerships (now being wound down), increased devolution, and the introduction of new Catapult research centres, modelled on Germany's Fraunhofer Institutes.⁶

Another school of thought insists on a more market-oriented approach to generating innovation, whether through tax incentives, regulatory relief, or other pro-market measures. One particular policy in this vein is the use of regulatory sandboxes, which are programmes that grant temporary regulatory relief to firms as they trial innovative products or services. First used in the UK in 2016, such sandboxes have spread around the world, with approximately 73 sandboxes across 57 jurisdictions as of 2020.⁷

This paper makes the case for an ambitious *general-purpose* sandbox in the UK, arguing that policymakers must seek to maintain "simple rules for a complex world".⁸

This would be a genuinely cutting-edge approach. General-purpose sandboxes are only now being set up in other countries for the first time. There is no large-scale evidence base to call upon to help make the case for such a policy. Nevertheless, this paper argues that there would be value in the UK joining those that are engaging in this experiment. In the context of

¹ John Fernald and Robert Inklaar, 'The UK Productivity "Puzzle" in an International Comparative Perspective', *Federal Reserve Bank of San Francisco Working Paper*, 2022.

² Office for Budget Responsibility, *The Productivity Puzzle*, 2012; The Economist, 'Low Economic Growth Is a Slow-Burning Crisis for Britain', *The Economist*, 2022.

³ Intellectual Property Office, *Innovation and Growth Report 2021-22*, 2022; IMF European Department, 'United Kingdom's Long-Run Prosperity Hinges on Ambitious Reforms', International Monetary Fund, 2023.

⁴ Mariana Mazzucato, *The Entrepreneurial State: Debunking Public vs Private Sector Myths* (Penguin Books, 2013).

⁵ Mariana Mazzucato, *Mission Economy: A Moonshot Guide to Changing Capitalism* (Harper Business, 2021).

⁶ Peter Sunley, Jack Harris, and Emil Evenhuis, 'Industrial Policies, Strategy and the UK's Levelling up Agenda', *Local Economy: The Journal of the Local Economy Policy Unit* 37, no. 5 (2022).

⁷ World Bank, 'Key Data from Regulatory Sandboxes across the Globe', World Bank, 2020.

⁸ Richard Allen Epstein, *Simple Rules for a Complex World* (Harvard University Press, 1995).

innovation, government should seek to avoid picking winners and losers as much as possible, and step out of the current sector-specific approach in favour of industry-neutrality and independence. This paper will therefore review the potential for general purpose sandboxes to be tried out in the UK, following the examples of Utah, Tennessee, and Japan.

2. The limits of mission-led governance

Liberal political economists argue that policymakers should be cognisant of epistemic and incentive problems when formulating interventions.⁹ Top-down interventions can lead to biases, and also to unintended consequences as complex problems are confronted by imperfect policy. These issues are heightened for the State when compared to market or other forms of social order. While uncertainty exists in market processes, its relatively higher degree of competition between multiple centres allows wider scope for experimentation.¹⁰

Innovation policy requires the removal of barriers to growth and providing a general framework of rules that facilitate ‘permissionless innovation’, rather than simply expecting states to pursue ambitious missions. Doing so requires knowledge to define the right mission, identify the right steps to achieve them, and evaluate their effectiveness. This is knowledge that a state will not always possess. Additionally, mission-led governance will require the selection of specific sectors, technologies and industries to support (vertical industrial policy), which will risk a range of incentive problems.

Advocates of the entrepreneurial state and mission-led governance point to numerous success cases, such as DARPA. There are also countries which have pursued industrial policy and can point to specific instances of success, such as a successful product or technology being launched. However, notwithstanding these cases, what the mission-led governance theories fail to produce is a systemic mechanism to explain how innovations can reliably be achieved through more top-down intervention.

It may be argued that significant innovations said to be fostered by the entrepreneurial state are not due to any directive intelligence of the State but were merely *accidental by-products* of private sector activity.¹¹ Inevitably, through the law of large numbers, with heavy state funding of R&D projects, some will end up being successful. In other words, lacking such a systemic mechanism, the various cases of successful mission-innovation cannot be easily replicated.

The market process contains a feedback mechanism that punishes entrepreneurs for their failures, but state actors (and voters, by proxy) lack the same level of risk as private actors, and so comparatively lack the same corrective pressures as actual entrepreneurs when faced with failure. On the flipside, even when the entrepreneurial state can point to a success, it would be impossible to know the counterfactual: what are the *unseen* opportunity costs incurred? This absence of a counterfactual flows inevitably from the singularity of the State’s decision-making,¹² which is further heightened when mission-led governance, with its emphasis on top-down investments, is favoured. In other words, what were the alternative ideas, investments and technologies that were not put into practice because the entrepreneurial state had committed itself onto a specific mission?

⁹ Mark Pennington, *Robust Political Economy* (Edward Elgar Publishing, 2011).

¹⁰ Samuel DeCanio, ‘Democracy, the Market, and the Logic of Social Choice’, *American Journal of Political Science* 58, no. 3 (2013).

¹¹ Alberto Mingardi, ‘A Critique of Mazzucato’s Entrepreneurial State’, *Cato Journal* 35, no. 3 (2015).

¹² Samuel DeCanio, ‘Efficiency, Legitimacy and the Administrative State’, *Social Philosophy and Policy* 38, no. 1 (2021).

3. Why regulatory sandboxes?

Instead of a top-down, directive approach to regulation and innovation policy, sandboxes offer a decentralised environment that acknowledges the limitations of centralised knowledge. They allow for innovation to evolve organically, with regulatory responses crafted based on real-world observations rather than theoretical predictions. This bottom-up approach mitigates the knowledge limitations of policymakers, fostering an environment where both innovation and regulation can co-evolve in response to actual market needs.

