

ARTIFICIAL INTELLIGENCE REGULATORY SANDBOXES

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INTRODUCTION

As leading jurisdictions worldwide—from the European Union to the United Kingdom and Switzerland—develop their approaches to artificial intelligence, regulatory sandboxes for AI are quickly gaining popularity. If such sandboxes are properly designed and implemented, they can be a helpful tool in developing an evidence-based, iterative approach to artificial intelligence regulation.

Regulatory sandboxes are government-run programs that allow startups, tech firms, and other entities to offer innovative products and services under close regulatory supervision for a limited period.² Companies often receive regulatory guidance, expedited registration, or specific regulatory waivers for the duration of the sandbox testing period.³ Meanwhile, by supervising and closely interacting with companies, regulators can gain a first-hand understanding of emerging technologies and business models and how

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² Ryan Nabil, *How Regulatory Sandbox Programs Can Promote Technological Innovation and Consumer Welfare*, COMPETITIVE ENTER. INST. (Aug. 17, 2022), <https://cei.org/studies/how-regulatory-sandbox-programs-can-promote-technological-innovation-and-consumer-welfare/>; see also Dan Quan, *A Few Thoughts on Regulatory Sandboxes*, STANFORD CTR. ON PHILANTHROPY & CIV. SOC'Y, <https://pacscenter.stanford.edu/a-few-thoughts-on-regulatory-sandboxes/>; see also *What is a regulatory sandbox?*, OFF. GAS & ELEC. MKTS. (2018), https://www.ofgem.gov.uk/sites/default/files/docs/2018/09/what_is_a_regulatory_sandbox.pdf.

³ Since different jurisdictions can design regulatory sandbox programs in different ways and for various purposes, there does not appear to be an academic or regulatory consensus about the definition of a regulatory sandbox. The European Union's recently passed Artificial Intelligence Act describes regulatory sandbox in Article 57 in the context of Member State obligation to establish such programs: "AI regulatory sandboxes established under paragraph (1) shall provide for a controlled environment that fosters innovation and facilitates the development, training, testing and validation of innovative AI systems for a limited time before their being placed on the market or put into service pursuant to a specific sandbox plan agreed between the prospective providers and the competent authority. Such regulatory sandboxes may include testing in real world conditions supervised in the sandbox." Artificial Intelligence Act, art. 57(5), EUR. PARL. DOC. TA 138 (2024). For a general discussion about regulatory sandboxes and their features, see, e.g., Nabil, COMPETITIVE ENTER. INST., *supra* note 2. Brian R. Knight & Trace E. Mitchell, *The Sandbox Paradox: Balancing the Need to Facilitate Innovation with the Risk of Regulatory Privilege*, 72 S.C. L. REV. 446–53 (2020); Hilary Allen, *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 580–84 (2019). https://digitalcommons.wcl.american.edu/facsch_lawrev/709.

they are impacted by current or proposed regulations.⁴ Such regulatory insights can then form the basis for calibrating regulations, introducing new statutory instruments, repealing cumbersome laws, and pursuing other regulatory reforms. This approach of regulatory experimentation and evidence-based reform can be particularly helpful in regulating sectors experiencing rapid technological changes, such as financial services and healthcare.

The UK's Financial Conduct Authority (FCA) launched the world's first financial technology ("fintech") regulatory sandbox in May 2016 to promote innovation in the financial services sector.⁵ Since then, more than 50 jurisdictions worldwide have established regulatory sandboxes in areas ranging from financial technology and insurance to healthcare and automated vehicles.⁶ However, while innovative jurisdictions like Hong Kong, Singapore, and South Korea have developed well-known fintech sandbox programs,⁷ U.S. regulatory interest in such programs at the federal level has been limited.⁸ Although the Consumer Financial Protection Bureau's Office of Innovation created the Compliance Assistance Sandbox and the Trial Disclosure Sandbox in September 2019,⁹ they remained limited in scope, with the former allowed to expire in September 2022, along with the Bureau's No Action Letter program.¹⁰ Against the backdrop of federal inactivity, at least eleven state governments launched regulatory sandboxes to promote innovation in fintech and other areas.¹¹

Despite the prevalence of fintech sandboxes, the most notable U.S. sandbox has been in the legal services sector. In August 2020, the Utah Supreme Court established a sandbox that permits participating non-lawyer-owned law firms and certain non-legal entities to provide specific legal services (e.g., filling out marriage, business, and immigration forms).¹² Since its establishment, this sandbox has admitted over 30 entities—including

⁴ *Id.*

⁵ See, *Key Data from Regulatory Sandboxes across the Globe*, WORLD BANK GRP. (2020), <https://www.worldbank.org/en/topic/fintech/brief/key-data-from-regulatory-sandboxes-across-the-globe>; *Regulatory Sandbox Lessons Learned*, FIN. CONDUCT AUTH. (Oct. 2017), <https://www.fca.org.uk/publication/research-and-data/regulatory-sandbox-lessons-learned-report.pdf>.

⁶ Sharmista Appaya et al., *Global Experiences from Regulatory Sandboxes*, WORLD BANK GRP. at 55, Appendix 3, <https://documents1.worldbank.org/curated/en/912001605241080935/pdf/Global-Experiences-from-Regulatory-Sandboxes.pdf> (Nov. 11, 2011); see also Nabil, COMPETITIVE ENTER. INST., *supra* note 2.

⁷ Nabil, COMPETITIVE ENTER. INST., *supra* note 2.

⁸ *Id.*

⁹ Bureau of Consumer Fin. Prot., Policy on the Compliance Assistance Sandbox, 84 Fed. Reg. 48246 (Sept. 10, 2019); Bureau of Consumer Fin. Prot., Policy to encourage Trial Disclosure Programs, 84 Fed. Reg. 48260 (Sept. 10, 2019).

¹⁰ Bureau of Consumer Fin. Prot., Statement on Competition and Innovation, 87 Fed. Reg. 58439 (Sept. 27, 2022).

¹¹ See Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at Table 2.

¹² *Our History*, UTAH OFF. OF LEGAL SERVS. INNOVATION, (last visited Apr. 20, 2024), <https://utahinnovationoffice.org/our-history/>.

alternative legal providers (“ALP”), alternative business structures (“ABS”), and intermediary platforms—thereby enabling a level of innovation uncharacteristic of most U.S. fintech sandbox programs.¹³ Nevertheless, fintech sandboxes remain the most common type of regulatory sandbox in the United States.¹⁴

Since the inception of the world’s first fintech sandbox programs between 2016 and 2017 and a subsequent second wave between 2018 and 2021, the global landscape for regulatory sandboxes now appears to be undergoing an inflection point.¹⁵ Whereas the earlier interest in regulatory sandboxes was primarily driven by financial technology, it is increasingly driven by artificial intelligence as more countries establish regulatory sandboxes to promote AI innovation. At a time when a growing number of jurisdictions worldwide are formulating their AI policies, regulatory sandboxes can be a helpful tool in pursuing an evidence-based approach to AI regulation.

More specifically, artificial intelligence regulatory sandboxes (“AI sandboxes”) can enable regulatory authorities to observe participating firms directly, assess the impacts of various regulations on businesses and consumers, and refine rules accordingly.¹⁶ By providing timely insights into the effects of AI regulations on businesses and consumers across various sectors, AI sandboxes can facilitate a better understanding of the need to calibrate existing and proposed AI regulations. In this manner, regulatory sandboxes can support lawmakers and regulators in adopting a more evolutionary, iterative approach to crafting AI rules.

Considering such benefits, a growing number of jurisdictions have expressed interest in establishing regulatory sandboxes for AI. The UK, which pioneered financial technology sandboxes, is currently exploring different models for establishing AI sandboxes.¹⁷ Across the Channel, the European

¹³ See *Activity Report: November 2023*, UTAH INNOVATION OFF. at 4 (Dec. 20, 2023), <https://utahinnovationoffice.org/wp-content/uploads/2024/01/Sandbox-November-Activity-Report.pdf>.

¹⁴ See Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at Table 2.

¹⁵ Appaya et al., *supra* note 6, at 7, Fig. 2.3, & appendix 3; see also Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at tables 1–2.

¹⁶ Unless otherwise noted, “AI sandboxes” refers to “artificial intelligence regulatory sandboxes,” a term that has been abbreviated for brevity. The term does not encompass “open data sandboxes,” which merely provide access to data without any regulatory support. In contrast, “AI innovation sandboxes,” like the one offered by Zurich Canton, are included within this broader category since they provide both data access *and* regulatory support. Such distinctions will be especially important to consider if the regulatory design and policy objectives of future AI sandbox programs show considerable divergences. For a more extensive discussion of the Zurich sandbox and how Swiss regulators distinguish between “regulatory sandboxes,” “innovation sandboxes,” and “open data sandboxes,” see the discussion on Switzerland and footnote 152 in Section III. ZÜRICH CANTON, *Innovation-Sandbox für Künstliche Intelligenz (KI) [Innovation Sandbox for Artificial Intelligence (AI)]*, <https://www.zh.ch/de/wirtschaft-arbeit/wirtschaftsstandort/innovation-sandbox.html> (last visited Apr. 20, 2024).

¹⁷ Unless otherwise noted, the terms “fintech sandboxes” and “fintech sandbox programs” refer to *regulatory* sandboxes, as opposed to open data sandboxes and other types of non-regulatory sandboxes. *A pro-innovation approach to AI regulation*, U.K. DEP’T FOR SCI., INNOVATION & TECH., & UK OFF. FOR

Union has recently emerged as a leading advocate of AI sandboxes, with each EU Member State required to develop at least one AI sandbox at the national level.¹⁸ Meanwhile, Switzerland's Zurich Canton has established thematic sandbox programs to promote innovation in several targeted areas,¹⁹ while Norway's data protection authority has also launched an AI sandbox.²⁰ Beyond Europe, countries such as Brazil, Colombia, and Singapore have either established or are considering similar AI sandbox programs.²¹

In the United States, enacting legislation to create a regulatory sandbox is relatively straightforward, particularly due to the growing availability of boilerplate templates from other jurisdictions. However, attracting a steady stream of applicants and using the sandbox findings to spearhead broader regulatory reforms have proven more challenging for many U.S. sandbox programs.²² Such difficulties underscore the importance of regulatory design for AI sandboxes, especially considering potential challenges related to developing multiple sandboxes for AI applications in various sectors. Without a careful approach to regulatory design, U.S. lawmakers and regulators might not fully benefit from the full potential of regulatory sandboxes to foster an evidence-based, iterative approach to AI regulation.

There are at least three reasons why policy and legal scholarship on AI sandboxes appears sparse despite their growing regulatory importance. First, regulatory sandboxes, more generally, and AI sandboxes, more specifically, remain a relatively recent concept. Second, although there has been some academic and policy work on regulatory sandboxes, such scholarship often tends to focus on the merits of creating sandboxes rather than the principles of designing effective sandboxes to enable evidence-based policy reform.²³

Lastly, another reason why regulatory sandboxes might have garnered less attention in the context of U.S. legal scholarship is that fintech and AI sandboxes have been more common overseas than in the United States. Although many U.S.-affiliated authors have produced highly cited works on regulatory sandboxes,²⁴ notable fintech sandbox programs have primarily been developed overseas.²⁵ Likewise, there appears to be greater regulatory

A.I. ¶¶ 96–100 (Aug. 3, 2023), <https://www.gov.uk/government/publications/ai-regulation-a-pro-innovation-approach/white-paper>.

¹⁸ Artificial Intelligence Act, art. 57(1), EUR. PARL. DOC. TA 138 (2024).

¹⁹ ZURICH CANTON, *supra* note 16.

²⁰ Tom E. Markussen, *Evaluation of the Norwegian Data Protection Authority's Regulatory Sandbox for Artificial Intelligence*, DATATILSYNET (Dec. 5, 2023), [https://www.datatilsynet.no/content-assets/41e268e72f7c48d6b0a177156a815c5b/agenda-kaupang-evaluation-sandbox_english_ao.pdf](https://www.datatilsynet.no/contentassets/41e268e72f7c48d6b0a177156a815c5b/agenda-kaupang-evaluation-sandbox_english_ao.pdf).

²¹ See Section III for a longer discussion.

²² See Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at Table 2.

²³ See, e.g., Ivo Jenik, Schan Duf, *How To Build A Regulatory Sandbox*, CONSULTATIVE GROUP TO ASSIST THE POOR (2020), <http://documents.worldbank.org/curated/en/126281625136122935/How-to-Build-a-Regulatory-Sandbox-A-Practical-Guide-for-Policy-Makers>.

²⁴ See, e.g., Knight & Mitchell, *supra* note 3; Allen, *supra* note 3.

²⁵ See Appaya et al., *supra* note 6, at appendix 3.

interest in establishing AI sandboxes overseas—including the European Union, Singapore, Switzerland, and the UK—than in the United States. Interestingly, whereas where Anglophone Common Law jurisdictions like Australia, Hong Kong, and the UK spearheaded the world’s first fintech sandbox programs,²⁶ European Civil Law jurisdictions appear to be playing a leading role in establishing AI sandboxes.²⁷ Such jurisdictions include Spain, which became the first EU country to enact legislation providing a statutory basis for AI regulatory sandboxes at the national level.²⁸

This trend might ultimately lead to greater divergences between global regulatory developments and U.S. legal scholarship on AI sandboxes, especially if statutes, regulations, and other primary source materials are not widely available in English. This Article seeks to address this growing gap in legal and policy scholarship by analyzing changing trends in the global regulatory landscape for AI sandboxes, comparing the sandbox strategies of select jurisdictions, and presenting observations and recommendations that could be helpful for U.S., European, and global policymakers interested in designing effective sandbox programs.

The remainder of this Article is structured as follows: Section I provides a brief overview of the development of regulatory sandboxes in the financial technology sector, tracing their origins in the UK and subsequent diffusion worldwide, including the United States. Section II analyzes the different natures of fintech and AI regulation and explains why the more multifaceted nature of AI regulation necessitates a differentiated approach to regulatory sandboxes for AI. Section III discusses the AI sandbox strategies of jurisdictions that are at the forefront of creating AI regulatory sandboxes as of January 2024, focusing on the UK, the EU, Norway, and Switzerland. This section also examines the challenges these jurisdictions face, especially in terms of regulatory design. Additionally, it also includes a brief discussion of sandbox-related initiatives in several emerging-market nations, including Singapore, China, and Russia, in the interest of a more global approach to legal scholarship. Based on this analysis, Section IV offers a series of general principles and policy recommendations for lawmakers and regulators as they design new AI sandboxes or improve existing ones. It also provides more tailored recommendations for designing effective AI sandboxes in the regulatory contexts of the United States, the European Union, and emerging-market countries. The Article concludes by offering broader observations on the regulatory sandbox’s evolving role and its limits as a policy tool in the context of AI regulation.

²⁶ Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at Table 1; Appaya et al., *supra* note 6, at appendix 3.

²⁷ Examples include the European Union, Norway, Switzerland, and Spain. See Section III for a longer discussion.

²⁸ REAL DECRETO 817/2023 [ROYAL DECREE 817/2023], C.E., B.O.E. n.268 (Nov. 9, 2023), https://www.boe.es/diario_boe/txt.php?id=BOE-A-2023-22767.

I. REGULATORY SANDBOXES IN THE FINANCIAL TECHNOLOGY SECTOR²⁹

Fintech sandboxes provide a helpful starting point for understanding the changing global landscape of regulatory sandboxes. As mentioned, the UK’s Financial Conduct Authority formally launched the world’s first fintech sandbox in May 2016.³⁰ According to the FCA, the sandbox is open to currently authorized firms, unauthorized firms seeking FCA authorization, and technology firms seeking to offer innovative products and services in the UK financial services market.³¹ For firms not yet ready to test new products through the sandbox, the FCA offers an “Innovation Pathway” program, allowing companies to seek regulatory help to better understand the UK’s financial regulatory regime.³² Most recently, in December 2023, the FCA and the Bank of England jointly announced the launch of the Digital Securities Sandbox.³³ The sandbox will be used to calibrate rules for innovative tokenized securities under the 2023 Financial Services and Markets Act, which came into effect on January 8, 2024.³⁴

When the FCA launched its fintech sandbox, the concept of regulatory sandboxes was relatively less known than the case today.³⁵ However, forward-thinking jurisdictions worldwide—such as Australia, Hong Kong, Singapore, Switzerland, and South Korea—designed similar programs to promote financial innovation soon thereafter.³⁶ According to the World Bank, which conducted a major study of sandbox programs worldwide, 57 jurisdictions created or announced the creation of 73 regulatory sandboxes as of November 2020, a number that has increased since then, especially in the United States and Europe.³⁷

²⁹ This section builds on the author’s previous report on financial technology sandboxes. *See generally* Nabil, COMPETITIVE ENTER. INST., *supra* note 2.

³⁰ More specifically, the application window for the first cohort of the FCA sandbox opened in May 2016 and closed in July 2016. *Financial Conduct Authority’s regulatory sandbox opens to applications*, FIN. CONDUCT AUTH. (2016), <https://www.fca.org.uk/news/press-releases/financial-conduct-authority%E2%80%99s-regulatory-sandbox-opens-applications>.

³¹ *Regulatory Sandbox*, FIN. CONDUCT AUTH., (2022), <https://www.fca.org.uk/firms/innovation/regulatory-sandbox#section-who-can-apply-to-the-regulatory-sandbox>.

³² *Id.*

³³ The Financial Services and Markets Act 2023 (Digital Securities Sandbox) Regulations 2023 No. 1398, Regulation 1, <https://www.legislation.gov.uk/uksi/2023/1398/regulation/1>.

³⁴ *Id.*

³⁵ *See Lessons Learned*, FIN. CONDUCT AUTH., *supra* note 5.

³⁶ *See*, Appaya et al., *supra* note 6, at appendix 3.

³⁷ The actual number of regulatory sandboxes, even as of November 2020, is likely to be higher since the World Bank study appears to exclude at least several sandboxes that were established in or before 2020. Examples in the context of the United States include state-level fintech and insurance sandboxes in Hawaii, Hawaii, Vermont, West Virginia, and Wyoming. *Compare* Appaya et al., *supra* note 6, at appendix 3, *with* Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at Table 2.

