

Blockchain, cryptoassets and banking: an introduction

Santiago Carbó Valverde (CUNEF)

1. Introduction

This paper introduces the session on cryptoassets organized by the Spanish Banking Association (AEB) and CUNEF Banking Lab in Madrid on October 10, 2019. It follows up on a previous meeting held at AEB premises on July 22, 2019. The aim is to provide some background on the topic, describing the main definitions of concepts such as blockchain and cryptoassets but also, importantly, how they are being incorporated into banking. Two insightful papers are presented in the session following this introduction. In one of them, entitled “The use and adoption of cryptoassets”, Andrei Kirilenko and Demelza Hays undertake a comprehensive revision of the structure of the cryptoassets industry. Specifically, they analyse the main attributes of cryptoassets, the determinants of their demand and the barriers to mainstream adoption, as well as some methodological aspects including the framework for analysing their adoption. The findings suggest that most of the problems standing in the way of adoption and trust have solutions (as the use of illicit activities and the related reputation problems). Regulation is described as a solution for most of these problems. As for structural issues, the solution to problems related to scaling is considered a matter of time. Major networks already have plans in place to improve technical aspects of their networks. All in all, the cryptoassets industry may evolve to a more friendly and competition industry with low barriers to entry.

In the second paper, entitled “Distributed ledger technology and central bank digital currencies” Santiago Fernández de Lis and Javier Sebastián offer a taxonomy of the different modalities and definitions of distributed ledger technologies (DLTs) –with the prominence blockchain- and of central bank digital currencies (CBDCs). While the debate on the extent to which central banks can issue and distribute digital money has been there for some time, there has been little analysis on the potential impact of such developments and, specifically, on the different possibilities (technically and economically) to follow this path. The current debate on the forthcoming irruption of Facebook’s Libra has been somehow presented as a private alternative to CBDC but actually, the CBDC offers a different range of possibilities that not only affects the retail

side of payments but also the wholesale side. Fernandez de Lis and Sebastián illustrate that wholesale models seem more feasible than retail models because they ultimately do not propose a significant operational change beyond a replacement of technological infrastructure. However, they also suggest that CBDC do not necessarily offer significant advantages compared to common real time gross settlement (RTGS) systems. As for the retail CBDCs, the authors show they are much more complex because they offer a wider range of possibilities. Complexity particularly emerges from the dilemma of the existence of anonymous models and identified models.

We cannot ignore that over the last few months there has been a considerable disruption in the cryptoassets industry with the announcement (and expected irruption and disruption) of Facebook's Libra. As discussed in section 3 of this note, Libra has created a renewed hype in the crypto world. Other currencies in this market have apparently benefited from the announcement of the new challenger and have recovered some of the lost ground. However, Libra presents some technicalities and potential economic, financial and monetary implications that have gathered substantial attention from central banks and regulators. The future of Libra remains challenging and it will be difficult for this digital currency to overcome the different regulatory and supervisory that are emerging and are likely to appear in the next few months. In any event, it is unknown if Libra will prevail but I am convinced it will probably pave the way for more disruptive projects of digital currencies.

