REGULATORY SANDBOXES: ONE DECADE ON

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ABSTRACT

Regulatory sandboxes have spread like wildfire since the U.K. Financial Conduct Authority launched its sandbox for financial technology businesses (fintech) one decade ago. Despite widespread adoption, however, there is little empirical evidence available to assess whether the signature sandbox policy combination of regulatory rollbacks and regulatory guidance is in fact good policy. The empirical evidence that is available suggests that regulatory sandboxes are beneficial for the tech firms that participate in them, but tells us nothing about how regulatory sandboxes have impacted the broader enterprise of regulation, or whether the innovation generated by sandbox participants is beneficial for anyone other than the innovating firms themselves. From the outset, there were reasons to be concerned about sandboxes' deregulatory impact and grounds for skepticism about the type of regulatory learning that sandboxes wou.ld facilitate. A decade of experience with fintech sandboxes has not allayed those concerns; sometimes it has deepened them.

Careful attention to sandbox design features can mitigate some concerns, but we should not skip straight to design questions without first considering whether a regulatory sandbox is appropriate at all. A reckoning with the sandbox model is particularly necessary at this moment, when there is a push to use sandboxes to further innovation in generative artificial intelligence (AI). It is becoming increasingly clear that simply scaling up generative AI will not solve its limitations, just as it is becoming increasingly clear that generative AI tools have significant negative impacts on privacy, intellectual property rights, and our environment (among other things). In these circumstances, it seems foolhardy to rush headlong into adopting sandboxes that roll back legal protections in order to let AI thrive.

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I. INTRODUCTION

Regulators in every field, in countries all around the world, are considering which regulatory approaches to apply to evolving technologies. In 2015, the U.K.'s Financial Conduct Authority (FCA) announced that it was developing a regulatory sandbox for new financial technology businesses (fintechs), and the concept has spread like wildfire in the decade since.[1] The basic premise is that a regulatory sandbox will allow select firms to engage in a limited launch of their products in an environment characterized by fewer rules and less risk of enforcement. The goals of regulatory sandboxes are twofold. First, it is hoped that the sandbox model will reduce regulatory barriers to entry that might impede fintech innovation. Second, regulatory sandboxes are intended to afford regulators an opportunity to learn about new fintech technologies as they oversee sandbox trials and consider how their practices might need to adapt in light thereof. In recent years, policymakers around the world have also expressed significant interest in using sandboxes to facilitate artificial intelligence (AI) innovation and inform new regulatory strategies for AI. But a decade of experience with fintech regulatory sandboxes provides limited support for AI sandboxes as a policy matter.

Despite widespread adoption, there is little empirical evidence available to help assess whether fintech sandboxes have achieved their goals. The empirical evidence that is available focuses on metrics of innovation: the ability of participating firms to attract funding and the number of patents obtained by such firms.[2] But that kind of data tells us nothing about how regulatory sandboxes have impacted the broader enterprise of regulating fintech, or indeed whether the fintech innovation generated by sandboxes is beneficial to anyone beyond the innovating firms themselves.

1. *See infra* Section II.
2. *See infra* Section III.

This lack of supportive data is important, because there are reasons to be pessimistic about fintech sandboxes' ability to further their goals. First, it is unclear that fintech innovation is generating sufficient societal benefits to justify rolling back important regulations that protect consumers and the broader financial system from harm.[3] Second, there are important constraints on what regulators can learn from sandbox trials, stemming from the non-representative nature of sandbox participation as well as conditions that are highly conducive to regulatory capture.[4] There are also constraints on regulators sharing the knowledge they *do* glean from the sandbox.[5]

Policymakers should therefore be wary of leaping headfirst into adopting AI sandboxes—especially because many of the jurisdictions that have rushed to adopt fintech sandboxes have been unpleasantly surprised by the operational costs they entailed.[6] The remainder of this Article will proceed as follows: Section II provides some brief background on the justifications for adopting fintech sandboxes. Section III looks at the evidence available to assess how valid these justifications are and finds reason for pessimism. Section IV considers in more detail sandboxes' twin goals of promoting innovation and improving regulation, and how those goals are likely to be served by AI sandboxes. It also discusses some sandbox challenges that are exacerbated when applied cross-border. This analysis suggests reasons for policymakers to be wary of deploying AI sandboxes. Section V therefore concludes that increased wariness of the sandbox model is warranted, as is a more wholesale reckoning with our veneration of Silicon Valley-style innovation.

II. THE REGULATORY SANDBOX PREMISE

In 2016, the FCA advertised its first regulatory sandbox as "a 'safe space' in which businesses can test innovative products, services, business models, and delivery mechanisms while ensuring that consumers are appropriately protected."[7] Since then, participants in the FCA's

3. *See infra* Section IV.B.

4. *See infra* Section IV.A.

5. *See infra* Section IV.A.

6. WORLD BANK & CAMBRIDGE CENTRE FOR ALTERNATIVE FINANCE (CCAF), REGULATING ALTERNATIVE FINANCE: RESULTS FROM A GLOBAL REGULATOR SURVEY 71–72 (2019) [hereinafter World Bank & CCAF], https://openknowledge.worldbank.org/server/api/core/bitstreams/4d8e205f-6a93-5f4a-ae0f-e04c3ffb9b2f/content.

7. Press Release, Fin. Conduct Auth., Financial Conduct Authority's Regulatory Sandbox Opens to Applications (May 9, 2016), https://www.fca.org.uk/news/press-releases/financial-conduct-authority%E2%80%99s-regulatory-sandbox-opens-applications.

sandbox have focused on using technology to develop new lending, investments, banking, and payments products.[8] Over the last decade, many other jurisdictions have followed suit and adopted their own fintech regulatory sandboxes.[9] Although there has been significant variation in the design and objectives of the sandboxes implemented by different authorities,[10] fintech sandbox objectives have typically been drawn from the following menu:

- Support financial innovation and fintech firms who are seeking to offer innovative new products, services or business models;
- Foster a financial services system that is more efficient and manages risks more effectively;
- Understand how emerging technologies and business models interact with the regulatory framework and where it may lead to barriers to entry;
- Promote effective competition in the interest of consumers; and
- Promote financial inclusion for consumers.[11]

Sandboxes are generally assumed to be win-win-wins: helping innovators to attract funding and bring their products to market faster; ensuring consumers have access to more fintech products; and allowing regulators to learn about fintech products and their relationship with financial regulations (not to mention branding the jurisdiction in question as innovation-friendly).[12]

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8. *See Regulatory Sandbox accepted firms*, FIN. CONDUCT AUTH. (last visited Apr. 4, 2025), https://www.fca.org.uk/firms/innovation/regulatory-sandbox/accepted-firms.

9. "By now, over 50 countries have followed the UK and introduced their own regulatory sandbox, often with the goal of nurturing the fintech sector." Giulio Cornelli et al., *Regulatory Sandboxes and Fintech Funding: Evidence from the UK*, 28 REV. FIN. 203, 203 (2023).

10. For a survey of different approaches to constructing fintech sandboxes, see also Deirdre M. Ahern, *Regulatory Lag, Regulatory Friction and Regulatory Transition as FinTech Disenablers: Calibrating an EU Response to the Regulatory Sandbox Phenomenon*, 102 EUR. BANKING INST. WORKING PAPER SERIES 1 (2021).

11. GLOB. FIN. INNOVATION NETWORK, CONSULTATION DOCUMENT 17 (2018), https://files.consumerfinance.gov/f/documents/bcfp_global-financial-innovation-network_consultation-document.pdf.

12. FINTECH WORKING GRP. OF THE UNITED NATIONS SEC'Y-GEN.'S SPECIAL ADVOC. FOR INCLUSIVE FIN. FOR DEV. (UNSGSA) & CCAF, EARLY LESSONS ON REGULATORY INNOVATIONS TO ENABLE INCLUSIVE FINTECH: INNOVATION OFFICES, REGULATORY SANDBOXES, AND REGTECH 30 (2019), https://www.unsgsa.org/sites/default/files/resources-files/2020-09/UNSGSA_Report_2019_Final-compressed.pdf.

The regulatory sandbox concept has also spread beyond fintech in the decade since the FCA launch, with regulators offering sandbox dispensations in fields ranging from autonomous vehicles to the practice of law.[13] A 2023 report from the Organisation for Economic Co-operation and Development (OECD) stated that approximately 100 sandbox initiatives had been implemented around the world at that time.[14] In particular, there is growing interest in using the sandbox model to suspend regulations in order to facilitate experimentation with AI.[15] The case for AI sandboxes echoes the arguments that have been advanced in favor of fintech sandboxes, and law professor Wolf-Georg Ringe has summarized this case as follows:

> A regulatory sandbox promises a number of advantages. First, it promotes innovation: AI is a rapidly evolving technology, and the regulatory environment has struggled to keep up. A sandbox allows for the development of new AI technologies in a controlled environment reducing the risk of violating laws or regulations. This has proven to reduce the so-called 'time to market' for innovations, giving new businesses increased legal certainty and thereby leading to more innovation.
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> A related advantage is the speed of response to new technological developments. Current legislative efforts such as the EU AI Act are very slow to adopt—it was proposed in April 2021 and is still making its way through the legislative process, not expected to become binding before 2025/26. Worse still, once a piece of classic legislation such as this one is adopted, it will be extremely difficult to overhaul it in the future to keep track with new developments. In some ways, the AI Act is already now outdated as it was first conceived in a world without generative AI and chatbots such as ChatGPT. A sandbox, in contrast, is a flexible and responsive tool to respond to new developments and can be adjusted quickly to take into account new challenges.