The Asia Pacific and the Europe and Central Asia regions were the geographical areas with the highest reported number of regulatory sandboxes, with 19 and 18 such programs, respectively, as of November 2020.³⁸ In contrast, South Asia and North America were the regions with the lowest reported number of regulatory sandboxes, with five and six programs, respectively, although the growth of state-level U.S. regulatory sandboxes since then likely means that North America is no longer a region with a relatively low number of sandbox programs.³⁹ While the number of financial technology sandboxes has increased considerably since 2020, an authoritative estimate of the total number of regulatory sandboxes worldwide does not appear available.

Nevertheless, these numbers should be interpreted with caution. While a high number of sandboxes might reflect a certain degree of regulatory interest in such programs, they do not necessarily reflect whether such sandboxes have been successful in promoting innovation and enabling regulatory reform. On the contrary, a lower number of well-designed and targeted regulatory sandboxes at the national level might be more desirable than a high overall number of state-level sandboxes that struggle to attract participants and promote innovation, as has recently been the case with fintech sandboxes in the United States.⁴⁰

In the United States, the Consumer Financial Protection Bureau (CFPB) created the Compliance Assistance Sandbox Program and the Trial Disclosure Sandbox Program, reportedly the only two sandbox programs at the federal level.⁴¹ However, the lack of regulatory interest from the CFPB under the Biden administration meant that the Compliance Assistance Sandbox program was allowed to expire in September 2022.⁴² That was also the case for the CFPB's No Action Letter program, which stated the agency's intention not to pursue enforcement actions against a particular company as long as it complied with specific rules and regulations.⁴³ Beyond the CFPB, regulators in other agencies—particularly the Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC)—

³⁸ Appaya et al., *supra* note 6, at 6, Fig. 2.1.

³⁹ *See id.*

⁴⁰ Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at Table 2.

⁴¹ *See id.* at 1.

⁴² However, according to the Bureau, “[t]he CFPB will continue to accept and process requests under the Trial Disclosure Policy.” Bureau of Consumer Fin. Prot., Statement on Competition and Innovation, 87 FED. REG. 58439 (Sept. 27, 2022).

⁴³ *Id.* While this program might have displayed some features of a sandbox, it was not a proper sandbox in the sense that it does not involve close, continuous regulatory supervision characteristic of traditional sandbox programs, nor are the regulatory insights from such No Action Letter programs used for broader calibration of regulations for all firms.

appear to have expressed interest in sandbox-like initiatives, although the future of such programs remains uncertain due to a lack of regulatory interest.⁴⁴

One particular challenge that U.S. agencies have faced in creating fintech sandboxes at the federal level is regulatory fragmentation.⁴⁵ Unlike jurisdictions like Australia, Singapore, and the UK, where fintech sandboxes are well-established, the financial regulatory landscape in the United States is considerably more fragmented. In this regard, Hilary Allen from the American University Washington School of Law provides a demonstrative example of a hypothetical robo-advisor firm in a fintech sandbox, which could simultaneously fall under the jurisdiction of the CFPB and the SEC.⁴⁶ If the firm were to offer banking services, it would likely fall under the jurisdiction of the Federal Reserve, the Federal Deposit Insurance Corporation, the Office of the Comptroller of the Currency, and state banking regulators.⁴⁷ This division of regulatory authority constrains the ability of a particular agency to supervise firms, calibrate regulations, and provide regulatory relief where appropriate.⁴⁸ Such constraints—coupled with the absence of a statutory basis for creating the sandbox and mechanisms for interagency coordination—limit the effectiveness of U.S. fintech sandboxes at the federal level.

Against this backdrop, several U.S. state governments have sought to create state-level sandbox programs. At least 11 U.S. states have established regulatory sandboxes so far, which include Arizona, Florida, Hawaii, Kentucky, Nevada, North Carolina, South Dakota, Utah, Vermont, West Virginia, and Wyoming.⁴⁹ Notwithstanding such efforts, multiple state-level fintech sandboxes appear to experience difficulties with attracting and admitting sandbox participants.⁵⁰ According to a study of regulatory sandboxes from the Competitive Enterprise Institute, only three state-level fintech sandboxes—in Arizona, Hawaii, and West Virginia—admitted at least one sandbox participant as of November 2021.⁵¹ In contrast, 223 firms participated in Hong Kong's Monetary Authority sandbox, while 118 and 150 firms participated in South Korea's Fintech sandbox and Britain's FCA sandbox (excluding the Digital Services Sandbox), respectively.⁵² Furthermore, the Utah Supreme Court's legal sandbox admitted more participants than all U.S.

⁴⁴ See Caroline D. Pham, Comm'r, Commodity Futures Trading Comm'n, Public Statement & Remarks on a CFTC Pilot Sandbox Program (Sept. 7, 2023), <https://www.cftc.gov/PressRoom/SpeechesTestimony/opapham9>; see also Victor Smart, *SEC'S Hester Peirce floats UK-US crypto sandbox idea*, BANKING RISK & REGUL. (July 18, 2023), <https://www.bankingriskandregulation.com/secs-hester-peirce-floats-uk-us-crypto-sandbox-idea/>.

⁴⁵ See Allen, *supra* note 3.

⁴⁶ *Id.* at 618.

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at 2.

⁵⁰ *Id.* at Tables 1–2.

⁵¹ *Id.* at Table 2.

⁵² *Id.* at Table 1.

fintech sandboxes as of November 2021, a gap that has likely grown further since then as state-level fintech sandboxes have struggled to attract enough quality applications.⁵³

While making such *inter-* and *intra-*country comparisons, a certain degree of caution is warranted. A higher number of participating firms does not necessarily mean that the sandbox will facilitate innovation or regulatory reform. Regulatory authorities could successfully pursue policy reforms based on higher-quality supervision and interaction with a smaller set of carefully selected and representative firms—as long as the number of participating companies meets a certain threshold. However, the lack of participants or a meager number thereof, as has been the case in some U.S. fintech sandboxes, can indicate underlying structural issues that limit the effectiveness of such programs in enabling regulatory reform and innovation.⁵⁴ Unless U.S. lawmakers and regulators address these underlying issues, such as the lack of adequate interagency coordination mechanisms, AI sandboxes might also suffer from similar challenges.

II. FROM FINTECH TO AI: DO REGULATORY SANDBOXES FOR AI REQUIRE A DIFFERENT APPROACH?

Although fintech regulatory sandboxes have provided the impetus behind creating similar programs for artificial intelligence, designing AI sandboxes requires a differentiated approach. Since AI-enabled applications and systems can be used in a wider range of contexts and sectors, AI regulation is often significantly more multifaceted than fintech regulation. As a result, whereas fintech products and services can be more easily regulated within the scope of the broader financial services sector, AI regulation will likely involve the application of specific AI and data protection regulations, along with the relevant sector rules. This section explores these differences in greater detail and explains what they mean for AI regulatory sandboxes.

⁵³ According to data from the CEI study, the number of participants in the Arizona fintech sandbox (11), Hawaii Digital Currency Sandbox (16), and West Virginia FinTech Sandbox (1) amount to 28, compared to the number of participants in the Utah Legal Sandbox (31) as of November 2021. Nabil, *COMPETITIVE ENTER. INST.*, *supra* note 2, at table 2. While further research and correspondence are needed to establish the current number of participants in different U.S. fintech sandboxes, preliminary research suggests that the trend of the low number of participants in U.S. fintech sandboxes has not changed substantially since November 2021, the end of CEI's data collection period for this report. In contrast, according to the latest activities report by the Utah Supreme Court Office of Legal Services Innovation, 51 entities have participated in the state's legal sandbox. *See Activity Report*, UTAH, *supra* note 13.

⁵⁴ *See* Nabil, *COMPETITIVE ENTER. INST.*, *supra* note 2, at Table 2.

A. *Effective AI Regulation and the Need for a Combination of Different Regulatory Sandboxes*

There are several reasons why regulatory sandboxes can be helpful in the context of both fintech and AI regulation. Given the rapid pace of technological innovation, they can bring new fintech products and AI systems into compliance, especially when the precise regulatory requirements are unclear. Likewise, the fintech and AI regulatory landscapes are often characterized by a gap between rapid technological developments and less-developed regulatory capacity. Through close and continuous regulatory contact and supervision, sandboxes can help regulators develop a better understanding of emerging business models and technologies and develop their regulatory expertise.⁵⁵ This improved understanding and expertise develop and calibrate evidence-based rules and maintain an innovative regulatory environment.⁵⁶

While regulatory sandboxes can be beneficial for both fintech and AI regulation, the differences in the nature of fintech and AI regulation underscore the need for a differentiated approach to AI sandboxes. Unlike fintech, which can be viewed as a subset of the broader financial services sector, there is no single “artificial intelligence” industry. Instead, AI applications and systems enable various products, services, processes, and other innovations in different sectors, ranging from healthcare to manufacturing and financial services. Furthermore, there is no single legal definition of artificial intelligence or AI systems; instead, the umbrella term refers to a wide range of technological applications and lacks a meaningful international consensus.⁵⁷ In contrast, while there are also different types of financial technologies, they are typically applied in the context of the financial services sector. Furthermore, some fintech sandboxes, such as the Hawaii Digital Currency Innovation Lab (DCIL) Sandbox, are geared towards specific types of financial technologies, such as cryptocurrencies and blockchain technologies, meaning that the regulatory scope of such sandboxes can be defined more narrowly.⁵⁸

These differences have important implications for designing regulatory sandboxes for AI. The wider variety of AI systems and applications and the range of sectors where they can be applied means that a single one-size-fits-all sandbox might be less effective for AI than for fintech. Since AI applications cut across various sectors and often involve the jurisdiction of multiple

⁵⁵ *Lessons Learned*, FIN. CONDUCT AUTH., *supra* note 5, at 3–4; Allen, *supra* note 3, at 643; Knight & Mitchell, *supra* note 3, at 449–50.

⁵⁶ *Id.*

⁵⁷ Rex Martinez, *Artificial Intelligence: Distinguishing Between Types & Definitions*, 19 NEV. L.J. 1015, 1016–17 (2019); Stanley Greenstein, *Preserving the Rule of Law in the Era of Artificial Intelligence (AI)*, 30 A.I. & L 291, 299 (2022), <https://link.springer.com/article/10.1007/s10506-021-09294-4>.

⁵⁸ See, e.g., HAW. TECH. DEV. CORP., *Digital Currency Innovation Lab*, <https://www.htdc.org/digital-currency-innovation-lab/> (last visited Jan. 24, 2023).

regulators, a general-purpose AI sandbox under the supervision of multiple regulators will be appropriate for many AI applications.⁵⁹

However, because AI applications often vary significantly by sector, a general-purpose AI sandbox needs to be complemented with sector-specific or thematic sandboxes under the supervision of the relevant sectoral regulator(s).⁶⁰ For instance, regulating AI applications in nuclear energy will require knowledge of energy regulations and applicable AI laws, whereas supervising medical AI applications will require expertise in health law, data protection law, and any applicable AI law.⁶¹ A general-purpose AI sandbox under the primary supervision of a particular jurisdiction's artificial intelligence or data protection regulator is unlikely to possess such sector-specific expertise. Therefore, specialized sandboxes might be more effective in developing context-specific rules tailored to different industries.⁶²

While general-purpose AI sandboxes might admit firms from various sectors, this approach might not yield the volume of case studies essential for developing more specialized, sector-specific rules. The need for more specialized sandboxes becomes apparent through Zurich Canton's thematic sandboxes, which have been designed to promote innovation and develop rules for i) automated grading in standardized testing and ii) augmented and virtual reality applications in foreign language instruction, among others.⁶³ Although a general AI sandbox might be open to developers of such applications, limited regulatory resources generally constrain the number of firms that can be admitted to a general sandbox at any given time. Furthermore, sandbox regulators might seek to ensure representation from a diverse array of sectors. Therefore, general-purpose AI sandboxes are unlikely to have a sufficiently high number of relevant projects needed to develop a nuanced understanding of highly specialized technologies and business models. In contrast, sector-specific or thematic sandboxes, such as those established by Zurich Canton within the framework of a broader AI sandbox program, can generate the volume and variety of projects needed to develop rules for more specialized AI applications.⁶⁴ Therefore, it is crucial to supplement general-purpose AI sandboxes with sector-specific or thematic programs to craft context-specific rules for AI across various sectors and specialized settings.⁶⁵

⁵⁹ U.K. DEP'T FOR SCI., *supra* note 17.

⁶⁰ *See id.* at ¶¶ 96–98.

⁶¹ *See also* Ryan Nabil, *Global AI Governance and the United Nations*, YALE J. INT'L AFFS. (Fall 2023), <https://www.yalejournal.org/publications/global-ai-governance-and-the-united-nations>.

⁶² *See, e.g.*, U.K. DEP'T FOR SCI., *supra* note 17, at ¶ 95–98.

⁶³ ZURICH CANTON, *supra* note 16.

⁶⁴ *Id.*

⁶⁵ *See, e.g., id.*

B. *Regulatory Sandboxes as a Tool for Evidence-Based, Iterative Approach to AI Regulation*

When the first and second waves of fintech sandbox programs were launched between 2016 and 2020,⁶⁶ the financial services sector was in the middle of rapid changes brought on by emerging technologies and business models, such as blockchain technologies, cryptocurrencies, digital and mobile banking, and peer-to-peer and crowd-lending platforms.⁶⁷ In this context, fintech sandboxes helped regulators like the Financial Conduct Authority, the Monetary Authority of Singapore, and the Hong Kong Monetary Authority better understand these technologies and attract innovative start-ups and financial firms while maintaining an innovation-friendly regulatory environment.⁶⁸ The arguments for creating AI sandboxes are perhaps stronger as many jurisdictions worldwide are now faced with the challenge of developing their regulatory approaches to artificial intelligence.

Some policymakers and popular observers in the United States might argue that the United States is falling behind its international competitors and point to the EU's Artificial Intelligence Act, reportedly the world's first comprehensive AI legislation, supposedly necessitating a similarly comprehensive legal framework that would regulate AI applications across all sectors of the U.S. economy.⁶⁹ However, this line of argumentation suffers from several shortcomings. First, it incorrectly equates the creation of comprehensive AI legislation with a country's overall competitive position in the global AI landscape. It is one thing to pass AI legislation but quite another to be a world leader in AI innovation. Second, and more importantly, it presupposes a certain uniformity of legal traditions and assumes that all jurisdictions have identical legal approaches to emerging technologies and similar timelines where statutory interventions are desired. The European Union's deliberate and careful negotiations and development of rules in different areas of AI governance—many of which would ultimately be decided through regulators and court decisions in Common Law jurisdictions—is a key feature of the continent's Civil Law traditions. The EU's approach to AI underlies several regulatory challenges—such as the classification of potentially less risky AI systems as high risk—that could lead to overregulation and stifle innovation

⁶⁶ See Appaya et al., *supra* note 6, at 7, fig. 2.3 & appendix 3.

⁶⁷ See generally *Crowdfunding*, FIN. CONDUCT AUTH. (2016), <https://www.fca.org.uk/consumers/crowdfunding>; *FCA confirms new rules for P2P platforms*, FIN. CONDUCT AUTH. (2019), <https://www.fca.org.uk/news/press-releases/fca-confirms-new-rules-p2p-platforms>.

⁶⁸ See generally Appaya et al., *supra* note 6; Nabil, COMPETITIVE ENTER. INST., *supra* note 2.

⁶⁹ European Parliament, Press Release IPR 19015, Artificial Intelligence Act: MEPs adopt landmark law (Mar. 13, 2024), <https://www.europarl.europa.eu/news/en/press-room/20240308IPR19015/artificial-intelligence-act-meps-adopt-landmark-law>; Kelvin Chan, *The E.U. Has Passed the World's First Comprehensive AI Law*, TIME, Mar. 13, 2024, <https://time.com/6903563/eu-ai-act-law-artificial-intelligence-passes/>.

in certain areas, although many such challenges could still be addressed within its current legal framework for AI.⁷⁰

Nevertheless, as calls for comprehensive AI legislation grow in the United States and elsewhere, regulatory sandboxes could serve as an important tool in shaping a more careful, iterative approach to AI regulation. Through sandboxes, decision-makers in Common Law jurisdictions such as the United States and the UK can develop a more practical understanding of how AI is applied across different industries and identify any potential regulatory gaps that might require statutory interventions.⁷¹ Instead of enacting passing comprehensive AI legislation, sandboxes can provide a tool for a more evidence-based, iterative way of lawmaking.⁷²

These benefits also apply to Civil Law jurisdictions that have already introduced or are seeking to introduce comprehensive AI legislation. For the European Union, AI sandboxes could play an important role in evaluating the regulatory impact and effectiveness of its proposed legal framework for AI. However, for this approach to be effective, European policymakers must improve the mechanisms for evaluating sandbox data and regulatory lessons from national-level AI sandboxes. Such mechanisms can help European lawmakers and regulators identify any potential issues with the EU's current regulatory approach and determine whether specific regulations should be adjusted, removed, or introduced.

III. AI REGULATORY SANDBOXES IN SELECTED JURISDICTIONS

While AI sandboxes provide an opportunity to develop well-calibrated rules and promote innovation, designing such programs remains a major regulatory challenge. A notable positive development, however, is that a growing number of jurisdictions are in the process of establishing AI sandboxes. Analyzing the regulatory designs of such programs and monitoring regulatory trends in these jurisdictions can offer helpful insights and best practices for creating effective AI sandboxes. This section provides an overview of the AI sandbox strategies of jurisdictions that are at the forefront of establishing AI regulatory sandboxes as of January 2024, highlighting the potential challenges that they face in designing these sandboxes.⁷³

⁷⁰ Artificial Intelligence Act, art. 6, EUR. PARL. DOC. TA 138 (2024).

⁷¹ Ryan Nabil, *Developing a Flexible, Innovation-Focused U.S. Approach to AI Regulation*, NAT'L TAXPAYERS UNION FOUND. (July 7, 2023), <https://www.ntu.org/library/doclib/2023/07/Ryan-Nabil-NTUF-AI-Governance-OSTP-TECH-2023-0007-.pdf>.

⁷² *Id.*

⁷³ As of January 2024, these jurisdictions are the United Kingdom, the European Union, Switzerland, Norway, and, to a lesser extent, Singapore, which has developed a narrower and more sandbox for generative AI evaluation. As of March 2024, Singapore has also announced a sandbox for SMEs, although it remains unclear whether the proposed sandbox will qualify as a "regulatory sandbox." For more information, see the discussion on Singapore in this section.

