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ABSTRACT

A blockchain is a decentralised, distributed and public digital ledger that is used to record transactions between members of a network. The widespread adoption of blockchain in the banking industry offers advantages but also poses risks relative to their anti-competitive impact on financial markets. On the one hand, blockchain will improve transparency and traceability of financial products to be exchanged, thereby undermining the need for intermediaries. On the other hand, blockchain could prove helpful to create or facilitate coordination among competing banks. This is because, by increasing market transparency, blockchain could help competing banks to establish coordination, monitor adherence to coordinated behaviour, and (to a certain extent) effectively punish deviations. For these reasons, the adoption of blockchain technology should go with the identification of safe harbours when dealing with information made public on blockchain.

Une blockchain est une technologie de stockage et de transmission d'informations sans organe de contrôle. L'adoption de la technologie blockchain dans le secteur bancaire offre des avantages certains. Elle permettra d'accroitre la transparence du marché, et partant, la traçabilité des produits financiers échangés. Elle réduira le besoin d'intermédiaires et donc les coûts de transactions. Cependant, la technologie blockchain présente également des risques, dès lors qu'elle peut venir à l'appui de comportements anticoncurrentiels. Ainsi, la technologie blockchain est susceptible de faciliter la coordination entre banques concurrentes. En renforçant la transparence du marché, elle pourrait aider des banques concurrentes à identifier une ligne d'actions commune, à contrôler le respect des termes d'un possible accord et (dans une certaine mesure) à mettre en œuvre un système de représailles efficace pour punir d'éventuelles déviations. Pour ces raisons, l'adoption généralisée de la technologie blockchain dans le secteur bancaire devrait être encadrée. Il est en particulier nécessaire d'identifier les informations qui pourraient être partagées par des banques concurrentes sur une blockchain.

I. Fintech firms have attracted substantial investment in recent years, while public interest has grown significantly

1. A new wave of technological innovations, often called "fintech," is accelerating change in the financial sector. Fintech leverages the explosion of big data on individuals and firms, advances in artificial intelligence, computing power, cryptography, and the reach of the internet. The strong complementarities among these technologies are giving rise to an impressive array of new applications touching on services from payments processing to lending, asset management, insurance, and financial advice.

2. Fintech firms have attracted substantial investment in recent years. Total global investment in fintech ventures between 2010 and 2017 reached about USD 98 billion. The volume of fintech deals globally within that timeframe grew at a compound annual rate of 35%, with total funding growing at a compound annual rate of 47%. In 2017 global investment in start-ups focusing on application for payments and lending accounted for c.60% of global investment in fintech ventures.[1]

1 Accenture's analysis of data from CB Insights. https://www.bankingtech.com/2018/02/global-vc-investment-in-fintech-reaches-record-27-4bn.

II. Among fintech, blockchain technology will make transactions between members of a trust-less network possible

3. Venture capital investors are investing into blockchain companies at a record-setting rate. By the end of February 2018, venture capital investments in blockchain companies had already hit 40% of the approximately USD 0.9 billion raised in all of 2017.[2]

4. Internet-enabled blockchain technology will allow encrypted and secure publishing and digital transfer of information—thereby removing the need for a trusted "middle man."

5. A blockchain is a decentralized, distributed and public digital ledger that is used to record transactions between members of a network. The data relating to each transaction is saved inside cryptographic blocks, connected in a hierarchical manner to each other. This creates an endless chain of data blocks that allows tracing and verifying all the transactions that have been ever made on the network. Blockchain ensures that any record cannot be altered retroactively without the alteration of all subsequent blocks and the consensus of the network.

6. Blockchain has therefore the potential to solve the "double-spending" problem, being able to provide public transactions without the need of a trusted central server. In other words, blockchain has the potential to prevent ownership of the same digital asset to be transferred more than once. This is a flaw that is unique to digital assets that can be reproduced rather easily. For example, a digital picture is nothing else than a file saved locally on a computer. There is nothing preventing from copying this file many times and transferring ownership at a price to multiple individuals. Physical assets would not face the same double-spending issue because everyone involved in the exchange of a physical asset has immediate access to the original asset which is unique, in this example the picture.