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13. Cristie Ford & Quinn Ashkenazy, *The Legal Innovation Sandbox*, AM. J. COMP. L. (forthcoming in 2023); *see also* Joshua T. J. Burd, *Regulatory Sandboxes for Safety Assurance of Autonomous Vehicles*, 7 U. PA. J.L. & PUB. AFF. 194 (2021).

14. OECD, REGULATORY SANDBOXES IN ARTIFICIAL INTELLIGENCE, OECD DIGITAL ECONOMY PAPERS NO. 356 8 (2023).

15. *See* Notes 17-20 *infra*.

> At the same time, the sandbox regime provides safeguards for consumer protection. AI systems have the potential to cause harm to consumers, and a regulatory sandbox can help ensure that AI systems are safe for use. The sandbox allows for testing of AI systems in a controlled environment, identifying and mitigating potential risks. This can help protect consumers and ensure that they have confidence in the technology being developed.
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> A sandbox further enables collaboration: it brings together regulators, businesses, and other stakeholders to collaborate on the development of AI technologies. This collaboration can lead to more effective and efficient regulations that balance the needs of innovation with public safety. This learning process for regulators and regulatees is a win-win situation and can help build trust in the technology and increase adoption.[16]

On the ground, some AI experimentation is already happening in sandboxes. Operators of fintech sandboxes in jurisdictions like the United Kingdom and Singapore have considered financial applications of AI[17] (and at least one bill has been proposed in the United States to create a sandbox that would allow financial services firms to experiment with AI).[18] But AI-focused sandboxes also exist separate and apart from the field of financial regulation. Some jurisdictions, including the U.K. and Norway, have AI-related sandboxes that focus on privacy laws.[19] These kinds of sandboxes are likely to proliferate across the EU in the coming years, as its AI Act requires each Member State to have at least one operational regulatory AI sandbox by August 2, 2026 or to participate in joint sandboxes with other EU Member States by that date.[20] The Act contemplates the possibility of cross-border AI sandboxes in anticipation of AI firms' desire to operate in multiple jurisdictions; due to the cross-cutting nature of AI tools, even within a single jurisdiction,

16. Wolf-Georg Ringe, *Why We Need a Regulatory Sandbox for AI*, OXFORD BUS. L. BLOG (May 12, 2023), https://blogs.law.ox.ac.uk/oblb/blog-post/2023/05/why-we-need-regulatory-sandbox-ai.

17. OECD, *supra* note 14, at 30-31.

18. Unleashing AI Innovation in Financial Services Act, S. 4951, 118th Cong. (2024).

19. OECD, *supra* note 14, at 30-31.

20. Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act), 2024 O.J. (L 1689) ¶138.

sandboxes may necessitate cooperation among regulators in multiple fields.[21]

In recognition that the market for *financial* products and services often crosses borders,[22] an international network of innovation-minded financial regulators known as the Global Financial Innovation Network (GFIN) was launched in 2019. It has explored "the concept of cross-border testing (CBT), also known as the 'global sandbox,' . . . to create an environment that allows firms to consecutively or concurrently trial and scale new technologies, products, or business models in multiple jurisdictions."[23] The GFIN opened applications for its first cohort of cross-border testing in October 2020, with applicants being required to satisfy the eligibility criteria for each jurisdiction they wished to operate in. This proved challenging: from thirty-eight applications, only nine made it through the assessment process.[24] From those nine firms, "two firms successfully [took] forward their propositions to the live testing phase."[25] There has not been a subsequent cohort, which suggests some cause for pessimism when it comes to sandboxes that cross borders and boundaries. But is there more concrete data available with which to judge regulatory sandboxes?

III. Evidence from Ten Years of Sandbox Operations

The first "report card" on regulatory sandboxes came from the U.K.'s FCA in 2017: a self-assessment of the beginning of its own sandbox experiment.[26] In the report, the FCA comments favorably on the sandbox's success in the following areas:

- Reducing the time and, potentially, the cost of getting innovative ideas to market.
- Enabling greater access to finance for innovators, by reducing regulatory uncertainty.

21. "There must be co-operation between firms, competition authorities, intellectual-property offices, national standardisation bodies, and data protection authorities, among others." OECD, *supra* note 14, at 9.

22. Glob. Fin. Innovation Network, *supra* note 11, at 4.

23. GFIN, The Global Financial Innovation Network Cross-Border Testing Initiative: Cohort 1.0 4 (2022), https://www.thegfin.com/uploads/publications/pdf/1719323347_GFIN+Cross-Border+Testing+Initiative+Cohort+1_0+external+2_FINALFINAL.pdf.

24. *Id.*

25. *Id.*

26. FCA, Regulatory Sandboxes Lessons Learned Report (2017), https://www.fca.org.uk/publications/research/regulatory-sandbox-lessons-learned-report.

- Enabling more products to be tested and, thus, potentially introduced to the market.
- Allowing the FCA to work with innovators to ensure that appropriate consumer protection safeguards are built into new products and services.[27]

The first three of these objectives redound most directly to the benefit of the innovators themselves. The last objective speaks more to the needs of the public—the FCA bases its satisfaction regarding this fourth objective in part on the fact that it has "worked with firms to develop bespoke safeguards for tests."[28]

Independent empirical assessment of regulatory sandboxes has been limited thus far. A prominent 2024 publication by economists from the Bank for International Settlements (BIS) notes that "despite their widespread adoption and significant attention in the media and policy circles, little systematic empirical evidence exists on whether sandboxes actually help fintechs to raise funding, innovate, or develop viable business models."[29] The BIS goes on to engage in an empirical assessment of U.K. sandbox firms' access to capital, survival, and patenting rates, and concludes that there is evidence that "sandboxes achieve one of their key goals: to help young fintechs raise capital and spur innovative activity."[30] In a similar vein, another empirical study by technology scholars Jayoung James Goo and Joo-Yuen Heo favorably describes the impact of regulatory sandboxes on fintechs' ability to attract venture capital funding.[31]

Like the U.K. FCA self-assessment, this empirical research focuses primarily on the impact of regulatory sandboxes on innovation and innovators. It provides evidence that it is beneficial for fintech firms to be part of a sandbox cohort. That finding may, however, implicate concerns about government agencies "picking winners"; in other words, innovation may prove harder for those firms that are *not* selected for a sandbox cohort. While the BIS authors note that sandbox participants' improved access to capital "is consistent with the notion that the sandbox reduces information asymmetries between investors and firms, as well as costs associated with regulatory uncertainty," they do not rule

27. *Id.* at 3.

28. *Id.* at 7.

29. Cornelli et al., *supra* note 9, at 204.

30. *Id.* at 231.

31. Jayoung James Goo & Joo-Yeun Heo, *The Impact of the Regulatory Sandbox on the Fintech Industry, with a Discussion on the Relation between Regulatory Sandboxes and Open Innovation*, 6 J. OPEN INNOV. TECHNOL. MARK. COMPLEX. 43, 43 (2020).

out the alternative explanation that "selection into the sandbox could serve as a stamp of approval and help sandbox firms raise more capital."[32]

More fundamentally, the limited empirical research available answers only a tiny piece of the bigger picture question: are fintech regulatory sandboxes good policy overall? The authors from the BIS are careful to note that their "results do not necessarily imply that sandboxes are unambiguously welfare-enhancing. Operating sandboxes often require public funds, and helping young firms raise capital is only one objective besides others, for example, increasing consumer welfare or maintaining financial stability."[33] Furthermore, the BIS research is predicated on the assumption that sandboxes "provide regulators with the ability to support safe innovation by gauging the potential welfare implications of new products *before* they are launched."[34] However, recent research by law professor Doug Sarro, discussing Canadian securities regulators' experience with crypto sandboxes, suggests that regulatory sandboxes' impact on objectives like consumer welfare and financial stability may be profound for new products even *after* they are launched to the broader public.[35]

Sarro observed that despite general assumptions that firms will comply with the full panoply of regulations once they graduate from a sandbox, Canadian provincial securities regulators "used these tools to oversee trading platforms not only within their sandbox, but also long after these firms' (nominal) exit from that sandbox."[36] Furthermore, Sarro observed that there are grounds for skepticism with regard to the bespoke consumer protections devised for the sandbox trial (and kept in place thereafter). He finds that,

> Rather than anticipating emerging risks posed by trading platforms, regulators tended to act on risks only where analogies could be drawn to more familiar risks posed in the traditional securities sector, or after these risks crystallized into consumer harms serious enough to turn a public spotlight on regulators' apparent inaction.[37]

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32. Cornelli et al., *supra* note 9, at 205–06.