Regulatory sandboxes have accordingly emerged as a pivotal tool for fostering innovation in various sectors, particularly in the financial and technological domains. Originating from the UK Financial Conduct Authority (FCA), these "safe spaces" allow businesses to test innovative products, services, and business models without immediately facing the full spectrum of regulatory consequences.¹³

This was pioneered in the UK in 2016 but has since spread around the world. This approach not only reduces the barriers to entry for innovators but also provides regulators with real-time insights into the market dynamics of novel solutions. The World Bank has highlighted the dual benefits of sandboxes: they facilitate a deeper understanding of fast-paced fintech markets and promote innovation-friendly policies.¹⁴ Furthermore, sandboxes can address the challenges of regulatory uncertainty and fear, providing clarity and confidence to both innovators and regulators. When executed effectively, they strike a balance between encouraging innovation and ensuring consumer protection.

3.1 The benefits of sandboxes

There are specifically two chief benefits of sandboxes relevant for the UK context.

Firstly, businesses in the UK report feeling a high impact of regulation, a problem that regulatory sandboxes are positioned to solve. Even though the UK continually ranks high on various indices of global competitiveness, survey research by government shows that the perceived impact and costs of regulatory compliance remain high. One of the key findings of the UK governments' Business Perceptions Survey 2022 is that over two fifths of businesses felt that regulation is "an obstacle to success", which is "significantly higher than the proportion of businesses who agree in 2020".¹⁵

The bulk of the concern was not about the level of regulation per se, but on the complexity of the rules and the resultant challenge of complying with them. Compared to 2020, there has been a 10 per cent fall in firms "being clear what the purpose of regulation is and the ease of complying with regulations".¹⁶ The report goes on to find that innovative businesses are *twice as likely* to report that "regulations prevented or hindered the implementation of a new or significantly improved product".¹⁷

¹³ Financial Conduct Authority, 'Regulatory Sandbox', 2022.

¹⁴ World Bank, 'Global Experiences from Regulatory Sandboxes', World Bank Group, 2020.

¹⁵ Department for Business and Trade and Department for Business, Energy and Industrial Strategy, *Business Perceptions Survey 2022*, 2023.

¹⁶ Department for Business and Trade and Department for Business, Energy and Industrial Strategy.

¹⁷ Department for Business and Trade and Department for Business, Energy and Industrial Strategy.

Secondly, there is a lack of systematic policy evaluation by civil servants. The National Audit Office reported in late 2021 that only a small percentage of government programmes were subject to meaningful impact evaluation (8 per cent of £400 billion worth of expenditure), while 64 per cent are not evaluated at all.¹⁸

This problem had been identified by the NAO in 2013, which concluded that where resources are spent on evaluation, the government “did not effectively use the learning from these evaluations to improve impact”.¹⁹ The follow up report in 2021 then found that over this period, the “use of evaluation continues to be variable and inconsistent”, and “government has been slow to address the known barriers to improvement”.²⁰ This paints an overall picture of the current regulatory framework not having sufficient epistemic capacity to deal with policy challenges, let alone the complex innovation landscape of the 21st century. Indeed, only 28 per cent of firms agree that “the government understands business technology and industry well enough to regulate”.²¹

Regulatory sandboxes can help to alleviate these twin problems. First, they provide a controlled environment for specific organisations to test products, services and production methods while having certain regulatory requirements temporarily waived. Some firms that participate in the sandbox identify specific regulations that particularly hinder their business intentions, and upon approval, get to test out their business plans for a set period of time. Another set of participants would be firms that, due to the novelty of their operations, operate in a regulatory ‘grey zone’ where there are no clear rules in place. Such firms will receive ‘letters of no enforcement’, giving them a guarantee that no enforcement action will be taken against them should they be retroactively found to have run afoul of certain rules. Firms are thereby given the incentive to engage in experimental innovations they otherwise would not in the absence of a sandbox.

By taking a sandbox approach to innovation policy, policymakers are operating on the premise that they are not in a position to determine *ex-ante* what sort of products, services or production techniques possess economic value, and which will catch the attention of the wider market. It is precisely because of the uncertainty surrounding these complex questions that room is given, through the sandbox, for firms to engage in trials within a controlled environment.

3.2 Why not general deregulation?

This then raises the question of why a more general policy of deregulation is not favoured. If regulation is burdensome, then why not engage in radical deregulation? Or pass legislation that radically limits the powers of regulatory agencies to impose new regulations?

While such an approach might have some merits in the long run, the same knowledge problem that policymakers face when comparing novel products in the market is also faced when they think about how to reform the regulatory state. Certain regulations may ultimately be needed to keep pace with industry changes – for example, the threats posed by artificial intelligence.

¹⁸ National Audit Office, *Evaluating Government Spending*, 2021; Behavioural Insights Team, ‘The Rise of Evidence-Based Policymaking?’, 2022.

¹⁹ National Audit Office, *Evaluating Government Spending*.

²⁰ National Audit Office.

²¹ Department for Business and Trade and Department for Business, Energy and Industrial Strategy, *Business Perceptions Survey 2022*.

Some other regulations may be found to be outdated. Taking a sweeping approach to deregulation violates the epistemic caution that would be required to carefully ascertain which rules are fit for purpose, and which are not.

3.3 Achieving ‘adaptive regulation’

Regulatory sandboxes provide an adaptive approach to regulation and regulatory review, placing greater emphasis on trial-and-error and faster feedback loops, incorporating the incremental adjustments of existing rules in response to new information.

‘Adaptive regulation’ could be achieved through policy laboratories, crowd-sourcing policymaking involving public inputs, and allowing industry experts more representation in the policymaking process.²² But use of regulatory sandboxes means that regulators can learn from sandbox experiments, and revise and craft their regulations along the way. Unlike some of the other approaches, this involves an actual ‘market test’ within the sandbox environment.

After an organisation’s time in the sandbox is over, the information collected could then be used for fuller regulatory review. This is an improvement as compared to the traditional process where firms craft rules in a vacuum, only to find that once implemented, industry changes have often made them obsolete.