7. Blockchain prevents double spending by confirming a transaction by multiple parties before the actual transaction is written onto the ledger. In the case of the example on digital picture, a transfer of ownership is requested to the entire network and needs to be confirmed by a large enough number of participants. If authorisation is granted, i.e., ownership confirmed, the transaction is recorded onto the ledger and this information is made public. This means that if one wants to transfer ownership of an asset that has already been transferred then one should have to alter every ledger on the entire blockchain—which would prove very complex, if not impossible.

III. Blockchain technology will have a deep disruptive effect on the functioning of financial markets

8. This unique feature of blockchain suggests that the adoption of blockchain could have a deep disruptive effect on the structure and the functioning of the banking sector. This is because the core functions of financial services—verifying and transferring financial information and assets—are very closely aligned with blockchain's core transformative impact.

9. The current structure of inter-bank transactions relies on a trusted third party to maintain a central ledger (e.g., clearing houses, settlement organisations, stock exchanges). With blockchain technology, each bank will maintain its own copy of the ledger. There is no room for dispute or error: the trusted third party is no longer needed.

10. In practice, blockchain technology could be used in stocks or derivatives trading to speed up the settlement of trades. Market traders, brokers, and regulators are currently required to go through a cumbersome, and expensive, process which typically takes three days or more to complete transactions—mainly due to the role of intermediaries, operational trade clearance, and regulatory processes. Blockchain technology could make exchanges much more efficient through automation and decentralisation. Beyond the settlement of trades, blockchain technology can also help with fundraising and asset management, as well as margin financing, post-trade settlements, tracking securities lending, and monitoring systemic risk.

11. Nasdaq, ASX, the New York Stock Exchange, the Tokyo Stock Exchange, the Deutsche Bourse, and India's Securities Exchange Board, among others, have already either started to use blockchain technology for some of their transactions, or have appointed commissions to study the feasibility of using blockchain in the future.[3]

2 https://news.crunchbase.com/news/2018-vc-investment-crypto-startups-set-surpass-2017-tally.

3 *Forbes*, Blockchain Technology Set To Revolutionize Global Stock Trading, 2018, available at https://www.forbes.com/sites/ericervin/2018/08/16/blockchain-technology-set-to-revolutionize-global-stock-trading/#5048fb354e56.

12. It is worth mentioning that possible applications of blockchain technology are not limited to the financial industry. Quite the contrary, it can virtually apply and bring benefits to all those sectors with high degree of intermediation services—verifying and transferring goods.

13. For example, blockchain technology could revolutionise the shipping industry. Nowadays, a single shipment can require hundreds of pages that need to be filled in and approved by agencies, banks and other authorities before a cargo can enter or leave a port.

14. One of the biggest contributions that the blockchain technology could bring in the shipping industry is the "smart contracts," i.e., contracts in the form of a computer program which is run and self-executed on the top of the blockchain and which automatically implement the terms and conditions of any agreement between the parties. These will speed up the clearing process, removing the need to mail various documents, while reducing risk of mistakes. As a result, cost savings would be expected as a large part of trading costs relate to documentation, procedural delay and errors. In addition, the parties will be able to develop direct communication without the need of intermediaries and the overall chain will become lighter.[4]

15. In fact, revolution of the shipping industry is already happening. PL Ltd. (owned by the world's third-largest container line CMA CGM SA), together with Anheuser-Busch InBev NV, Accenture Plc, a European customs organisation and other companies have announced they are testing a blockchain-based platform.[5]

IV. The widespread adoption of blockchain technology offers advantages but also poses risks relative to their anti-competitive impact on financial markets

16. Blockchain improves transparency and traceability of financial products to be exchanged. As such, it could undermine the need for intermediaries by reducing asymmetric information, thereby lowering transaction costs, and (to some extent) improving liquidity and allowing for a more efficient matching of market participants. In addition, blockchain could lower barriers to entry by decreasing fixed costs of operation and/or lowering network externalities—thereby enhancing competition.

17. At the same time, the adoption of blockchain could pose serious challenges for competition authorities. This is because blockchain could, among other things, prove helpful to facilitate collusion among competitors.[6] A leading reason for this presumption is the element of blockchain's transparency: the exchange of information is a common element of all cartels and a fundamental element of blockchain.

18. In this respect, the Communication from the Commission relative to Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (hereafter the "Communication") emphasises that increased market transparency resulting from exchanges of information could facilitate collusion among competitors by allowing them to (i) establish coordination; (ii) monitor adherence to coordinated behaviour; and (iii) effectively punish any deviations.[7]

19. In the more specific case of blockchain technology applied to the banking sector, competing banks could in theory leverage on information available on the blockchain to support or facilitate coordination.[8] Blockchain could constitute a plus factor to define and enforce parallel conducts.

