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Digital asset market structure: lessons from and for the institutional foreign exchange spot market

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This note compares the market structures of foreign exchange (FX) spot and digital assets. Institutional digital asset markets face heightened risks in funding, trade execution, and settlement, which the FX spot market mitigated through intermediation by regulated entities and a clear separation of responsibilities. Building on these lessons, the digital asset market is currently evolving towards a structure similar to the FX spot market. Even though the FX spot market is known for its extensive electronification, technological innovations from digital assets can help address an important risk in FX spot markets, namely, FX settlement risk.

Since the emergence of blockchain and distributed ledger technology (DLT), several types of investable digital assets have been created. The most well-known ones are privately issued and are secured by cryptography. These include stablecoins and unbacked cryptoassets such as Bitcoin. The speculative nature of many digital assets has attracted primarily retail investors. Although the exposure of institutional investors to digital assets has remained modest, institutional interest is increasing due to their high return potential (Auer et al., 2022).

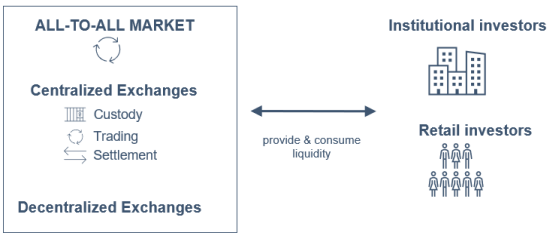
The market structure requirements of institutional investors differ significantly from those of retail investors. Institutional investors trade continuously and in an automated fashion, both for themselves and on behalf of clients. Consequently, they require a reliable trading infrastructure, robust governance, regulatory oversight, and a clear separation of responsibilities to mitigate operational risk. Therefore, some of the key promises of digital asset markets—particularly in decentralized finance—regarding trustlessness, disintermediation, and transparency are undesirable in an institutional setting, where governance, regulatory compliance, and market stability are central concerns.

The digital asset market has much in common with the FX spot market. Both are decentralized markets that operate 24 hours a day. Their trading landscapes are highly fragmented, with numerous trading venues that operate different trade execution methods (Schrimpf and Sushko, 2019; CoinDesk, 2025). Given these similarities, the digital asset market is undergoing a transformation towards a market structure similar to that of the FX spot market. The latter relies on domestically regulated intermediaries, a segregation between trading and custody, and global principles of good practice such as the FX Global Code.

Initial digital asset market structure compared to FX spot

Similar to FX spot, digital assets trade over-the-counter, which involves direct transactions between buyers and sellers. Furthermore, they are traded on centralized and decentralized exchanges. Centralized exchanges (CEXs) account for more than 90% of the overall traded volume (CCData, 2023). Trading activity is highly concentrated on a few of these exchanges. Like key institutional FX trading venues, CEXs use limit order books (LOB) to match the buy and sell orders of market participants. Decentralized exchanges (DEXs) were instead created to reduce reliance on CEXs after several major exchange bankruptcies. To process buy and sell orders without intermediaries, DEXs operate in simplified market forms that rely on self-executing programs—so-called smart contracts—which run on DLT. The most common form is an automated market maker, which facilitates trading by using a common pool of liquidity.[1] DEX with LOB models remain nascent due to technological limitations.[2]

CHART 1: SCHEMATIC OF THE INITIAL DIGITAL ASSET MARKET STRUCTURE



Initially, the market for digital assets exhibited a one-tier structure. This is depicted in Chart 1, where retail and institutional investors trade in an all-to-all market on the same CEX or DEX. An important feature of this initial ecosystem is that CEXs function as trading venues and custodians of funds, resulting in a highly disintermediated market structure and a concentration of counterparty risk at exchanges.