As with fintech sandboxes, there appears to be greater interest in creating AI sandboxes in foreign jurisdictions, particularly in the European context. The United Kingdom, a pioneer in launching fintech sandboxes, has announced that sandboxes will play an important role in its regulatory approach to AI.⁷⁴ Meanwhile, the European Union has taken a significant interest in creating AI sandboxes. According to the EU's AI Act, which received approval from the European Parliament in March 2024 but is yet to become law, every EU Member State will be required to create at least one AI sandbox at the national level,⁷⁵ while they can also create or join additional sandboxes at the national or regional level.⁷⁶ This section also discusses AI sandboxes in Norway and Switzerland—both of which formally remain outside the European Union despite maintaining close institutional ties with the European Union. Norway is part of both the European Economic Area (EEA) and the European Free Trade Area (EFTA), while Switzerland is a member of the EFTA but not EEA.⁷⁷

Beyond Europe, several jurisdictions have expressed interest in creating AI sandboxes. Singapore has launched an AI sandbox with the participation of ten of the world's leading AI companies,⁷⁸ while Chile and Colombia are currently exploring plans to create AI sandboxes.⁷⁹ Among the BRICS and other emerging-market nations, Brazil is currently exploring plans to create an AI sandbox,⁸⁰ while Singapore has already launched a generative AI

⁷⁴ U.K. DEP'T FOR SCI., *supra* note 17, at ¶ 95.

⁷⁵ Unless otherwise noted, the European Union's Artificial Intelligence Act, as cited in this Article, refers to the final text of the AI Act as adopted by the European Parliament on March 13, 2024. Note that the Council of the European Union will formally need to endorse the final text. The legislation will enter into force 20 days after the legislation is published in the *Official Journal of the European Union*, followed by a transition period of six to 36 months, depending on the type of AI system. Artificial Intelligence Act, art. 57(1), EUR. PARL. DOC. TA 138 (2024), https://www.europarl.europa.eu/doceo/document/TA-9-2024-0138_EN.pdf. See also European Parliament, Press Release IPR 19015, Artificial Intelligence Act: MEPs adopt landmark law (Mar. 13, 2024).

⁷⁶ Artificial Intelligence Act, art. 57(2), EUR. PARL. DOC. TA 138 (2024)

⁷⁷ The EFTA consists of four countries: Iceland, Liechtenstein, Norway, and Switzerland. The EEA includes all EU Member States along with three of the EFTA members—namely, Iceland, Liechtenstein, and Norway—except for Switzerland.

⁷⁸ Press Release, First of its Kind Generative AI Evaluation Sandbox for Trusted AI by AI Verify Foundation and IMDA, Infocomm Media Dev. Auth., (Oct. 31, 2023), <https://www.imda.gov.sg/resources/press-releases-factsheets-and-speeches/press-releases/2023/generative-ai-evaluation-sandbox>.

⁷⁹ *Sandbox on privacy by design and by default in Artificial Intelligence projects*, SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO [SUPERINTENDENCE OF INDUSTRY AND COMMERCE] (2021), <https://www.sic.gov.co/sites/default/files/files/2021/150421%20Sandbox%20on%20privacy%20by%20design%20and%20by%20default%20in%20AI%20projects.pdf>; see also *Sandbox Regulatorio de Inteligencia Artificial en Chile [Regulatory Sandbox of Artificial Intelligence in Chile]*, MINISTERIO DE ECONOMÍA, FOMENTO Y TURISMO [MINISTRY OF ECON., DEV. AND TOURISM] (2021), <https://www.economia.gob.cl/wp-content/uploads/2021/09/PaperSandboxIA.pdf>.

⁸⁰ *Ministry of Justice and Public Security, ANPD's Call for Contributions to the regulatory sandbox for artificial intelligence and data protection in Brazil is now open*, GOV'T OF BRAZIL (2023),

evaluation sandbox with the participation of several of the world's leading AI companies.⁸¹ While the governments of China, Russia, and India have previously created fintech sandboxes, their plans to design AI sandboxes remain unclear. While this section primarily draws from European regulatory experiences, it also briefly discusses sandboxes in select emerging-market countries in the interest of a more internationally oriented and globally aware approach to AI regulation.

A. *The United Kingdom*

As the UK government develops its regulatory regime for AI, it seeks to build upon its expertise in fintech sandboxes and establish regulatory sandboxes for AI.⁸² The UK government's AI White Paper, which details the UK's approach to AI regulation, notes that the FCA's sandbox advised more than 800 companies, accelerating their entry into the market by approximately 40 percent.⁸³ More recently, the Medicine and Healthcare Regulatory Authority (MHRA) has announced the creation of the "AI-Airlock" sandbox to test new medical products and services.⁸⁴ While the specific details of the UK's AI sandboxes are forthcoming, the government's AI White Paper and the accompanying government consultation provide a window into its evolving sandbox strategy.

The UK's broader approach to AI regulation provides a useful starting point for understanding its evolving sandbox strategy. In an effort to position itself as a major AI hub, the UK government has put forward policies that sometimes mark a stark contrast with the European Union's regulatory approach.⁸⁵ For instance, unlike the European Union, the UK government does not currently intend to create comprehensive AI legislation.⁸⁶ Instead, the UK

<https://www.gov.br/anpd/pt-br/assuntos/noticias/anpds-call-for-contributions-to-the-regulatory-sandbox-for-artificial-intelligence-and-data-protection-in-brazil-is-now-open>.

⁸¹ The participants are: Anthropic, DataRobot, Deloitte, EY, Global Regulation Inc, Google, IBM, Microsoft, NVIDIA, OCBC, Resaro.AI, Stability.AI, Singtel, TÜV SÜD, and XOPA.AI. See Infocomm, *supra* note 78, at Annex A – List of Participants in Sandbox.

⁸² U.K. DEP'T FOR SCI., *supra* note 17, at ¶¶ 94–95.

⁸³ *Id.* at ¶ 94.

⁸⁴ MEDICINES AND HEALTHCARE PRODUCTS REGULATORY AGENCY, MHRA TO LAUNCH THE AI-AIRLOCK, A NEW REGULATORY SANDBOX FOR AI DEVELOPERS (2023), <https://www.gov.uk/government/news/mhra-to-launch-the-ai-airlock-a-new-regulatory-sandbox-for-ai-developers>.

⁸⁵ U.K. DEP'T FOR SCI., *supra* note 17; U.K. GOV'T, National AI Strategy (Sept. 2021), <https://www.gov.uk/government/publications/national-ai-strategy>.

⁸⁶ See Ministerial Foreword by Rt Hon Michelle Donelan MP in the UK Government's AI White Paper: "Our approach relies on collaboration between government, regulators, and business. Initially, we do not intend to introduce new legislation. By rushing to legislate too early, we would risk placing undue burdens on businesses. But alongside empowering regulators to take a lead, we are also setting expectations. Our new monitoring functions will provide a real time assessment of how the regulatory framework is performing so that we can be confident that it is proportionate. The pace of technological development

favors an outcomes-based and sectoral, context-specific approach to AI governance, noting that the sectoral framework will be updated as needed as AI-related safety risks, regulatory challenges, and statutory gaps become evident.⁸⁷ In this context, the UK government has also developed a series of policy tools, such as a cross-sectoral risk assessment framework, to support the implementation of the government's broader approach to AI regulation.⁸⁸

Furthermore, whereas the European risk-rated regulatory approach focuses on classifying different types of AI systems according to their risk level, the UK approach emphasizes the *context-specific* nature of AI risks.⁸⁹ For example, AI applications in the nuclear sector would generally be associated with a much higher level of risk than spam filters in emails.⁹⁰ However, even within the nuclear sector, not all potential AI applications would carry the same risks, and the UK approach seeks to recognize such differences.⁹¹ For instance, whereas using AI to improve the process of nuclear fusion would carry significant risks, using AI to identify minor cosmetic flaws within a nuclear plant would involve much lower risks.⁹² The sector- and context-specific nature of AI applications means that regulatory supervision of an AI sandbox will require deep regulatory knowledge of the specific sector(s) and any associated artificial intelligence and data protection law that might apply.⁹³

The UK's sandbox strategy builds upon this sector- and context-approach to AI, which raises important questions regarding regulatory design. Should the UK's AI sandbox program(s) cover single or multiple sectors and implicate the jurisdiction of one or multiple regulators?⁹⁴ The response involves four possible combinations: i) single-sector sandbox with a single regulator; ii) multi-sector sandbox with a single regulator; iii) single-sector sandbox with multiple regulators; and iv) multi-sector sandbox with multiple regulators.⁹⁵

As a first step, the UK government plans to roll out a pilot AI sandbox that focuses on only one sector, which will be under the regulatory

also means that we need to understand new and emerging risks, engaging with experts to ensure we take action where necessary. A critical component of this activity will be engaging with the public to understand their expectations, raising awareness of the potential of AI and demonstrating that we are responding to concerns." U.K. DEP'T FOR SCI., *supra* note 17.

⁸⁷ *Id.*

⁸⁸ *Id.*

⁸⁹ See generally Lilian Edwards, *Expert explainer: The EU AI Act proposal*, ADA LOVELACE INST. (Apr. 8, 2022), <https://www.adalovelaceinstitute.org/resource/eu-ai-act-explainer/>; see U.K. DEP'T FOR SCI., *supra* note 17, at ¶ 96.

⁹⁰ U.K. DEP'T FOR SCI., *supra* note 17; see also Nabil, *YALE J. INT'L AFFS.*, *supra* note 61, at 4.

⁹¹ Nabil, *YALE J. INT'L AFFS.*, *supra* note 61, at 4.

⁹² *Id.*

⁹³ U.K. DEP'T FOR SCI., *supra* note 17.

⁹⁴ *Id.* ¶ 96.

⁹⁵ *Id.*

supervision of multiple regulators, corresponding to the third model in Table 1.⁹⁶ However, recognizing that generative AI and other AI applications and systems often cut across different sectors, this pilot sandbox would be expanded to cover multiple sectors.⁹⁷ Since such an arrangement would involve multiple sectors and require the participation of multiple regulators, it would correspond to the fourth model in Table 1.⁹⁸

Table 1. Possible Models for the UK’s Proposed Artificial Intelligence Sandbox Program(s)⁹⁹

Model	Description
i) Single sector, single regulator	“[S]upport innovators to bring AI products to the market in collaboration with a single regulator, focusing on only one chosen industry sector.”
ii) Multiple sectors, single regulator	[S]upport AI innovators in collaboration with a single regulator that is capable of working across multiple industry sectors.”
iii) Single sector, multiple regulator	“[E]stablish a sandbox that only operates in one industry sector but is capable of supporting AI innovators whose path to market requires interaction with one or more regulators operating in that sector.”
iv) Multiple sectors, multiple regulators	“[A] sandbox capable of operating with one or more regulators in one or more industry sectors to help AI innovators reach their target market. The DRCF [Digital Regulation Cooperation Forum] is piloting a version of this model.”

While designing sector-specific sandboxes—whether single or multiple regulators—the question arises regarding the sectors in which such sandboxes should be introduced. The UK government’s current position is that the pilot sandbox will be focused on “a sector where there is a high degree of AI investment, industry demand for a sandbox, and appetite for improved collaboration between regulators to help AI innovators take their products to market.”¹⁰⁰ This approach is a helpful starting point, especially given that the government recently solicited public and expert input on this issue through a consultation.¹⁰¹

⁹⁶ *Id.* ¶ 97.

⁹⁷ *Id.*

⁹⁸ U.K. DEP’T FOR SCI., *supra* note 17, at ¶ 97.

⁹⁹ *Id.*

¹⁰⁰ *Id.* at ¶ 98.

¹⁰¹ U.K. DEP’T FOR SCI., INNOVATION & TECH., & UK OFF. FOR A.I., *A pro-innovation approach to AI regulation: Government Response*, at Annex C, Questions S1 to S3 (Feb. 6, 2024), <https://www.gov.uk/government/consultations/ai-regulation-a-pro-innovation-approach-policy->

Nevertheless, additional questions remain. For example, what will regulatory coordination mechanisms in a sandbox involving multiple sectors and regulators look like? As the White Paper notes,¹⁰² the Digital Regulation Cooperation Forum (DRCF)—a network of regulators involving the Competition and Markets Authority, the Information Commissioner’s Office, the Office of Communications, and the Financial Conduct Authority—is currently piloting a version of this model.¹⁰³ However, in some contexts, a larger platform with more stakeholders or a platform with a different set of stakeholders might be more appropriate. For example, the Department of Transportation’s involvement would likely be essential in a hypothetical AI sandbox focusing on autonomous vehicles. Additionally, whether such cooperation is best conducted through informal arrangements like the DRCF or whether an appropriate statutory basis should be established through legislation remains to be seen. Ultimately, answering these questions will likely require some regulatory experimentation and involve a process of trial and error. However, considering these questions can help the UK government design more effective AI sandboxes, which can play a useful role in implementing the government’s AI framework.

B. *The European Union*

Across the Channel, the European Commission, the executive arm of the European Union, first proposed the creation of regulatory sandboxes in the draft of the Artificial Intelligence Act in April 2021,¹⁰⁴ and Spain became the first EU country last year to have launched an AI sandbox.¹⁰⁵ Although the European Union had initially expressed a lukewarm attitude towards regulatory sandboxes, the EU increasingly appears to endorse AI sandboxes as a tool to promote innovation.¹⁰⁶ While the EU’s approach to AI is still evolving, the final AI Act text provides helpful insights into recent European thinking on AI sandboxes. First, whereas the first draft of the AI Act only

proposals/outcome/a-pro-innovation-approach-to-ai-regulation-government-response#annex-c-individual-question-summaries.

¹⁰² *The Digital Regulation Cooperation Forum*, U.K. GOV’T, <https://www.gov.uk/government/collections/the-digital-regulation-cooperation-forum> (last visited Jan. 29, 2023).

¹⁰³ U.K. DEP’T FOR SCI., *supra* note 17, at ¶ 96.

¹⁰⁴ *Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts*, art. 53(1), COM (2021) 206 final (April 4, 2021), <https://artificialintelligenceact.eu/wp-content/uploads/2022/05/AIA-COM-Proposal-21-April-21.pdf> [hereinafter EU AI Act Proposal].

¹⁰⁵ ROYAL DECREE 817/2023, *supra* note 28.

¹⁰⁶ Ryan Nabil, *Reforming the European Union’s Proposed AI Regulatory Sandbox*, AUSTL. INST. INT’L AFFS. (Oct. 6, 2023), <https://www.internationalaffairs.org.au/australianoutlook/reforming-the-european-unions-proposed-ai-regulatory-sandbox>; Artificial Intelligence Act, art. 57, EUR. PARL. DOC. TA 138 (2024).

recommended that individual EU countries create a regulatory sandbox program,¹⁰⁷ the final AI Act text requires that every EU Member State create at least one AI sandbox at the national level (although this requirement could also be fulfilled by joining an existing AI sandbox).¹⁰⁸ In addition, the European Data Protection Supervisor might also create AI sandboxes at the EU level, the details of which might be provided in future implementing acts.¹⁰⁹

Second, another issue with the EU's original sandbox proposal was that innovation did not appear to be a priority of the European AI strategy.¹¹⁰ However, the final text appears to make supporting innovation a more important aspect of the AI Act more generally and regulatory sandboxes more specifically.¹¹¹ Although the EU's AI approach still has significant scope for improvement, the increased emphasis on innovation is a step in the right direction.¹¹² Third, the AI Act rightly recognizes the importance of regulatory learning and how regulatory insights gained through AI sandboxes could help calibrate the EU's AI framework.¹¹³

Fourth, the AI Act also recognizes potential challenges that could arise from an AI sandbox and rightly emphasizes the importance of informed consent and adequate data protection standards during the sandbox testing period.¹¹⁴ Fifth, the legislation grants Member States significant autonomy in designing AI sandboxes at the national level. While this flexibility is a step in the right direction, the EU must address significant challenges of regulatory coordination, such as how sandboxes are designed and implemented in various Member States. To that end, the European Commission has proposed several mechanisms, including the creation of the Artificial Intelligence Board, which, among others, will also provide support and advice to national

¹⁰⁷ EU AI Act Proposal (Apr. 21, 2021), art. 53(1).

¹⁰⁸ Artificial Intelligence Act, art. 57(1), EUR. PARL. DOC. TA 138 (2024).

¹⁰⁹ *Id.* at art. 57(3).

¹¹⁰ Nabil, AUSTL. INST., *supra* note 106.

¹¹¹ Artificial Intelligence Act, recital (1), art. 57(5), EUR. PARL. DOC. TA 138 (2024).

¹¹² KI Bundesverband [German AI Association], Statement des KI Bundesverband zur aktuellen Dynamik um den AI Act [Statement of the German AI Association on the Current Dynamic of the AI Act] (2024).

¹¹³ More specifically, Recital (139) of the AI Act states: "The objectives of the AI regulatory sandboxes should be to foster AI innovation by establishing a controlled experimentation and testing environment in the development and pre-marketing phase with a view to ensuring compliance of the innovative AI systems with this Regulation and other relevant Union and national law, to enhance legal certainty for innovators and the competent authorities' oversight and understanding of the opportunities, emerging risks and the impacts of AI use, to facilitate regulatory learning for authorities and undertakings, including with a view to future adaptations of the legal framework, to support cooperation and the sharing of best practices with the authorities involved in the AI regulatory sandbox, and to accelerate access to markets, including by removing barriers for SMEs, including start-ups (emphasis removed)." Artificial Intelligence Act, recital (139), EUR. PARL. DOC. TA 138 (2024).

¹¹⁴ Artificial Intelligence Act, arts. 57-58, EUR. PARL. DOC. TA 138 (2024).

authorities for establishing and operating sandboxes.¹¹⁵ While the effectiveness of such measures remains to be seen, the EU is right to recognize the importance of regulatory coordination and the need for a more harmonized approach for EU-aligned AI sandboxes at the national level.¹¹⁶

Finally, the AI Act recognizes that its obligations could disproportionately impact SMEs and emphasizes the importance of removing regulatory barriers for smaller businesses through AI sandboxes.¹¹⁷ While the European approach to AI governance could still benefit from improvements in other areas, the revised approach to AI sandboxes is a step in the right direction.

C. *Selected EU, EEA, and EFTA Member States*

Currently, individual EU countries are given significant autonomy in creating and implementing such sandboxes within the framework of the EU's broader AI sandbox policy. While the EU will likely create additional common rules for implementing EU-aligned AI sandboxes at the national level, there could still be considerable divergences in how different EU countries design AI sandboxes.¹¹⁸ For example, whereas some countries might launch several AI sandboxes, smaller jurisdictions might instead join existing sandboxes offered by other EU countries. As more Member States develop EU-aligned sandboxes at the national level, analyzing the differences in regulatory designs between different EU countries will become especially important.