20. If all competing banks active in stocks or derivatives trading were to use a single blockchain, every competing bank would be able to find out details of all past transactions conducted using the blockchain. Banks could leverage on the disseminated information to track competitor's prices, positions, exposure changes with greater speed and accuracy and at a lower cost than before.

21. The resulting transparency could help them to identify the terms on which to collude, for example, the price quoted or volume traded. The transparency could also help identify any deviation by cartel participants. Even more, the transparency offered by the blockchain could help them (in an oligopolistic market structured around few market makers) to coordinate tacitly without any direct or indirect contact, or any agreement to do so.

4 https://opensea.pro/blog/blockchain-for-shipping-industry.

5 https://www.bloomberg.com/news/articles/2018-04-18/drowning-in-a-sea-of-paper-world-s-biggest-ships-seek-a-way-out.

6 OECD, Blockchain Technology and Competition Policy, 2018, available at https://one.oecd.org/document/DAF/COMP/WD (2018)47/en/pdf.

7 European Commission, Communication from the Commission, Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements, 2011, available at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011XC0114 (04)&from=EN.

8 As explained above, transactions are recorded onto a ledger and this information is made public.

V. The extent of possible negative effects of blockchain on competition would have to be assessed in light of the characteristics of both the market and the information disseminated

22. The *Airtours* judgement identifies specific characteristics that make it possible to identify and monitor coordinated actions or even to sustain such coordination over time.[9] The Decree identifies three conditions, when taken together, create a situation of sustainability for coordinated action, namely: (i) transparency enabling identifying collusive conduct and the tracking of actions; (ii) reprisals in the case of deviation (internal stability); and (iii) lack of counterbalancing power of companies not within the agreement and/or customers (external stability).

23. Applying such a framework to assess possible anti-competitive impact of blockchain requires distinguishing between public and private blockchains.

24. Public blockchain can be seen as a highly secure open network. They can receive and send transactions from anybody. They can also be audited by anybody. Before a transaction is considered valid, it must be authorised by a large enough number of participants as per the blockchain consensus process.

25. To the contrary, in private blockchain, only specific, pre-chosen firms have the ability to read and record transactions on the blockchain. A private blockchain is therefore a closed network that offers benefits associated with the blockchain technology while a private governance design allows the blockchain to be operated by only few participants—the developers of the blockchain.

26. In light of *Airtours* criteria, these two types of blockchains are likely to have different antitrust implications.

27. As regards internal stability of a collusive agreement, explicit arrangement through specific governance rules could be embedded in a private blockchain. In addition, smart contracts on a blockchain, which execute automatically, could also specify automated punishments for deviations. Such explicit arrangement will be difficult to implement in a public blockchain. This is because the possibility of anti-competitive practices would have to be embedded in public blockchains as the time of the creation and not at a later stage when collusion could become appealing. It is worth mentioning that these anti-competitive conducts embedded in governance rule or enforced through smart contracts (or other technologies on the top of the blockchain) are likely to be subject to direct and traditional antitrust rules.

28. As regards external stability, public blockchains are likely to be less of a concern. As explained, blockchain could lower barriers to entry. Potential entry is likely to have a disciplinary effect on the possible coordination. Furthermore, any transaction on the blockchain could be observed by anyone, including a competition authority. If competition authorities were to access information on the blockchain they could (i) increase the likelihood of detecting parallel conducts and (ii) ease data disclosure in an investigation. All-in-all it could increase likelihood of a cartel to be discovered and fined, thereby reducing incentive to form a collusive agreement in the first place.

29. In a nutshell, as far as stability is concerned, private blockchain is likely to be viewed with great deal of suspicion. That said, private blockchain is also likely to be the most common type of blockchains. This is because private blockchains would overcome issues in relation to public blockchains—namely, the speed of execution, the power required to maintain and update ledgers and the lack of flexibility. To provide a bit of insight, a traditional centralised database only needs to write, check and transmit data for storage once. A blockchain needs to perform these same operations thousands of times, i.e., on each ledger of the network. By restricting the number of participants, private blockchains would reduce the number of operations required to operate and maintain the blockchain.