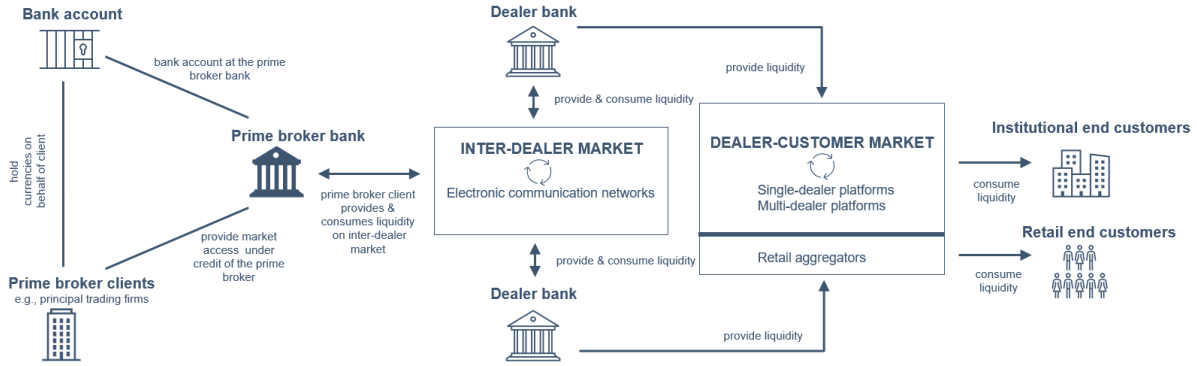
FX spot trading instead takes place in a two-tier market structure. This is illustrated in Chart 2. The first tier is the inter-dealer market, which operates across multiple trading venues with LOBs, commonly referred to as electronic communication networks (ECNs). Access to this market is restricted to dealer banks and the clients of prime broker banks. The second tier is

[1] See the BIS Quarterly Review December 2021 for a high-level introduction to automated market makers.

[2] The trading process in a LOB involves comparing an incoming buy (sell) order against all existing sell (buy) orders. Because the list of existing orders can be arbitrarily long, LOB software requires high throughput and speed, as well as low execution cost.

the dealer-customer market, which is accessible to end customers such as corporations, hedge funds, and asset managers. In this segment, end customers consume liquidity by executing trades, whereas the inter-dealer market is traditionally used by liquidity providers to manage the inventory risk that arises from customer trades. Typical execution methods accessible to end customers include single- and multi-dealer platforms or retail aggregators. Liquidity provision in both tiers is facilitated primarily by dealer banks. However, in recent years, principal trading firms (PTFs) have gained significant market share, as highlighted by the latest FX survey conducted by Euromoney. PTFs are firms that trade with their own capital and are often referred to as high-frequency traders.

CHART 2: SCHEMATIC OF THE FX SPOT MARKET STRUCTURE



This offers a stark contrast to the initial digital asset market structure depicted in Chart 1. Indeed, the FX spot market structure features a range of intermediaries, each of whom plays a specific role in the trading process. Prime broker banks play an important role in intermediating the institutional FX spot market. A prime brokerage agreement covers services throughout the entire trading process, from funding to trade execution and settlement (GFXC, 2005). The emergence of FX prime brokerage in the late 1990s played a key role in expanding liquidity beyond the dealer bank model by opening the inter-dealer market to institutional investors such as PTFs (Chaboud et al., 2023). According to the BIS (2022), approximately 40% of FX spot trading is conducted via prime broker banks. This contrasts with the initial digital asset market structure, in which institutional investors directly trade on CEXs and maintain funds and margin accounts at each trading venue without any intermediation.

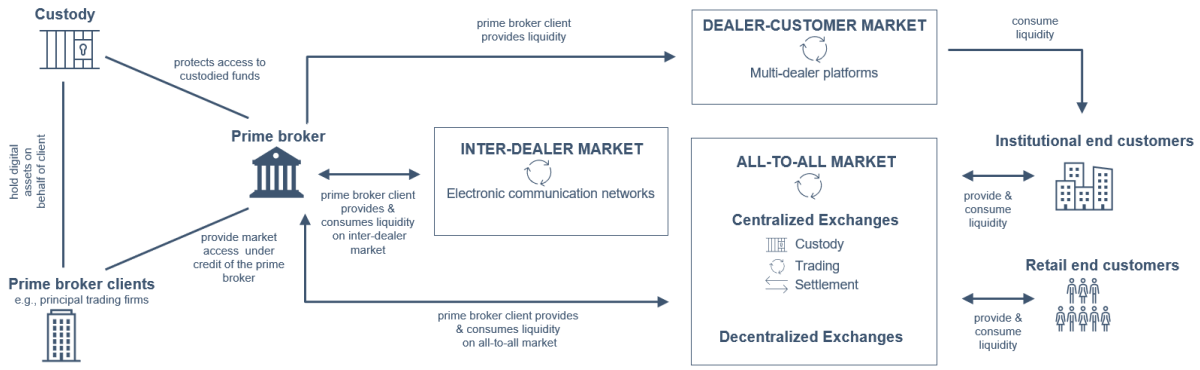
Emerging digital asset market structure and lessons from FX spot

The initial digital asset market structure induced risks throughout the entire trading process, from funding to trade execution and settlement. The lack of credit intermediation forced prefunded trading, requiring market participants to either lock up capital at multiple trading venues or to constantly move funds between them, in turn creating significant inefficiencies. The participants also faced direct relationships with each trading venue separately.

