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Instant Payment System and CBDC in Brazil: The Case of Pix and Drex

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Good morning, dear colleagues and friends. It is a great honour to address this distinguished audience. I would like to thank Banco de España and Universidad Carlos III de Madrid for the opportunity to share some reflections on Brazil's experience with financial innovation — particularly through two transformative initiatives: Pix, our instant payments system, and Drex, our prospective Central Bank Digital Currency.

Today, I will focus on the legal and institutional frameworks that have enabled these innovations. My aim is to highlight how legal clarity, institutional leadership, and regulatory foresight can serve as catalysts for meaningful change in the financial system.

Let me begin with Pix, which has become a cornerstone of Brazil's retail payments landscape since its launch in November 2020.

The legal foundation for Pix is rooted in a gradual evolution of Brazil's payments regulation, beginning with the 1964 Central Bank Law, which granted the Central Bank powers over currency and the settlement of deposit accounts kept in it by banks. Later, in 2001, came the Brazilian Payments System Law, focusing on wholesale transactions. However, it was the 2013 Retail Payments Law that marked a turning point by extending regulatory authority to retail payments. This law introduced key concepts such as payment institutions, payment schemes, and scheme owners, and — crucially — mandated the Central Bank to promote efficiency, competition, and financial inclusion as regards retail payments.

Despite this mandate, the private sector did not respond to the Central Bank's 2013 recommendation to develop a real-time retail transfer system. In light of this inaction, the Central Bank assumed a proactive role. It established a

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working group in 2018 and formally announced its intention to lead the development of an instant payments platform. This culminated in the launch of Pix under BCB Resolution 1 of 2020.

From a legal standpoint, the Central Bank's authority to operate Pix, despite the absence of an explicit statutory provision, is grounded in its broader mandate to ensure the soundness and efficiency of the payments system. The Bank operates Pix on a cost-recovery basis with no profit-seeking, ensuring neutrality and avoiding market distortion.

A recurring concern regarding Pix is the potential conflict of interest stemming from the Central Bank of Brazil acting simultaneously as regulator and operator of a retail payment system. Critics argue that this dual role could grant undue advantages or bias in rule-setting. However, the Central Bank's active provision of the Pix infrastructure is, in fact, a deliberate public-interest strategy to level the playing field. By opening access to all financial and payment institutions—without discrimination — the Central Bank ensures symmetric participation, preventing concentration by dominant banks and enabling broader competition. This inclusive framework fosters an environment where fintechs and smaller players can enter and scale, spurring innovation and offering more tailored solutions to end users. Notably, the Pix governance framework mandates non-discriminatory access and conflict mitigation mechanisms, reinforcing its role as a credible, neutral platform.

Pix is not merely a payment scheme — it is a comprehensive ecosystem, which also comprises three crucial components:

1. The Instant Payment System (SPI), a 24/7 real-time gross settlement infrastructure, with liquidity facilities for the participants.
2. The Transactional Account Identifier Directory (DICT), which enables alias-based transactions.
3. The Pix Rulebook, a hybrid legal instrument combining regulatory provisions and contractual obligations.

Participation in Pix as a transaction account provider is mandatory for financial and payment institutions that keep more than 500,000 active customer accounts — including checking, savings, and prepaid accounts.

Pix has evolved considerably since its launch in 2020, due to an important evolutionary agenda. Beyond its core functionality of fast and secure transfers available 24/7, the system has progressively incorporated new features aimed at enhancing user experience and supporting a broader range of use cases. One such development is *Pix Agendado*, which allows users to schedule payments for a future date — a functionality akin to post-dated transfers. Another is *Pix Parcelado*, a feature offered by financial institutions that enables users to split payments into instalments, thereby introducing credit functionalities within the Pix environment. Most recently, the system has begun rolling out *Pix Automático*, designed for recurring payments such as utility bills and subscription services. This new mechanism allows users to authorize automated debits under pre-approved conditions, paving the way for more seamless and programmable payment experiences.

User protection has been a central priority in the evolution of Pix. As adoption has expanded, so have the efforts to strengthen the system's resilience against fraud, abuse, and financial crime. A key feature is the Special Return Mechanism, which allows for the reversal of funds in cases of confirmed fraud, offering users a path to redress without compromising the system's finality. Preventive measures include configurable transaction limits — such as lower thresholds during nighttime hours — and the widespread use of AI-based tools to monitor and detect suspicious activity in real time. The DICT database facilitates secure payment addressing while enabling the identification and blocking of accounts linked to illicit activity. These safeguards are complemented by a robust AML/CFT framework, with institutions required to monitor transactions, report unusual patterns, and apply enhanced due diligence where appropriate. Together, these elements form a multilayered approach that aims to preserve both the security and the efficiency of the Pix ecosystem.