Adaptive regulation through the use of sandboxes may not always result in system-level deregulation, even if there is limited regulatory relief within the sandbox. The information gleaned from the sandbox may provide insights for policymakers to make an evidence-based decision to increase their regulation in certain areas, or relax them in others. The point of the sandbox is precisely for policymakers to gain valuable information inputs to then decide on the scope and pace of wider regulatory reform.

3.4 Why industry neutral?

There are several problems with the existing way in which sandboxes are used. Most sandboxes in the world, including in the UK, are sector-specific, where central government identifies a specific sector worth supporting and then creates a programme around it. Yet by opening a sandbox environment to all firms, a broader range of experiments can be tried out, and a broader set of information inputs can be gleaned by regulators as a result.

An industry neutral sandbox approach also reduces the chance of an ‘expertocracy’ being formed around a single industry-based regulatory agency. Many sandboxes thus far have resulted in the creation of a new bureaucracy, with various industry experts being involved to evaluate applications and monitor the firms’ experiments. Far from reducing regulatory burdens, such a system could result in an entire class of bureaucrats administering this sandbox programme for each specific sector.

The second related problem is incentive-based. Sector-specific sandboxes run the risk of rent-seeking, because firms in that specific sector gain the opportunity to obtain regulatory relief in ways unavailable to others. This is also because the sandbox process is one that brings

²² William D. Eggers, Mike Turley, and Pankaj Kishnani, ‘The Future of Regulation: Principles for Regulating Emerging Technologies’, *Deloitte*, 2018.

participants' firms and administrators in close contact, given the need for firms to conduct demonstrations of their products and services. Already in the UK, regulatory agencies are largely sector-specific, since they were mostly created before the 1998 Competition Act, and this has ever since heightened the potential for rent-seeking and regulatory capture, according to John Fingleton, Board member of UK Research and Innovation.²³

While an industry neutral sandbox will not remove this interface between the firm and the sandbox administrators (because the sandbox requires both parties to interact over the demonstration process), it would minimise the chances for rent-seeking since the eligibility criteria is broadened up to a wide swathe of firms, reducing the chances for “concentrated benefits” being overwhelmingly heaped on a few firms in one industry. This itself would not guarantee the elimination of rent-seeking, and thus additional checks and balances will be required.

²³ John Fingleton, ‘Economic Regulation and Productivity’, *Fingleton Insights*, 2022.

4. Demonstrating the impact of general purpose sandboxes

General purpose sandboxes are a new approach. Countries already adopting this approach have not been doing so for long enough to establish a comprehensive evidence base as to their efficacy. However, there are clear lessons to be derived from the approaches taken in Japan and the USA.

This section first sets out a simplified model to suggest the possible value of a general purpose sandbox approach in the UK, before detailing the emergence – and early effects – of such sandboxes in other countries.

4.1 Estimating the possible value of sandboxes

Regulatory environments can have a decisive impact on the survival, and thus the economic potential, of private sector innovations. CB Insights 2021 found that 18 per cent of start-ups failed due to regulatory issues, and this is likely an understatement of the overall failure rate as some start-ups will anticipate regulatory difficulties, either due to familiarity with the legislation preventing their activity or due to knowledge relating to the general difficulty of entering certain industries.²⁴

Regulatory sandboxes offer a significant advantage by providing a more flexible regulatory environment, one that encourages innovation. This flexibility is particularly beneficial because uncertainty about future regulations can deter investment and inhibit the initiation of new projects. By mitigating these uncertainties, sandboxes foster an environment that supports increased investment and encourages the establishment of new firms, contributing positively to the ecosystem of innovation.

Based on a simple model (see Appendix), it is possible to estimate the scale of the gains created by such an approach. Minimum viable firm profitability could decline 5-18 per cent. This would substantially boost levels of market entry and create a greater diversity of products for consumers at lower prices while reducing market power.

This could also have substantial wider impact if the use of the sandbox leads regulators to learn and improve practice across industries.

4.2 The Japanese example

Japan is the first country in the world that has established a distinctive regulatory sandbox system that is industry-neutral and general-purpose, setting it apart from other countries' frameworks. The sandbox is designed to accelerate the introduction of new business models and innovative technologies, such as blockchain, artificial intelligence, and the Internet of Things, across various fields including financial services, healthcare, and transportation.

²⁴ CB Insights, *State of Venture 2021 Report*, 2022.

Japan's regulatory sandbox is open to all industries, emphasising innovation areas including financial services, healthcare, mobility, and transportation. This broad focus allows for the discovery of new business ideas from operators in various industrial fields and their connection to social implementation. The Japanese sandbox also emphasises a "fully supportive" approach, providing government approval for testing without application fees, free prior consultation, and a flexible duration for testing projects, which can range from three to 18 months.²⁵

Another differentiating factor of Japan's sandbox is its centralised one-stop consultation window, which allows for efficient and quick review of applications by assigning a department responsible for the promotion of regulatory reform. This system is not only open to domestic companies but also welcomes overseas companies to apply for testing their innovations in the Japanese market.

The Japanese sandbox operates on the principle of "try-first," which allows for indicative experiments to be conducted quickly, gathering necessary data to inform decisions regarding regulatory reforms.²⁶ This approach does not aim to break regulations but to establish appropriate regulations for new technologies and business models by testing these innovations first. The sandbox system includes an Innovative Business Activities Committee, comprised of experts familiar with new technologies and business models. This committee plays a crucial role in evaluating and certifying demonstration projects, adding a layer of expertise and transparency to the process.

Figure 1: The Japanese sandbox process overview

1. **Initial Consultation:** Businesses start by consulting with the Cabinet Office's one-stop service (which can be done remotely). This consultation is to design a demonstration plan that can be implemented without the application of existing regulations.
2. **Application Submission:** The business submits a demonstration plan to the competent minister (the minister in charge of business jurisdiction and regulatory jurisdiction). The Cabinet Office supports the entire process.
3. **Plan Certification:** If the demonstration plan does not violate existing regulations, the competent minister certifies it. The decision (whether to certify or not, and the reasons if not) is deliberated by the New Technology Evaluation Committee established in the Cabinet Office.
4. **Post-Demonstration Regulation Review:** After the demonstration, the regulatory authority considers the results and takes necessary legislative or other measures to abolish or relax the necessary regulations.

