Government Actuary's Department

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Investment Bulletin

In this bulletin we discuss the rise and impact of Blockchains, the second of a series of articles on 'tech in finance'.

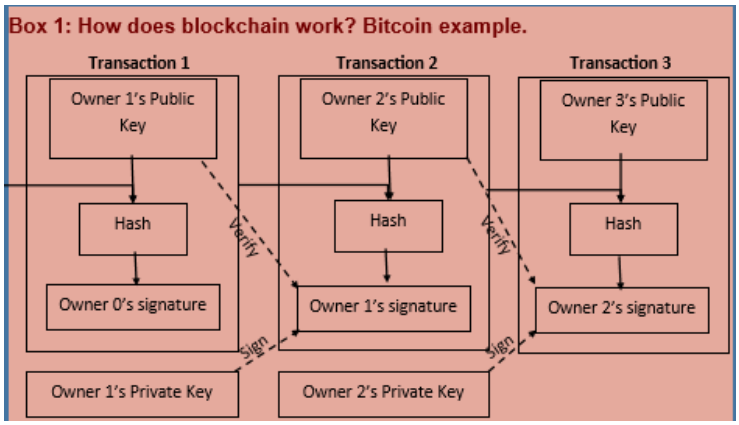
Background

Imagine I owe you £20. I ask my bank to send you £20, deducting it from my balance and adding it to yours. The bank is facilitating the transfer, maintaining a ledger of transactions that it updates daily. We are reliant on the bank and their ledger, with any decision made by them impacting our ability to perform transactions. We trust in this process because we believe that the bank's ledger, which records transactions, is accurate. Money has no intrinsic value of its own – it is the trust that people have for the authority issuing the money (the Bank of England in the UK) that gives it value.

Blockchain is essentially a database which is stored, shared and verified by multiple users, replacing the need for a centralised authority and removing the third party from the equation. It is most commonly known as the technology underpinning the cryptocurrency, Bitcoin. Bitcoins remove the payments we provide to banks for their time and service and make our transactions more secure.

How do blockchains work?

Instead of the bank maintaining the ledger, every computer using the network retains its own copy of the ledger. This ledger is not hidden, meaning that all transactions on the Bitcoin network are visible to anyone. To store Bitcoin, each user holds a wallet which includes a unique digital signature and the number of Bitcoins they own. This means that users remain anonymous as names are not visible on transactions – simply their digital signatures.



To make the transaction of £20, I would announce to the network that I am sending a Bitcoin from me to you. A complex mathematical message is sent containing both of our wallet's unique identifiers, the amount and a unique hash. If someone were to intercept and alter the message, the digital signatures would no longer be valid, and so the message would not be accepted on the network. Once accepted, the network updates its ledger with the transaction considered successful and therefore irreversible. The digital signature for each transaction added to the official ledger builds on the previous and the new transaction is chained to the block preceding it all the way back to the very first block. Blocks in a blockchain are identified by their "hash", which serves the purposes of both identification and verification. A hash is an alphanumerical password intrinsically tied to the transactions in the list, known as proof of work. If one character in any of the transactions in the block is changed, the entire proof of work is no longer valid. All transactions by a user can be traced, eliminating scope for fraud.

Looking forward

The demand for, and level of investment in, Blockchain technology has risen significantly in recent years across many different industries. Last year, JPMorgan used blockchain technology to create the JPM Coin, a digital coin enabling institutional accounts to make instantaneous payments. Companies such as Amazon and IBM offer enterprise-grade blockchain solutions. Blockchain projects have also been introduced in areas like cybersecurity, healthcare and agriculture alongside the typically associated investing and finance. This trend has already continued into 2020, with several upgrades, new initiatives and further platforms being offered.