1. Spain

Spain deserves particular mention among EU Member Countries in its efforts to create an AI regulatory sandbox. It became the first EU country to announce the creation of an AI sandbox in June 2022.¹¹⁹ After receiving

¹¹⁵ *Artificial Intelligence in the European Commission*, EUR. COMM'N, (2024), <https://commission.europa.eu/system/files/2024-01/EN%20Artificial%20Intelligence%20in%20the%20European%20Commission.PDF>.

¹¹⁶ *Id.*; Artificial Intelligence Act, arts. 58(1)–(2), EUR. PARL. DOC. TA 138 (2024).

¹¹⁷ For example, the AI Act states: “Regulatory sandboxes should be widely available throughout the Union, and particular attention should be given to their accessibility for SMEs, including start-ups. The participation in the AI regulatory sandbox should focus on issues that raise legal uncertainty for providers and prospective providers to innovate, experiment with AI in the Union and contribute to evidence-based regulatory learning. . . .” Artificial Intelligence Act, recital (139), EUR. PARL. DOC. TA 138 (2024).

¹¹⁸ Artificial Intelligence Act, arts. 58(1)–(2), EUR. PARL. DOC. TA 138 (2024).

¹¹⁹ *Launch event for the Spanish Regulatory Sandbox on Artificial Intelligence*, EUR. COMM'N (2022), <https://digital-strategy.ec.europa.eu/en/events/launch-event-spanish-regulatory-sandbox-artificial-intelligence>.

Royal assent from King Felipe VI, the Spanish Decree 817/2023 provided the legal basis for the first EU-aligned AI sandbox, creating a space for public and private entities to test AI-enabled products and services.¹²⁰ The Spanish government also created the *Agencia Española de Supervisión de la Inteligencia Artificial* (AESIA or the “Spanish Agency for the Supervision of Artificial Intelligence” in English), reportedly the first body of its kind in the EU.¹²¹ The AESIA is expected to enforce the legal provisions of the EU’s AI Act in Spain and collaborate with the Spanish Data Protection Authority in cases where AI Act responsibilities overlap with GDPR requirements.¹²² However, in cases of overlapping jurisdiction in areas such as financial services and healthcare, the extent to which it can successfully coordinate with other Spanish regulators remains to be seen and could influence the program’s effectiveness. Other challenges related to the broader EU’s AI sandbox strategy, such as regulatory coordination between the EU and Member States and the extent to which regulatory insights are used as a basis for policy reform, also apply to the Spanish sandbox. How the Spanish and European governments and EU institutions respond to these challenges will be key in determining the future success of European AI sandboxes.

2. Germany

There has been growing interest in creating AI sandboxes in Germany, the EU’s economic powerhouse. Although Germany’s Federal Ministry for Economic Affairs and Climate Action (*Bundesministerium für Wirtschaft und Klimaschutz* or BMWK) launched a sandbox for green energy technologies, the German government has not yet launched an AI sandbox at the national level.¹²³ However, the German AI strategy recognizes the importance of regulatory sandboxes for developing appropriate legal frameworks and promoting innovation,¹²⁴ while BMWK has also issued a more detailed

¹²⁰ ROYAL DECREE 817/2023, *supra* note 28.

¹²¹ *El Gobierno inicia el proceso para elegir la sede de la Agencia Española de Supervisión de la Inteligencia Artificial [The Government starts the process to choose the headquarters of the Spanish Agency for Artificial Intelligence Supervision]*, MINISTERIO DE ASUNTOS ECONÓMICOS Y TRANSFORMACIÓN DIGITAL [MINISTRY OF ECONOMIC AFFAIRS AND TRANSFORMATION] (2022), https://portal.mineco.gob.es/RecursosNoticia/mineco/prensa/noticias/2022/20220913_ndp_sede_agencia_ia.pdf.

¹²² *Id.*

¹²³ *Was passiert eigentlich in einem Reallabor der Energiewende? [What actually happens in a real-life laboratory for the energy transition?]*, BUNDESMINISTERIUM FÜR WIRTSCHAFT UND KLIMASCHUTZ [FEDERAL MINISTRY FOR ECONOMIC AFFAIRS AND CLIMATE ACTION OF GERMANY] (2021), <https://www.bmwk-energiewende.de/EWD/Redaktion/Newsletter/2021/05/Meldung/direkt-erklart.html>.

¹²⁴ *Strategie Künstliche Intelligenz der Bundesregierung [Artificial Intelligence Strategy of the Federal Government]*, DIE BUNDESREGIERUNG/MINISTERIUM [THE FEDERAL GOVERNMENT] (2020) at 21–22, https://www.ki-strategie-deutschland.de/files/downloads/201201_Fortschreibung_KI-Strategie.pdf.

strategy and advisory document about developing experimental clauses (“Experimentierklausen”) and regulatory sandboxes (“Reallabor”).¹²⁵ Having been published in 2020, a year before the publication of the EU’s first AI Act draft, these documents do not reflect the same alignment with the AI Act as the Spanish government’s AI strategy, although that could change in the future.¹²⁶

3. France

In France, the country’s data protection authority—known as the *Commission nationale de l’informatique et des libertés* or CNIL in short—has also emerged as an important actor in the European AI sandbox regulatory landscape.¹²⁷ CNIL has also developed a cohorts-based sandbox, where the latest sandbox cohort focused on using artificial intelligence to promote public-sector innovation.¹²⁸ It should be noted, however, that the Spanish AI sandbox is expressly aligned with the EU’s AI Act via statute,¹²⁹ but that does not

¹²⁵ *Recht flexibel [Quite flexible]*, Bundesministerium für Wirtschaft und Klimaschutz [Federal Ministry for Economic Affairs and Climate Action of Germany], (2020), <https://www.bmwi.de/Redaktion/DE/Publikationen/Digitale-Welt/recht-flexibel-arbeitshilfe-experimentierklauseln.html>.

¹²⁶ *Id.*

¹²⁷ *Intelligence artificielle: l’avis de la CNIL et de ses homologues sur la future réglementation européenne [Artificial intelligence: the opinion of the CNIL and its counterparts on the future European regulation]*, COMMISSION NATIONALE DE L’INFORMATIQUE ET DES LIBERTES [NATIONAL COMMISSION ON INFORMATICS AND LIBERTY (“CNIL”)] (2021), <https://www.cnil.fr/en/artificial-intelligence-opinion-cnil-and-its-counterparts-future-european-regulation>.

¹²⁸ *Bac à sable intelligence artificielle et services publics: la CNIL accompagne 8 projets innovants [AI sandbox and Public Service: CNIL supports 8 Innovative Projects]*, CNIL (2023), <https://www.cnil.fr/fr/bac-sable-intelligence-artificielle-et-services-publics-la-cnil-accompagne-8-projets-innovants>.

¹²⁹ See ROYAL DECREE 817/2023, *supra* note 28. According to the preamble to the Royal Decree 817/2023, “En este contexto, el Gobierno de España, con la colaboración de la Comisión Europea, pone en marcha el primer entorno controlado de pruebas para comprobar la forma de implementar los requisitos aplicables a los sistemas de inteligencia artificial de alto riesgo de la propuesta de reglamento europeo de inteligencia artificial con el ánimo de obtener, como resultado de esta experiencia, unas guías basadas en la evidencia y la experimentación que faciliten a las entidades, especialmente las pequeñas y medianas empresas, y a la sociedad en general, el alineamiento con la propuesta del Reglamento Europeo de Inteligencia Artificial. Durante el desarrollo de este entorno controlado de pruebas, se utilizará como referencia la posición del Consejo de la Unión Europea del 25 de noviembre de 2022, como se explica en el anexo I.” Author’s translation: “In this context, the Government of Spain, in collaboration with the European Commission, launches the first controlled environment to test ways to implement the requirements applicable to high-risk AI systems of the proposed European regulation on artificial intelligence with the aim of obtaining, based on this experience, evidence-based guidelines and feedback that will facilitate the alignment with the proposed European regulation on artificial intelligence, evidence-based guidelines and experimentation that will facilitate the alignment of entities, especially small and medium-sized entities, and businesses in general, with the proposal of the European regulation on artificial intelligence. During

appear to be the case for the CNIL sandbox, which became operational in February 2021.¹³⁰ Unlike many regulatory sandboxes in the United Kingdom and the United States, the CNIL sandbox does not focus on promoting innovation directly by providing regulatory relief or by suspending existing legal requirements.¹³¹ Instead, it focuses on helping participants achieve regulatory compliance with data protection regulations, particularly the GDPR, in the context of AI-enabled products and services.¹³² Like the Spanish model and the broader EU's approach to AI sandbox, the CNIL approach focuses on compliance rather than experimentation.¹³³ This approach reflects the more cautious European approach to regulatory sandboxes—although that could change in light of the EU's growing support for AI sandboxes and technological innovation more broadly.

One interesting aspect of CNIL's sandbox strategy is its adoption of thematic sandboxes and a cohorts-based model, which remains relatively unusual in the United States.¹³⁴ More specifically, the CNIL sandbox is “thematic” in the sense that different iterations of the sandbox focus on particular issues. For example, whereas the first two editions of the sandbox focused on digital health and educational technology, the most recent iteration focuses on AI applications in the public sector.¹³⁵ The CNIL sandbox also uses a cohorts-based model instead of an open-application model, meaning that companies apply to the sandbox and are admitted during a given time period.¹³⁶ In the U.S. context, an imperfect analogy would be Hawaii's Digital Currency Innovation Lab sandbox, which is also i) thematic (aimed at digital currencies) and ii) cohorts-based (albeit with only one cohort with

the development of this evidence-controlled environment, the position of the Council of the European Union as of 25 November 2022, as explained in Annex I, will be used as a reference.”

¹³⁰ *Bac à sable* « données personnelles de la CNIL : appel à projets 2021 [CNIL's personal data 'sandbox': call for projects 2021], CNIL (2021), <https://www.cnil.fr/fr/bac-a-sable-2021>.

¹³¹ See, e.g., *Bac à sable « santé numérique »: Les recommandations de la CNIL aux lauréats [Digital Health Sandbox: CNIL's recommendations to graduates]*, CNIL (2023) https://www.cnil.fr/sites/cnil/files/2023-07/bilan_bac_a_sable_sante_numerique.pdf; see also *Bac à sable « EdTech »: Les recommandations de la CNIL aux lauréats, [“EdTech” sandbox: CNIL's recommendations to the sandbox graduates]*, CNIL (2023), https://www.cnil.fr/sites/cnil/files/2023-07/bilan_bac_a_sable_edtech.pdf.

¹³² *Digital Health Sandbox*, CNIL, *supra* note 131; “*EdTech*” *Sandbox*, CNIL, *supra* note 131.

¹³³ *Digital Health Sandbox*, CNIL, *supra* note 131; “*EdTech*” *Sandbox*, CNIL, *supra* note 131.

¹³⁴ *Digital Health Sandbox*, CNIL, *supra* note 131; “*EdTech*” *Sandbox*, CNIL, *supra* note 131.

¹³⁵ « *Bac À sable* » données personnelles : la CNIL lance un appel à projets sur l'intelligence artificielle dans les services publics [Personal data « sandbox »: CNIL launches a call for projects on artificial intelligence in public services], GOV'T OF FRANCE (2023), <https://www.bercynumerique.finances.gouv.fr/bac-sable-donnees-personnelles-la-cnil-lance-un-appel-projets-sur-lintelligence-artificielle-dans>.

¹³⁶ *Id.*

subsequent additions and a testing period of approximately 51 months after an extension instead of six months as is the case with the CNIL sandbox).¹³⁷

4. Norway

Beyond the European Union, Norway and Switzerland are also becoming increasingly active in the AI regulatory sandbox landscape. While Norway is not part of the European Union, it remains part of the EEA and the EFTA, and Oslo's regulatory approach to AI appears broadly aligned with the EU's, as reflected in the Norwegian position paper on the EU's AI Act.¹³⁸ The Norwegian government has also expressed interest in creating regulatory sandboxes to promote AI innovation, as detailed in its national AI strategy.¹³⁹ Like the UK government, the Norwegian government also recognizes that AI applications vary significantly depending on the function and argues that multiple sandboxes will be more appropriate than a single AI sandbox. As noted in the Norwegian national AI strategy:

However, it makes little sense to talk about one regulatory sandbox for AI. AI solutions do not represent a homogeneous group of services and are subject to a broad spectrum of regulations and regulatory authorities, depending on their purpose and functionality.¹⁴⁰

This approach builds on the Norwegian government's willingness to create several regulatory sandboxes in recent years. Finanstilsynet, the country's financial supervisory authority, created a fintech sandbox in December 2019, while a similar sandbox was also created for autonomous vehicles in 2016.¹⁴¹ More recently, Datatilsynet, Norway's data protection regulator, launched an AI-focused sandbox that has already seen a number of participants since January 2022.¹⁴² More specifically, the sandbox provides

¹³⁷ Unlike the CNIL sandbox, the Hawaii DCIL sandbox is expected to expire after the testing period ends. See HAW. DEP'T COM. AND CONSUMER AFFS., *State of Hawai'i's Digital Currency Innovation Lab Extended to June 30, 2024*, (June 2, 2022), <https://cca.hawaii.gov/dfi/files/2022/06/06-02-22-DCIL-Extension-Press-Release-FINAL.pdf>.

¹³⁸ *Norwegian Position Paper on the European Commission's Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts*, GOV'T OF NORWAY (2021), <https://www.regjeringen.no/contentassets/939c260c81234eae96b6a1a0fd32b6de/norwegian-position-paper-on-the-ecs-proposal-for-a-regulation-of-ai.pdf>.

¹³⁹ *National Strategy for Artificial Intelligence*, NORWEGIAN MINISTRY OF LOCAL GOV'T AND MODERNISATION 24 (2020), https://www.regjeringen.no/contentassets/1febbb2c4fd4b7d92c67ddd353b6ae8/en-gb/pdfs/ki-strategi_en.pdf.

¹⁴⁰ *Id.*

¹⁴¹ *Id.*

¹⁴² *Reports*, DATATILSYNET, <https://www.datatilsynet.no/en/regulations-and-tools/sandbox-for-artificial-intelligence/reports/> (last visited Mar. 29, 2024).

regulatory advice regarding the data protection requirements and privacy implications associated with AI-enabled products and services.¹⁴³ As part of the sandbox program, Datatilsynet also seeks to create a collaborative learning environment for participating companies and communicate regulatory insights to other companies and policymakers—features that distinguish the Datatilsynet sandbox from several of its foreign counterparts.¹⁴⁴ Beyond helping companies, the sandbox has helped improve Datatilsynet’s own legal understanding of the field, as noted in its assessment report.¹⁴⁵

This sandbox, of course, has scope for improvement. As the case with the French CNIL sandbox and Spanish AI sandboxes, the Norwegian sandbox remains limited in its ability to provide regulatory relief and calibrate regulations. Norway might also benefit from other AI-related sandboxes in other sectors beyond the direct jurisdiction of the data protection authority. Nevertheless, Norway’s thoughtful approach to creating AI sandboxes and its success in attracting quality applicants and communicating the results of its sandbox experiences makes the country a worthwhile case study for other jurisdictions seeking to launch AI sandboxes, especially within the framework of the EU and EEA.

5. Switzerland (Canton of Zurich)

Finally, Switzerland, which belongs to the EFTA but neither the EU nor the EEA, has also become active in the regulatory sandbox landscape. Previously, the Swiss Financial Market Supervisory Authority was one of the first continental regulators to create a fintech sandbox.¹⁴⁶ More recently, Zurich Canton has launched several thematic programs within the framework of the broader “Innovation Sandbox for Artificial Intelligence.”¹⁴⁷ This sandbox is the result of collaboration among several Swiss government bodies, universities, and industry associations to promote AI-enabled innovation in targeted areas.¹⁴⁸ Thus far, the thematic iterations of the Zurich sandbox have focused

¹⁴³ Markussen, *Evaluation of Norwegian Data*, *supra* note 20, at 17.

¹⁴⁴ *Id.* at 40–42.

¹⁴⁵ *Id.* at 40.

¹⁴⁶ SWISS FIN. MKT. SUPERVISORY AUTH., *Die FINMA ist fit für Fintech* [FINMA is fit for fintech], (Sept. 13, 2016), https://www.finma.ch/de/~media/finma/dokumente/dokumenten-center/myfinma/finma-publikationen/referate-und-artikel/20160913-fit-fuer-fintech-le-temps_de.pdf.

¹⁴⁷ ZÜRICH CANTON, *supra* note 16.

¹⁴⁸ More specifically, the participating entities are: i) Location Promotion in the Office for Economy, Canton of Zurich; ii) Office for Economy and Labor, Canton of Schwyz; iii) Statistical Office, Canton of Zurich; iv) Digital Administration and E-Government, State Chancellery Canton of Zurich; v) Metropolitan Area Zurich; vi) ETH AI Center (Swiss Federal Institute of Technology); vii) University of Zurich Center for Information Technology, Society, and Law; viii) University of Zurich Digital Society Initiative; ix) Swiss Information and Communication Technology Association; x) Zurich University of Applied Sciences Entrepreneurship; and xi) Lucerne University of Applied Sciences and Arts. *Id.*

on five areas: i) autonomous systems; ii) automated infrastructure maintenance (drone inspection with image recognition); iii) AI in education; iv) smart parking (image recognition); and machine translation.¹⁴⁹

The stated goals of the Zurich AI sandbox are to “i) provide regulatory clarity; ii) promote innovation through the provision of data; and iii) to transfer know-how and initiate new projects.”¹⁵⁰ According to Swiss regulators, since this program provides participating companies with both regulatory support and access to new data, it qualifies as an “innovation sandbox” rather than a “regulatory sandbox.”¹⁵¹ In contrast, regulatory sandboxes provide regulatory support but do not include any such data provision for participating companies, according to the definition provided by Zurich Canton.¹⁵² While this distinction between “innovation sandbox” and “regulatory sandbox” does not appear to be widely recognized by other governmental bodies and legal scholars, the Zurich sandbox’s focus on promoting innovation by providing access to regulatory data is a feature that distinguishes it from other AI sandboxes discussed in this Article, which would be considered merely “regulatory sandboxes” and not “innovation sandboxes” under Zurich Canton’s definition.¹⁵³

Beyond these aspects, the Zurich sandbox features additional characteristics that distinguish it from its European counterparts. For example, it places a greater focus on understanding the regulatory implications of different emerging technologies—such as image recognition technologies in drones and their potential in automated infrastructure maintenance—and on updating laws and regulations accordingly.¹⁵⁴ The focus on highly specific themes, like image recognition-enabled smart parking, could allow Swiss regulators to identify regulatory challenges and fine-tune AI rules for highly specialized domains of AI applications.¹⁵⁵ If this approach is scaled up and successfully implemented at the national level, it could provide valuable regulatory insights for regulators across Europe and beyond.