²⁵ Cabinet Secretariat, Government of Japan, *Japan's Regulatory Sandbox*, 2018.

²⁶ Shuhei Kataoka, 'Japan's New Policy for Testing Innovative Propositions for Growth with Government: The Regulatory Sandbox', *Banking & Finance Law Review* 35, no. 1 (2019).

Figure 2: Notable cases and results from the Japanese sandbox

1. **Electric Kickboards:** A sharing service provider conducted a sandbox demonstration allowing unlicensed operation of electric kickboards within university premises (non-public roads). Following the demonstration and under a new business exemption system, the operation expanded to public roads, leading to amendments in the Road Traffic Act (enacted in April 2022, to be enforced in July 2023).
2. **Blockchain for Clinical Data Monitoring:** Sasmed Co., Ltd. conducted a demonstration of a monitoring system using blockchain technology for clinical trials. The system was designed to directly link and synchronize original data contained in source documents with data in Case Report Forms (CRFs), equipped with tamper detection functions. The demonstration clarified that if the system is operated appropriately, on-site verification of data consistency is unnecessary. This led to business implementation using similar methods for monitoring in "treatment" contexts, leveraging the grey zone elimination system.
3. **Prevention of Fraudulent Account Creation:** Caulis Inc. and Kansai Electric Power Co. demonstrated a system to prevent fraudulent account creation using impersonation. The system verified application information for online account openings against a part of Kansai Electric Power's infrastructure information, providing financial institutions with the possibility of impersonation. This demonstration confirmed that the business could be legally commercialized and led to a capital increase of 300 million yen.

The sandbox system has been used in various fields, including mobility, Internet of Things, FinTech, and healthcare, with 30 plans from 149 entities certified.

In summary, Japan's regulatory sandbox system has been a catalyst for innovation, allowing businesses to test and refine their technologies and business models in a real-world environment with regulatory support. This has not only led to the creation of new markets and services but has also informed regulatory reforms that support the sustainable growth of Japan's economy. The system's success is evident in the variety of fields it has touched and the tangible legislative changes and business expansions that have resulted from its application.

4.3 The USA example

General purpose sandboxes have started to take root in parts of the United States. Recently, the state of Tennessee has started the process of creating a programme of regulatory exemptions in order to spur pilot programs of experimental products. Applicants must provide a business plan that outlines the regulatory barriers that they find a hindrance, potential risks to consumers and how these may be mitigated. While a waiver would not negate critical consumer protections, federal laws, or civil liabilities, it would allow the entrepreneur to bypass certain regulations for a maximum of two years. After this period, the entrepreneur must present a withdrawal strategy to the commissioner. This sandbox is not confined to any single

industry; it is an opportunity for any entrepreneur to argue how existing regulations are impeding their novel ideas.

Utah has become the first American state to establish a general-purpose sandbox, administered by a government department called the Office of Regulatory Relief, or ORR, which manages the sandbox and provides advice to participants.²⁷ Entrepreneurs with novel business concepts are able to seek guidance from the ORR to assess their eligibility for the program and identify the regulations from which they wish to be exempted. Following this, applicants submit a detailed request for regulatory exemption. The ORR collaborates with state regulatory agencies to identify the most promising candidates and consider whether current regulations need updating to reflect new market trends, leveraging. The ORR, along with the relevant state agency, would jointly select sandbox participants, with the ORR engaging in dialogue with applicants to finalize decisions and manage the terms of the sandbox trial, which lasts one year with the possibility of extension.

²⁷ Governor's Office of Economic Opportunity, 'Utah Office of Regulatory Relief', 2021.

5. Establishing a new model

Applying this model to the UK requires the phasing out of current industry-specific regulatory sandboxes. These should be replaced with a general-purpose sandbox system to be administered by a new Regulatory Relief Unit, jointly operated by the Cabinet Office and the Department for Business and Trade. This Regulatory Relief Unit will directly administer the sandbox program, ensure that experiments within the sandbox are effectively evaluated and learned from, and be empowered to directly pursue wider regulatory changes in response.

The proposed general-purpose sandbox will address four gaps in the current system.