33. *Id.* at 231.

34. *Id.* at 207 (emphasis added).

35. Douglas Sarro, *Sandbox Fictions,* OSGOODE HALL L.J. (Jan. 17, 2025) (forthcoming) (manuscript at 4).

36. *Id.* at 4.

37. *Id.* at 3.

A 2019 report issued by the U.N. Secretary-General's Special Advocate for Inclusive Finance for Development (UNSGSA) and the Cambridge Center for Alternative Finance (CCAF) also suggests other grounds for skepticism regarding regulatory sandboxes. The headline finding of that report is as follows:

> Lessons learned from early regulatory sandboxes highlight that they are neither necessary nor sufficient for promoting financial inclusion. Sandboxes do offer benefits but are complex to set up and costly to run. Experience shows that most regulatory questions raised in connection with sandbox tests can be effectively resolved without a live testing environment. Similar results may be more affordably achieved through innovation offices and other tools.[38]

In other words, the significant resources needed to operate a fintech regulatory sandbox might bear more fruit if deployed elsewhere (the same report found that many jurisdictions that started a regulatory sandbox were unpleasantly surprised by just how resource-intensive the sandbox proved to be).[39] Sandboxes are resource-intensive because of the degree of bespoke engagement offered by regulators to participants. This kind of regulatory handholding is expensive to provide but without it, regulatory sandboxes are likely to produce lackluster results (judged here from the perspective of participating firms).[40] These findings inevitably beg the question whether promoting fintech innovation actually needs to involve a sandbox's regulatory dispensations—guidance alone may prove to be enough to encourage innovation (and many financial regulatory agencies already have offices known as "innovation hubs" that provide this kind of guidance).[41] The more fundamental question,

38. UNSGSA & CCAF, *supra* note 12, at 7.

39. *Id.* at 31 ("Almost two thirds of those regulators interviewed noted that they had significantly underestimated the resources required to develop and operate their sandboxes.").

40. "It is the promise of facilitating real innovation in financial services without imposing real demands on these resources which accounts for sandboxes' remarkable global popularity with financial regulators. This is entirely understandable. However, we bear bad news: regulators who genuinely wish to promote innovation need to make the staff available to interact with industry, assist with advice and guidance to fintech startups seeking to navigate the regulatory maze, and, where necessary, issue bespoke waivers or other forms of dispensation of some regulatory requirements." Ross P. Buckley et al., *Building Fintech Ecosystems: Regulatory Sandboxes, Innovation Hubs and Beyond*, 61 WASH. UNIV. J. L. & POL'Y 55, 59 (2020).

41. *Id. See also* World Bank & CCAF, *supra* note 6 at 71–72.

though, is whether expenditures on nurturing private sector innovation are in the public's best interest.

IV. CONCERNS

I have previously published articles that highlight causes for concern about the regulatory sandbox model.[42] Some of these concerns can be mitigated through careful design approaches, but they cannot be eliminated entirely. Such concerns include that regulators selecting firms for regulatory sandboxes are "picking winners" and creating an unequal regulatory playing field;[43] that regulatory sandboxes may prove more expensive to operate than anticipated; [44] that such expense accrues more to the benefit of the innovators than to the public at large;[45] and that signaling openness to innovation through sandbox adoption may deliver diminishing marginal returns over time as more jurisdictions adopt sandboxes.[46] Most recently, I have focused on the concern that fintech regulatory sandboxes entail rollbacks of regulations designed to protect consumers and the broader financial system from harm.[47]

Sandbox proponents have implicitly excused this potential for increased public harm, assuming that (i) the resulting innovation will benefit the public through increased efficiency and competition, and (ii) the regulatory sandbox will allow regulators to learn more about how new technologies will operate in their markets, improving regulation in the long run.[48] However, as this Section will explore, these assumptions do not stand up to scrutiny when it comes to fintech, and are similarly unlikely to stand up to scrutiny when it comes to AI. To provide a preview, not all innovation is broadly beneficial: although innovation is seen as a necessary condition for improved efficiency and competition, what constitutes "efficiency" or "competition" is highly contested in any given context, and many interpretations will not be

42. Hilary J. Allen, *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 579 (2019) [hereinafter Regulatory Sandboxes]; Hilary J. Allen, *Sandbox Boundaries*, 22 VAND. J. ENT. & TECH. L. 299 (2020) [hereinafter Sandbox Boundaries]; Hilary J. Allen, *Experimental Strategies for Regulating Fintech*, 3 J. L. & INNOVATION 1 (2020) [hereinafter Regulating Fintech]; Hilary J. Allen, *Regulating Fintech: A Harm Focused Approach*, 52 COMPUTER L. & SECURITY REV. 105910 (2024) [hereinafter Fintech Harm].

43. Regulatory Sandboxes, *supra* note 42, at 625.

44. Fintech Harm, *supra* note 42, at 13. *See also* UNSGSA & CCAF, *supra* note 12, at 31.

45. Regulatory Sandboxes, *supra* note 42, at 640-41.

46. Regulating Fintech, *supra* note 42, at 22.

47. Fintech Harm, *supra* note 42. *See also* Regulatory Sandboxes, *supra* note 42, at 633.

48. GLOB. FIN. INNOVATION NETWORK, *supra* note 11, at 4.

broadly beneficial to society at large.[49] In addition, the transformation of financial regulators into cheerleaders and sponsors for the innovations they have selected for their sandboxes may undermine their objectivity and willingness to share what they learn, and that knowledge may be incomplete and skewed in the first place by the choice of sandbox participants.[50]

A. *Sandboxes as a Space for Regulatory Learning*

No firm is required to participate in a regulatory sandbox. Instead, sandboxes are populated by cohorts of firms that have affirmatively sought to join the sandbox. As a starting point, this means that sandboxes teach regulators nothing about firms that have designed their products and services to be fully compliant with existing laws and therefore do not need to participate in sandboxes; nor do they teach regulators about firms that claim the laws in question do not apply to them at all. Of the firms who *do* apply to be part of a sandbox cohort, not all are accepted, and there is often little by way of established criteria to guide this selection.[51]

What regulators can learn from sandboxes is therefore skewed from the start. The knowledge gained even from this skewed sample may still be valuable to regulators, but we should not assume that sandboxes are the only or best way to obtain such knowledge. As discussed above, research indicates that the success of regulatory sandboxes (judged here from the perspective of participating firms) depends on the degree of engagement those firms receive from regulators throughout the process.[52] The implication here is that the guidance dispensed by "innovation hubs" is far more valuable to participating fintech firms than the regulatory dispensations provided as part of the sandbox,[53] and one corollary of that implication is that an innovation hub is likely to be where a lot of the regulatory learning is done. As the UNSGSA and CCAF have observed, regulators who want to learn about new technologies from industry can do so through informal engagement with startups.[54] Loosening regulations is not a prerequisite for regulatory learning—about fintech, or about AI.

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49. *See infra* Section IV.B.2.
50. *See infra* Section IV.A.
51. Regulatory Sandboxes, *supra* note 42, at 625.
52. *See* Notes 30-31 and accompanying text.
53. World Bank & CCAF, *supra* note 6, at 71.
54. UNSGSA & CCAF, *supra* note 12, at 31.

Another problem with relying on regulatory sandboxes to generate regulatory knowledge is that admitting a private firm to a regulatory sandbox creates a very unusual relationship between the regulator and firm that can exacerbate regulatory capture. At the risk of oversimplification, "regulatory capture" describes a situation where regulators prioritize the interests of regulated industry over the public interest, and it can arise for many different reasons—some of them openly venal and others more subtle.[55] For an example of a more subtle version of regulatory capture, if a regulator receives most of their information about industry activities from the industry itself (and fails to consult with independent researchers and consumer groups), that information will understandably be permeated with the industry's worldview and the regulator may very well take on that worldview as a result.[56] This process has been described as "cognitive capture," and the seeming complexity of the technology underlying many fintech business models can exacerbate cognitive capture.[57] Unless regulators develop baseline technological expertise (whether through hiring or internal training and development), their ability to critically evaluate what they are being told by industry will be circumscribed.[58] Technological complexity is likely to be an equally salient problem when it comes to regulating AI,[59] and AI firms around the world are already seeking to capture regulators with the narrative that regulation will "'slow the pace of innovation' and lead entrepreneurs to 'leave the state in search of greater opportunity elsewhere.'"[60]

Cognitive capture may be a perennial concern, but the conditions for it are intensified in a regulatory sandbox where a regulatory agency has chosen to nurture a particular private firm and is responsible to a

55. For a volume discussing the definition, prevalence, and forms of regulatory capture, see James Kwak, *Cultural Capital and the Financial Crisis, in* PREVENTING REGULATORY CAPTURE: SPECIAL INTERESTS INFLUENCE AND HOW TO LIMIT IT 71, 86–89 (Daniel Carpenter & David Moss ed., 2014).