¹⁴⁹ *Id.*

¹⁵⁰ Based on the author’s translation of the three goals provided in German: “i) Regulatorische Klarheit schaffen, ii) Innovationsförderung durch Datenbereitstellung, [und] iii) Know-how-Transfer und Anstoss neuer Projekte.” *Id.*

¹⁵¹ Zurich Canton offers the following distinction between an innovation sandbox, a regulatory sandbox, and an open data sandbox: i) Innovation sandbox: with regulatory support (“Mit regulatorischer Begleitung”) and with data provision (“Mit Datenbereitstellung”); ii) Regulatory sandbox: with regulatory support but without data provision; iii) Open data sandbox: with data provision but without regulatory support; iv) Without a sandbox: Without regulatory support and without data provision. *See id.* at Figure “Unterschied zwischen Regulatory Sandbox, Open Data Sandbox und Innovation Sandbox” [“Difference between Regulatory Sandbox, Open Data Sandbox, and Innovation Sandbox”].

¹⁵² Zurich Canton, *supra* note 16.

¹⁵³ *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

D. *Selected Emerging-Market Countries*

While this Article mostly draws from regulatory sandboxes in Europe and the United States, it also recognizes growing technological and policy innovations elsewhere. As was the case with the global regulatory landscape for fintech sandboxes, where Asian jurisdictions like Hong Kong and Singapore played an important role, jurisdictions outside the United States and Europe have demonstrated interest in creating AI sandboxes. While the sandbox strategies of many such countries merit more careful examination, a comprehensive discussion goes beyond the scope of this Article. However, in the interest of a more global view of AI sandboxes, this section briefly discusses noteworthy developments in selected non-Western jurisdictions. Such developments might be particularly insightful for emerging-market nations seeking to create regulatory sandboxes and promote AI innovation within the context of their specific economic and political conditions.

1. Singapore¹⁵⁶

In September 2023, Singapore’s Infocom Media Development Authority (IMDA) and the AI Verify Foundation, a non-profit foundation under the IMDA, launched a generative AI evaluation sandbox.¹⁵⁷ This sandbox is reportedly the first AI sandbox outside of Europe and the first sandbox in the world to focus on generative AI evaluation.¹⁵⁸ More specifically, the IMDA sandbox seeks to create a testing framework (called “AI Verify”) based on five internationally recognized AI ethics principles, which future developers

¹⁵⁶ In February 2024, the Infocomm Media Development Authority announced a generative AI sandbox for small and medium-sized enterprises, the applications for which are expected to close in May 2024. Since this sandbox was announced after the first draft of this Article was submitted, it is not included in this section. Furthermore, while information about this sandbox remains limited, the sandbox appears more focused on providing financial support to SMEs for generative AI enterprise solutions and developing the local AI ecosystem instead of providing regulatory support and relief. Therefore, it is unclear whether this sandbox fulfills the criteria of a “regulatory sandbox” as typically understood by regulators in the UK, the EU, Australia, and Canada (see the discussion *supra* note 3). That is why this sandbox most likely falls outside the scope of this study, which is restricted to “regulatory sandboxes” for AI. Nevertheless, as more information about this sandbox becomes available, legal and policy scholarship would benefit from closer attention to it and the extent to which it varies from other AI sandboxes included in this Article. See Infocomm, *supra* note 78; Andy Leck, *Singapore: First Generative AI Sandbox to Allow SMEs to Harness the Benefits of Generative AI*, BAKER MCKENZIE (Mar. 18, 2024), https://www.global-compliancenews.com/2024/03/18/https-insightplus-bakermckenzie-com-bm-technology-media-telecommunications_1-singapore-first-generative-ai-sandbox-to-allow-smes-to-harness-the-benefits-of-generative-ai_02272024.

¹⁵⁷ Infocomm, *supra* note 78; see also *What is A.I. Verify?*, AI VERIFY FOUND., <https://aiverifyfoundation.sg/what-is-ai-verify/> (last visited Jan. 24, 2024).

¹⁵⁸ *Id.*

could use to test AI systems.¹⁵⁹ With participation from leading global companies, the sandbox also displays a distinct international character.¹⁶⁰

However, compared to most other AI sandboxes discussed in this paper, this sandbox is narrower in scope since it only seeks to develop benchmarks for evaluating the ethical compliance of AI systems. Despite its narrower scope, the sandbox is committed to solving an increasingly important global challenge of generative AI evaluation.¹⁶¹ Despite the growing use of generative AI, there appears to be a lack of common benchmarks for large language models.¹⁶² Through the sandbox, the IMDA seeks to develop a “baseline set of evaluation tests” for generative AI products that companies and regulators in Singapore and other jurisdictions can use to address this challenge.¹⁶³

Unlike the European Union, which emphasizes the importance of SME participation in AI sandboxes,¹⁶⁴ the IMDA sandbox has only admitted large technology companies to its generative AI evaluation sandbox.¹⁶⁵ Thus far, ten leading tech companies—including Microsoft, IBM, Google, NVIDIA, and Amazon—have joined the Singapore sandbox.¹⁶⁶ Although the EU is right to stress the importance of admitting SMEs into its AI sandboxes,¹⁶⁷ the Singapore sandbox’s more specific policy objectives might have required a more tailored approach.¹⁶⁸ Since this sandbox primarily seeks to produce specific testing guidelines and standards instead of helping companies test new products and bring them into regulatory compliance, prioritizing larger companies with extensive capabilities in large language models is understandable.¹⁶⁹ However, in the context of more general AI sandboxes, a mix of smaller and larger participants can help regulators better understand the impacts of various regulations on different types of and their consumers.¹⁷⁰ Future AI sandboxes in Singapore might also benefit from admitting and receiving input from a more heterogeneous set of firms from diverse sectors.

¹⁵⁹ *AI Governance Testing Framework and Toolkit*, AI VERIFY FOUND. (2023), https://aiverifyfoundation.sg/downloads/AI_Verify_Primer_Jun-2023.pdf.

¹⁶⁰ See Infocomm, *supra* note 78, at Annex A – List of Participants in Sandbox.

¹⁶¹ Infocomm, *supra* note 78; see also *What is A.I. Verify?*, *supra* note 157.

¹⁶² Infocomm, *supra* note 78.

¹⁶³ *Id.*; MINISTRY OF COMMUNICATIONS AND INFORMATION, *AI FOR THE PUBLIC GOOD FOR SINGAPORE AND THE WORLD* (2023), <https://file.go.gov.sg/nais2023.pdf>.

¹⁶⁴ EU AI Act Recital (143), Art. 58 (2) (d), Art. 58 (2) (f).

¹⁶⁵ See Infocomm, *supra* note 78, at Annex A – List of Participants in Sandbox.

¹⁶⁶ See Infocomm, *supra* note 78, at Annex A – List of Participants in Sandbox.

¹⁶⁷ EU AI Act Recital (143), Art. 58 (2) (d), Art. 58 (2) (f).

¹⁶⁸ Infocomm, *supra* note 78; see also *What is A.I. Verify?*, *supra* note 157.

¹⁶⁹ See *What is A.I. Verify?*, *supra* note 157.

¹⁷⁰ Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at 9–12.

2. China

The Chinese government's approach to AI governance and regulatory sandboxes is particularly important in both the Asian and the broader global contexts. As Matt Sheehan of the Carnegie Endowment for International Peace correctly points out, international observers, particularly in the United States, tend to i) dismiss China's AI laws and regulations as "irrelevant" or unworthy of rigorous scholarship or ii) instrumentalize such laws as political props to the benefit of normative political arguments.¹⁷¹ One consequence of this approach is that China's approach to AI governance is poorly understood in most Western countries.¹⁷² While a detailed analysis of the Chinese approach to regulatory sandboxes and AI governance is an important topic that goes beyond the scope of this paper, a discussion of the global regulatory landscape of AI sandboxes would be incomplete without at least briefly mentioning Chinese regulatory sandboxes.

Despite Chinese Premier Xi Jinping's recent efforts to centralize power and increase party control over private companies, many aspects of Chinese technology governance remain decentralized in important ways, with at least some Chinese technology-related initiatives and regulations being implemented at the provincial instead of national level.¹⁷³ In the context of financial regulation, the Chinese government announced the creation of a financial regulatory sandbox in December 2019. Since then, the People's Bank of China and nine cities announced more than 60 projects that could be considered regulatory sandboxes.¹⁷⁴

In comparison, the extent to which artificial intelligence "regulatory sandboxes," as understood in Europe and the United States, are a priority for the Party leadership and key actors of Chinese technology policy—notably the Ministry of Science and Technology (MOST), the Cyberspace Administration of China (CAC), and the Ministry of Industry and Information Technology (MIIT)—appear less clear.¹⁷⁵ However, the Chinese government has endeavored to create innovation zones ("国家人工智能创新应用先导区" or the "National Pilot Zone for Artificial Intelligence Innovation and Application") and AI-related projects, some of which might share specific features

¹⁷¹ For a broader discussion, see Matt Sheehan, *China's AI Regulations and How They Get Made*, CARNEGIE ENDOWMENT FOR INT'L PEACE at 7 (July 2023), <https://carnegieendowment.org/2023/07/10/china-s-ai-regulations-and-how-they-get-made-pub-90117>.

¹⁷² *Id.*

¹⁷³ *Id.*

¹⁷⁴ Mi Wang, *Regulation Paths of Regulatory Sandbox Entry Mechanism in China*, INT'L J.L. & SOC'Y (Dec. 27, 2022), <https://www.sciencepublishinggroup.com/article/10.11648.j.ijls.20220504.17>.

¹⁷⁵ Sheehan, *supra* note 171, at 22–24.

of regulatory sandboxes.¹⁷⁶ Since the MOST announced the creation of the country's first five innovation zones in February 2021, there have been 11 such zones with 100 innovation projects, according to the International Center for Science and Technology Innovation (ICSTI), affiliated with the Chinese Ministry of Science and Technology.¹⁷⁷

3. India

Among other BRICS nations, the Indian government does not yet appear to have created an AI sandbox, although the Reserve Bank of India launched a regulatory sandbox for financial technology.¹⁷⁸ Nevertheless, there appear to be growing calls within India to develop sector-specific AI sandboxes.¹⁷⁹ Given the size of the Indian market and significant disparities in economic outcomes and technology expertise of different states—an additional argument could be made in favor of sub-national sandboxes in different Indian states and union territories. However, in any such local sandboxes, as well as sector-specific sandboxes at the national level, the roles of different sectoral regulators and central and state governments would need to be clearly delineated. Furthermore, as discussed in the next sub-section, the risks of regulatory privilege granted to politically favored companies remain considerable, especially in the Indian context, which would need to be addressed in designing potential sandbox programs.

4. Russia

In the years before the Russia-Ukraine War, Russia passed several laws aimed at the digital sector, the most well-known among which was the controversial Yarovaya Law (“Закон Яровой”), which increased the

¹⁷⁶ Sofia Baruzzi, *AI Innovation Zones in China: Opportunities for Foreign Investors*, CHINA BRIEFING (Mar. 3, 2021), <https://www.china-briefing.com/news/ai-innovation-zones-in-china-opportunities-for-foreign-investors/>.

¹⁷⁷ The eleven zones are Beijing, Shanghai (Pudong), Shenzhen, Guangzhou, Chengdu, Hangzhou, Jinan-Qingdao, Wuhan, Changsha, Hefei, and Xiamen. *Id.*; 国际科技创新中心 [International Center for Science, Technology, and Innovation], 国家人工智能创新应用先导区“智赋百景” [National AI Innovation and Application Pilot Zone “Hundred Intelligent Scenes”], <https://www.ncsti.gov.cn/kjdt/tzgg/202210/P020221011591635361520.pdf>.

¹⁷⁸ Elizaveta Gromova & Tjaša Ivanc, *Regulatory Sandboxes (Experimental Legal Regimes) for Digital Innovations in BRICS*, 7 BRICS L.J. 10 (2020).

¹⁷⁹ Shashidar K.J., *Regulatory Sandboxes: Decoding India's Attempt to Regulate Fintech Disruption*, OBSERVER RSCH. FOUND. (Nov. 28, 2023), <https://www.orfonline.org/public/uploads/posts/pdf/20230524172113.pdf>; see also Nivedita Krishna, *Why India Needs Sectoral Regulatory Sandboxes for Artificial Intelligence based solutions*, THE TIMES INDIA (Sept. 10, 2023), <https://timesofindia.indiatimes.com/blogs/niveditas-musings-on-tech-policy/why-india-needs-sectoral-regulatory-sandboxes-for-artificial-intelligence-based-solutions/>.

government's control over data held on Russian territories.¹⁸⁰ In July 2020, the Russian government announced the creation of a regulatory sandbox for digital innovation, although it did not specifically focus on artificial intelligence.¹⁸¹ The law sought to promote digital innovation in several sectors, including medicine, online commerce, financial markets, and government services.¹⁸² Likewise, the Bank of Russia also launched a fintech sandbox, which still appears functional as of September 2023.¹⁸³ Nevertheless, given the exodus of Russian professionals in the technology sector, Western sanctions, and the securitization of the Russian economy, the marginal effects of supposedly pro-market policies might be minimal.¹⁸⁴

Furthermore, even without an external shock like the current Russia-Ukraine conflict, the rent-seeking aspects of the Russian economy would have exacerbated the potential downsides of poorly implemented sandbox programs. As Brian Knight and Trace Mitchell of the Mercatus Center rightly point out, one disadvantage of a regulatory sandbox is “regulatory privilege”—that is, the set of advantages that a company gains vis-à-vis its competitors outside the sandbox, including regulatory relief, advice, and reputational benefits¹⁸⁵ By ensuring that regulatory insights gained from a sandbox are applied to all similarly situated firms via legal reform, policymakers can reduce potential market distortions due to regulatory privilege. However, in an economy like Russia's, where proximity to political power is often the key to market access, regulatory sandboxes can become another tool where government-aligned firms entrench their competitive positions. Meanwhile, if

¹⁸⁰ Federal Law #374-FZ On Amending Federal Law “On Combating Terrorism” And Certain Legislative Acts of the Russian Federation Regarding the Establishment of Additional Counter-Terrorism Measures and Public Security, STAN. L. SCH. (July 7, 2016), <https://wilmap.stanford.edu/entries/federal-law-374-fz-amending-federal-law-combating-terrorism-and-certain-legislative-acts>.

¹⁸¹ Byungkom Lim, Gary E. Murphy, & Evgenii Lebedev, *В России принят закон о регуляторных песочницах* [Russia has adopted a law on regulatory sandboxes], DEBEVOISE & PLIMPTON (2020), <https://www.debevoise.com/-/media/files/insights/publications/2020/09/20200918-russian-law-on-regulatory-sandboxes-rus.pdf>.

¹⁸² *Id.*

¹⁸³ BANK OF RUSSIA, *Регулятивная песочница Банка России: теперь удобнее и проще* [The Bank of Russia will compile a rating of the accessibility of credit institutions for people with disabilities] (2023), <https://cbr.ru/eng/press/event/?id=16996>; Karine Hadji, *Регуляторные песочницы в России и в мире* [Regulatory Sandboxes in Russia and the World], ВСЕРОССИЙСКАЯ АКАДЕМИЯ ВНЕШНЕЙ ТОРГОВЛИ [ALL-RUSSIAN ACADEMY OF FOREIGN TRADE] (July 31, 2020), https://www.vavt-imef.ru/wp-content/uploads/2020/07/2020.07.31_Песочницы_с-кратким-описанием-и-ссылкой-на-текст-закона-для-публикации-на-сайт-и-ФБ_чистой-вариант.pdf.

¹⁸⁴ See generally Johannes Wachs, *Digital Traces of Brain Drain: Developers During the Russian Invasion of Ukraine*, EPJ DATA SCI. (2023), <https://doi.org/10.1140/epjds/s13688-023-00389-3>; Margarete Klein & Nils Holger Schreiber, *Der Angriff auf die Ukraine und die Militarisierung der russischen Außen- und Innenpolitik* [The Attack on Ukraine and the Militarisation of Russian Foreign and Domestic Policy], SWP (Dec. 2022), <https://www.swp-berlin.org/publikation/der-angriff-auf-die-ukraine-und-die-militarisierung-der-russischen-aussen-und-innenpolitik>.

¹⁸⁵ See Knight & Mitchell, *supra* note 3, at 437.

the legal insights gained through a regulatory sandbox are not used for broader legal reforms to create a more innovative and competitive market, the marginal pro-innovation benefits of sandboxes might remain minimal.

This broader point goes beyond the case of Russia and could easily apply to many emerging-market countries, from Brazil to India and Indonesia. A regulatory sandbox can be an effective policy tool, but its effectiveness can vary significantly depending on how it is designed and implemented and how it interacts with different components of the broader political, economic, and legal systems. Enacting legislation to create a sandbox is not difficult in most jurisdictions, especially given the availability of boilerplate templates that could be copied from other countries. However, creating effective sandbox programs requires more than that: having the right policy objectives and regulatory design, developing well-thought entry and selection criteria, ensuring fair selection and regulatory treatment, and using the lessons from the sandbox for more comprehensive reforms. These factors will ultimately influence whether an AI sandbox contributes to creating a more market-friendly, innovative regulatory environment and ecosystem.

As more emerging-market countries seek to create AI sandboxes to promote innovation, these factors are especially worth considering. Other jurisdictions that are currently considering the creation of an AI sandbox include Brazil, with the Brazilian Data Protection Authority having concluded a consultation last year that sought expert opinions on designing an AI sandbox.¹⁸⁶ While precise details of Brazil's AI sandbox strategy remain to be seen, the Brazilian data protection regulator's explanation of the rationale for creating an AI sandbox, thoughtful questions related to regulatory design, and its insightful assessment of the global AI regulatory landscape—as detailed in the accompanying technical paper on AI sandboxes—were all steps in the right direction.¹⁸⁷ Furthermore, the Colombian and Chilean governments have also expressed interest in creating regulatory sandbox programs to promote AI innovation.¹⁸⁸ Well-designed AI sandboxes, when implemented effectively in a regulatory environment characterized by the rule of law, could pave the way for thoughtful, innovation-friendly AI regulation and help promote growth and innovation in emerging-market countries.

