Original Research Article

The UK experience in supporting digital bonds development with regulatory sandboxes

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Abstract: The UK has a well-developed bond market and a leading fintech industry, but it started relatively late in the field of digital bonds. To support the development of digital bonds in the UK, the country established a Digital Securities Sandbox(DSS). The DSS is characterized by its financial market infrastructure-ledding approach and emphasis on substantial regulatory exemptions. Under the DSS, the UK has vigorously promoted the pilot issuance of digital gilts, effectively enhancing the global status of UK digital bonds. Drawing on the UK's experience, it is advisable to set up a regulatory pilot for digital securities, led by FMI, to support the development of digital bonds in China in terms of legal frameworks, regulatory policies, technical standards, and industry rules, thereby consolidating the leading position in this field.

Keywords: Digital bonds; Regulatory sandbox; Financial market infrastructure; UK

1. Introducion

Digital bonds are bonds in digital form. They are based on the standardization of bond element indicators, rely on digital technology as the means of implementation, and are stored in the form of accounts or tokens (CCDC, 2024). In recent years, digital bonds have been rapidly emerging on a global scale. In 2024, the global issuance scale of digital fixed-income instruments reached €3 billion, an increase of 260% compared to 2023, with the issuance scale of digital bonds exceeding €2.4 billion (AFME, 2025).

The regulatory sandbox is the most innovative and distinctive financial technology regulatory model of UK. In 2016, the Financial Conduct Authority (FCA) launched the world's first regulatory sandbox system (FCA Regulatory Sandbox"). It provided a "safe space" for enterprises to achieve safe and controllable innovation and also served as an observation window for the FCA to advance the reform of financial technology regulation. This system effectively supported the UK's leading position in global financial technology.

2. The UK's DSS

2.1. Background

As a leading player in financial technology, the UK has always paid close attention to the role of financial technology in supporting the development of the financial industry. In 2022, the UK government released a document titled *Regulatory Approach to Cryptoassets, Stablecoins and the Application of Distributed Ledger Technology in Financial Markets: Response to Consultation and Call for Evidence*. It pointed out that the application of digital technology to FMI could enhance market efficiency and reduce various risks. However, the current legal and regulatory framework in the UK was not sufficient to support such applications, nor could it effectively manage the risks associated with them (HM Treasury, 2022). Since the application of digital technology in FMI is still in its infancy, it is difficult for authorities to clearly define the direction of legislative and regulatory framework adjustments in advance. Acting rashly could lead to regulatory gaps or overreach. There-

fore, the UK decided to draw on the experience of the regulatory sandbox previously established by the FCA and set up a dedicated FMI sandbox. This sandbox would provide a safe testing environment for the application of digital technology to FMI and serve as an observation window for authorities to improve the corresponding legislation and regulatory systems.

The DSS is the first significant attempt following the establishment of the UK's FMI sandbox system. In January 2024, *FSMA 2023: Digital Securities Sandbox Regulations* were officially introduced after being approved by Parliament. These regulations provided clear guidance for the establishment and operation of the DSS. Under the guidance of the HM Treasury and the Regulations, in September 2024, the Bank of England(BOE) and the FCA jointly issued the *Digital Securities Sandbox Operational Guidelines* and officially opened the application process for the DSS.

Sources: DSS Regulations.

2.2. Operation process of the DSS

The operation process of the DSS can be divided into three sub-stages: initial application, business testing, and business launch and expansion. These stages are mainly managed by the BOE and the FCA, who are responsible for entry review, business evaluation and testing, and supervision of business launch within the sandbox.

Initial Application Stage: At the initial application stage, the sandbox regulatory authorities will first assess the applicants to determine whether they meet the entry requirements stipulated by the sandbox regulatory regulations. In addition to this, the regulatory authorities will conduct two further assessments: one is the business necessity assessment, which evaluates whether there are any legal or regulatory obstacles to the business that the applicant intends to conduct, such that it must be tested within the sandbox; the other is the regulatory and illegal background assessment, which evaluates whether the applicant has any significant illegal or non-compliant issues that could negatively impact the operation of the sandbox.

Business Testing Stage: During the business testing stage, the sandbox regulatory authorities will conduct a feasibility assessment and launch testing of the applicant's business to ensure that the applicant can meet the minimum requirements for business launch. The BOE will focus on the impact of the applicant's business on financial stability, while the FCA will focus on issues related to consumer protection and market integrity. Companies that pass the initial application and business testing stages can conduct their business within the specified testing boundaries.

Business Launch and Expansion Stage: For companies that have just entered the sandbox, the regulatory authorities usually set their business limits at the lower limit of the specified testing boundaries. After stable testing, companies can apply to the regulatory authorities for an increase in their business limits. Companies that successfully increase their business limits indicate that their business is generally capable of stable operation outside the sandbox.

3. Comparison of DSS and FCA regulatory sandbox

3.1. Comparative analysis based on the "Four-dimensional framework" of regulatory sandboxes

This section, based on the "four-dimensional framework" constructed by Song et al. (2021), compares the DSS and the FCA Regulatory Sandbox across four dimensions: test space, test time, participants, and test rules. Table 1 organizes the components of these two types of sandboxes. Overall, the main differences between the two sandboxes lie in the participants and test rules.

3.1.1. Differences in test space

In the early stages of the FCA Regulatory Sandbox, the proposed products or services to be tested needed to

be conducted within the regulatory scope of the FCA, and the applying companies needed to have the intention to promote the products or services in the UK. In January 2019, the FCA launched the Global Financial Innovation Network (GFIN), which covers regulatory authorities in 29 countries/regions, expanding the sandbox test space for UK companies beyond the UK (Hu et al., 2019). The DSS is only open to companies based in the UK.