56. For an in-depth discussion of some of the mechanisms of this kind of cognitive capture, see *id.* at 86–89; for a discussion of the importance of consultation beyond industry, see generally JULIE E. COHEN, BETWEEN TRUTH AND POWER: THE LEGAL CONSTRUCTIONS OF INFORMATIONAL CAPITALISM (2019).

57. Hilary J. Allen, *Resurrecting the OFR,* 47 J. CORP. L 1., 26 (2021).

58. Erie Meyer, *Public Interest Tech Jobs: Regulate tech and AI*, CFPB BLOG (May 20, 2024), https://www.consumerfinance.gov/about-us/blog/public-interest-tech-jobs-regulate-tech-and-ai/ ("It is essential that the government has the technical expertise it needs to address and regulate this constantly evolving marketplace.").

59. *Id.* The OECD also asserts that technological expertise is critical for regulators administering AI sandboxes. OECD, *supra* note 14, at 9.

60. Katie McQue et al., *The Global Struggle Over How to Regulate AI*, REST OF THE WORLD (Jan. 21, 2025), https://restofworld.org/2025/global-ai-regulation-big-tech/.

degree for assuring its success. In other words, the role of regulator as an agent of the public can be diluted when the regulator becomes a "cheerleader" for a firm that has been admitted to its sandbox.[61] This cheerleading also has the potential to undermine regulatory cooperation across geographic and subject matter boundaries: regulators supervising sandbox trials who want "their" firms to succeed may be loath to share information with regulators carrying out similar trials for other firms.[62]

Incentives discouraging information sharing may undermine the assumption that sandboxes will improve regulatory understanding of new technologies. Siloing of regulatory knowledge has proven to be detrimental in the past—for example, one of the causes of the 2008 financial crisis was the failure of various financial regulatory agencies to discuss cross-cutting risks that affected the financial system.[63] Looking forward, given that many AI tools are intended for use in multiple jurisdictions, "international co-operation and coordination is needed for regulatory experimentation mechanisms."[64] However, a regulatory body's desire to champion its own AI sandbox firms may discourage or undermine such cooperation.

There are therefore many reasons to be skeptical about regulatory sandboxes' ability to teach regulators how to do a better job of protecting the public they are mandated to serve. In any event, as I have written previously, "regulatory sandboxes may incidentally assist financial regulators in carrying out their mandated harm-reduction functions, but that is not why these regulatory structures have been so popular. Instead, they have been premised on often superficial assumptions that accommodating private sector fintech innovation is in the best interests of society."[65] We will now turn to interrogating that second assumption.

B. *Innovation as a Regulatory Goal*

As law professor Deirdre Ahern has pointed out, the concept of the regulatory sandbox is premised on "a public interest role for regulators in improving consumer choice, price and efficiency . . . a completely

61. Deirdre Ahern, *Regulators Nurturing Fintech Innovation: Global Evolution of the Regulatory Sandbox as Opportunity-Based Regulation*, 60 EUR. BANKING INST. WORKING PAPER SERIES 1, 11 (2020).

62. Sandbox Boundaries, *supra* note 42, at 319.

63. *See generally* Gillian Tett, *Silos and Silences. Why So Few People Spotted the Problems in Complex Credit and What That Implies for the Future*, 14 BANQUE DE FR. FIN. STABILITY REV. 121, 121–29 (2010).

64. OECD, *supra* note 14, at 9.

65. Fintech Harms, *supra* note 42, at 14.

different driver than a regulatory model predicated on risk-reduction."[66] But there are reasons to be skeptical that the types of competition and efficiency produced by fintech sandboxes are broadly beneficial to the public overall—and so abandoning risk reduction may well prove misguided. There are also increasing indications that we should be similarly skeptical of AI innovation's ability to deliver public benefits.[67] In such circumstances, it is hard to justify policies that accommodate innovation by rolling back regulatory protections designed to protect the public from harm. But that is precisely what sandboxes are designed to do.

1. Limited Benefits of Fintech and Generative AI Innovation

Mandates to promote innovation benefit the innovators first and foremost. There is an assumption that beneficial second-order effects will flow from that innovation to others, but in reality not all innovations are win-wins and so that assumption does not necessarily stand up to scrutiny.[68] Doug Sarro, for example, infers from his study of Canadian crypto sandboxes that "Canadian regulators' efforts . . . lend at least some weight to concerns that sandboxes might put innovators ahead of consumers."[69] As I and others have outlined in previous research, the reality is that many fintech products offer little by way of useful technological innovation beyond slick apps and pleasant web interfaces.[70] Some fintech products are downright harmful "predatory inclusion," offering products and services to previously excluded marginalized communities but exploiting those marginalized communities in the process.[71] Often, the source of fintech profitability is not any technological edge, but the ability to justify—on the grounds of

66. Ahern, *supra* note 61, at 2–3.

67. *See infra* Section IV.B.1.

68. For a fulsome discussion of this issue, see Christopher Buccafusco & Samuel N. Weinstein, *Antisocial Innovation*, 58 GA. L. REV. 573 (2024).

69. Sarro, *supra* note 35, at 38.

70. On the limitations of fintech innovation, see Christopher K. Odinet, *Predatory Fintech and the Politics of Banking*, 106 IOWA L. REV. 1739, 1746 (2021); *see generally* Lindsay Sain Jones & Goldburn Maynard, *Unfulfilled Promises of the FinTech Revolution*, 111 CALIF. L. REV. 801, 804 (2023); Nakita Q. Cuttino, *The Rise of 'Fringetech': Regulatory Risks in Earned Wage Access*, 115 NW. UNIV. L. REV. 1505, 1507-08 (2021); Hilary J. Allen, Fintech and Techno-Solutionism, S. CAL. L. REV. (forthcoming) (2025).

71. For exploration of the concept of predatory inclusion, see generally KEEANGA-YAMAHTTA TAYLOR, RACE FOR PROFIT: HOW BANKS AND THE REAL ESTATE INDUSTRY UNDERMINED BLACK HOMEOWNERSHIP (2019). For a discussion of crypto as predatory inclusion, see generally Tonantzin Carmona, *Debunking the narratives about crypto and financial inclusion*, THE BROOKINGS INST. (Oct. 26, 2022), https://www.brookings.edu/research/debunking-the-narratives-about-cryptocurrency-and-financial-inclusion/.

"innovation"—a departure from the consumer protection rules that everyone else must play by.[72]

There is increasing evidence that we should be similarly skeptical of claims that generative AI will produce win-wins (the umbrella term "AI" includes many varied technologies; "generative AI" describes a subset of tools that detect correlations in voluminous training data sets and then use those correlations to generate new expressive content).[73] Over the course of 2024, pointed questions started to be asked about what generative AI could actually deliver. For example, Goldman Sachs' head of stock research Jim Covello—who has followed the tech industry since the dotcom days—noted the lack of well-articulated use cases for the generative AI that Silicon Valley has developed. He also observed that never before has a technology started off with a forecasted trillion dollars in funding, noting that "[h]istorically, [they have] always had a very cheap solution replacing a very expensive solution … Here, you have a very expensive solution that's meant to replace low-cost labor. And that doesn't even make any sense from the jump."[74]

One significant limitation of this form of AI is its propensity to hallucinate, meaning that models regularly provide authoritative-sounding responses that are factually incorrect.[75] These models do not engage in human-style reasoning to provide a correct answer; instead, they rely upon statistical analysis to select a sequence of words to respond to a prompt, a sequence of words deemed likely to belong together in light of the data that was used to train the model (training data is often

72. In one speech, former Consumer Financial Protection Bureau Director Rohit Chopra noted that value creation in the fintech industry is sometimes the result of regulatory arbitrage stories devised by lawyers, not the technologists. Rohit Chopra delivered these remarks at the Seventh Annual Fintech Conference at the Federal Reserve Bank of Philadelphia. Federal Reserve Bank of Philadelphia, *Fireside Chat with Rohit Chopra*, YOUTUBE (Sept. 7, 2023), https://www.youtube.com/watch?v=iKez0tDjGJg&list=PL3nIbYCsVRj3puS1JkkWNGOyjaKjutPdw&index=2 (at 24:40). For further discussion, see Allen, *supra* note 70, at 11-18.

73. This is a simplified definition, offered here for brevity. For a far more detailed discussion of what constitutes "generative AI," see generally Katherine Lee et al., *Talkin' 'Bout AI Generation: Copyright and the Generative-AI Supply Chain*, J. OF THE COPYRIGHT SOC'Y OF THE U.S.A (forthcoming 2024).

74. Daron Acemoglu et al., *A Skeptical Look at AI investment*, GOLDMAN SACHS EXCHANGES (June 11, June 13, and July 11, 2024), https://www.goldmansachs.com/pdfs/insights/podcasts/episodes/ai-tom-acemoglu-covello/transcript.pdf.