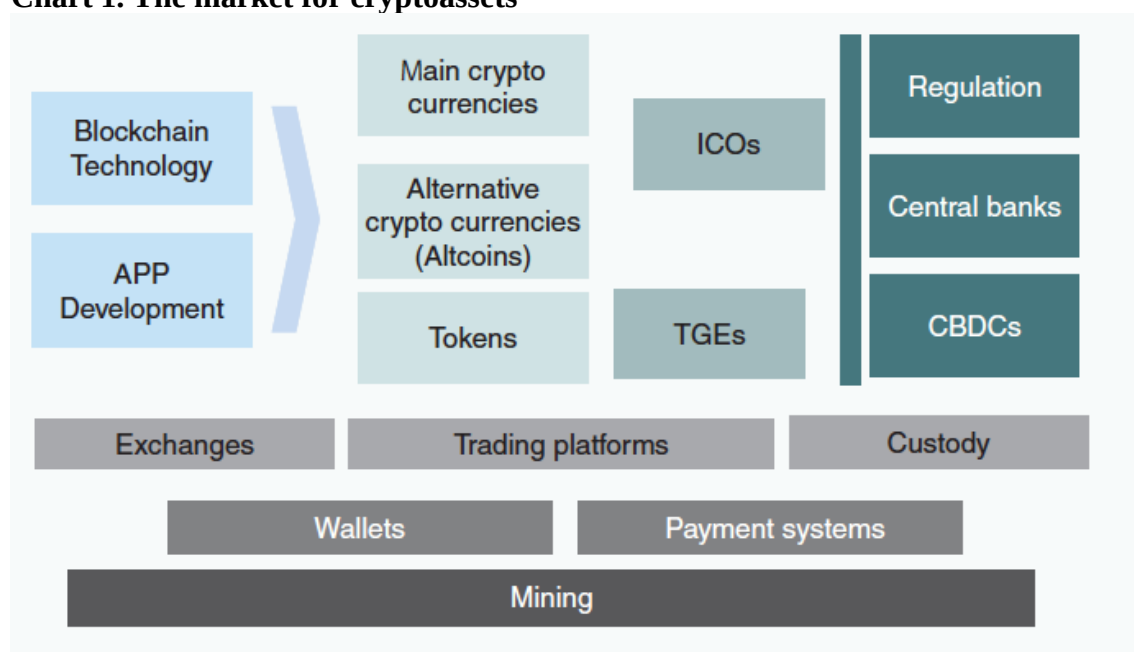
Cryptoassets are a sign of the times we are living in insofar as they combine technological innovation, opportunity and uncertainty. Broadly defined, these assets comprise the universe of crypto currencies and other kinds of goods and services that use cryptography and blockchain technology to function. From this definition, a plethora of connotations has proliferated that are not always sufficiently exclusive. For example, these assets exclude the currencies, applications and services that are simply virtual or digital but lack encryption as their system of generation and protection.

Cryptoassets bring together two worlds experiencing growth and offering still-untapped possibilities to generate financial and non-financial assets and services protected by cryptography that have already commanded a considerable presence in the market: blockchain technology and apps development. Blockchain emerges as the technological reference. It is one distinctive clash of distributed ledger technology (DLT) in which information is recorded in a large ledger in "blocks" that are linked and

encrypted to be secure and unalterable. Blockchain's key virtue is decentralisation, which enables information to be recorded (theoretically) without the need for intermediaries. A first question is then: can financial intermediaries have a say on this front?

As shown in Chart 1, cryptoassets are mostly negotiated in exchanges, which are markets of varying depth that function by means of algorithms that match buy and sell orders. They are, in turn, supported by brokers and trading/marketing platforms that offer interconnection between participants. Blockchain systems permit transaction clearing and settlement at a speed that can vary but is sufficient to allow for the formation of prices that are observable by the participants. As in standard financial markets, the funds invested in cryptoassets are subject to a custody regime in the main exchanges. This regime means that value can be accumulated with sufficient guarantees. Value is stored in wallets, systems or software applications designed to store cryptoassets. There are custody wallets – in which the custodian holds the key for each crypto asset – and private wallets – in which the asset holder's private key, essentially an access password, is stored.

Chart 1. The market for cryptoassets



Source: Carbó and Rodríguez (2018)

2. Blockchain in banking

It is somehow a paradox that while Europe lacks big players in the tech industry that can compete with the Asian and American, European banks have emerged as leaders in the adoption of blockchain technologies and mainly through cooperation with platforms. Regulators have taken note on these developments. Throughout 2018, the European Commission pursued several initiatives that suggest blockchain may play a key role in the configuration of the Digital Single Market (DSM), a target that the banking industry is working to meet. It was hardly surprising when the EU invited major European firms and start-ups to a DSM forum in 2018 to create the International Association for Trusted Blockchain Applications (INATBA), in which Spain and its banks are strongly represented. INATBA is fully operational since April 2019 and to become the public face of technological cooperation and development in the region, competing with Asia and the US in the DLT arena.

Europe's banks have pioneered some of the world's most important DLT-based platforms, with Spain's financial institutions playing an important role in most of them. In 2018, some Spanish banks began promoting blockchain transaction use in certain fields, such as asset securitisation and loan approval. To an extent, these initiatives have been testing environments to study how these types of transactions can be speeded up, at what cost and at what level of security. Perhaps the best example to date of DLT addressing corporate demand for more agile financial services is in large-scale trade finance. In a field where bookkeeping, financing and payment transactions for large-scale exports can take days and even weeks to close (a single transaction can involve multiple firms across the globe), international banks have begun to cooperate. Spearheaded by European banks, this collaboration has enabled trade transactions to be automated and monitored as never before.