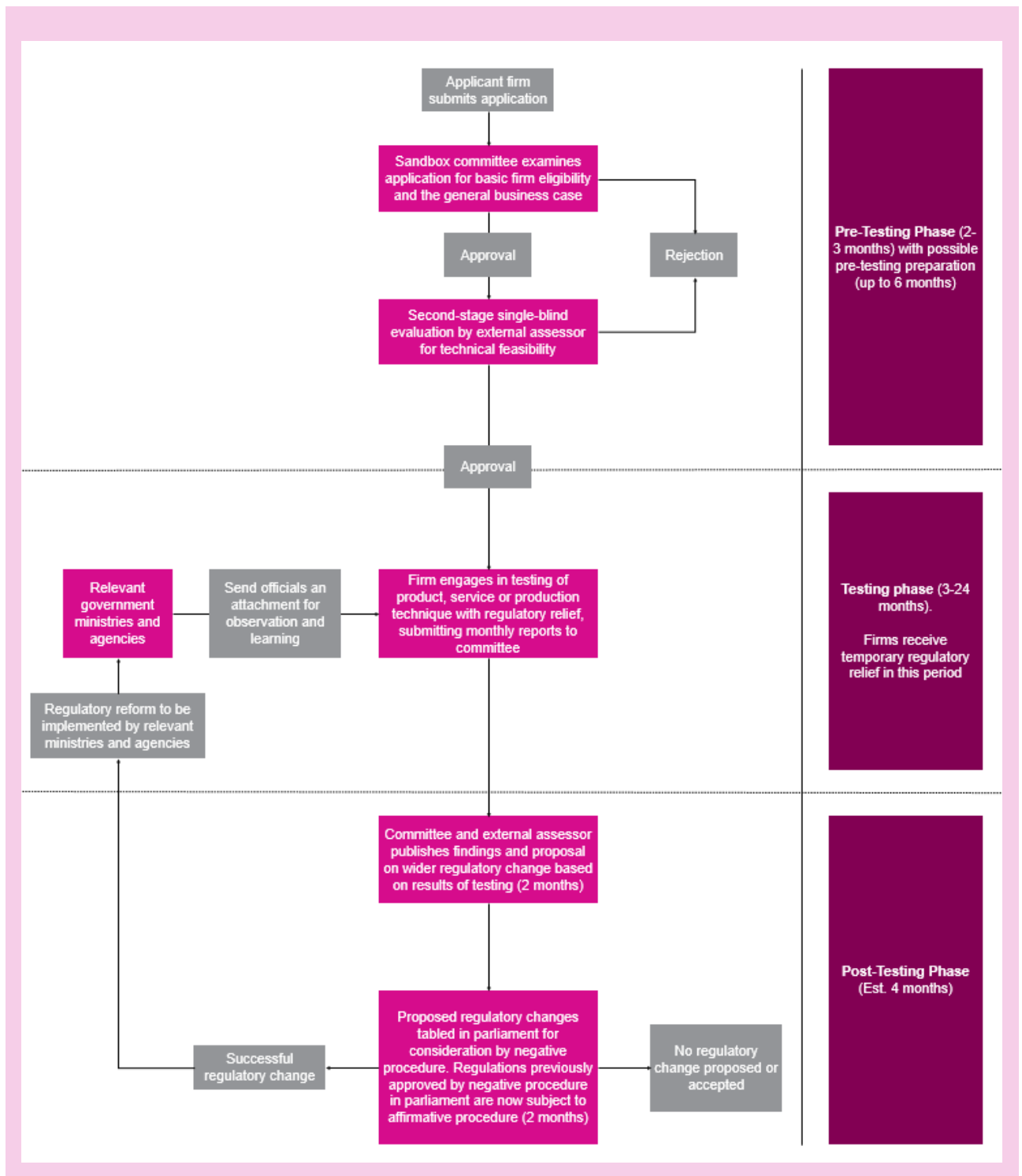
1. It will remove the industry specification and be sector neutral, thereby allowing for greater scope of experimentation.
2. It will focus purely on economic objectives, and remove all non-economic considerations which hinder efficiency.
3. As in Japan, foreign firms will be allowed to participate in the programme, subject to the relevant oversight.
4. It will specifically incorporate regulatory learning and adaption, by publishing findings of testing and assessor evaluation, and not merely grant temporary relief to the participant firms. Review of testing will incorporate wider regulatory reform by determining which regulations should be changed.

Recommendation 1: Establish a new interdepartmental Regulatory Relief Unit. This new unit should be staffed and jointly operated by the Cabinet Office and the Department for Business and Trade. It should be empowered to consider specific cases for regulatory relief and participation in a general-purpose sandbox by different applicants. It should also be designed to learn from sandbox experiments with the objective of setting guidelines for further government-wide adoption, supported by a range of sector-specific experts.

5.1 Application, eligibility and process

The overall process map of the sandbox programme is illustrated in Figure 3.

Figure 3: Process map of proposed sandbox programme



A summary of the entire programme timeline is as follows:

1. **Application phase:** Rolling application with no specific deadlines to encourage continuous innovation.
2. **Evaluation phase:** Up to 90 days from the receipt of the application, application to be subject to a two-round evaluation involving generalists and one external technical assessor.
3. **Preparation phase:** An optional preparation phase is available of up to six months for the firm to prepare for the testing phase, including finalising the test design with the sandbox team.
4. **Testing Phase:** Flexible duration based on the complexity of the innovation, ranging from three to 24 months. In this phase, relevant ministries send officials for observation and regulatory learning, with findings to be brought back to government.
5. **Post-testing phase:** Within 30 days post-testing, firms must submit a report on the outcomes, learnings, and proposed next steps. The sandbox team will then have 60 days to provide feedback and discuss potential regulatory pathways or necessary modifications. A proposal is then made identifying whether wider regulatory reform is warranted, with findings made public and tabled in Parliament where relevant.

The sandbox program should be limited to small-medium enterprises (SMEs only), which are defined as any commercial organisation that has fewer than 250 employees and a turnover of less than €50 million or a balance sheet total less than €43 million.²⁸ All SMEs, regardless of industry, may be eligible to participate in the sandbox program. Crucially, international SMEs are also eligible for participation. The purpose of limiting the program to SMEs only is that it would minimise the risk of rent-seeking by large corporations, keep administrative burdens of the sandbox unit manageable, while still facilitating gains from innovation; since 20-30 per cent of most innovation comes from new entrants into markets.²⁹

Firms wishing to enter the sandbox would first submit an application, demonstrating they have a proposal for an innovative product that would benefit consumers but which is currently impeded by current regulations. Each applicant must submit an application and outline answers to the criteria set out in Figure 4.

Recommendation 2: Application and evaluation processes for sandbox applications should be significantly streamlined. Government should implement a rolling application system with no specific deadlines to encourage continuous innovation, and establish a two-round evaluation process involving generalists and technical specialists.

²⁸ Foreign, Commonwealth and Development Office, *Small to Medium Sized Enterprise (SME) Action Plan*, 2023.

²⁹ Daniel Garcia-Macia, Chang-Tai Hsieh, and Peter Klenow, 'How Destructive Is Innovation?', *Econometrica* 87, no. 5 (2019).