75. Kyle Wiggers, *Study suggests that even the best AI models hallucinate a bunch*, TECHCRUNCH (Aug. 14, 2024, 11:29 AM), https://techcrunch.com/2024/08/14/study-suggests-that-even-the-best-ai-models-hallucinate-a-bunch/. For the full study, see Wenting Zhao et al., *WildHallucinations: Evaluating Long-form Factuality in LLMs with Real-World Entity Queries*, CORNELL UNIV. ARXIV.ORG (2024).

drawn from the internet, and often includes material protected by intellectual property laws).[76] Sometimes models produce an answer that is simply wrong: a Google model responded that pizza can be made cheesier by adding Elmer's glue;[77] an OpenAI model was unable to correctly state the number of "r"s in the word strawberry.[78] Sometimes, AI output backs up its statements by citing to sources that simply do not exist: a 2025 BBC study of AI assistants found that "13% of the quotes sourced from BBC articles were either altered from the original source or not present in the article cited."[79]

Businesses unleashing these models without human supervision can suffer costly mistakes, as Air Canada discovered to its detriment when its chatbot provided an inaccurate answer to a customer query about Air Canada's bereavement policy (the airline tried to allege that the chatbot was "responsible for its own actions," but the Civil Resolution Tribunal was unconvinced and Air Canada was ordered to compensate the customer and pay a fine).[80] Having a "human in the loop" can mitigate the risk of such errors, but requiring human oversight undoes many of the cost savings the AI was intended to generate.[81] Detecting and fixing hallucinations in AI output can be time-consuming drudgery, and it can require significant domain area expertise to conduct properly. A 2024 study by the freelancing platform Upwork found that ninety-six percent of the executives they surveyed expected that AI-based tools would increase overall productivity at their company (with thirty-nine percent of their companies mandating the use of such tools

76. The large language models on which text-generating AI tools are built have been described as "stochastic parrots," a "system for haphazardly stitching together sequences of linguistic forms it has observed in its vast training data, according to probabilistic information about how they combine, but without any reference to meaning." Emily M. Bender et al., *On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?*, FAccT '21: Proc. of the 2021 ACM Conf. on Fairness, Accountability, and Transparency 610, 617 (2021). Regarding the copyright issues relating to AI training data, see Lee et al., *supra* note 73.

77. Kylie Robinson, *Google promised a better search experience — now it's telling us to put glue on our pizza*, The Verge (May 23, 2024, 3:27 PM), https://www.theverge.com/2024/5/23/24162896/google-ai-overview-hallucinations-glue-in-pizza.

78. "I also asked o1 to count the number of times the letter "R" appears in the word strawberry — its pre-release codename. It said two." Ed Zitron, *The Subprime AI Crisis*, Where's your ed at? (Sept. 16, 2024), https://www.wheresyoured.at/subprimeai/.

79. BBC, *Representation of BBC News content in AI Assistants,* https://www.bbc.co.uk/aboutthebbc/documents/bbc-research-into-ai-assistants.pdf (last visited Apr. 4, 2025).

80. Leyland Cecco, *Air Canada Ordered to Pay Customer who was Misled by Airline's Chatbot*, The Guardian (Feb. 16, 2024), https://www.theguardian.com/world/2024/feb/16/air-canada-chatbot-lawsuit.

81. Cory Doctorow, *What Kind of Bubble is AI?*, Locus (Dec. 18, 2023), https://locusmag.com/2023/12/commentary-cory-doctorow-what-kind-of-bubble-is-ai/.

and forty-six percent encouraging them), but nearly forty-seven percent of the surveyed employees using the AI tools had "no idea how to achieve the productivity gains their employers expect."[82]

The current pitch from Silicon Valley is that generative AI tools will become more accurate if they are given more data and more computing power.[83] That pitch can be interpreted as an implicit request for regulatory dispensations: from intellectual property and privacy laws which restrict data access[84] and potentially from energy and environmental laws,[85] given the alarming electricity and water demands associated with model training and usage.[86] While some of that pitch was punctured when the Chinese firm DeepSeek released its AI models in early 2025—these models appear to require far less computing power to train than U.S.-generated counterparts, and may also require less computing power to run[87] —key figures in Silicon Valley have yet to back down from claims that generative AI will surmount its obstacles with more computing power.[88] There is no guarantee, however, that users will be willing to pay for the escalating computing power integral to operating Silicon Valley's models.[89]

Furthermore, generative AI tools—whether developed in China or Silicon Valley—face significant (perhaps even insuperable) challenges

82. *Upwork Study Finds Employee Workloads Rising Despite Increased C-Suite Investment in Artificial Intelligence*, UPWORK (July 23, 2024), https://investors.upwork.com/news-releases/news-release-details/upwork-study-finds-employee-workloads-rising-despite-increased-c.

83. Acemoglu et al., *supra* note 74, at 13.

84. Sometimes this request is more explicit. For a discussion of Silicon Valley's influence on the Brazilian debate over AI regulation and copyright protections, see McQue, *supra* note 60.

85. Drew Hutchinson, *States Propose Data Center Energy Guardrails as Demand Soars*, BLOOMBERG LAW (Jan. 20, 2025), https://news.bloomberglaw.com/environment-and-energy/data-center-energy-guardrails-proposed-in-states-as-demand-soars ("Legislators in at least eight states have filed or plan to file bills setting eco-conscious guardrails on the [data center] industry, which is expected to consume up to 12% of total US electricity by 2028).

86. James O'Donnell, *AI's emissions are about to skyrocket even further*, MIT TECH. REV. (Dec. 13, 2024), https://www.technologyreview.com/2024/12/13/1108719/ais-emissions-are-about-to-skyrocket-even-further/.

87. Ed Zitron, *Deep Impact*, WHERE'S YOUR ED AT? (Jan. 29, 2025), https://www.wheresyoured.at/deep-impact/.

88. Following the release of DeepSeek, OpenAI's Sam Altman was quoted as saying "the world is going to want to use a LOT [of AI]" and he believes that "more compute is more important now than ever before to succeed at our mission." Angrej Singh, *Altman calls DeepSeek's R1 "impressive" and promises better models*, AXIOS (Jan. 27, 2025), https://www.axios.com/2025/01/28/altman-deepseek-r1-ai-models-openai.

89. Maxwell Zeff, *OpenAI's o3 suggests AI models are scaling in new ways — but so are the costs*, TechCrunch (Dec. 23, 2024), https://techcrunch.com/2024/12/23/openais-o3-suggests-ai-models-are-scaling-in-new-ways-but-so-are-the-costs/.

when it comes to improving accuracy.[90] Their underlying models have already been trained on large swathes of the internet, and simply providing those models with more data is unlikely to eliminate hallucinations, especially if the new training data is itself synthetic data generated by AI that contains its own hallucinations.[91] Strategies to improve output accuracy by using retrieval-augmented generation (RAG) techniques and training models on smaller, bespoke sets of data have also failed to tame the hallucination problem: for example, one Stanford study of specialized legal tools that utilize RAG techniques found that "bespoke legal AI tools still hallucinate an alarming amount of the time: the Lexis+ AI and Ask Practical Law AI systems produced incorrect information more than 17% of the time, while Westlaw's AI-Assisted Research hallucinated more than 34% of the time."[92] Concerns have also been expressed about censorship and bias affecting the accuracy of generative AI, given that there are multiple opportunities for individual human beings to intervene in and influence the development of these tools.[93] Particular concerns have been raised about DeepSeek's exclusion of politically sensitive material (like Tiananmen Square) from its training process,[94] but censorship and bias

90. Researchers from Cornell, University of Washington and University of Waterloo "found that no model performed exceptionally well across all topics, and that models that hallucinated the least did so partly because they refused to answer questions they'd otherwise get wrong . . . At present, even the best models can generate hallucination-free text only about 35% of the time . . . "Empirical results in our paper indicate that, despite the promise of certain methods to reduce or eliminate hallucinations, the actual improvement achievable with these methods is limited," [one author] said. "Additionally, our analysis reveals that even the knowledge found on the internet can often be conflicting, partly because the training data—authored by humans—can also contain hallucinations." Wiggers, *supra* note 75 (citing Wenting Zhao et al., *WildHallucinations: Evaluating Long-form Factuality in LLMs with Real-World Entity Queries*, CORNELL UNIV. ARXIV.ORG (2024).

91. Peter Lee, *Synthetic Data and the Future of AI,* 110 CORNELL L. REV. (forthcoming) ("[L]ow-quality synthetic data can exacerbate the limitations of real-world data and severely undermine the functionality of ML systems. . .in a recursive fashion, AI systems generate synthetic data, which then trains other AI systems, which then generate more synthetic data, ad infinitum . . . Ultimately, low-quality synthetic data can render AI models irretrievably divorced from reality.").

92. Varun Magesh et al., *AI on Trial: Legal Models Hallucinate in 1 out of 6 (or More) Benchmarking Queries*, STAN. UNIV. HUMAN-CENTERED A.I. (May 23, 2024), https://hai.stanford.edu/news/ai-trial-legal-models-hallucinate-1-out-6-or-more-benchmarking-queries.

93. James O'Donnell, *Three things to know as the dust settles from DeepSeek*, MIT TECH. REV. (Feb. 4, 2025), https://www.technologyreview.com/2025/02/04/1110918/three-things-to-know-as-the-dust-settles-from-deepseek/; Lee et al, *supra* note 73.