Table 1. International initiatives and the role of European banks in blockchain-based trade finance platforms

	VOLTRON	MARCO POLO	BATAVIA	WE.TRADE	HKTFP
Technology partners	R3 and CryptoBLK	R3 and TradeIX	IBM	IBM	Hong Kong Monetary Authority

Member banks	HSBC, BBVA, Natwest, Bangkok Bank, BNP Paribas, ING, USBancorp, Mizuho, Scotiabank, SEB, CTBC Bank, Intesa Sanpaolo	Natixis, Standard Chartered, Natwest, Bangkok Bank, BNP Paribas, ING, SMBC, OP Bank, Commerzbank, DNB	BMO, UBS, Erste, Caixabank, Commerzbank	HSBC, Société Générale, Santander, Unicredit, Natixis, KBC, Deutsche Bank, Nordea, Rabobank	HSBC, Standard Chartered, DBS, ANZ, Hang Seng Bank, Bank of China, BEA
Core activity	Digitisation of paper-based letters of credit (generally generated manually) to speed up transaction turnaround and reduce fraud	Improving recordkeeping systems to speed up payments and the discounting of receivables	Development of smart contracts to enable the tracking and monitoring of trade transactions in real time	Using smart contracts to enable the development of receivable discounting and invoicing capabilities for European SMEs	Digitisation of the production chain and recordkeeping for corporate transactions and connection with other platforms
Milestones	In May 2018, it completed a letter of credit for a shipment of soybeans from Argentina to Malaysia in 24 hours (the standard turnaround time without blockchain is 5 to 10 days).	In October 2017, it was the first platform to digitally discount receivables and simultaneously secure credit risk for an undisclosed logistics company.	In April 2018, it ran two pioneering import pilots that automatically monitored each stage of the import of German cars and Austrian textiles into Spain.	In July 2018, this platform announced it was operational in 11 European countries and that it had completed 7 “live” or real-time trades involving 10 European firms.	Activity started in September 2018.

Source: CBInsights and own elaboration.

Table 1 shows the world’s top five trade finance platforms. Four of the five are markedly European in profile (all include Spanish banks): Voltron, Marco Polo, Batavia, We.Trade and the Hong Kong Trade Finance Platform (HKTFP). These platforms cover multiple activities, from transaction payments and credit underwriting to the execution of trades via smart contracts, all at speeds that allow transactions to close within 24 hours. Although it is too soon to tell, a growing share of global trade will likely be channelled through these platforms thanks to cooperation between technology firms and financial institutions. This collaboration is strengthened further by cooperation among the various

platforms themselves, with some banks participating in more than one platform at the same time.

There is a range of other possible applications for blockchain in banking and finance. In the markets, blockchain can make equity trades faster and more secure, paving the way for more open and competitive trading. It could also make it easier to verify private investments and provide access to a larger number of possible suppliers. It too enables the development of more secure or complementary asset clearance, settlement and custody systems. Paradoxically, blockchain could even make it possible to manage and account for something as unelectronic as cash more efficiently, enhancing traceability and ownership recordkeeping. Payments is another area of significant development for DLTs. The limitation in this case is the failure of cryptocurrencies like Bitcoin to live up to their expectations. The utility of cryptocurrencies as a store of value or speculative asset may be up for debate, but there is general consensus that they have not worked as a means of payment. Regardless, the large card operators and other electronic payment instruments are already developing and testing blockchain technology to shorten settlement times for national and, above all, international payments. Payments may be ripe for blockchain expansion in the near future.

In banking, there are broad possibilities in both the retail and wholesale segments. Beyond the realm of trade finance, there is scope for using distributed ledgers to improve efficiency, turnaround times and verification in areas such as:

- Real-time lending underpinned by borrower risk management based on smart contracts;
- Property valuations and verification;
- Development of tailored personal financial tools;
- Management of liquidity and cash, virtual portfolios and management of currencies/remittances;
- Audit and control of counterparty risk;
- Mitigation of operational risk;
- Regulatory compliance.

It is important not to forget BigTech players like Facebook, Apple, Amazon, Google and Netflix. The use of DLTs is the natural next step for companies that control the key

input for distributed ledgers: information. This may imply faster customer access systems for their own financial transactions, stepping up competitive pressure on the banks.