3.1.2. Differences in test time

The FCA Regulatory Sandbox stipulates that the testing period for each project does not exceed six months, and exemptions from relevant rules are only valid during the testing period. This arrangement encourages companies to maximize the testing of their products within a limited time but may also fail to expose long-term risks. The DSS does not specify a specific testing period for each project. Participating institutions can continue to conduct business within the sandbox until it ceases operation. The absence of a time limit is more conducive for regulatory authorities to observe the long-term risk status of the testing companies and products.

3.2. Institutional limitations of the FCA regulatory sandbox

By the end of 2022, the FCA Regulatory Sandbox had supported 168 companies in conducting tests, with test projects involving blockchain, cryptocurrency, regulatory technology, and other fields, effectively supporting the use of fintech by UK financial institutions. However, despite the existence of this mature FCA Regulatory Sandbox system, the UK still chose to support the development of digital bonds through the DSS. The main reasons lie in the three limitations of the FCA Regulatory Sandbox.

Firstly, insufficient regulatory resources. Digital bond pilots involve multiple business links such as registration, custody, settlement, and trading, which are mainly led by central securities depositories and exchanges as FMI. The FCA's regulatory resources are mostly used to support business innovation in small-scale, retail scenarios. According to the FCA's regulatory sandbox guidelines, for complex, systemically significant wholesale business conducted by MTFs and OTFs, the FCA finds it difficult to provide sufficient regulatory resources (FCA, 2022).

Secondly, limited regulatory responsibilities. The BOE is the regulatory authority for the UK's CSD, central counterparties, and some payment systems. The FCA is mainly responsible for the regulation of exchanges and over-the-counter trading platforms. According to the memorandum of understanding between the FCA and the BOE, the FCA only has partial conduct of business regulatory responsibilities for FMI. When FMI conducts relevant business tests through the FCA Regulatory Sandbox, it needs to cooperate with the BOE for joint regulation. This results in the FCA Regulatory Sandbox lacking regulatory leverage in supporting the development of digital bonds.

4. The practical basis for regulatory pilots to support the development of digital bonds

Amid the rapid development of digital technology, major FMI around the world are actively exploring the provision of digital securities services based on blockchain and other digital technologies. In comparison, China's FMI has achieved certain positive results in the field of digital bonds. In 2021, the CCDC completed the research on the topic of blockchain-based digital bond book-building and issuance, and explored a prototype system. In 2022, the company was selected as one of the pilot units for national blockchain innovation applications. To implement the national pilot tasks, the CCDC launched the first blockchain-based digital bond issuance public platform in China, successfully supporting the issuance of several bonds. It has also actively engaged in standard-setting and summarized the first batch of standards in China's blockchain digital bond field. Establishing a digital bond pilot in China is conducive to advancing the development of legal frameworks, reg-

ulatory policies, technical standards, and industry rules for digital bonds, and consolidating the leading position in this field.

5. Conclusion

Compared with the regulatory sandbox in the UK, China's regulatory pilot system has distinct local characteristics. If a regulatory pilot for digital bonds is established in the future, it can actively draw on the UK's pioneering experience for optimization. On the basis of China's regulatory pilot, it is necessary to fully consider the characteristics and current development status of China's regulatory pilot to establish a regulatory pilot suitable for the innovation of digital bonds in China. This section proposes ideas and suggestions from three aspects.

5.1. Testing arrangements: Enhance the targeted nature of FMI

Thematic pilots have the advantage of "concentrating efforts on major tasks." Establishing regulatory pilots for FMI should also set targeted testing arrangements to fully leverage the role of thematic regulatory pilots.

Emphasize Coordination Between Front and Back Office Participants: FMI connects multiple trading front offices, and its business innovation also requires effective cooperation from the front office. In terms of pilot entity access, both front-office institutions and back-office entities can be included to form a full-process pilot innovation chain with front-back office linkage.

Flexible Testing Periods: The regulatory pilot testing period in China is around two years, which is conducive to exposing long-term risks and aligns with the systemic and foundational characteristics of FMI. However, a longer testing period may lead to the ineffective occupation of regulatory resources. The testing period can be flexibly arranged based on the actual situation of the testing project. For projects with longer or unclear testing periods, it is necessary to refine the evaluation and reporting feedback mechanisms during the testing period.

5.2. Exemption mechanism: Highlight the supportive role of regulatory reform

China's financial technology regulatory pilots emphasize "setting a rigid bottom line," requiring pilot projects to be conducted within the existing legal and regulatory requirements. This arrangement limits the regulatory exemption space for pilots, making it difficult to fully leverage the supportive role of regulatory pilots in regulatory reform and not good for creating a moderately relaxed financial technology innovation environment.

To address this issue, it is possible to consider piloting in the Shanghai Pilot Free Trade Zone first. International experience shows that FMI plays an important strategic role in the formation and development of international financial centers. The Shanghai Pilot Free Trade Zone has the advantage of a developed financial technology industry and strong local financial regulatory capabilities. Its "pilot first" development philosophy is highly compatible with regulatory pilots. Establishing regulatory pilots for FMI can rely on the endowment advantages of the Shanghai Free Trade Zone and the central legislative authorization advantages to seek support and authorization from national financial regulatory authorities. It is possible to explore the establishment of a more flexible financial technology regulatory pilot system in the form of "Pudong New Area regulations." Under controllable risks, this provides a trial-and-error space and an observation window for regulatory authorities to optimize the financial technology regulatory framework and also strengthens the support of FMI for the construction of Shanghai as an international financial center.

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