BANCA D'ITALIA
EUROSISTEMA

Questioni di Economia e Finanza

(Occasional Papers)

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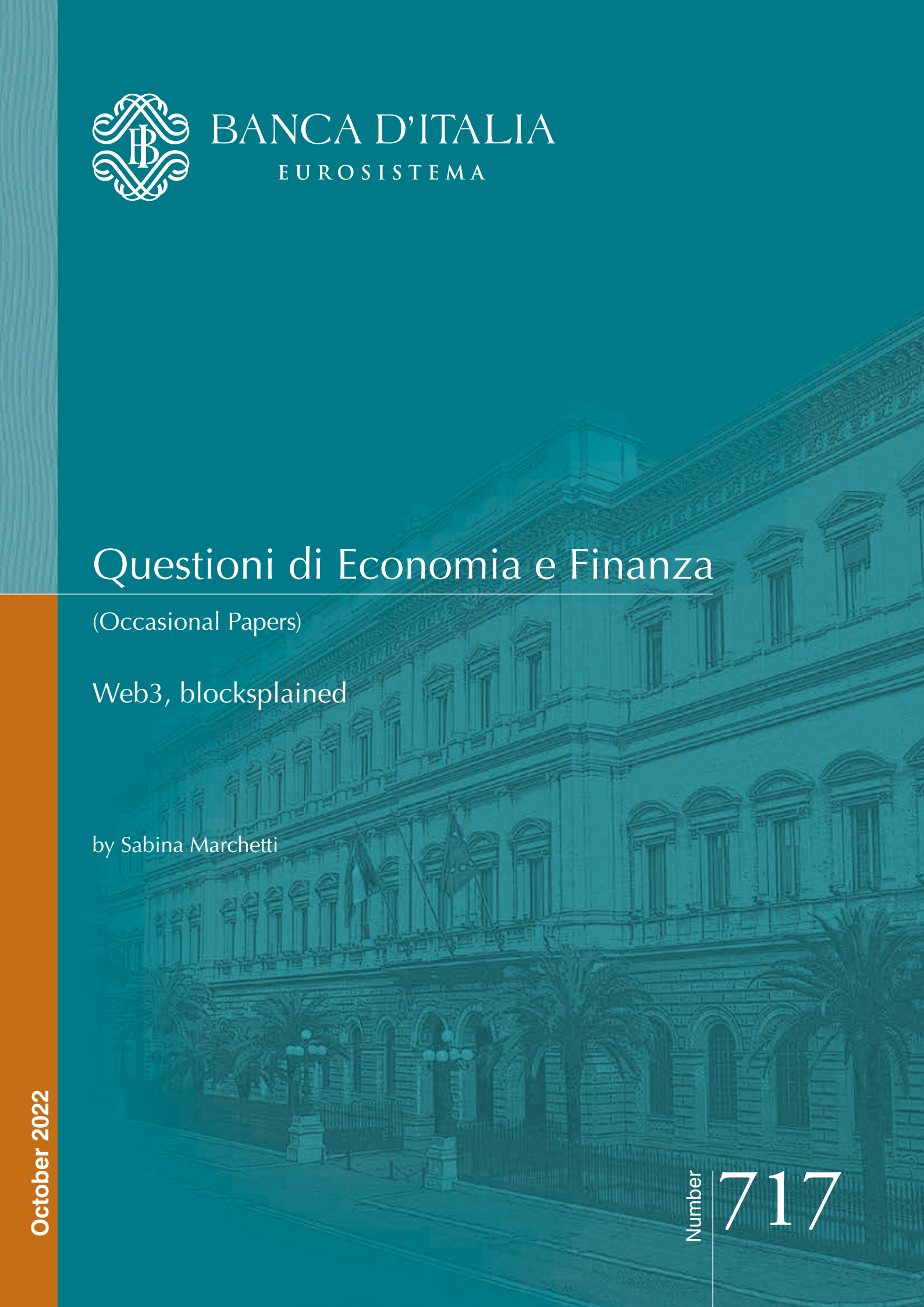
by Sabina Marchetti



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WEB3, BLOCKSPLAINED

by Sabina Marchetti*

Abstract

'Web3' is shorthand for decentralized internet applications built on blockchains. Based on distributed ledger technology, Web3 applications seamlessly encompass value tokenization (the basis of peer-to-peer payments and many other uses) and decentralized management of information, with great emphasis on their aspiration to re-shape the digital economy. To date, Web3 initiatives have been attracting sizeable resources from venture capital firms. Nevertheless, the technological limitations at the basis of decentralized applications prevent a full understanding of the effective potential of Web3. Our work provides an essential overview of the phenomenon, with a focus on the actual incentives it offers to different economic agents as well as to individuals. We pinpoint the key drivers that may contribute to the large-scale establishment of distributed ledger technology as the new paradigm underlying internet applications, and differentiate them from the hype put forward by the crypto-community.