3. The blockchain trilemma and the emergence of Libra

Part of the limitation in the use of cryptoassets and, in particular, in the development of blockchain in banking can be explained by the so-called “blockchain trilemma” (a term coined by Abadi and Brunnermeier (2018) or the “scalability trilemma” (originally described by Ethereum founder, Vitalik Buterin). Because the blockchain is (mostly) written by anonymous users, consensus is reached by making the ledger publicly viewable and verifiable. A DLT should ideally record all information correctly and in a cost-efficient, decentralised manner that avoids concentration of power.

The issue is that no ledger to date has been able to satisfy these three conditions simultaneously. Many blockchain applications fail to reach sufficient operating scale to reduce their energy consumption and other costs (computing, verification, time) below the costs of centralised ledgers. Scalability is also important to verify that records (a financial transaction, for example) are correct. However, not all potential users will have access to the computing capabilities needed to verify the algorithms in various parts of the blockchain, thus limiting its size and, sometimes, decentralisation. This issue is further complicated when the verification technology is divided into one or more technologies or the verification protocol of a blockchain network is changed. This phenomenon is known as a “fork” and is a common problem with cryptocurrencies that have several versions.

Without being too technical, verification implies (among other issues) the ability to add a “solution” to the algorithm so that the blockchain can continue to be written. Blockchain provides the “proof of work” that verifies the correctness of the information recorded. Other protocols, such as “proof of stake” have been put forward to enable faster verification. Proof-of-work systems sometimes make it too costly to verify records. Although costs are lower with a proof-of-stake system, decentralisation is lost (as this protocol implies fewer participants and more centralised control) — another example of the trilemma.

It has been suggested that in certain contexts, centralisation could be the “lesser evil”, or the part of the trilemma that could be “sacrificed”. This could be, for example, the case of Facebook’s Libra, as I will discuss later on. Specifically, the concentration of verification systems could make sense when transactions are relatively delimited among a smaller group. However, this route breaks with an essential part of the DLT philosophy (decentralisation) and introduces possible market power rents more typical of intermediation.

In the financial sector, it could make sense to sacrifice some decentralisation in exchange for an equivalent cost saving in markets where competition is already high. In the banking industry, for example, margins have fallen considerably and competition has increased due to, among other things, the push for digitisation, growing competition from non-banks, and cost cutting. The trade finance example presented earlier suggests the potential for significant efficiency gains, even at the price of using somewhat more centralised protocols.

Taking Libra as a reference for current public debate, there are three issues that are worth considering:

- First of all, from a strict technical standpoint, Libra is not a standard blockchain in the way a typical DLT is conceived. The Libra’s white paper says: “There is no concept of a block of transactions in the (Libra) ledger history. ... This is in contrast with Bitcoin and Ethereum (...) the transactions occur in sequence without distinction as to which block contained each transaction.” Even so, another line in the white paper reads: “The Libra Blockchain is a decentralized, programmable database designed to support a low-volatility cryptocurrency.” The truth is that the term “blockchain” has been continuously applied to all types of networks using different transactions protocols and even some protocols that use “approved states” rather than blocks. Libra “states” are validated by authorized parties and these authorization is the only decentralization that can be identified in Libra, which is actually quite centralized.

- Secondly, Libra emerges not just as a ‘storage of value’ device –which has been the only successful path of other cryptoassets- but as a payment instrument and, most importantly, as an alternative currency. This has caused serious concerns among central

banks and authorities all over the world as, if successful, it could potentially represent an alternative and private monetary system. This is not a minor issue, as central banks' and financial regulators' reaction has shown, since financial and monetary stability would be at stake.

- Third, given the attention raised by Libra, regulators are effectively casting several doubts on it and this is causing a delay in the estimated release of the cryptocurrency. In September 2019, central banks from all over the world met at the Bank for International Settlements (BIS) for a "Conference on global stablecoins". Libra was on the agenda as the main topic for discussion. The conclusions have not been released but there have been public statements from officials that underline the doubts that dominate around Libra. Agustín Carstens, General Manager of the BIS said: "A key part of assessing new initiatives is to understand the details (...) When such initiatives cross national borders, it's important for regulators to coordinate and come to a common understanding." Benoît Cœuré, Chair of the BIS-hosted Committee on Payments and Market Infrastructures said: "As a new technology, stablecoins are largely untested, especially on the scale required to run a global payment system (...) They give rise to a number of serious risks related to public policy priorities. The bar for regulatory approval will be very high.