Figure 4: Criteria for sandbox applicant firms

Criteria	Objective	Application questions to answer
Innovative potential	The firm’s application materials should articulate the way in which the proposed product, service or business process includes or incorporates new technologies, or existing technologies utilised in an innovative way.	<ul style="list-style-type: none"> Describe the innovative product, service, or business model you intend to test? What are the potential consumer and industry benefits of your innovation?
Need for testing	The applicant must demonstrate the need for testing within the sandbox, by providing details on how the project cannot be deployed under the current regulatory framework. Applicants should provide an explanation of specific regulatory hurdles, barriers or constraints posed by the current framework for the proposed business model or product in question.	<ul style="list-style-type: none"> Why is a regulatory sandbox necessary for your test?
Readiness	<p>The applicant must be ready to start testing within six months of approval and have the necessary resources to do so.</p> <p>The proposal should show that the applying firm has secured or intends to secure relevant assets and resources for experimentation and has clearly defined test scenarios and outcomes.</p>	<ul style="list-style-type: none"> What is your plan for the testing phase, including timelines, milestones, and risk management? What type of testing will be conducted and what is the estimated project period?
Risk management	The applying firm is to present a plan for managing risks to consumers and the relevant stakeholders. Significant risks arising from the proposed technology, product or service should be foreseen, assessed, and mitigated; for instance, by providing evidence of preliminary testing, and by identifying risks and proposing mitigating measures.	<ul style="list-style-type: none"> How will you ensure consumer protection during the testing phase?

5.2 Evaluation process

The Regulatory Relief Unit would comprise a committee to consider proposals. This committee would comprise of five generalists, who would review each application and send it to a specialist in the relevant field to decide whether or not to progress to the testing phase should it satisfy the requirements of the sandbox. The specialist would not be known to the company, but the company would be known to the specialist (single blind review), to allow them to carry out their work as required but to minimise the risk of rent seeking or regulatory collusion.

All applicants would be screened by the committee for whether they meet the basic firm criteria, and whether the business plan provided adequately addresses the four above-mentioned criteria. All applications are then forwarded to the specialist external assessor for a second review, to provide technical feedback. If the external assessor agrees that the project is technically feasible, then the testing phase would begin, with the firm submitting monthly review reports to ensure that consumer safety was being maintained.

At the conclusion of the sandbox, the firm would then submit a final report, which would then be reviewed by the same external assessor who would give a recommendation, with reasoning, about whether any regulatory change should be made permanent. The committee would then make its own decision, publicly publishing their reasons for disagreeing with the external assessor should they do so. Any regulatory relief granted would then be applied across the whole economy to all relevant firms, and other regulatory bodies would not be permitted to overturn the results, possibly requiring primary legislation.

For the above process, the Regulatory Relief Unit shall maintain a pool of potential external assessors across the public and private sector. These assessors must demonstrate knowledge and experience pertaining to the industry in question and must sign relevant legal agreements and disclosures to bar any potential conflicts of interest. Thus, while the sandbox is open to all SMEs, it may also draw on specific domain knowledge held by specialists in the wider innovation ecosystem. Importantly, all decisions made by external assessors and the general committee, as to whether the application is to be approved or rejected and the relevant reasons for said decision, shall be made public.

For added transparency and provision of information to customers, relevant information of all approved Sandbox applications such as the name of the applicant, the start and expiry dates of the sandbox experimentation and a broad description of the program would be published on the Regulatory Relief Unit's website.

Recommendation 3: Take steps to inculcate a new governance culture for innovation policy that is not dominated by top-down or mission-led models but reflects the complexity of the innovation landscape. This would mean a new, sector-neutral way of thinking about regulation to promote 'permissionless innovation', reducing the burden on central policymakers and maximising the scope for experimentation across different industries. As a first step, a new overarching regulatory framework and guidance should be issued, instructing regulators to aim for the development of fewer, simpler, and less sector-specific regulatory rules.

Recommendation 4: Ensure public disclosure of all approved sandbox applications, including broad program descriptions, on the Regulatory Relief Unit's website.

5.3 Regulatory learning, relief and assessment

The purpose of this sandbox would not merely be to grant temporary relief to participant firms, but to allow state officials to learn from the testing phase and relevant reviews. This could be achieved in two ways.

Relevant officials from government ministries could be attached to specific firms who are engaging in product testing, and asked to produce a report of findings that may inform future regulatory initiatives. These findings may be incorporated into regulatory work by the relevant agencies even if the final regulatory proposal is not approved by parliament (see process map).

Review decisions made by the committee and technical assessor in the post-testing phase would be published in full and shared with relevant agencies and ministries. Proposals made may then be approved or rejected by Parliament for further regulatory reform.

Aside from regulatory learning, the findings from the sandbox testing would feed into a decision by the committee on whether further economy-wide regulatory change is warranted. Any such positive decision would also, if appropriate, extend the temporary regulatory relief to the participant firm on a permanent basis, ensuring that firms would still receive some advantage from originally proposing the change. This is to partially avoid a scenario in which firms deem participation in the sandbox as leading to too much free riding by other firms.

Recommendation 5: Shift from providing temporary regulatory relief to incorporating a comprehensive system of regulatory learning and adaptation, where findings from sandbox ‘experiments’ are comprehensively recorded, studied, and used to inform broader regulatory reform. Systematically testing regulators through these sandboxes will then enable a higher level of adaptation and learning within regulatory agencies.

6. Conclusion

This paper advocates for the adoption of a general-purpose regulatory sandbox in the UK, modelled on that of Japan, to foster innovation and economic growth. Sector-specific sandboxes, while beneficial, limit the scope of innovation by confining it to predetermined industries. Instead, a general-purpose sandbox would provide a more open environment, allowing for a broader range of experiments across various sectors.

While there may be a need for reform of the existing status quo, and also a role for the State in innovation policy, these do not necessarily mean that a mission-led governance approach is the proper response. This is especially in consideration of the fact that economic innovation is a complex phenomenon, and with no clear “lever” with which a policymaker can pull to achieve a definite outcome. Rather than seeking to enhance a state’s “directive intelligence” to steer the economy in a mission-led manner, a better response is to reduce the decision-making burden on policymakers and instead adopt a rules-based approach to innovation that facilitates permissionless innovation.