94. Donna Lu, *We tried out DeepSeek. It worked well, until we asked it about Tiananmen Square and Taiwan*, THE GUARDIAN (Jan. 28, 2025), https://www.theguardian.com/technology/2025/jan/28/we-tried-out-deepseek-it-works-well-until-we-asked-it-about-tiananmen-square-and-taiwan.

are risks in any generative AI tool (particularly when details of the training data and tuning process are not disclosed).[95]

It is perhaps not surprising, then, given all these limitations, that business use cases for generative AI have proved somewhat limited. Google and Microsoft have struggled to find customers for their standalone Gemini and Copilot AI tools and have therefore bundled them with existing products in order to sell them at scale (often to their customers' chagrin).[96] And we should, in many respects, be grateful for limited business uptake, given that recent research has found a significant negative correlation between greater dependence on AI tools and critical thinking abilities.[97] Although AI has been marketed as a way of freeing people up from low-level tasks so that they can focus on more interesting higher-order activities, in many instances, people learn how to engage in the higher-order activities by doing the low-level tasks.[98]

I have not delved here into the challenges that AI may pose for labor, or its use as a tool of misinformation, or a myriad of other concerns that have been raised about AI.[99] Even just restricting our focus to the limitations I *have* discussed, though, it seems foolhardy to rush headlong into adopting sandboxes that roll back regulatory protections in order to let AI thrive. Furthermore, as scholars Cristie Ford and Quinn Ashkenazy have argued, the case for loosening regulation is stronger in staid fields where there are few incentives to innovate and little innovation is actually occurring.[100] This cannot be said of AI (or fintech, for that matter), which has already attracted astronomical amounts of

95. Emily Bobrow, *Timnit Gebru is Calling Attention to the Pitfalls of AI*, WALL ST. J. (Feb. 24, 2023) ("We talk about algorithms, but we don't talk about who's constructing the data set or who's in the data set," she says. Because machine-learning systems adopt patterns of language and images scraped from the internet, they are often riddled with the internet's all-too-human flaws: "If the input data is biased, then the output can amplify such biases.").

96. Ina Fried, *Tech giants' dreams of AI price hikes meet resistance*, AXIOS (Jan. 21, 2025), https://www.axios.com/2025/01/21/microsoft-google-price-hikes-ai-chatbots.

97. Michael Gerlich, *AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking*, 15(1) SOCIETIES 1, 15 (2025).

98. "For instance, automated decision-support systems in healthcare and finance streamline operations and improve efficiency, but might also reduce the need for professionals to engage in independent critical analysis. This could result in a workforce that is highly efficient, yet potentially less capable of independent problem-solving and critical evaluation." *Id.* at 2.

99. For further reading on these issues, see, e.g., Zitron, *supra* note 87; Bender et al., *supra* note 76; BRIAN MERCHANT, BLOOD IN THE MACHINE: THE ORIGINS OF THE REVOLUTION AGAINST BIG TECH (2023); Timnit Gebru & Emile P. Torres, *The TESCREAL bundle: Eugenics and the promise of utopia through artificial general intelligence*, 29 FIRST MONDAY (2024); MEREDITH BROUSSARD, ARTIFICIAL UNINTELLIGENCE: HOW COMPUTERS MISUNDERSTAND THE WORLD (2019).

100. "The controlled, small-scale, experimental sandbox format is probably especially well-suited to opening up a closed or over-regulated industry." Ford & Ashkenazy, *supra* note 13, at 4.

venture capital funding over the last decade—especially in jurisdictions like the United States where regulatory sandboxes are not prevalent.[101] Some have gone so far as to argue that this abundance of funding has actually *impeded* useful innovation, by insulating firms from market forces that would force them to design products that consumers and businesses actually want.[102] A sandbox that does nothing more than offer regulatory dispensations and make funding even more readily available could very well increase such insulation and lead to less useful innovation.

2. The Perils of an Innovation-Focused Approach to Regulation

Even if we consider sandboxes in a subject matter-agnostic way, there are reasons to be skeptical of this regulatory tool. As discussed above, sandboxes are expensive to administer properly and when regulatory resources are scarce, it will often be better policy to deploy those resources to directly benefit the public (rather than hoping that public benefit will trickle down from private-sector innovation).[103] Policymakers should also be mindful of the incentives that regulatory sandboxes create. Regulatory bodies would ideally telegraph to industries that desirable innovation occurs within the four corners of laws designed to protect the public from harm,[104] but a sandbox can be interpreted as a concession that those laws should get out of the way in order to allow innovation to thrive. Law professor Ross Buckley and his colleagues have discussed the "signaling effect" of regulatory sandbox adoption, which communicates to the world that a particular jurisdiction is "open for business."[105] But the flip side of that signal is a message to innovators that their innovation will

101. "In Q3 2024, VCs invested $3.9 billion in generative AI startups across 206 deals, per PitchBook. (That's not counting OpenAI's $6.6 billion round.) And $2.9 billion of that funding went to U.S.-based companies across 127 deals." Kyle Wiggers, *Investments in generative AI startups topped $3.9B in Q3 2024*, TECHCRUNCH (Oct. 20, 2024, 7:30 AM), https://techcrunch.com/2024/10/20/investments-in-generative-ai-startups-topped-3-9b-in-q3-2024/. With regard to fintech, by one estimate, "[o]ver $500B in VC funding has gone into fintech startups since 2016," with the vast majority going to US startups. *Fintech Guide*, DEALROOM.CO, https://dealroom.co/guides/fintech-guide.

102. Ed Zitron, *Deep Impact*, WHERE'S YOUR ED AT? (Jan. 29, 2025), https://www.wheresyoured.at/deep-impact/; s*ee also* Peter Lee, *Enhancing the Innovative Capacity of Venture Capital*, 24 YALE J. L. & TECH. 611, 611 (2022) (arguing that "VCs exhibit a surprising degree of herd mentality, investing in trendy technologies while shying away from truly radical innovations. Finally, the VC business model favors innovations that promise large returns in a medium time frame with minimal risk. Such criteria necessarily deprioritize large swaths of socially valuable innovations with longer, riskier development timelines").

103. *See supra* notes 39-40, 44-45 and accompanying text.

104. COHEN, *supra n*ote 56, at 90–92.

105. Buckley et al., *supra* note 40, at 60, 74.

be prioritized over fully enforcing the law as the jurisdiction in question seeks to outcompete other jurisdictions to attract innovative businesses.[106] Such messages can discourage startups from developing fully compliant innovation.

Regulatory efforts to promote innovation are best justified in jurisdictions where regulators have an express mandate to do so, as is the case with the Ontario Securities Commission.[107] To be clear, I consider such mandates misguided: because of the subjectivity surrounding what does and does not count as "innovative," an innovation mandate can serve as a potent tool for those seeking to undermine rules adopted to protect the public from harm[108] (mandates to pursue efficiency have long been weaponized in this way).[109] An innovation mandate also puts the burden on already stressed regulators to learn about innovation theory, "a task arguably far beyond the . . . skill set" of many subject matter regulators and one that does not offer much guidance about how best to further the interests of the public.[110] Still, if regulators have been given an express innovation mandate by their legislature, then

106. For an analogous discussion of "competition among jurisdictions around the world to attract increasingly mobile capital through legal and financial innovations," see generally CHRISTOPHER BRUNER, RE-IMAGINING OFFSHORE FINANCE: MARKET-DOMINANT SMALL JURISDICTIONS IN A GLOBALIZING FINANCIAL WORLD (2016).

107. "[T]hat regulator's legislative mandate was revised to require it to "have regard to the . . . fundamental principle[] . . . that "[i]nnovation in Ontario's capital markets should be facilitated." Sarro, *supra* note 35, at 11.

108. As Douglas Sarro notes with regard to the Canadian crypto sandboxes, "while regulators had the legal authority to stop these firms from operating in Canada, this might have interfered with their efforts to present themselves as innovation-friendly (or, at least, avoid being cast as hostile to innovation)." *Id.* at 11. For further discussion of the perils of innovation mandates for financial regulators, see Hilary J. Allen, *The SEC cannot sacrifice citizens on the altar of private sector innovation*, THE HILL (July 18, 2023), https://thehill.com/opinion/finance/4101392-the-sec-cannot-sacrifice-citizens-on-the-altar-of-private-sector-innovation/.

109. For critiques of the weaponization of efficiency, see generally John C. Coates IV, *Cost-Benefit Analysis of Financial Regulation: Case Studies and Implications*, 124 YALE L.J. 882, 1003 (2015); FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING (2005).