¹⁸⁶ GOV'T OF BRAZIL, *supra* note 80.

¹⁸⁷ *Id.*; see also *Regulatory Sandbox Benchmark Technical Study (Public Version)*, MINISTÉRIO DA JUSTIÇA E SEGURANÇA PÚBLICA [MINISTRY OF JUSTICE & PUBLIC SECURITY], (2023), https://www.gov.br/anpd/pt-br/documentos-e-publicacoes/documentos-de-publicacoes/sandbox_regulatorio_estudo_tecnico_versao_publica_pdf/view.

¹⁸⁸ UNESCO, *Chile: Artificial Intelligence Readiness Assessment Report (2023)*, <https://unesdoc.unesco.org/ark:/48223/pf0000387216>; see also *MinTIC estructurará 10 'sandbox' regulatorios para acelerar los ecosistemas de innovación en Colombia* [MinTic Will Structure 10 Regulatory "Sandboxes" to Accelerate Innovation Ecosystems in Colombia], MINISTERIO DE TECNOLOGÍAS DE LA INFORMACIÓN Y LAS COMUNICACIONES DE COLOMBIA [MINISTRY OF INFORMATION & COMMUNICATION TECHNOLOGIES OF COLOMBIA] (2024), <https://www.mintic.gov.co/portal/inicio/Sala-de-prensa/Noticias/281130>.

IV. CONSIDERATIONS FOR DESIGNING EFFECTIVE AI REGULATORY SANDBOXES

Gaining a comparative view of regulatory strategies and challenges faced by different jurisdictions can help lawmakers and regulators design more effective sandboxes for artificial intelligence. Based on the analysis of select AI sandboxes worldwide, this section presents a series of observations to identify guiding principles and provide regulatory insights for policymakers. While these recommendations are not intended to be exhaustive, they aim to contribute additional perspectives to assist policymakers in refining AI sandbox strategies at the national and supranational levels.

A. *Choice of Regulatory Models for AI Sandboxes*

One of the initial considerations in developing a country's sandbox strategy is whether to establish single or multiple AI sandboxes and whether these should be under the jurisdiction of single or multiple regulators. While this decision is multifaceted, the analytical framework provided by the UK government's AI White Paper offers helpful insights. As previously discussed, lawmakers have four different regulatory models to consider: i) single-sector sandbox with a single regulator; ii) multi-sector sandbox with a single regulator; iii) single-sector sector with multiple regulators; and iv) multi-sector sandbox with multiple regulators (Table 1).¹⁸⁹

With this framework in mind, a few observations are worth noting. First, there appears to be a growing regulatory trend toward establishing multiple AI sandboxes. For example, the first draft of the EU's AI Act only recommended that Member States create an AI Sandbox.¹⁹⁰ In contrast, the final text suggests a significant shift, with Member States now required to create or join at least one AI sandbox.¹⁹¹ Likewise, the UK government, as detailed in the AI White Paper, is exploring plans to set up multiple sandboxes,¹⁹²

Second, the decision to create multiple sandboxes raises the question of choosing the most appropriate models for such programs. Developing an effective sandbox strategy will ultimately require a degree of regulatory experimentation and an iterative approach. Therefore, governments might consider launching one or two pilot programs initially. These pilot sandboxes should be straightforward to design and implement and should be introduced in areas or sectors most likely to benefit from a sandbox.

To that end, governments could create a multi-sector, single-regulator AI sandbox under the supervision of a country's data protection or artificial intelligence regulator. For example, the Spanish government appears to have

¹⁸⁹ U.K. DEP'T FOR SCI., *supra* note 17, at n.142.

¹⁹⁰ Artificial Intelligence Act, art. 53(1), EUR. PARL. DOC. TA 138 (2024).

¹⁹¹ *Id.* at art. 57.

¹⁹² U.K. DEP'T FOR SCI., *supra* note 17, at n.142.

adopted this model for its sandbox, providing a potential template for countries planning to launch their first sandbox. As such programs expand and attract companies from different sectors, the involvement of additional regulators might become necessary. This pilot sandbox can be gradually developed into a more comprehensive multi-sector, multi-regulator AI sandbox.¹⁹³

Lawmakers and regulatory authorities could also consider introducing a single-sector, single-regulator sandbox. To that end, they must identify a sector that falls under the supervision of a single regulator where market participants—including companies, investors, and consumers—support the concept of a sandbox. The appropriate sector might vary from country to country, but identifying the right sector can be crucial in determining the success of the pilot sandbox. Drawing on insights from the pilot sandbox program(s), governments can adopt more complex regulatory models, such as the single-sector, multiple-regulator sandbox and multiple-sector, multiple-regulator sandbox.

Lawmakers and regulators might also benefit from considering an additional factor: in most jurisdictions, designing a single-sector sandbox will be more straightforward than a multiple-sector sandbox. However, in certain jurisdictions, the fragmentation of regulatory authority across multiple regulators can exacerbate the difficulties of designing effective sandboxes for certain sectors. Whether a specific sector will require a sandbox with single or multiple regulators will vary by jurisdiction, which can be a critical consideration in developing pilot sandbox programs.

For example, compared to the United States, where the financial regulatory architecture is characterized by complex horizontal and vertical fragmentation, creating a sector-specific fintech AI sandbox is likely to be more straightforward in the UK and Australia because the latter two would most likely implicate the single-sector, single-regulator model.¹⁹⁴ For instance, if the FCA had not already launched a fintech sandbox, and the UK government wanted to design an AI sandbox for financial services, such a sandbox would most likely be placed under the FCA's jurisdiction. In Australia, a similar program would likely require the regulatory supervision of the Australian Securities and Investments Commission, which currently runs the country's Enhanced Regulatory Sandbox (ERS).¹⁹⁵ In contrast, the presence of multiple U.S. financial regulators at the federal and state levels means that an effective AI sandbox for financial services would necessitate the single-sector, multiple-regulator model, thereby involving significantly more regulatory complexity. Consequently, whereas financial services might be a suitable sector for a sector-specific pilot AI sandbox in jurisdictions like Australia and the

¹⁹³ *Id.*

¹⁹⁴ Allen, *supra* note 3, at 579.

¹⁹⁵ *Enhanced Regulatory Sandbox (ERS)*, AUSTRALIAN SEC. & INV. COMM'N (2024), <https://asic.gov.au/for-business/innovation-hub/enhanced-regulatory-sandbox-ers/> (last visited Jan. 24, 2023).

UK, other sectors may be better suited for similar initiatives in the United States.

B. *Mechanisms to Review Regulatory Insights*

To maximize the benefits of AI sandboxes, policymakers need to ensure that regulatory insights gained from such programs are generalized and applied to the broader economy. In the context of regulatory sandboxes, it is helpful to distinguish between short-term, direct benefits for the participating firm and consumers and longer-term, systemic benefits for the broader economy. As participating firms receive regulatory advice and fine-tune the proposed AI product or service, such regulatory support represents a direct and immediate benefit to the sandbox firms and their consumers. However, lawmakers and regulators should also recognize the less immediate but systemic benefits that can arise from applying insights gained from sandbox projects more widely.

However, to realize such benefits, lawmakers and regulators must focus on deriving broader regulatory insights from sandbox projects and using such insights to develop and refine regulations. To that end, policymakers should consider implementing formal mechanisms to conduct periodic reviews of sandbox data and regulatory lessons and to evaluate existing and potential regulations. Likewise, sandbox programs could serve as an additional tool for monitoring AI safety risks, assessing whether current regulations adequately address these risks, and determining whether new statutory measures are necessary.

C. *Measures to Mitigate Regulatory Privilege*

While designing sandbox programs, governments should consider taking steps to address potential adverse effects. One particular concern is the issue of regulatory privilege, which refers to the advantages that firms participating in a sandbox may have vis-à-vis their similarly situated competitors outside the sandbox.¹⁹⁶ This issue can be particularly acute in emerging-market countries with weaker institutional frameworks and lower levels of transparency, but it also poses significant challenges in more developed economies. Several measures could be helpful in mitigating the adverse impacts of regulatory privilege, which are discussed below.

First, any regulatory relief or waiver provided through AI sandboxes should be granted based on an identified regulatory shortcoming. For example, if a cumbersome regulation prevents the offering of a certain AI-enabled product or service, a firm could receive a regulatory exemption from the

¹⁹⁶ Knight & Mitchell, *supra* note 3, at 473.

specific regulation during the sandbox testing period.¹⁹⁷ However, such insights should be used as the basis for broader regulatory reform so that other similarly situated firms are also exempted from the regulation in question. Otherwise, regulatory sandboxes risk becoming a tool through which firms can gain regulatory privilege while firms outside the sandbox continue to suffer from onerous rules.¹⁹⁸ Only when the regulatory insights from AI sandboxes are used to promote broader policy reform and benefit all similarly situated firms do regulatory sandboxes become a more effective tool in pursuing evidence-based policy reform.

Second, any benefits that participating firms receive through the regulatory sandbox should be time-limited to minimize potential market disruptions.¹⁹⁹ In determining this time limit, or the duration of the sandbox test, two general principles should be considered. The testing period should not be so long that it leads to unnecessary waste of regulatory resources while allowing companies to enjoy regulatory advantages vis-à-vis their competitors.²⁰⁰ However, the testing duration needs to be long enough so that firms have adequate time to bring their proposed AI system into compliance and regulators can gather enough data about how current and proposed regulations affect participating companies.²⁰¹

While the appropriate testing period will likely vary by sector and the nature of the proposed product, the testing duration of other regulatory sandboxes can provide a helpful benchmark. For example, although the British and Spanish AI sandbox proposals do not specify a testing period, the Norwegian AI sandbox test lasts between three and six months.²⁰² Meanwhile, France's CNIL sandbox has a support phase ("phase d'accompagnement") of six months, followed by an implementation phase ("phase d'implémentation") and a phase for returning to the market ("phase de retour à l'écosystème"). Additionally, the testing duration of fintech sandboxes can provide an additional frame of reference for AI sandboxes. Nevertheless, it is important to bear in mind that the appropriate testing duration might vary by sector.²⁰³ As a result, instead of setting testing duration via statute, it would be more appropriate to provide a recommended range and enable regulators to determine the precise testing duration on a case-by-case basis.²⁰⁴ At the same time, lawmakers and regulators should ensure that similar products and services receive similar testing duration to minimize regulatory privilege and ensure fair treatment for all firms.

¹⁹⁷ *Id.* at 459–60.

¹⁹⁸ *Id.* at 473.

¹⁹⁹ *Id.*; Allen, *supra* note 3, at 638–39.

²⁰⁰ Knight & Mitchell, *supra* note 3, at 534; Allen, *supra* note 3, at 638.

²⁰¹ Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at 7.

²⁰² *Reports*, DATATILSYNET, *supra* note 142.

²⁰³ Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at 9–12.

²⁰⁴ *Id.*

D. *Eligibility and Selection Criteria*

Regulatory sandboxes require well-developed eligibility and selection criteria to ensure the selection process is fair, unbiased, and conducive to regulatory learning and reform.²⁰⁵ Without evidence-based evaluation criteria, the selection process risks becoming biased. For example, sandbox regulators might favor politically favored firms or firms with ties to the regulators over those with greater potential for innovation and regulatory capacity building. While the Norwegian AI sandbox and the proposed British AI sandbox do not appear to have published potential selection criteria for applications, the Zurich AI sandbox has established 11 criteria against which potential applicants are evaluated (Table A1).²⁰⁶ These criteria include product-specific considerations, such as the readiness of a proposed project for testing in the sandbox and its compliance with specific technical and non-technical feasibility requirements.²⁰⁷ Additionally, applicants are asked a set of questions to assess the proposed project's broader innovation potential and determine whether supervising the project would help Swiss authorities enhance their regulatory expertise (Table A1).²⁰⁸

The European Union's AI Act does not specify a formal list of evaluation criteria for EU-aligned AI sandboxes at the national level. However, the European Commission is expected to develop common principles for eligibility and selection criteria through future implementing acts to prevent regulatory fragmentation.²⁰⁹ Currently, Member States enjoy considerable freedom in specifying the design of sandbox programs, as well as eligibility and selection criteria, but that could change with future implementing acts.²¹⁰ Spain, which was the first EU country to pass legislation establishing a statutory basis for its EU-aligned sandbox, has published a list of selection criteria for its AI sandbox, providing a potential template for other jurisdictions, especially within the European Union.²¹¹

More specifically, as specified in the Royal Decree 817/2023, the Spanish AI sandbox has 11 sandbox criteria, which differ substantially from the Zurich AI sandbox.²¹² Compared to those of the Zurich sandbox, the Spanish

²⁰⁵ See generally Knight & Mitchell, *supra* note 3, at 454–57; Allen, *supra* note 3, at 624–30.

²⁰⁶ *Selektionskriterien der Innovation-Sandbox für Künstliche Intelligenz* [“*Selection Criteria for Innovation Sandbox for Artificial Intelligence*“], AMT FÜR WIRTSCHAFT UND ARBEIT, KANTON ZÜRICH [OFFICE FOR ECONOMY AND LABOR, CANTON OF ZÜRICH], https://www.zh.ch/content/dam/zhweb/bilder-dokumente/themen/wirtschaft-arbeit/wirtschaftsstandort/dokumente/innovation-sandbox_selektionskriterien.pdf (last updated March 2022).

²⁰⁷ *Id.*

²⁰⁸ *Id.*

²⁰⁹ Artificial Intelligence Act, arts. 58(1)(a), EUR. PARL. DOC. TA 138 (2024).

²¹⁰ *Id.*

²¹¹ ROYAL DECREE 817/2023, *supra* note 28, at art. 8(2).

²¹² *Id.*

AI sandbox's evaluation criteria show a greater emphasis on the proposed project's technical specifications and alignment with existing data protection regulations and other EU requirements. For example, in selecting participating firms, Spanish regulators will evaluate the technical complexity of the proposed AI systems, explainability, algorithmic transparency, and broader impacts on the economy and society (Table A2).²¹³ Likewise, they will also consider the AI Act's risk classification levels and the testing readiness of the proposed project (Table A2).²¹⁴ To that end, Spanish regulators intend to ensure a representative grouping of AI systems with varying risk classification levels and testing readiness levels, as well as a mix of large companies and start-ups (Table A2).²¹⁵ A varied representation of sandbox participants can provide valuable insights into how AI Act obligations affect different types of AI systems in various sectors. Such insights could be helpful in assessing whether adjustments to the EU's risk classifications, risk-rated regulations, and broader AI rules will be needed in the future.

As more jurisdictions develop selection criteria for regulatory sandboxes, caution is essential. Policymakers should be careful of overly restrictive eligibility and selection criteria, which can prevent otherwise innovative firms from participating in AI sandboxes—a major concern for several U.S. state-level sandbox programs.²¹⁶ For example, some U.S. fintech and insurance sandboxes have implemented strict state residency requirements for sandbox applicants, preventing out-of-state and foreign companies from applying to these programs.²¹⁷ Thus far, Switzerland and the European Union have avoided creating overly restrictive entry criteria—a regulatory approach that should be maintained. As a general principle, while developing generally liberal entry criteria, regulators should seek to apply them fairly and consistently. Selecting high-impact projects with the greatest potential to promote innovation and regulatory learning is crucial to the long-term effectiveness of AI sandboxes.

E. *Innovation Hubs and Reciprocal Sandbox Agreements*

Regulatory sandboxes can play an important role in promoting international economic and regulatory cooperation and elevating the global profile of a particular jurisdiction. As mentioned, the Spanish, Swiss, and Norwegian sandboxes do not require sandbox participants to be based in the respective jurisdictions. This policy is a step in the right direction as it can allow sandbox applications from across the European Union and beyond. Likewise,

²¹³ *Id.*

²¹⁴ *Id.*

²¹⁵ *Id.*

²¹⁶ Nabil, COMPETITIVE ENTER. INST., *supra* note 2, at 7.

²¹⁷ *Id.*

under the AI Act, a Member State could join the sandbox program offered by another EU country to fulfill the requirement that each Member State have at least one AI sandbox.²¹⁸ Beyond such measures, innovation hubs and reciprocal sandbox arrangements can also help promote international cooperation.

First, innovation hubs can help complement a given jurisdiction's AI sandbox strategy. Innovation hubs serve as a platform for dialogue between regulators and businesses, allowing regulators to advise businesses on identifying market opportunities and achieving regulatory compliance, in addition to providing information about business registration, tax, and immigration.²¹⁹ Even without sandbox programs, innovation hubs can help promote awareness and attract foreign start-ups and entrepreneurs. The European Union has launched a network of European Digital Innovation Hubs (EDIHs), representing a step in the right direction.²²⁰ Additionally, certain jurisdictions, such as Estonia, have created effective innovation hubs for the financial services sector, which can provide a helpful template for other countries.²²¹

In the context of AI sandboxes, innovation hubs can play a pivotal role by providing potential applicants with information and regulatory advice about the application process. For example, these hubs can assist companies and start-ups in deciding whether to apply for a general-purpose AI sandbox or a sector-specific one. Due to limited regulatory resources, sandboxes often restrict the number of participants they can admit at any given time. Consequently, otherwise highly qualified projects might be overlooked due to factors beyond the applicants' control, such as the need for a diverse mix of companies from various sectors and projects with different levels of safety risks and commercial maturity.²²² Innovation hubs can help mitigate this challenge by facilitating informal consultations, enabling regulators to advise companies while spending limited regulatory resources more efficiently.

Lastly, governments should consider reciprocal sandboxes as a tool to promote international economic and regulatory cooperation.²²³ Reciprocal sandbox agreements would allow participants in one country's sandbox to gain automatic or simplified access to another state's regulatory sandbox.²²⁴ For example, start-ups from a U.S. or UK sandbox could enjoy simplified access to the Zurich sandbox due to a reciprocal agreement between the

²¹⁸ Artificial Intelligence Act, art. 57(1), EUR. PARL. DOC. TA 138 (2024).

²¹⁹ For example, see *ASIC's Innovation Hub and our approach to regulatory technology*, AUSTL. SECS. & INV. COMM'N, <https://download.asic.gov.au/media/4270022/rep523-published-26-may-2017.pdf> (May 2017).