The results speak for themselves: over 170 million users — in a country of a little over 200 million —, more than 900 participating institutions, and over 70 million individuals newly included in the financial system. Pix has not only modernized payments — it has advanced public policy goals in financial inclusion and digital transformation.

The institutional experience gained through Pix has provided a valuable foundation for the design of Drex. Lessons in participant onboarding, data governance, and regulatory neutrality are now being applied to the next frontier of financial innovation.

Drex represents a forward-looking effort to explore the potential of tokenised finance and programmable money. The project is structured as a multi-layered DLT platform, comprising a wholesale layer—where financial institutions settle transactions using central bank money — and a retail layer, where users hold tokenised bank deposits.

The Central Bank of Brazil has framed the development of Drex around a clear set of principles guiding its progressive implementation. These include technological innovation, leveraging DLT—such as smart contracts and programmable money—for both online and offline use; regulatory alignment, ensuring that Drex transactions comply with existing financial regulations without permitting regulatory arbitrage; legal certainty, upholding established legal frameworks; data privacy and security, in compliance with the General Data Protection Law and the Bank Secrecy Law; crime prevention, embedding AML/CFT controls and enabling transaction traceability for judicial requests; cyber resilience, applying standards equivalent to those for critical financial infrastructure; and interoperability, allowing diverse asset registration and future cross-border integrations.

The legal and regulatory challenges are more complex in this case. The Central Bank has adopted a philosophy of proactive experimentation, grounded in legal prudence. The pilot has been divided into two phases:

- Phase 1 focused on privacy and smart contract performance, revealing the classic privacy trilemma — the difficulty of simultaneously achieving privacy, scalability, and programmability. The Central Bank tested several privacy-enhancing technologies. While these solutions provided strong confidentiality guarantees, they often prevented even the token authority from accessing transaction data, conflicting with Brazil's legal requirements under the General Data Protection Law, the Bank Secrecy Law, and AML/CFT standards. Other approaches, such as confidential computing and API-based restrictions, were also found wanting — either due to centralisation risks or by limiting decentralisation and programmability. The pilot employed a permissioned DLT network, with 26 validator nodes operating within Brazil's closed financial network (RSFN). Although this ensured greater security, it imposed constraints on bandwidth and scalability. The experience highlighted the need for enhanced cyber resilience, threat modelling, and infrastructure planning.
- Phase 2, currently ongoing, explores business models and concrete use cases. These include the tokenisation of certificates of bank deposits, federal public debt instruments, and credit card receivables. The aim is to enhance collateral mobilisation, liquidity, and market efficiency — particularly for small and medium-sized enterprises — by enabling more flexible and transparent asset registration and settlement mechanisms. This phase also investigates how Drex might support a broader tokenised financial ecosystem, combining public and private sector innovation under a unified technical architecture.

Legally, the Drex ecosystem builds upon the Central Bank's authority to issue wholesale money (specifically in the form of tokenised banking reserves) and to manage the corresponding financial infrastructures, as well as to regulate and oversee both the retail and wholesale payments landscape pursuant to its constitutional mandate and the same foundational statutes that support Pix.

However, Drex raises new legal questions regarding data protection, smart contract enforceability, and the role of central banks in programmable finance. The Central Bank's strategy is deliberately technology-agnostic. Rather than

committing to full-scale DLT adoption, it seeks incremental improvements that bridge current infrastructure with emerging tokenised arrangements. This pragmatic approach ensures legal continuity while fostering innovation.

The Drex pilot has also served as a testbed for privacy-enhancing technologies. In Phase 1, the Central Bank emphasised the principle of privacy with accountability—ensuring that the authority over a token, whether the Central Bank or a financial institution, retains the ability to view transactions, enforce redemptions, and comply with legal obligations. This is achieved through permissioned blockchain infrastructure, controlled access to smart contracts, and auditable transaction records.

The Central Bank has also launched an institutional project to identify and mitigate legal uncertainties related to tokenisation. This includes clarifying the legal status of smart contracts, reconciling blockchain immutability with data protection rights, and proposing regulatory adaptations where necessary.

To conclude: Pix and Drex, while distinct in scope and maturity, share a common legal DNA. Both initiatives reflect the Central Bank's commitment to the public interest, institutional neutrality, and market collaboration.

They also illustrate the evolving role of central banks — not only as regulators but also as infrastructure providers and innovation stewards. This dual role requires careful legal balancing to avoid conflicts of interest and to maintain trust in the financial system.

Thank you for your attention. I look forward to your questions and to continuing this important dialogue.