110. Dirk A. Zetzsche et al., *Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation*, 23 FORDHAM J. CORP. & FIN. L. 31, 69–70 (2017). So much organizational and management research has flowed from the work of Joseph Schumpeter and Clayton Christensen, focusing on identifying the conditions in which firms become more innovative, and the environments within which the spread of innovation is more conducive—but this literature does not tell us much about the best way in which to identify, generate, and spread the kind of innovation that is most likely to solve social problems. For seminal works by Schumpeter and Christensen see JOSEPH SCHUMPETER, CAPITALISM, SOCIALISM, AND DEMOCRACY (1942); CLAYTON CHRISTENSEN, THE INNOVATOR'S DILEMMA: WHEN NEW TECHNOLOGIES CAUSE GREAT FIRMS TO FAIL (1997). For an example of highly accessible critique of this work, see Jill Lepore, *The Disruption Machine*, THE NEW

they should seek to promote innovation among their other objectives. But most financial regulators around the world do not have express innovation mandates,[111] and the same is true for many regulators in many other fields. Among these regulators, attempts to promote innovation are often justified on the grounds that they will further other mandates, such as promoting competition or efficiency.[112]

Regulatory goals like competition and efficiency are in many respects Rorschach tests that reveal the values of the beholder. The word "efficiency," for example, has so many specialized meanings in different fields, each imbued with value-driven perceptions about which costs are or are not worth incurring, that it cannot be treated as a single, neutral, regulatory end.[113] The meaning of "competition" is also politically charged, having long been constricted in the United States to a narrow consumer welfare standard concerned only with the prices consumers pay—to the exclusion of other potential harms that can be wrought through excessive market power.[114] But European authorities have typically had a more robust view of competition law,[115] and more robust views of competition were also a feature of Lina Khan's recent tenure as Chair of the U.S. Federal Trade Commission.[116] Efficiency and competition mandates therefore supply few clear guideposts for regulators. When evaluating sandboxes, regulators need to inquire "from whose perspective do we judge competition and efficiency: the perspective of the participating firms, industry more broadly, or the public at large?"

As law professor Jodi Short has chronicled, in recent years, administrative law scholars in many fields have been engaging with the moral

YORKER (June 16, 2014), https://www.newyorker.com/magazine/2014/06/23/the-disruption. For a more recent discussion of the dark sides of innovation, see Buccafusco & Weinstein, *supra* note 68.

111. "Innovation" does not figure in the menu of typical financial regulatory agency mandates set forth in JOHN ARMOUR ET AL., PRINCIPLES OF FINANCIAL REGULATION 61-69 (2016).

112. "Embedded in their formal mandates—capital formation, investor protection, competition, and market integrity—is also an interest in developing financial innovation." Chris Brummer & Yesha Yadav, *Fintech and the Innovation Trilemma*, 107 GEO. L. J. 235, 246 (2019).

113. For critical interrogations of the meaning of "efficiency," see Luke Herrine, *Who Cares About Efficiency?*, LPE BLOG (Oct. 11, 2023), https://lpeproject.org/blog/who-cares-about-efficiency; *see generally* ELIZABETH POPP BERMAN, THINKING LIKE AN ECONOMIST: HOW EFFICIENCY REPLACED EQUALITY IN U.S. PUBLIC POLICY (2022).

114. For an overview of different interpretations of the role of antitrust law in the United States, see Jonathan B. Baker, *Finding Common Ground Among Antitrust Reformers*, 84 ANTITRUST L.J. 705 (2022).

115. EU guidance indicates cause for concern when market power is deployed in a way that is "largely insensitive to the actions and reactions of competitors, customers and, ultimately, consumers." 2009 O.J. (C 45) 8.

116. Baker, *supra* note 114, at 705–06.

underpinnings of these kinds of questions.[117] One strand of this "moral turn" in administrative law scholarship has reverted to a focus on the public harms that regulatory agencies were created to address in the first place.[118] If we care primarily about public harms, then it will often be hard to justify the rollbacks of regulatory protections that are an integral feature of most regulatory sandboxes—these rollbacks primarily benefit participating firms, and may create barriers to entry for other members of the industry. When it comes to the public interest, substitute conditions developed in dialogue with sandbox participants are unlikely to provide the same level of protection as the rules dispensed with, because the firms in question are likely to disregard or misunderstand the harms their business model could occasion (and as discussed above, regulators may be too cowed by their lack of technological chops to provide meaningful pushback).[119] The first impulse for any profit-driven enterprise is to find an opportunity to exploit quickly and cheaply,[120] and Silicon Valley "disruptors" often lack knowledge about the domains they propose to disrupt and are unlikely to invest heavily in obtaining it.[121] As such, sandbox participants may not understand (or even care) why a particular industry has come to be regulated in a particular way.

Innovation is paradoxically viewed as both an inexorable force that regulators could not stop if they tried, and something so valuable and vulnerable that regulators should never take action to impede it. The view of innovation as an inexorable force gives rise to what is known as the pacing problem: the sense that attempts to update the law cannot keep up with the pace of technological innovation.[122] When innovation is portrayed as valuable and vulnerable on the other hand, there are

117. *See generally* Jodi L. Short, *The Moral Turn in Administrative Law*, UNIV. S.F. L. RSCH. PAPER (forthcoming)

118. *See, e.g.*, William Boyd, *With Regard for Persons*, 86 L. & CONTEMP. PROBS. 101 (2023) ("this article outlines a series of interventions intended to recenter harm and regard for persons in health, safety, and environmental law").

119. *See* Notes 56-60 and accompanying text.

120. CRISTIE FORD, INNOVATION AND THE STATE: FINANCE, REGULATION, AND JUSTICE 147 (2017).

121. For discussion of this phenomenon, see, e.g., MARGARET O'MARA, THE CODE: SILICON VALLEY AND THE REMAKING OF AMERICA 7 (2020); Brian Barrett, *The Incompetence of DOGE is a Feature, Not a Bug*, WIRED (Feb. 20, 2025, 7:00 AM), https://www.wired.com/story/doge-incompetence-mistakes-feature-not-bug/ ("It's a familiar Silicon Valley mindset, the reason startups are forever reinventing a bus, or a bodega, or mail. It's the implacable certainty that if you're smart at one thing you must be smart at all of the things. It doesn't work like that").

122. Meg Leta Jones, *Does Technology Drive Law? The Dilemma of Technological Exceptionalism in Cyberlaw*, 2018 UNIV. ILL. J. L. TECH. & POL'Y 249, 256 (2018).

demands for legal certainty so that innovators can navigate around laws that might otherwise serve as impediments to their innovation.[123] Regulatory sandboxes are seen as a solution to both problems: a way of adapting the law so that it does not fall behind the pace of technological change, and a way of providing legal certainty for innovators.[124] However, as I have argued previously, refusing to apply existing law to a technology until it is fully-baked and established is a choice, and the pacing problem is, therefore, one that regulators can sometimes opt out of by rejecting the idea that technological innovation is exceptional and therefore requires new law.[125] Demands for perfect legal certainty are often unrealistic or disingenuous. It is rare indeed to find a rule or statute or judicial decision that is not susceptible to different interpretations, and some legal flexibility is often necessary to ensure that the public is protected in novel situations.[126] Innovation does not require perfect legal certainty to thrive.[127]

Instead of bending over backwards to accommodate innovation with regulatory sandboxes, regulators could take a more proactive and precautionary approach to regulation and seek to blunt the public harms of new technologies. Former Acting Comptroller of the Currency Michael Hsu suggested an "accommodation versus taming" framework for categorizing approaches to regulating fintech, which is a useful framework for thinking about responding to technological innovations more broadly.[128] Accommodation is premised on the false assumption

123. "[I]f regulators prioritize market safety and clear rulemaking, they necessarily must do so through broad prohibitions, likely inhibiting financial innovation. Alternatively, if regulators wish to encourage innovation and issue clear rules, they must do so in ways that ultimately result in simple, low-intensity regulatory frameworks, increasing risks to market integrity." Brummer & Yadav, *supra* note 112, at 242.

124. Ringe, *supra* note 16.

125. Allen, *supra* note 70, at 19. For more on the pacing problem and technological exceptionalism, see Jones, *supra* note 122.

126. The U.S. Supreme Court recognized this when it noted that Congress had chosen to include "investment contracts" within the definition of "security" as it "embodies a flexible rather than a static principle, one that is capable of adaptation to meet the countless and variable schemes devised by those who seek the use of the money of others on the promise of profits." Sec. and Exch. Comm'n v. W.J. Howey Co., 328 U.S. 293, 299 (1946).

127. The example of limited liability companies is illustrative in this regard. The U.S. Securities and Exchange Commission and the courts have resisted requests to formulate bright-line rules regarding when equity interests in a limited liability company will qualify as securities, instead making case-by-case determinations. *See, e.g.,* United States v. Leonard, 529 F.3d 83 (2d. Cir. 2008). And yet, "LLCs are far and away the most popular legal entity form for new businesses." Eric H. Franklin, *A Rational Approach to Business Entity Choice*, 64 KAN. L. REV. 573, 586 (2016).