²²⁰ *European Digital Innovation Hubs*, EUR. COMM'N (last visited Jan. 30, 2024), <https://digital-strategy.ec.europa.eu/en/activities/edihs>.

²²¹ For example, see *Finantsinspeksioon Innovation Hub Report 2022*, Finantsinspeksioon, https://www.fi.ee/sites/default/files/2022-09/Innovatsioon_FI_eng_w.pdf (last visited Apr. 8, 2024).

²²² For example, see the evaluation criteria of the Spanish AI sandbox. ROYAL DECREE 817/2023, *supra* note 28, at art. 8(2).

²²³ Ryan Nabil, NAT'L TAXPAYERS UNION FOUND., *supra* note 71.

²²⁴ *Id.*

respective jurisdictions. Such programs would make it easier for firms to ensure that their offered product complies with AI regulations in both jurisdictions. While no governments are currently known to have signed such reciprocity agreements for AI sandboxes, several jurisdictions have endorsed the concept. For example, the legislation creating multiple U.S. state-level fintech and insurance sandbox programs authorizes state regulators to negotiate reciprocal sandbox agreements with their foreign counterparts.²²⁵ Although the constitutionality of such programs under U.S. law could be challenged, there appears to be a growing interest in reciprocal sandbox arrangements at the state level.

The European Union could play a vital role in pioneering reciprocal sandbox programs at the regional and international levels. Under Article 57 of the AI Act, a Member State could join an existing sandbox to fulfill the requirement of having at least one AI sandbox, as long as this sandbox “provides an equivalent level of national coverage for the participating Member States.”²²⁶ Such programs could be designed in a way that participating companies receive regulatory advice from regulators of multiple countries.²²⁷ Comparable arrangements could also be created with non-EU countries—like Canada, Japan, Switzerland, and the UK—which are recognized by the European Commission as having established adequate data protection standards.²²⁸ Although transatlantic divergences in AI and data policies might pose a certain degree of challenge, such differences might be precisely the reason why firms would benefit from reciprocal sandbox programs, especially as it becomes increasingly important to bring AI-enabled products into compliance with distinct legal regimes.²²⁹

F. *Additional Considerations for the U.S. Federal Government*

Since the design of regulatory sandboxes is context-specific, some regulatory insights and recommendations apply in the context of some jurisdictions but not necessarily others. While the United States has not yet created a regulatory sandbox for AI, there appears to be a growing interest in developing such programs at the federal and state levels. While the precise design of these sandboxes will require careful consideration, a few general principles are worth considering.

²²⁵ See Nabil, COMPETITIVE ENTER. INST., *supra* note 2.

²²⁶ Artificial Intelligence Act, art. 57(1), EUR. PARL. DOC. TA 138 (2024).

²²⁷ *Id.*

²²⁸ *Adequacy decisions*, EUR. COMM’N, https://commission.europa.eu/law/law-topic/data-protection/international-dimension-data-protection/adequacy-decisions_en (last visited Jan. 30, 2024).

²²⁹ Ryan Nabil, *The new EU-US data agreement is facing familiar privacy challenges*, THE HILL (Oct. 20, 2023), <https://thehill.com/opinion/technology/4267142-the-new-eu-u-s-data-agreement-is-facing-familiar-privacy-challenges>.

First, as in the UK, U.S. AI rules will vary by sector and the context in which AI applications are used. Although the Biden administration's recently published AI strategy has several shortcomings, its endorsement of a sector-based approach to AI governance is the right approach in the U.S. regulatory context.²³⁰ As the United States pursues a sector-based approach to AI, it might be more beneficial to develop both general-purpose and sector-specific AI sandboxes rather than relying solely on a single all-purpose AI sandbox.²³¹ For example, the U.S. financial regulatory landscape differs notably from those of the education and healthcare sectors, each featuring a distinct set of regulators and legal frameworks. Given AI applications in various industries might be subject to distinct regulatory frameworks, multiple sector-specific sandboxes might be more effective in developing evidence-based AI rules tailored to each sector.

One major challenge in the U.S. context is regulatory fragmentation, as evidenced by the difficulties that U.S. regulatory authorities experienced in developing successful fintech sandbox programs.²³² The division of financial regulatory authority among various federal regulators and, to a lesser extent, between federal and state authorities has been a significant challenge for the type of regulatory supervision and relief that has been crucial to the success of fintech sandbox programs elsewhere.²³³ Unsurprisingly, the most prominent regulatory sandbox program in the United States has not been in the area of financial services but in (Utah's) legal services market, which is not characterized by the same degree of regulatory fragmentation.²³⁴ Creating AI sandboxes will likely pose an additional layer of regulatory complexity since they would most likely require joint supervision by a future U.S. privacy or AI regulator and the relevant sectoral regulator (or regulators in case of the proposed AI system falling under the overlapping jurisdiction of multiple agencies).²³⁵ Without establishing a clear legal framework and statutory mechanisms for interagency coordination, U.S. AI sandboxes might face challenges that restrict their long-term effectiveness vis-à-vis comparable programs in jurisdictions with more streamlined, less fragmented regulatory environments.²³⁶

²³⁰ Cobun Zweifel-Keegan, *A view from DC: Sectoral rules make US AI governance policy leader*, INT'L ASS'N PRIV. PROS. (Oct. 20, 2023), <https://iapp.org/news/a/a-view-from-dc-sectoral-rules-make-us-ai-governance-policy-leader>.

²³¹ *Id.*

²³² See Appaya et al., *supra* note 6.

²³³ *Id.*

²³⁴ *Utah Office Of Legal Services Innovation*, UTAH OFF. OF LEGAL SERVS. INNOVATION, <https://utahinnovationoffice.org/authorized-entities/> (last visited Jan. 24, 2023) (More specifically, the Utah Supreme Court's Office for Legal Innovation has created a legal sandbox program, which allows non-lawyer-owned firms, including tech firms, to provide certain types of legal services); see Nabil, *COMPETITIVE ENTER. INST.*, *supra* note 2, at 7.

²³⁵ See Ryan Nabil, NAT'L TAXPAYERS UNION FOUND., *supra* note 71, at 9–10.

²³⁶ *Id.*

G. *Additional Considerations for U.S. States*

Compared to the federal government, U.S. states have demonstrated greater interest in creating sandbox programs in the context of financial services. Despite this enthusiasm, state-level sandboxes have encountered considerable challenges—often due to their inability to provide sufficient regulatory relief, overly restrictive entry criteria, and the overall business and regulatory environments in individual states.²³⁷ However, with the right approach, state governments could play an important role in initiating AI sandboxes, particularly if the federal government continues to lag in establishing such programs. Against this backdrop, how could state governments navigate the evolving regulatory sandbox landscape of AI sandboxes and develop effective AI sandbox programs at the state level?

The response will ultimately depend not only on ongoing federal AI policy developments but also on individual states' economic and political circumstances and policy objectives. As the AI regulatory landscape continues to evolve, a few general principles and observations are worth noting. Given that the U.S. federal government appears to be pursuing a sector-based approach to AI regulation, state governments should identify areas predominantly within their regulatory remit where federal initiatives are less likely.

Drawing an analogy to European Union law could be particularly helpful in this context. In EU law, there are three types of “regulatory authority” or, more accurately, “competence” in EU parlance. These include i) “exclusive EU competence,” as outlined in Article 2 of the Treaty on the Founding of the European Union (TFEU), where only the EU has the authority to enact legally binding acts; ii) “shared competence,” where both the EU and member can legislate and adopt legally binding acts, as per Article 5 TFEU; and iii) “supporting competence,” where the EU’s role is limited to coordinating, supporting, or implementing the policies of EU Member States under Article 6.²³⁸ While an imperfect analogy, it can provide valuable insights into areas where individual U.S. states might possess a comparative advantage in developing sandbox programs.

Instead of focusing on the areas where the federal government dominates (akin to the first group in the EU analogy), state governments are likely to find more success in areas where they enjoy substantial regulatory authority, corresponding to the second and third groups of competences. For example, financial services and insurance are two sectors that might benefit from state-level AI sandboxes. Indeed, as already discussed, many U.S. states have already designed financial technology and insurance sandbox programs, with Arizona and Hawaii’s sandboxes having admitted a considerable number of

²³⁷ See Nabil, *COMPETITIVE ENTER. INST.*, *supra* note 2, at 11–12.

²³⁸ The Treaty on the Functioning of the European Union, Official Journal of the European Union, European Union, 326/50, Oct. 26, 2012, C 326/47.

participants.²³⁹ These initiatives can serve as a foundation for launching new sector-specific AI sandboxes for financial services or making AI applications a thematic focus of existing fintech and insurance sandboxes.

However, the legal services sector, which remains the preserve of individual U.S. states, likely represents the most promising area for AI sandboxes at the state level. In terms of the number of participants admitted as of November 2022, the Utah Supreme Court's legal sandbox remains by far the best-performing U.S. sandbox at both federal and state levels.²⁴⁰ By enabling non-lawyer-owned companies to provide certain legal services within a sandbox, AI-focused legal sandboxes can significantly reduce the costs of certain legal services (e.g., filling out real estate, marriage, and immigration-related forms) and improve access to justice for low-income Americans.²⁴¹ Following Utah, the Law Societies of British Columbia and Ontario—bar associations that regulate legal services in the two Canadian provinces—have also launched similar sandbox programs.²⁴²

Whereas the support for fintech sandboxes might display partisan leanings, legal sandboxes might be more likely to garner bipartisan support,²⁴³ particularly due to their potential to lower the costs of legal services and expand access to justice.²⁴⁴ According to the Legal Services Corporation, 92 percent of low-income Americans reported not receiving any or adequate legal assistance for their civil legal challenges.²⁴⁵ Nevertheless, unlike several Common Law jurisdictions, such as England and Wales, almost all U.S. states prohibit non-lawyers, including technology firms, from co-owning legal practices and providing legal services.²⁴⁶ However, legal sandbox programs, which allow non-lawyers (including start-ups and tech firms) to provide limited legal services, could introduce much-needed competition and innovation in the sector, thereby lowering the cost of such services.²⁴⁷ Since the launch of Utah's legal sandbox in August 2020, breakthroughs in

²³⁹ See Nabil, *COMPETITIVE ENTER. INST.*, *supra* note 2, at 11.

²⁴⁰ *Id.*

²⁴¹ *Activity Report*, UTAH, *supra* note 13; see *Utah Office Of Legal Services Innovation*, *supra* note 234.

²⁴² *Innovation Sandbox*, L. SOC'Y OF BRITISH COLUMBIA (Jan. 24, 2023), <https://www.lawsociety.bc.ca/priorities/innovation-sandbox>.

²⁴³ For example, conservative and libertarian-leaning groups, such as the Libertas Institute and the American Legislative Exchange Council (ALEC), have been particularly active in advocating fintech regulatory sandboxes at the state level. In contrast, the support for legal sandboxes, while not as widespread, appears to have come from a wide range of groups, including university-affiliated think tanks, such as the Institute for the Advancement of the American Legal System of the University of Denver).

²⁴⁴ Ryan Nabil, *Regulatory sandbox programs can promote legal innovation and improve access to justice*, THE HILL (Oct. 9, 2021), <https://thehill.com/opinion/judiciary/576041-regulatory-sandbox-programs-can-promote-legal-innovation-and-improve-access>.

²⁴⁵ *The Justice Gap: The Unmet Civil Legal Needs of Low-income Americans*, LEGAL SERVS. CORP., at 19 (April 2022), <https://lsc-live.app.box.com/s/xl2v2uraiotbbzrhwtjlgioemp3myz1>.

²⁴⁶ Ryan Nabil, THE HILL, *supra* note 244.

²⁴⁷ *Id.*

generative AI have presented even greater opportunities to automate and reduce costs for a range of legal services.²⁴⁸ As a result, legal tech represents an ideal starting point for state governments and courts to establish an AI sandbox and broaden access to justice.

Beyond the financial and legal services sectors, U.S. state governments can monitor regulatory developments at the federal level and recalibrate their AI strategies accordingly. If the federal government remains inactive in establishing AI sandboxes, it could present new opportunities for other state-level initiatives. An educational technology sandbox is one potential area for exploration, while sandboxes focused on autonomous vehicles, agricultural technology, and automated manufacturing also merit consideration.

In designing such programs, state regulators might face significant constraints, particularly in providing relief from certain federal laws. However, even in such cases, state-level sandboxes could still prove effective. For example, they could offer regulatory advice for compliance with applicable federal regulations—as the Norwegian sandbox does with respect to EU laws, which Norway, as a non-EU member, has no power to change.²⁴⁹ Additionally, state governments could still provide tax and other incentives to encourage participation in these sandboxes. Combining state-level sandboxes with innovation hubs could be particularly effective in raising awareness among domestic and international firms about business opportunities at the state level. For instance, a foreign start-up might apply to a state-level sandbox in Arkansas or Florida to bring its proposed AI product in compliance with U.S. law and enter the U.S. market. Such considerations will, of course, need to be reflected in the design of state-level AI sandboxes. Accordingly, state governments must establish liberal entry criteria to ensure that innovative companies and start-ups from both the United States and overseas can participate in their AI sandbox programs.

*H. Additional Considerations for the European Union*²⁵⁰

While the European Union's revised approach to regulatory sandboxes is a step in the right direction, it faces several challenges and concerns that European policymakers must consider, particularly as more countries launch EU-aligned sandboxes at the national level. First, although many regulatory sandboxes offer some regulatory relief, often in the form of regulatory

²⁴⁸ *Activity Report*, UTAH, *supra* note 13; see *Utah Office Of Legal Services Innovation*, *supra* note 234.

²⁴⁹ *Hva skjer med sandkassene i Norge? [What happens to the sandboxes in Norway?]*, DATATILSYNET, <https://www.datatilsynet.no/aktuelt/aktuelle-nyheter-2023/erfaringsseminar-for-sandkasser> (last visited Apr. 7, 2023).

²⁵⁰ This section builds on the author's previous article on the topic. Nabil, AUSTL. INST, *supra* note 106.

exemption or expedited registration,²⁵¹ the EU's AI sandbox appears to provide no such relief, which could limit long-term private-sector interest in such programs.²⁵² Second, as different EU Member States launch sandboxes at the national level, the European Union would benefit from closer attention to regulatory divergence—an issue that it might address through future implementing acts under Article 58 of the AI Act.²⁵³

Third, the European Union must ensure that regulatory insights from the national-level AI sandboxes are used to facilitate regulatory calibration and reform at the EU level. The final text of the AI Act recognizes regulatory learning as an objective of AI sandboxes, marking a positive step forward.²⁵⁴ To that end, the AI Act mandates national authorities to submit annual reports on sandbox outcomes, best practices, lessons learned, recommendations on the sandbox setup, and, where applicable, recommendations on regulatory adjustments for the AI Act.²⁵⁵ While that is a step in the right direction, the EU could further benefit from more thorough and focused evaluation mechanisms at the national level to evaluate the effectiveness of and assess the need for recalibrating existing regulations. A more rigorous evaluation at the national level also needs to be complemented by enhanced EU-level mechanisms to evaluate and compare the results from different national sandboxes. Strengthening such mechanisms through subsequent implementing acts and delegated legislation can help ensure that regulatory sandboxes are used to develop and maintain an evidence-based, innovation-friendly EU approach to AI governance.

Fourth, as the European Union refines its sandbox strategy, it must pay particular attention to the evaluation criteria for admitting companies interested in the AI sandbox programs. While the AI Act does not provide a list of eligibility and selection criteria, future implementing acts under Article 58 are expected to establish common principles to avoid regulatory fragmentation.²⁵⁶ When developing these criteria, a few concerns should be considered. While preventing regulatory fragmentation is an important goal, it must be balanced with the need to provide Member States greater freedom in designing AI sandboxes that reflect individual EU countries' policy objectives and conditions. That is why, to the extent possible, future implementing legislation should seek to provide Member States with flexibility in designing such criteria. Likewise, as discussed earlier, evidence-based selection criteria and application procedures will be crucial in minimizing regulatory privilege and potential biases in selection processes. Therefore, selection criteria should be carefully developed so that they can promote innovation and regulatory

²⁵¹ Nabil, COMPETITIVE ENTER. INST., *supra* note 2.

²⁵² Artificial Intelligence Act, art. 57, EUR. PARL. DOC. TA 138 (2024).

²⁵³ *Id.* at art. 58.

²⁵⁴ *Id.* at recital (139), art. 58(2)(i).

²⁵⁵ *Id.* at art. 57(16).

²⁵⁶ *Id.* at art. 58(1).

learning. To that end, the selection criteria in the Spanish AI sandbox—which seeks to ensure a variety of company sizes, sectors, risk levels, and commercial maturity of AI systems—warrants closer consideration from Member States.²⁵⁷ A more representative set of firms can be especially helpful in understanding how AI rules affect various firms in different sectors. Entry criteria should also not be set so narrowly that they exclude otherwise well-qualified participants from participating in the sandbox. To that end, EU authorities would do well to pay attention to U.S. fintech sandboxes, where overly strict entry criteria have contributed to their lack of success.²⁵⁸

Finally, the European Union could distinguish itself from other jurisdictions by pursuing a more internationalized approach to regulatory sandboxes. At a time when China and the United States, two of the world's leading tech players, increasingly appear to turn inwards, the EU could advocate a less restrictive approach to tech governance, and regulatory sandboxes could play an important role in this strategy. The EU's AI sandbox strategy currently shows considerable openness, for example, in that it does not have overly restrictive entry criteria and that EU Member States could join the regulatory sandbox offered by another EU country.²⁵⁹ The EU could go one step further by launching reciprocal or joint sandbox arrangements with like-minded jurisdictions—such as Britain, Japan, and Switzerland—which provide an equivalent level of data protection according to the Commission's assessment.²⁶⁰ These reciprocal arrangements could allow companies from these countries to join the sandbox of an EU country (or even an EU-level sandbox) and benefit from the regulatory supervision and advice from multiple jurisdictions. Such innovative approaches could go a long way towards regaining the EU's reputation as an open and innovation-friendly jurisdiction at a time of growing tech protectionism from China and the United States.

I. *Additional Considerations for EU Member States*

It is helpful to consider possible national policies that individual EU countries can take while remaining within the bounds of the broader European AI governance framework. In this context, several points are worth considering. First, while the implementing acts and delegating legislation might add further rules, the AI Act currently appears to grant considerable autonomy in how Member States design their sandbox program. For example, while each EU country must create or join at least one national-level AI sandbox, the decision of how many and which sandboxes to create and join is

²⁵⁷ ROYAL DECREE 817/2023, *supra* note 28, at Art. 8(2).