The adoption of FX-style prime brokerage arrangements for credit intermediation represented a principled solution for these issues and is currently emerging for digital assets, albeit outside

of traditional financial institutions. A bilateral credit limit with a prime broker bank avoids having to prefund activity across multiple trading venues. In FX spot markets, prime broker banks are global banks whose large balance sheets and institutional trustworthiness enable broad credit lines across trading venues. These credit lines can be passed on to clients under the prime brokerage agreement. Chart 3 provides a schematic of the emerging digital asset market structure. Here, clients access the inter-dealer market and the dealer-customer market via the prime broker bank.

CHART 3: SCHEMATIC OF THE EMERGING DIGITAL ASSET MARKET STRUCTURE



Trade execution and custody functions are often combined in digital asset trading venues. This comes with substantial counterparty risks, especially for liquidity providers, who buy and sell continuously and thus must keep funds on CEXs permanently. Separating trade execution from custody requires trading venues to become execution-only. In FX spot markets, this is achieved through ECNs, where trading occurs under credit arrangements, typically via prime brokerage. These arrangements restrict ECNs to banks that grant access to institutions, creating a two-tier market with distinct inter-dealer and dealer-customer segments. Execution-only trading venues for digital assets are currently emerging and are often backed by major traditional financial market infrastructure providers.

Moreover, digital asset trading venues usually handle settlement. Consequently, participants executing trades across multiple trading venues must settle trades with each venue individually. In FX spot markets, settlement is often intermediated via prime broker banks. By doing so, it can be performed efficiently against one entity instead of a multitude of market participants on various trading venues. In the highly fragmented digital asset market, this has the potential to significantly streamline and reduce the risks inherent to post-trade processes.

The FX spot market provides solutions for separating trade execution from custody and enhancing capital efficiency in a highly fragmented market. Adopting these might result in a similar two-tier market structure for digital assets, with clear inter-dealer and dealer-customer segments. It remains an open question whether nonbank institutions, which are currently emerging as intermediaries, can fulfil their roles with the same efficacy as major banks do in the FX spot market today.

Digital asset technology can reduce FX settlement risk

The FX spot market structure has proven to be both robust and efficient. Moreover, the FX spot market is among the most electronified financial markets, leveraging the expertise and specialized infrastructure of intermediaries (Drehmann and Sushko, 2022). Trading an average of approximately USD 7.5 trillion per day makes it the largest financial market in the world, according to the BIS (2022).

A key risk in the FX market, given its size, is FX credit risk. This risk can be split into replacement cost risk and settlement risk. From the time of trade until its settlement, the parties face the risk of the counterparty defaulting on its obligations and a trade having to be replaced at unfavourable prices. On the settlement date itself, the parties then additionally face settlement risk if the payments are not exchanged simultaneously because one part of a transaction could settle without the other(s). Almost one-third of deliverable global FX turnover faces settlement risk (Glowka and Nilsson, 2022).

Atomic settlement via smart contracts is often considered a solution to FX credit risk. As Lee et al. (2022) highlighted, atomicity frequently conflates two distinct mechanisms: instant settlement (exchanging currencies instantly at the time of trade, eliminating replacement cost risk) and simultaneous settlement (settling if and only if both currencies can be exchanged, removing settlement risk). While the latter is desirable, the former has drawbacks.

Instant settlement typically comes at the cost of having to prefund transactions. This results in higher liquidity needs and makes processes to reduce liquidity requirements, such as netting, much more complex (Bech et al., 2022), since every trade must be settled individually. Therefore, instant settlement can be undesirable for intermediaries in FX spot markets. This is the case for banks, which must manage substantial amounts of diverse customer transactions.

In contrast, simultaneous settlement mechanisms from digital asset markets might help make FX spot markets more efficient. In particular, technology from digital asset markets could be used to ensure simultaneous settlement via automated payment-versus-payment (PvP) smart contracts. In doing so, DLT-based post-trade solutions could reduce settlement risk by implementing PvP continuously. This comes with favourable funding and liquidity requirements. In principle, the ability to settle continuously also opens the possibility of introducing customizable settlement cycles. This could also support the generally observed global trend towards shorter settlement cycles, with markets moving to daily settlement cycles (so-called T+1) following the lead of US securities.

To conclude, the similarities between FX spot and digital assets motivate a two-way exchange of lessons. On the one hand, using DLT-based innovations from digital assets can help reduce FX settlement risk. On the other hand, the FX spot market structure with regulated intermediaries can serve as a blueprint to address risks throughout the entire digital asset trading process.

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