EasyChair Preprint

№ 5990

Potential Sources of Internet of Value Systemic Risk

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July 3, 2021

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This is a pre-print of Josep Lluis de la Rosa (2021), Potential Sources of IoV Systemic Risk, Enabling the Internet of Value, book chapter Springer (2021), Agosto 2021, ISBN: ISBN 978-3-030-78183-5, doi of the chapter: 10.1007/978-3-030-78184-2_1 6

With the continuous development of the IoV, the lack of interoperability between networks of trust can become an important source of systemic risk.

Indeed, the main problem blockchain technology faces at the moment for the sake of the IoV is the lack of interoperability and the obstacles faced in building a second and third layer network.

There are thousands of distributed ledgers out there today, and they perform or improve several functions. Each one is working separately like a local area network (LAN) of the 1970s that did not communicate with others around it; closed off because there is no adoption as yet of industry-wide standardisation of protocols. If they could all interoperate, then moving several digital assets and converting from one to another could be fast, cheap, and more secure, especially as there would no longer be a need to rely on risky centralised exchanges.

Even if the current financial system started adopting distributed ledgers on a large scale, with each institution using its own private or public ledger, not all of the challenges faced by today's siloed systems would be solvable. Paradoxically, in this scenario, the situation with cross-border and inter-bank transactions might remain the same, as it would require time-consuming processes for value to move from one ledger to another.

Thus, interoperability is a must, and its lack is a potential source of systemic risk. This is of paramount importance, especially in the current expansion phase where the IoV's new business models come up to erase long-standing barriers and enable the democratisation of finance and property by empowering its users to transact instantly not only across borders but also across currencies while closing cultural and socioeconomic gaps.

The reasons for the lack of interoperability between ledgers are many; not only the lack of agreed standard protocols to make it possible, but the fact that every ledger has different goals when it comes to how data and the digital assets are handled. They are also built using different distributed ledger technologies, languages, protocols and consensus mechanisms. For more insights about the blockchain interoperability issue, we refer the readers to Tasca and Piselli (2019).

The lack of interoperability – driven by the diversity of missions and technological proposals for ledgers – is not the only source of systemic risk envisaged here. In addition, the lack of scalability of these new network technologies could worsen the risks of assets and value, in general, being lost in endless sidechains.

Sidechains, state channels, payment channels are off-chain solutions to specialise the validation of transactions in subsets of nodes. An off-chain transaction is the movement of value outside of the *main* ledger, despite being very likely registered in a local or minor ledger validated by subsets of nodes from

the main net, which in their turn tend to be trusted parties among each other and work out in a permissioned minor ledger (Back et al., 2014).

Subsequently, only a "summary" of this minor ledger is uploaded on the main ledger in any form that is eventually validated by the main net. Risk is again at the core of this specialisation. If this is the technology which will be used for a hyperconnected IoV, we may expect that from time to time tokens might get trapped in these new siloes or take the wrong direction in the network, and therefore their value might fade according to their distance to the main net and the number of summary hops required to get the greatest level of confirmation.

To summarise, considering the current growing trend of open communities along with all types of permissioned ledgers, and the developments of side-channels for speeding up consensus for those who transact at high volume or demand higher privacy or speed, the lack of scalability and interoperability are major risks.

Of course, the network structure – as discussed in the previous Part – also plays an important role, especially if we consider networks of networks – see, for example, coloured coin applications (Bitcoin Wiki, n.d.). This source of systemic risk is of paramount importance, as numerous new initiatives are proposing services backed by collaterals in whatever asset that is tokenised (i.e. lending, factoring, insurance, guarantees of service, creative industries, and more). The trend of collateralising the risk of digital currencies or any of the new digital assets may lead to systemic risk.

In the case of crypto-collateralised stablecoins, conceived as a workable, truly decentralised approach to stabilise prices in the distributed ledgers world, these are unstable. The same might occur with crypto-collateralised loans, which are paid by smart contracts collateralised by cryptocurrencies. For example, "*when you want to take a Dai loan from MakerDAO, you freeze some Ether in MakerDAO as a guarantee that you will repay your loan. As the US mortgage market collapse of the 2000s has shown, Collateral is an unstable asset whose price may decrease significantly*" (Heydari, 2018). Under these assumptions, the stablecoins' smart contracts might demand several times more collateral than the original value of the loan.