²⁵⁸ Nabil, COMPETITIVE ENTER. INST., *supra* note 2.

²⁵⁹ Artificial Intelligence Act, art. 57, EUR. PARL. DOC. TA 138 (2024).

²⁶⁰ *Adequacy decisions*, *supra* note 228.

rightly left to the devices of individual Member States.²⁶¹ To that end, each Member State must develop a strategy of how many and which types of AI sandboxes to create, a decision for which the earlier discussion on the structure of AI sandboxes will be particularly relevant. Ultimately, developing a successful AI strategy at the national level will likely require a degree of experimentation, which is why national governments might benefit from launching pilot sandboxes during the transition period of the AI Act.²⁶²

Second, given the benefits of a general AI sandbox combined with multiple sector-specific AI sandboxes, that is likely the most sensible approach for at least major Member States like France, Germany, and Spain. Alternatively, EU countries could also group together and create sector-specific AI sandboxes open to any companies from participating nations.²⁶³ This approach can also work for smaller countries, although some jurisdictions might instead prefer creating fewer sector-specific sandboxes focused on industries where they have a comparative advantage. However, smaller Member States might also have the option of joining the AI sandbox of another EU country (or a group of countries), including sector-specific sandboxes.²⁶⁴ Further, national governments could still launch thematic sandboxes aimed at specific sectors within the framework of the broader AI sandbox. Zurich's thematic sandboxes in areas ranging from drone-assisted maintenance to AI-enabled grading could also provide helpful insights in this regard.²⁶⁵

Third, although the AI Act imposes some requirements on Member States to document the regulatory learning from AI sandboxes through exit reports and annual reports, national governments might benefit from implementing more extensive evaluation mechanisms.²⁶⁶ Therefore, individual EU countries should consider going beyond the formal requirement and analyze how different aspects of the EU's current framework affect companies and consumers through the sandbox. While individual EU governments do not have the power to waive or adjust EU regulations through the sandbox, the regulatory insights from national-level AI sandboxes could still form the basis for reform at the EU level. Such efforts could also provide the impetus for more rigorous regulatory review and evaluation processes through EU bodies, such as the European Artificial Intelligence Board and the European Artificial Intelligence Office.²⁶⁷

Finally, one disadvantage that EU-aligned sandboxes at the national level might face vis-à-vis their non-EU counterparts like Britain and Switzerland is the inability to provide regulatory relief from EU regulations.

²⁶¹ Artificial Intelligence Act, arts. 57(1)-(2), EUR. PARL. DOC. TA 138 (2024).

²⁶² *Id.* at art. 57(1).

²⁶³ *Id.*

²⁶⁴ *Id.*

²⁶⁵ ZÜRICH CANTON, *supra* note 16.

²⁶⁶ Artificial Intelligence Act, arts. 57(7), (16), EUR. PARL. DOC. TA 138 (2024).

²⁶⁷ *Id.*

While national governments might not have the power to provide such regulatory relief, they can still provide regulatory advice on compliance with EU regulations, as is the case with the Norwegian AI sandbox.²⁶⁸ Even without regulatory waivers, such advice could provide an attractive incentive for start-ups and larger companies to join the sandbox. Furthermore, EU governments can use other policy levers, such as fiscal incentives, to promote participation. Additional efforts through innovation hubs could further complement these incentives. The European Union has already developed the European Digital Innovation Hubs (EDIH) network, which is a step in the right direction.²⁶⁹ Member States should consider taking steps to improve regional EDIHs as well as national hubs outside the EDIH framework. These programs could be especially helpful in raising awareness about technology-related business opportunities and simplifying business registration, tax filing, and immigration procedures. A combination of these efforts could help individual European countries mitigate the potential disadvantages of the EU's sandbox strategy while advocating broader reforms at the EU level as needed.

J. *Additional Considerations for Emerging-Market Countries*

Several jurisdictions outside the United States and Europe—such as Brazil, Chile, and Colombia—are currently exploring ways to create artificial intelligence sandbox programs.²⁷⁰ While best practices for designing AI sandboxes in the United States and Europe are broadly applicable, emerging-market countries could also face specific challenges that require special attention. However, since the term “emerging-market countries” encompasses countries as heterogeneous as Belarus, Indonesia, and Mexico, precise policy recommendations must be tailored to each country's political, economic, and legal contexts.

First, the analysis of the AI sandbox programs in this Article suggests that, while general principles exist, there is no one-size-fits-all formula for designing AI sandboxes that apply to all countries. Even within relatively similarly situated jurisdictions, such as Norway and Switzerland, the regulatory design of AI sandboxes can vary considerably. Instead of replicating the approach of a particular country wholesale, a more effective strategy would entail selectively borrowing elements from multiple jurisdictions that align best with the policy objectives and regulatory context of a specific country.

Second, while the growing availability of boilerplate legal templates makes formally creating a sandbox relatively easy, attracting quality applicants and implementing policy reforms based on sandbox data pose greater challenges for most jurisdictions. While this Article recommends the creation of innovation hubs to complement the efforts of AI sandboxes, such hubs are

²⁶⁸ Note that Norway is a member of the European Economic Area, not the European Union.

²⁶⁹ *European Digital Innovation Hubs*, *supra* note 220.

²⁷⁰ GOV'T OF BRAZIL, *supra* note 80; UNESCO, *supra* note 188; *see also MinTic*, *supra* note 188.

especially crucial for emerging-market nations with technological ambitions. Well-designed sandboxes in the UK and Singapore, owing to their global reputation, will likely attract a steady stream of applicants because of their global reputation. However, for emerging-market nations that are less known internationally, it is paramount to engage in outreach efforts through innovation hubs and overseas investment offices. To that end, fintech innovation hubs of Estonia, Hong Kong, Singapore, and other innovative jurisdictions offer valuable models that merit closer examination.

Third, it is also important to consider the potential negative effects of sandboxes and implement preventive measures to mitigate such risks. For example, launching an ambitious AI sandbox program without establishing adequate privacy protection and consumer protection rules could result in the misuse of sensitive personal data and consumer harm. Because of such risks, jurisdictions such as the European Union are indeed correct in emphasizing the importance of data protection and informed consent in the context of AI sandboxes.²⁷¹ Such measures are even more important in the context of emerging markets, where structural weaknesses in the broader regulatory environment and legal system can exacerbate these risks. Questionable data protection practices could result in significant privacy violations and reputational damage, especially if foreign companies and consumers are implicated in those cases. That is why jurisdictions need to think more broadly about their broader technology ecosystem and take steps to improve the overall legal and regulatory frameworks when designing sandbox programs.

Finally, governments in emerging-market countries should take particular care to address potential challenges such as regulatory privilege and market distortion associated with regulatory sandboxes. While these risks also exist in developed economies, they are particularly pronounced in countries with recent histories of corruption and weak rule of law. Without establishing evidence-based criteria for eligibility and selection, adequate consumer safeguards, and mechanisms to evaluate regulatory lessons, it would be challenging to benefit properly from sandboxes. Likewise, while a well-designed sandbox might provide useful regulatory insights and foster innovation, other counterproductive policies—such as business-unfriendly tax policies, weak judicial systems, and bias against foreign companies—could counteract any marginal positive effects from a sandbox. Therefore, well-designed AI sandboxes must be complemented by other policy measures crucial for economic growth and innovation.

CONCLUSION

In his insightful lectures and scholarly works, Lord Jonathan Sumption, the distinguished English jurist and historian, questions the limits of law as a

²⁷¹ Artificial Intelligence Act, arts. 57-58, EUR. PARL. DOC. TA 138 (2024).

social and political instrument.²⁷² His analysis is helpful in understanding these limits: a growing number of litigations, for example, may signify not only a well-functioning legal system but also a broader weakening of social order and norms. While less profound a line of inquiry, it is similarly beneficial to question the role of regulatory sandboxes. What, after all, is the purpose of regulatory sandboxes, and what are their limits in the context of AI regulation? A clearer sense of their regulatory functions and limits can be instrumental in designing sandboxes that more accurately reflect a particular jurisdiction's policy objectives and help avoid potential regulatory missteps.

At their best, regulatory sandboxes can promote technological innovation by attracting innovative companies and helping policymakers design an evidence-based, iterative approach to regulating emerging technologies. Where there are no innovative products or services, a regulatory sandbox cannot produce them out of thin air; however, a carefully designed sandbox can provide a platform that allows companies to test and bring innovative products to market more quickly while enabling regulators to craft better rules.

Now that it has been about eight years since the FCA launched the world's first regulatory sandbox in 2016, it is worth taking stock of the sandbox as a policy instrument.²⁷³ From the FCA's fintech sandbox to Utah's legal sandbox, well-designed regulatory sandboxes have been effective in helping companies develop new products, promoting innovation, and inspiring other jurisdictions to do so. However, notwithstanding the growing number of regulatory sandboxes, it would be a mistake to conclude that they all have been equally effective. The more pertinent question is not whether a jurisdiction established a sandbox but *how* it was designed and implemented. As remains the case for fintech sandboxes, regulatory design will be critical to the long-term effectiveness of AI sandboxes.

Beyond regulatory design, are there specific sectors that are particularly well-suited for the introduction of a regulatory sandbox? While the right answer varies by jurisdiction, a general observation is that regulatory sandboxes can be particularly effective in rapidly changing industries, where supervised experimentation can allow new products and services to be offered more quickly and regulations calibrated. It is worth recalling that the most prominent U.S. sandbox has been in legal services, not insurance or financial services. At a time when more than 90 percent of Americans have inadequate access to legal services, legal sandboxes like Utah's have great potential to expand access to justice.²⁷⁴ Moreover, recent advances in generative AI have expanded the range of industries that could benefit from well-designed

²⁷² See, e.g., Lord Jonathan Sumption, Lord Sumption gives the 27th Sultan Azlan Shah Lecture, Kuala Lumpur: The Limits of Law, Nov. 20, 20213, <https://www.supremecourt.uk/docs/speech-131120.pdf>; see also LORD JONATHAN SUMPTION, *LAW IN A TIME OF CRISIS* (2011).

²⁷³ *Regulatory Sandbox*, FIN. CONDUCT AUTH., *supra* note 31.

²⁷⁴ LEGAL SERVS. CORP., *supra* note 245, at 19; *Activity Report*, UTAH, *supra* note 13.

sandbox programs. Against this backdrop, the growing regulatory interest worldwide in creating general-purpose and sectoral AI sandboxes should be no surprise.²⁷⁵

Across the world, governments appear to face growing pressure to enact comprehensive AI legislation, which will likely increase as generative AI capabilities continue to evolve. While such pressure is understandable, prematurely enacting laws to regulate AI across various sectors without understanding their full regulatory implications can inhibit innovation while failing to address unforeseen AI safety and other risks.

Whether a jurisdiction seeks to enact comprehensive AI legislation or opts for a sector-specific approach, AI sandboxes can help chart an evidence-based, iterative path forward. On the one hand, for jurisdictions like the United Kingdom, which have opted against comprehensive AI legislation, regulatory sandboxes can help lawmakers and regulators identify statutory gaps and gradually introduce well-calibrated regulations and statutes accordingly.

On the other hand, for jurisdictions like the European Union, which are in the process of adopting comprehensive AI laws, regulatory sandboxes can also serve as a tool for course correction. If certain AI regulations are suboptimal, as might be the case with specific aspects of the EU’s AI Act, regulatory insights from sandboxes could provide timely feedback. To that end, such jurisdictions must implement mechanisms to review regulatory lessons from sandboxes so that such insights can serve as the basis for regulatory adjustment and broader policy reform. That way, properly designed AI sandboxes could be an additional tool to help policymakers identify potential mistakes and recalibrate their approach if needed—without prolonging the adverse effects of poorly designed regulations in rapidly evolving sectors.

APPENDIX

Table A1. Selection and Evaluation Criteria for the Zurich Artificial Intelligence Sandbox²⁷⁶

Criteria and Description (Original)	Criteria and Description (English)
1) Testreife. Reifegrad des KI-Vorhabens zur konkreten Umsetzung.	1) Testing maturity. Maturity of the proposed AI project for concrete implementation.

²⁷⁵ For example, U.K. DEP’T FOR SCI., *supra* note 17, at ¶¶ 95–98, n.142; *see also* GOV’T OF NORWAY, *supra* note 138; Artificial Intelligence Act, art. 53, EUR. PARL. DOC. TA 138 (2024).

²⁷⁶ Each application receives an evaluation of “Sehr tief” (very low), “Tief” (low), “Mittel” (medium/average), “Hoch” (high), and “Sehr hoch” (very high) from the regulatory body. The minimum score required for selection is not disclosed by Swiss regulatory authorities.

2) Regulierung. Potential für den Aufbau von regulatorischem Know-how.	2) Regulation. Potential to develop regulatory expertise.
3) Datennutzung. Potential für die Nutzung von schwer zugänglichen Datenquellen.	3) Data use. Potential for using data sources that are difficult to access.
4) Gesellschaftlicher Mehrwert. Potential für Bereitstellung von Diensten im öffentlichen Interesse.	4) Social value. Potential for providing services in the public interest.
5) Innovationsstandort. Potential für die Stärkung des Innovationsstandorts durch Differenzierung von herkömmlichen KI-Lösungen.	5) Innovation hub. Potential strengthening of the innovation hub through differentiation from conventional AI solutions.
6) Übertragbarkeit. Potential, die Ergebnisse auf weitere KI-Vorhaben in Wirtschaft, Verwaltung oder Forschung zu übertragen.	6) Transferability. Potential to apply the results [from the sandbox] to AI projects in business, administration, and research.
7) Technologische Ansätze. Potential für den Einsatz von innovativen technolog. [technologische] Ansätzen (bspw. Privacy-Enhancing-Technologies).	7) Technological approaches. Potential for innovative technological solutions (e.g., privacy-enhancing technologies).
8) Relevanz für Verwaltung. Relevanz der Ergebnisse für Kantone, Städte und Gemeinden im Metropolitanraum ZH.	8) Relevance for public administration. Importance of the [project's] outcomes for the Zurich metropolitan area's cantons, cities, and communities.
9) Notwendigkeit. Notwendigkeit für eine Teilnahme an der Sandbox.	9) Necessity. Necessity for participation in the sandbox.
10) Technische Umsetzbarkeit. Umsetzbarkeit aufgrund der technischen Anforderungen (bspw. Infrastruktur, Datenaustausch, Modellierung, etc.)	10) Technical feasibility. Feasibility of technical requirements (e.g., infrastructure, data transfer, modeling).
11) Nicht-technische Umsetzbarkeit. Umsetzbarkeit aufgrund der nicht-technischen Anforderungen (bspw. Datenzugang, politische Kritikalität).	11) Non-technical feasibility. Feasibility of non-technological requirements (e.g., data access, political sensitivity).

Source: Office for Economy and Labor, Canton of Zürich (2022); author's translation²⁷⁷

Table A2. Selection and Evaluation Criteria of the Spanish Government's EU-Aligned AI Sandbox²⁷⁸

Criteria and Description (Original)	Criteria and Description (English)
a) Grado de innovación o complejidad tecnológica del producto o servicio.	a) Degree of innovation or technological complexity of the [proposed] product or service.
b) Grado de impacto social, empresarial o de interés público que presenta el sistema de inteligencia artificial propuesto.	b) Degree of the potential social and commercial impact and the public interest benefits of the proposed AI system.
c) Grado de explicabilidad y transparencia del algoritmo incluido en el sistema de inteligencia artificial presentado.	c) Degree of explainability and algorithmic transparency of the proposed AI system.
d) Alineamiento de la entidad y el sistema de inteligencia artificial con la Carta de Derechos Digitales del Gobierno de España.	d) Alignment of the entity and proposed AI system with the Charter of Digital Rights of the Spanish government.
e) Tipología de alto riesgo del sistema de inteligencia artificial, buscando una representación variada de tipologías en la selección.	e) High-risk classification of the AI system [according to the EU's AI Act], seeking a variety of risk classifications in the selection [of AI sandbox projects].
f) Cuando se trate de sistemas de inteligencia artificial de propósito general, se evaluará también su potencial de ser transformados en un sistema de inteligencia artificial de alto riesgo.	f) In the case of general-purpose AI systems, the [proposed project's] potential to be transformed into a high-risk AI system will also be evaluated.
g) Cuando se trate de modelos fundacionales de inteligencia artificial se evaluará la capacidad de despliegue y utilización, así como el impacto relativo o absoluto en la economía y sociedad.	g) In the case of foundational AI models, the capacity for deployment and utilization and the relative or absolute impact on the economy and society will be evaluated.
h) El grado de madurez del sistema de inteligencia artificial, considerando que ha de estar lo suficientemente avanzado como para ser puesto en servicio o en el mercado	h) The degree of market-readiness of the AI system, considering that it must be sufficiently advanced to be put into service or on the market within the time frame of the

²⁷⁷ Amt für Wirtschaft und Arbeit, *supra* note 206.

²⁷⁸ ROYAL DECREE 817/2023, *supra* note 28, art. 8(2); author's translation.

en el marco temporal del entorno controlado de pruebas o a su finalización. Se buscará una representación variada de madurez de los sistemas de inteligencia artificial.	controlled test environment or following its completion. AI systems with varying levels of market-readiness levels will be sought [during the selection process].
i) La calidad de la memoria técnica.	i) The quality of the [accompanying] technical report.
j) El tamaño o tipología del proveedor IA solicitante, según número de trabajadores o volumen de negocios anual, valorándose positivamente la condición de empresa emergente, pequeña o mediana empresa para garantizar una mayor diversidad de tipologías de empresas participantes. Se buscará una representación variada de tamaño y tipología de proveedor IA en la selección.	j) The size or type of the applicant AI provider, according to the number of employees or annual turnover, with start-ups and small and medium-sized enterprises being favored to ensure a better representation of the types of participating companies. A varied representation, with respect to the size and type of AI providers, will be selected.
k) Y en su caso, la evaluación de la declaración responsable que acredite el cumplimiento de la norma relativa a la Protección de Datos Personales. De igual forma se podrá solicitar documentación acreditativa adicional según recoge el anexo V del presente real decreto.	a) And, where applicable, the evaluation of the statement accrediting the [project's] compliance with the Regulation on Personal Data Protection. Additional supporting documents may also be requested in accordance with Annex V of this Royal Decree.