128. News Release 2022-126, Michael J. Hsu, Acting Comptroller of the Currency, "Don't Chase," Remarks to the Harvard Law School and Program on International Financial Systems (Oct. 11, 2022) (https://www.occ.gov/news-issuances/speeches/2022/pub-speech-2022-126.pdf).

that all innovations are win-wins that will redound to the public benefit, whereas taming forces the technology to "conform to regulatory standards," even if "taking a careful and cautious approach and by developing guardrails and gates" may impede innovation to a degree.[129]

Accommodation can lend legitimacy to technology-based business models, creating markets for those business models that the technology might not be useful enough to sustain on its own. Because innovators lack an understanding of the broader context in which their innovation will operate, as discussed above,[130] taming will often be the better approach. As scholar of technology culture Aarthi Vadde has observed with regard to AI tools,

> Technical experts in artificial intelligence are less qualified to assess its social and political implications than experts in the domains they claim to disrupt. Physicians, teachers, social workers, policymakers, and other professional experts are not out of their depth when speaking out about AI; rather, they are the best qualified people to understand the potential uses and abuses of automated technologies in their respective professions.[131]

To be clear, regulations will sometimes need to evolve for the public's benefit, but we should be concerned when regulatory change is carried out in a piecemeal fashion that primarily benefits the few firms admitted to a sandbox cohort. If a regulator does wish to experiment with new types of regulatory strategies, there are plenty of options that predate sandboxes that can be applied industry wide. As the UNSGSA and CCAF noted in their review of fintech sandboxes, "proportional or risk-based licensing regimes and regulations may help lower the costs of regulatory compliance for FinTech start-ups and, unlike sandbox testing programs, are available to all market participants on a class-wide basis."[132]

Informal types of regulation (ranging from guidance to waivers) can be particularly useful when dealing with fast-moving technologies,[133]

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129. *Id.* at 3, 6.

130. *See supra* note 121 and accompanying text.

131. Aarthi Vadde, *Review of Arvind Narayanan and Sayash Kapoor's "AI Snake Oil: What AI Can Do, What it Can't, and How to Tell the Difference" and Ethan Mollick's "Co-Intelligence: Living and Working with AI"*, CRITICAL AI (last visited April 4, 2025), https://criticalai.org/2024/10/16/sneak-preview-review-arvind-narayanan-and-sayash-kapoors-ai-snake-oil-what-ai-can-do-what-it-cant-and-how-to-tell-the-difference-and-ethan-mollicks/.

132. UNSGSA & CCAF, *supra* note 12, at 31.

133. *See* Tim Wu, *Agency Threats*, 60 DUKE L. J. 1841, 1842 (2011).

but there are always trade-offs when such informal regulatory strategies are used, particularly with regard to opportunities for public participation and reason-giving in the regulatory process.[134] The negative aspects of these tradeoffs are likely to be particularly pronounced in the sandbox context—private firms have significant input into the terms on which they are regulated and there may be no way for affected populations to even find out about those terms, let alone push back. When sandbox firms have products that are very technologically complex, those firms are even more likely to be able to dictate their own terms, because regulators are more likely to defer to their technological expertise.[135] As Cristie Ford has observed, when the thing being regulated is outside of a regulator's area of knowledge or expertise, collaborative regulatory strategies can often devolve into deregulation.[136]

Regulatory cheerleaders want their sandbox firms to succeed, and this creates a temptation to loosen regulations even further to facilitate that success. Furthermore, this deregulation may even persist after the sandbox trial period has concluded. Doug Sarro found that when it came time for crypto firms to "graduate" from the sandboxes created by provincial Canadian securities regulators, they were still unable to comply with the law.[137] This is unsurprising, given that—as I have explored extensively in other work—blockchain technology is not the primary selling point for crypto businesses. Instead, crypto businesses profit from their ability to skirt the regulatory requirements that apply to other businesses, including the securities laws.[138] When the Canadian crypto sandbox terms expired, the regulators were therefore faced with the choice of requiring regulatory compliance, which would have had the practical effect of shutting down the businesses in question, or making sandbox exemptions permanent.[139] From a political economy perspective, it is not surprising that they chose the latter—as many have noted, once a business becomes established and has a substantial number of employees and customers, it becomes harder for regulators to rein it in because of the ecosystem of vested interests attached to that business.[140]

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134. Sarro, *supra* note 35, at 7–8.

135. *See supra* notes 56–60 and accompanying text.

136. Cristie Ford, *New Governance in the Teeth of Human Frailty: Lessons from Financial Regulation*, WIS. L. REV. 441, 479 (2010).

137. Sarro, *supra* note 35, at 6.

138. Allen, *supra* note 70, at 37–38.

139. Sarro, *supra* note 35, at 6.

140. *See, e.g.*, Arthur E. Wilmarth Jr., *Citigroup: A Case Study in Managerial and Regulatory Failures*, 47 IND. L. REV. 69, 73–74 (2014); Saule T. Omarova, *License to Deal: Mandatory Approval of Complex*

And so it would not be surprising if indefinite extensions of sandbox dispensations become a common occurrence in the future.

The result, however, will be a variety of inconsistent sets of rules applying to different firms, the very definition of an unlevel playing field. This is contrary to how regulatory sandboxes around the world were billed at their inception—the initial idea was that firms would graduate into full compliance with the full panoply of regulatory obligations, but upon reflection this seems somewhat unrealistic. Policymakers need to heed the reality that once a firm has been admitted to a sandbox, regulators can become boxed-in by political economy considerations that force them to keep accommodating the firm's public harms. Instead, regulatory approaches that tame innovation are more likely to redound to the public benefit.

C. *The Cross-Border Dimension*

Given that the EU AI legislation contemplates the creation of joint sandboxes with other EU Member States,[141] it is worth noting the challenges in conducting cross-border regulatory sandboxes before concluding this discussion of sandbox limitations. Often, the businesses who opt to participate in a sandbox would like to offer their products and services in more than one jurisdiction, and so their desire for cross-border sandboxes is understandable. The reality is that in some smaller jurisdictions, a sandbox will be of extremely limited utility unless it is operated cross-border.[142] Operating cross-border sandboxes entails significant challenges, however, and these challenges are yet another reason to be skeptical about sandboxes as a regulatory tool.

The GFIN, which was launched in 2019 with a goal of running cross-border sandbox trials for fintech firms,[143] has only successfully conducted one cross-border trial and only two firms have made it through to the live testing phase.[144] One explanation for this lack of uptake was the need for participants to satisfy different sets of regulatory requirements in

Financial Products, 90 WASH. U. L. REV. 63, 65 (2012); *see generally*, Elizabeth Pollman & Jordan M. Barry, *Regulatory Entrepreneurship*, 90 S. CAL. L. REV. 383 (2017).

141. Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act), 2024 O.J. (L 1689) ¶138.

142. Arizona's state-based fintech sandbox, for example, had only one participant at the time of writing, and thirteen alumni total from the previous five years, even though no alternative federal fintech sandbox was available. *See Sandbox Alumni*, ARIZONA ATTORNEY GENERAL (last visited Apr. 4, 2025), https://www.azag.gov/sandbox/alumni.

143. GLOB. FIN. INNOVATION NETWORK, *supra* note 11, at 6.

144. GLOB. FIN. INNOVATION NETWORK, *supra* note 11, at 8.

different jurisdictions.[145] To limit the need to reach multi-jurisdictional consensus on everything, the GFIN trial used a "lead regulator" approach, but noted that,

> A significant resource burden was also placed upon the lead regulators as they were responsible for the management and coordination of the 38 applications and 23 participating regulators. Substantial effort and resource commitments were required by them to ensure that queries on both the firm and regulator side were resolved and that applications were progressed and assessed appropriately and on time.[146]

Harmonization of legal standards will most likely be necessary to increase the utility of cross-border sandboxes, but cross-border harmonization is a highly political process that is often complicated by the competing interests of domestic factions.[147] In particular, any "signaling" benefits of regulatory sandbox adoption will be undercut by harmonization, because then no jurisdiction will stand out as having legal standards that are more hospitable to innovation. Challenges in allocating resources and responsibility will also persist—whether the sandbox is operated cross-border, or across multiple subject matter agencies within the same jurisdiction. Although sandboxes have been adopted to promote new technologies, there is nothing new about these underlying resource and coordination challenges—and regulatory sandboxes offer no new response to them.

V. Conclusion

This Article has built on my previous work, arguing that when it comes to fintech, regulators should prioritize protecting the public from harm over promoting efficiency and competition through private-sector innovation. It is becoming increasingly evident that this holds as true for generative AI as it does for fintech, and so there are many reasons to be concerned about the adoption of AI sandboxes. Careful attention to sandbox design features can mitigate *some* concerns about sandbox harms, but we should not skip to questions about design without first considering whether a regulatory sandbox is appropriate *at all* in the circumstances. It is time for a broader societal reckoning with

145. *Id.*

146. *Id.*

147. For a discussion of these issues, see generally Abraham L. Newman & Elliot Posner, Voluntary Disruptions: International Soft Law, Finance and Power (2018).

our veneration of Silicon Valley-style innovation, and increased wariness of the sandbox model (and the type of regulatory learning it facilitates) should be part of that reckoning. After all, a decade has passed since the U.K. FCA first announced its regulatory sandbox, and there remains scant—if any—hard evidence that these resource-intensive regulatory vehicles have improved public welfare.