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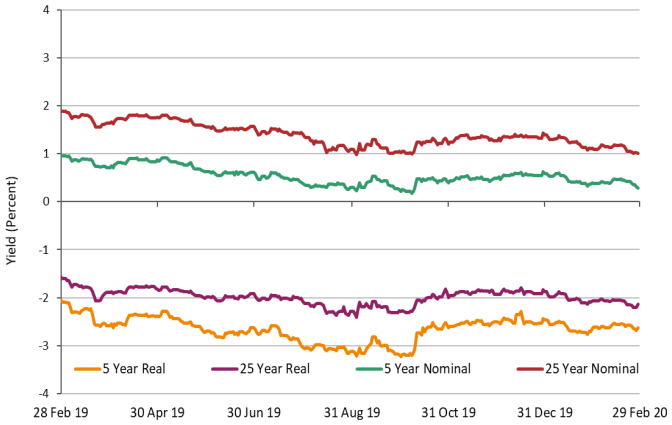
This month in brief

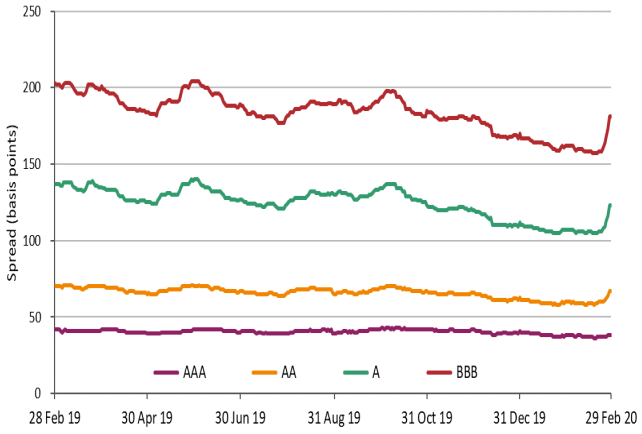
Businesses, markets and economies around the world have taken a large hit due to the coronavirus outbreak. At the beginning of the month the Organisation for Economic Co-operation and Development (OECD) predicted that the global economy could grow at its slowest rate since 2009. The OECD predicted that growth could plummet to just 1.5% in 2020, from the 3% that was initially projected before the virus had surfaced. However other commentators have questioned whether a "V-shaped" recovery that would limit the economic impact is likely and have instead suggested that the economic impacts might be larger.

The major stock markets including FTSE 100 and Dow Jones, saw its worst performance in the last week of February since the 2008 financial crisis. Equity markets have continued to fall and suffered further volatility throughout March and credit spreads have widened as investors seek "safer" assets such as cash. A global response was launched in March, with many governments intervening to protect jobs and to try to limit the economic damage. More than 50 central banks including the Chinese Central Bank, the Bank of England and the Federal Reserve have slashed interest rates to ease the disruption. The Bank of England also announced an expansion to the Quantitative Easing programme.

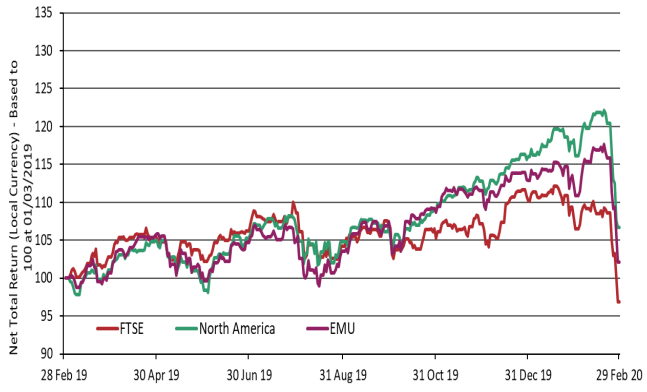
Real and nominal yields on short-term and long-term bonds declined over the month



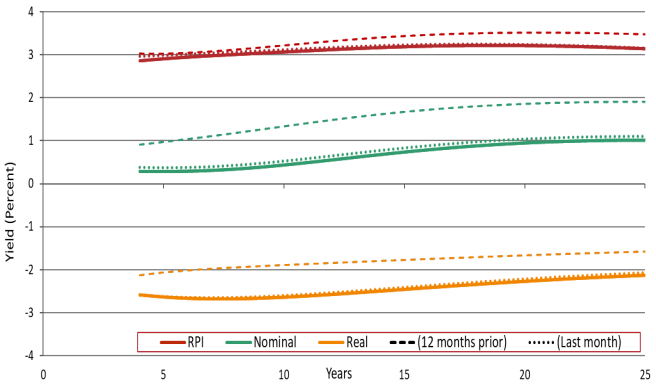
Credit Spreads continued to steadily decline with slight improvements towards the end of the period



All markets rose slightly before dropping sharply towards the end of the month



RPI Inflation, nominal and real gilt yields were lower than the previous month over all durations



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