The proposed sandbox would not only reduce typical bureaucratic hurdles posed by the regulatory state, but also serve as an *adaptive learning mechanism* for regulatory bodies. By allowing firms to test new products and services within a controlled environment, regulators can gather real-world data to inform future legislation and adapt regulations to evolving market needs. This approach would foster a more dynamic and responsive regulatory framework, which is crucial in an age marked by rapid technological advancements and changing market landscapes.

Based on our model, we estimate that sandboxes could reduce the minimum required firm profitability by 5-18 per cent, both resulting in new products being introduced and increasing competition in existing markets, with both effects lowering prices and increasing the variety and quality of products available to consumers. Under the right conditions (elaborated in the appendix below), this could result in an increase in productivity growth equivalent to 1.4-7.6 per cent of GDP. Ultimately, the implementation of a general-purpose regulatory sandbox in the UK represents a forward-thinking strategy to catalyse innovation, drive economic growth, and maintain regulatory relevance in the 21st century.

Appendix: a simple model of the possible gains from a general-purpose sandbox

To assess the effects of sandboxes, we model their effects on the minimum viable profitability of a firm whose success is uncertain such that it receives sufficient funding to come to market. Entrepreneurs raise capital K from perfectly competitive capital markets, with the probability p of success of a project some strictly increasing function of capital raised. They finance this by offering a rate of return Δ on all capital invested, given project success. This is somewhat distinct from real-world capital markets where funding for startups tends to take the form of selling shares not bonds: however, assuming risk neutrality, this distinction will not matter for our purposes as selling shares and a variable amount of bonds are equivalent assuming perfect β knowledge. This implies

$$\pi = p(\beta - \Delta K)$$

As capital markets are perfectly competitive, the condition on necessary returns is

$$\Delta p = 1+r$$

By the zero-profit condition for investors. Assume

$$p = 1 - e^{-\alpha K}$$

Each unit of capital allocated to a firm reduces its probability of failure by the same percentage, and that firms retain idiosyncratic probability of failure q subsequent to the problem resolution. Then

$$K = (1/\alpha) \ln(\alpha\beta q/(1+r))$$

$$p = 1 - (1+r)/\alpha\beta q$$

And the minimum return requirement conditional on success for single-period positive profit is

$$\beta = (1+r)/\alpha q$$

Regulatory uncertainty

Importantly, even though investors are risk-neutral, later resolution of uncertainty regarding firm survival is costly because this raises minimum firm profitability requirements and thus lowers firm entry. Firm failure probabilities before any funding rounds would have no effect on investment, although it would affect the entrepreneur entry decision, taken here to be exogenous. As the success probability in the subsequent period can be viewed as exogenous failure, and thus substituted to solve for if the firm faces some existential risk only at the end of the second period, then

$$\beta = ((1+r)/q) (1/\alpha_1 + 1/\alpha_2)$$

If uncertainty is resolved between the first and the second period, then investors in the second period will have some strictly lower firm failure probability, so will be willing to invest at a lower price: this will lead to the entrepreneur to both be willing to undertake the project at some lower level of profitability to begin with, but also to issue more shares raising the probability of project

success further and thus also reducing the cost of funding in the previous round. This reduces β to

$$\beta = (1+r)((1/a1q)+(1/a2))$$

Parameter estimation

Interest rates r will be set at 6 per cent: the probability of regulatory rejection q will be set today at 18 per cent, and varied. Alpha will be presented at various values related to possible project sizes. CB Insights 2021 found that 18 per cent of start-ups failed due to regulatory issues: this is likely an understatement of the overall failure rate as some start-ups will anticipate regulatory difficulties, either due to familiarity with the legislation preventing their activity or due to knowledge relating to the general difficulty of entering certain industries, so results with 25 per cent will also be presented.

Figure 5: Model results

	Present, 18% rejection	Present, 25% rejection	Regulatory sandboxes, 18% rejection	Regulatory sandboxes, 25% rejection	Regulatory sandboxes, 18% to 10%	Regulatory sandboxes, 25% to 15%
Minimum viable profitability	2.58	2.83	2.35	2.47	2.24	2.31

Discussion

Assuming that the elasticity of firm entry to profits is unity, this represents an increase in productivity growth given that 20-30 per cent of all productivity growth is from new firm entry of 1-5.4 per cent.³⁰ When added to existing UK productivity growth of 0.7 per cent/year, if UK companies could capture half of the surplus from export this gives an increase in growth of 0.035-0.0189 per cent, which under a discount rate of 5 per cent has present value of 1.4-7.6 per cent of GDP. The assumption about surplus is necessary as while within the domestic economy the distribution of the surplus from innovation does not matter, across countries only exports will contribute to UK GDP.

The benefit of regulatory sandboxes is that, as resolution of uncertainty in some later period supresses investment in all prior periods compared to any prior decision time, including periods before both possible decision points, sandboxes result in substantial additional firm entry. We estimate that the gains are that minimum viable firm profitability would decline 5-18 per cent, boosting market entry and creating a greater diversity of products for consumers at lower prices while reducing market power. This could also have potentially substantial externalities across product markets, not modelled here, if it causes regulators to learn and improve practice across industries.