The phenomena of the IoV presents an interesting avenue to the application of tokenisation to new business models that may lead to systemic risk. The IoV facilitates value moving as quickly and as easily as information does. As value is something that is up to a society to determine, there is practically no limit to what can be exchanged over the Internet with value for individuals or institutions. According to Heydari (2018), already in 2018, cryptocurrencies had attracted 5% of gold market customers to reach a USD 400 billion market size, and since then, stable-coins with all type of collaterals, and above all with Bitcoin, have greatly grown, with a peek in mid-2020.

Therefore, another source of systemic risk may come precisely from the nature of digital assets used as collateral. Tokenisation and collateralisation might create new types of much more complex asset interdependencies, and the collapse of even a small asset used as collateral could trigger the domino effect of a failure cascade.

Some collaterals value might fade by their lack of usage, trust, lost in a minor ledger, and indeed because they are poorly preserved. Finally, the preservation of collateral value over time must be considered. The preservation of value tackles the problem of value loss through time and exchanges (de la Rosa, 2019).

Through time, the accumulation of errors that occur when updates and migration into new technologies take place tend to erode the usability and integrity of digital assets. Thus, their value may reflect this situation and suffer a devaluation, as they would not be ready for any value transaction as the receiver will not receive the assets at their full integrity in the form and time that is required. Similarly, the accumulation of errors in the transmission of value to inappropriate receivers impacts the value that goes on erosion. The two factors, obsolescence and bad exchanges multiply, accelerating the decrease in the value of digital assets.

Thus, the development of techniques that look after the curation and integrity of digital assets along with their proper ownership management across all exchanges is all about the preservation of value, as an ultimate safeguard to avoid systemic risks triggered by a failure to preserve the value of digital assets.

The value preservation will worth a world as I also foresee massive migration of value onto the ledgers, a sort of Value Deluge, that requires fine value preservation of the digital assets to avoid Value Blackouts which would amplify the systemic risks. A Value Blackout would harm collaterals and undermine the long term storage of value of the digital assets.

To conclude, there has been a discussion of some potential sources of systemic risk to the emergence of the IoV. However, it is difficult if not impossible to be exhaustive regarding all possible sources. Indeed, the recent 2007–2008 financial crisis showed that with increasing connectedness comes increasing complexity, which is understood as greater interdependence. Any increasingly complex system is also characterised by higher unpredictability and speed, and presents emergent properties not observable at the micro level, leading to higher fragility. For further discussion on economic complexity, please see Sahdev (2016).

References

Back, A., Corallo, M., Dashjr, L., Friedenbach, M., Maxwell, G., Miller, A., and Wuille, P. (2014). *Enabling blockchain innovations with pegged sidechains.* [online] Available at: http://www. opensciencereview. com/papers/123/enablingblockchain-innovations-with-pegged-sidechains, *72*.

Bitcoin Wiki. (n.d.). Colored Coins - Bitcoin Wiki. [online] Available at: https://en.bitcoin.it/wiki/Colored_Coins [Accessed 25 Jun. 2020].

Heydari, M., (20180). The Next Explosion in Ether Price. [online] *Medium*. Available at: <https://medium.com/hackernoon/the-next-explosion-in-ether-price-8262d6509b59> [Accessed 25 June 2020].

de la Rosa, J. L. (2019). On Value Preservation with Distributed Ledger Technologies, Intelligent Agents, and Digital Preservation. © Springer 2020, J. Prieto et al. (Eds.): BLOCKCHAIN 2019, AISC 1010, pp. 145–152, 2020. https://doi.org/10.1007/978-3-030-23813-1_18.

Sahdev, N. (2016). *Do knowledge externalities lead to growth in economic complexity? Empirical evidence from Colombia.* Palgrave Commun 2, 16086. https://doi.org/10.1057/palcomms.2016.86

Tasca P. and Piselli R. (2019). The Blockchain Paradox. In Lianos, I., Hacker, P., Eich, S., and Dimitropoulos, G. (eds.). *Regulating Blockchain: Techno-social and Legal Challenges*. Oxford University Press. DOI:10.1093/oso/9780198842187.003.0002