4. Regulation and risks of blockchain in Europe

The full development of blockchain technology in the European banking system will depend largely on how it is regulated. The EU stands out in the international arena in its efforts to promote the use of blockchain technology. It is important to single out the regulatory and supervisory debate on the most extensive application of blockchain technology to date: cryptocurrencies. Although the International Monetary Fund has urged the main global central banks to make progress on creating so-called central bank digital currencies (CBDCs), both the European Central Bank and, more vehemently, the US Federal Reserve are reluctant to go much further than experimental tests and do not deem it necessary, for the time being, to launch their own CBDCs.

However, the scope for blockchain expansion goes well beyond private or monetary authority virtual currencies. Once again, Europe stands out. In March 2018, the

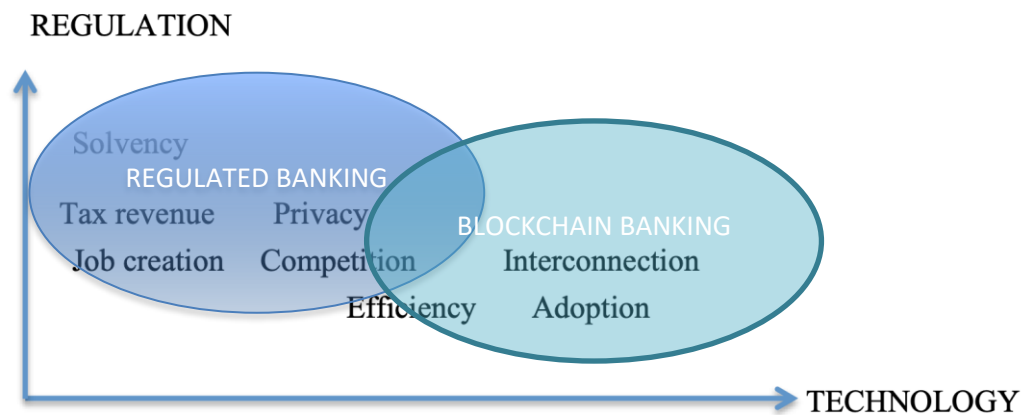
European Commission set up a blockchain technology taskforce, and that same month launched a FinTech Action Plan that prominently featured blockchain-based projects. Indeed, the first objective listed in the Action Plan is to enable the financial sector to make use of the rapid advances in new technologies, such as blockchain, artificial intelligence and cloud services.

While the Action Plan seeks to make markets safer and easier for new players to access, its three main objectives are to enable innovative business models to reach scale in the EU, to support the uptake of technological innovation in the financial sector, and to enhance cybersecurity and integrity in the financial sector.

5. Conclusions: implications for banks: regulated banking and blockchain banking

The good and the bad thing about blockchain technologies and their application in banking is that innovation can unexpectedly emerge from many different sources. On the one hand, there is plenty of room for innovation. On the other hand, regulators and supervisors may assure disruptions do not negatively affect financial stability and competition. The new Facebook payment system, Libra, intends to be a disruptor and not only for private banks but for central banks as well (as it may set up as a reserve fund supporting a new currency). At the time I am finishing these lines, Libra has already encountered the initial opposition of, among others, the US lawmakers and French government. Only time will tell if Libra is able to meet the regulatory requirements that monetary and financial authorities around the world are likely to set to keep a “level playing field” in the payments and currency markets. This just seems the start of a new era of competition among digital currencies in which regulatory bodies will have a lot to say.

Chart 2. Regulated banking and blockchain banking



Source: own elaboration

With different alternatives and perspectives, blockchain can be used for banking services. Libra is one example. In Europe, another example is the extensive array of payment services that orbit around the banking industry fostered by the Second Payment Services Directive (PSD2). Chart 2 illustrates the potential benefits and regulatory challenges of this new “blockchain banking” trend. It may bring more interconnection, efficiency and effective adoption of retail banking services. However, at the same time, it can be used as a “back door” to avoid regulation and to generate uncertainty on privacy issues and financial risks.

References

ABADI, J. and M. BRUNNERMEIER (2018), Blockchain Economics, mimeo, Princeton University,

CARBÓ, S. and F. RODRIGUEZ (2018): The cryptoassets economy: reality, myth and opportunity, Spanish Economic and Financial Outlook, 7, 5-17.

FERNANDEZ DE LIS and J. SEBASTIAN (2019), Distributed ledger technology and central bank digital currencies, BBVA Research.

HAYS, D. and A. KIRILENKO (2019), The use and adoption of cryptoassets, mimeo.