Note that, as investors in earlier periods would prefer for entrepreneurs to commit to raise more capital than is immediately profit-maximising, we assume that due to informational

³⁰ Daniel Garcia-Macia, Chang-Tai Hsieh, and Peter Klenow, 'How Destructive Is Innovation?', *Econometrica* 87, no. 5 (2019).

asymmetries regarding the probability of success of firms entrepreneurs cannot pre-commit to raise additional capital than is naively optimal in each period. This principal-agent problem occurs because investors after they have bought shares offering some guaranteed rate of return if the firm succeeds care strictly about maximising the probability of success, while the entrepreneur will ignore their welfare, resulting in sub optimally little capital being raised. The net effect of this assumption on the value of sandboxes is ambiguous; however, as firm survival lengths follow a Weibull distribution this seems to represent a relatively minor issue as firm failure probabilities is for young firms decreasing with age.³¹

Importantly, this all requires no assumptions regarding sector specific characteristics: any area of the economy which has a non-zero rate of firm entry, and any involvement of regulators, can benefit from the introduction of sandboxes under the mechanism designed here. Gains from existing regulatory sandboxes in finance cannot be expected to scale linearly, as such sandboxes will have the largest effect in areas with the highest rates of innovative new firm entry and regulator influence over products offered, which are especially high in finance.³²

However, this still leaves substantial value to be created. Key assumptions that could be investigated as being loosened are to assess the effect if capital markets are imperfect, as may be the case for large UK start-ups - while the combined market size may exceed France and Germany combined, this is still an order of magnitude smaller than the US market.³³ As this would raise the interest rate which the firm would pay on large capital offerings, this would increase their final failure rate, with potentially large effects on profitability due to effects on the required return at each previous stage. Additionally, β is assumed independent of firm number: increased competition could potentially decrease it as more innovative firms enter, or if incumbents face disruption more frequently, rendering adaption worth further investigation and the increase in the number of possible business ideas smaller.

³¹ Serguei Kaniovski and Michael Peneder, 'Determinants of Firm Survival: A Duration Analysis Using the Generalised Gamma Distribution', *Empirica* 35 (2008).

³² Giulio Cornelli et al., 'Regulatory Sandboxes and Fintech Funding: Evidence from the UK', *Review of Finance* 28, no. 1 (2024).

³³ HM Treasury, *Build Back Better: Our Plan for Growth*, 2021; Tech Nation, *UK Tech for a Changing World*, 2020.

Bibliography

- Behavioural Insights Team. 'The Rise of Evidence-Based Policymaking?', 2022.
- Cabinet Secretariat, Government of Japan. *Japan's Regulatory Sandbox*, 2018.
- CB Insights. *State of Venture 2021 Report*, 2022.
- Cornelli, Giulio, Sebastian Doerr, Leonardo Gambacorta, and Ouarda Merrouche. 'Regulatory Sandboxes and Fintech Funding: Evidence from the UK'. *Review of Finance* 28, no. 1 (2024).
- DeCanio, Samuel. 'Democracy, the Market, and the Logic of Social Choice'. *American Journal of Political Science* 58, no. 3 (2013).
- — —. 'Efficiency, Legitimacy and the Administrative State'. *Social Philosophy and Policy* 38, no. 1 (2021).
- Department for Business and Trade, and Department for Business, Energy and Industrial Strategy. *Business Perceptions Survey 2022*, 2023.
- Eggers, William D., Mike Turley, and Pankaj Kishnani. 'The Future of Regulation: Principles for Regulating Emerging Technologies'. *Deloitte*, 2018.
- Epstein, Richard Allen. *Simple Rules for a Complex World*. Harvard University Press, 1995.
- Fernald, John, and Robert Inklaar. 'The UK Productivity "Puzzle" in an International Comparative Perspective'. *Federal Reserve Bank of San Francisco Working Paper*, 2022.
- Financial Conduct Authority. 'Regulatory Sandbox', 2022.
- Fingleton, John. 'Economic Regulation and Productivity'. *Fingleton Insights*, 2022.
- Foreign, Commonwealth and Development Office. *Small to Medium Sized Enterprise (SME) Action Plan*, 2023.
- Garcia-Macia, Daniel, Chang-Tai Hsieh, and Peter Klenow. 'How Destructive Is Innovation?'. *Econometrica* 87, no. 5 (2019).
- Governor's Office of Economic Opportunity. 'Utah Office of Regulatory Relief', 2021.
- HM Treasury. *Build Back Better: Our Plan for Growth*, 2021.
- IMF European Department. 'United Kingdom's Long-Run Prosperity Hinges on Ambitious Reforms'. International Monetary Fund, 2023.
- Intellectual Property Office. *Innovation and Growth Report 2021-22*, 2022.
- Kaniovski, Serguei, and Michael Peneder. 'Determinants of Firm Survival: A Duration Analysis Using the Generalised Gamma Distribution'. *Empirica* 35 (2008).
- Kataoka, Shuhei. 'Japan's New Policy for Testing Innovative Propositions for Growth with Government: The Regulatory Sandbox'. *Banking & Finance Law Review* 35, no. 1 (2019).
- Mazzucato, Mariana. *Mission Economy: A Moonshot Guide to Changing Capitalism*. Harper Business, 2021.

— — —. *The Entrepreneurial State: Debunking Public vs Private Sector Myths*. Penguin Books, 2013.

Mingardi, Alberto. 'A Critique of Mazzucato's Entrepreneurial State'. *Cato Journal* 35, no. 3 (2015).

National Audit Office. *Evaluating Government Spending*, 2021.

Office for Budget Responsibility. *The Productivity Puzzle*, 2012.

Pennington, Mark. *Robust Political Economy*. Edward Elgar Publishing, 2011.

Sunley, Peter, Jack Harris, and Emil Evenhuis. 'Industrial Policies, Strategy and the UK's Levelling up Agenda'. *Local Economy: The Journal of the Local Economy Policy Unit* 37, no. 5 (2022).

Tech Nation. *UK Tech for a Changing World*, 2020.

The Economist. 'Low Economic Growth Is a Slow-Burning Crisis for Britain'. *The Economist*, 2022.

World Bank. 'Global Experiences from Regulatory Sandboxes'. World Bank Group, 2020.

— — —. 'Key Data from Regulatory Sandboxes across the Globe'. World Bank, 2020.

REFORM

ISBN: 978-1-910850-59-6



[@reformthinktank](https://twitter.com/reformthinktank)



info@reform.uk



www.reform.uk