30. Turning to transparency, both types of blockchains (public or private) are likely to affect market transparency in the same way as soon as they disclose the same level of information. Therefore, it is expected that they should have roughly the same impact on the possibility to establish coordination and to monitor adherence to coordinated behaviour. The ability of a blockchain to facilitate collusion would have to be considered on a case-by-case basis.

31. This observation advocates for a clear delimitation of the type of information to be made available on the blockchain.

9 *Airtours* judgement, 6 June 2002, T-342/99.

VI. The adoption of blockchain should go with the identification of safe harbours when dealing with information made public to competitors

32. While [...] all bank members of the blockchain share the same ledger and therefore see the same information, some strategic information could be stored off the blockchain to prevent any negative effect on competition.

33. Competition authorities [...] should clearly identify what is considered as a safe harbour. The usefulness of safe harbours and legal presumptions when dealing with information exchanges has already been recognised in the past.[10] Private information exchanges and discussion about future intentions would be suitable for per se prohibitions. While rarely necessary for the attainment of efficiencies generated by information sharing, these forms of information exchanges have great potential for coordination and as such should be deterred. Other types of exchanges would have to be considered on a case-by-case basis following a rule of reason type of analysis with a full evaluation of their effects.[11]

34. These create a grey area on what type of information could be shared between competing banks on a blockchain. That said, the Communication[12] identifies a number of factors that should be accounted for when assessing the legality of information exchanges and can therefore provide a flavour of what should be considered as a safe harbour. These relate to the (i) characteristics of the affected market, (ii) characteristics of the information exchanged.

35. The Communication indicates that companies are more likely to achieve a collusive outcome in markets which are sufficiently "*transparent, concentrated, non-complex, stable and symmetric*"—which is not necessarily the case for derivatives markets. However, the Communication also indicates that information exchange can also enable companies to achieve a collusive outcome in other market situations where they would not be able to do so in the absence of the information exchange.

36. In this context, the competitive outcome of an information exchange would not only depend on the initial characteristics of the market in which it takes place but also on how the type of the information exchanged may change those characteristics.

37. The Communication poses that the nature of the information exchanged would be a "*crucial factor in competitive assessment as not all information has the same collusive potential*."

38. In this respect, it is worth distinguishing between the various characteristics of the information exchanged, such as the subject matter, the information age and level of aggregation. In terms of the subject matter, exchanges of information on future pricing intentions carry the greatest risk. The age of the information also plays an important role in the assessment, with past and historical information having much lesser collusive potential than current or even future information. Finally, the level of aggregation is an important factor: the exchange of disaggregated information has the greatest potential to create anti-competitive behaviours.[13]

39. In the past, the European Commission has taken the view that exchanges of information have a strong probability of being problematic in the financial market. In particular, the European Commission has fined several international financial institutions for participating in illegal coordinated conducts in markets for financial derivatives.[14] According to the Commission:

- The *Euro Interest Rate Derivatives* cartel involving, among other things, traders discussing their bank's submissions for the calculation of the EURIBOR as well as their trading and pricing strategies.[15]
- The *Yen Interest Rate Derivatives* cartel involving, among other things, discussions between traders on certain JPY LIBOR submissions and trading positions.[16]
- The *Swiss Franc Interest Rate Derivatives* cartel involving, among other things, discussions between traders on CHF LIBOR submissions, trading positions and intended prices.[17]

40. All in all there is a bit of legal uncertainty around treatment of blockchain that could slow down its adoption and the benefits that could come with it. ■

10 *See* footnote 9.

11 *See* footnote 9.

12 *See* footnote 10.

13 *See* footnote 10.

14 http://ec.europa.eu/competition/cartels/cases/cases.html.

15 European Commission, Commission fines Crédit Agricole, HSBC and JPMorgan Chase €485 million for euro interest rate derivatives cartel, 2016, available at http://europa.eu/rapid/press-release_IP-16-4304_en.htm.

16 European Commission, Commission fines broker ICAP €14.9 million for participation in several cartels in Yen interest rate derivatives sector, 2013, available at http://europa.eu/rapid/press-release_IP-15-4104_en.htm.

17 European Commission, Commission settles RBS-JPMorgan cartel in derivatives based on Swiss franc LIBOR; imposes €61.6 million fine on JPMorgan, 2014, available at http://europa.eu/rapid/press-release_IP-14-1189_en.htm.

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