JEL Classification: O31, O33.
Keywords: internet, blockchain, digital ownership economy.
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Contents

* Bank of Italy, Directorate General Economics, Statistics and Research.

1. Introduction[1]

Web3 is the proposal for a new architecture of internet applications, based on blockchain technology. It stands to replace the current functioning of the internet, called Web2, which in turn substituted its predecessor, the Web1, in the early 2000s. Unlike Web2, which built upon a stable layered internet architecture to enable dynamic content creation and brought a revolution of the graphical appearance of Web1, Web3 puts forward a paradigm shift in the infrastructure of the internet: from the current *centralised* architecture toward a *decentralised* one.[2]

As a blockchain-based framework encompassing built-in peer-to-peer (P2P) payments, Web3 also has the potential to "financialize every possible human interaction" [3] alongside the range of Web2 services and applications, like social networks and streaming platforms. This might open the doors to decentralised business models, transferring management competencies away from a central authority toward distributed parties, while enhancing automation of decision-making processes. This is already visible in the world of decentralized finance (DeFi).

Beyond and above DeFi, some argue that Web3 holds the promise of a second digital revolution. Web3 evangelists argue the decentralized architecture of internet applications would prompt re-thinking of current platform-based business models, unleashing competitive pressures that might reshape the digital environment. Furthermore, some claim blockchain-based protocols would underpin users' control over data, overcoming pooling of information toward centralised repositories. According to such view, this might in turn weaken the role of Big Techs as designated trusted parties for information exchange and, in some cases, payments clearing. A reduction of the incumbents' technical perimeter may generate prominent externalities for competition (challenging their oligopolistic regime), politics (re-defining content moderation and the spreading of disinformation) as well as the foundations of digital economy (providing alternative marketplaces and business models).

To date, the discussion around Web3 remains mostly centred around its aspiration to re-shape the digital economy. The potential of Web3 to challenge Big Tech's position and generally to reshape the current digital order has attracted both attention and funding by venture capital (VC) firms.[4,5] As a result, the great emphasis surrounding Web3 is now leaving most observers uncertain about its effective potential.

This work provides an essential overview of the Web3 phenomenon. It debates the main technical aspects underlying the proposal of a blockchain-based internet, the incentives it provides to different economic agents, including VC funds, and the sources of uncertainty that foreshadow criticisms in their ripples. The available evidence suggests that the actual advent of Web3 will follow a slow path, with hybrid solutions combining centralised and decentralised elements underpinning its potential

[1] The author is grateful to Claudia Biancotti, Pietro Catte, Riccardo Cristadoro, Michele Savini Zangrandi and Giovanni Veronese for their comments and suggestions.
[2] The term *centralised* refers to vertically organised (siloed) sets of systems, protocols, hardware and standards, exchanging payloads of uninterpreted information within a network. *Decentralisation* entails horizontally organised systems, collectively accessing and sharing all available information.
[3] https://www.wsj.com/articles/nfts-cryptocurrencies-and-web3-are-multilevel-marketing-schemes-for-a-new-generation-11645246824 .
[4] https://www.forbes.com/sites/rahulrai/2022/01/02/an-overview-of-web3-venture-capital-activity-in-2021/?sh=2cd2e3c71f16 .
[5] Including Andreessen Horowits VC firm, also known as *a16z*. Source: https://www.protocol.com/newsletters/protocol-fintech/opensea-nft-frozen .

large-scale deployment. However, the many economic and financial implications of the Web3 proposal already call for vigilance by EU regulators.

We describe the current centralised version of the internet in Sec. 2, pointing to its main limitations. In Sec. 3 we review the key features and novelties of the technology underlying Web3. Finally, in Sec.4, we provide an overview of the heated debate around Web3, and assess its potential to become the novel version of the internet.

2. Web2 before Web3

Web3 could replace Web2 by re-designing the internet's infrastructure for applications. The Web2's infrastructure leans on siloed server-based centralised technologies, as illustrated by Figure 1. Until now, such centralisation successfully provided an organization of data transmission and enabled the Web2 to extend the limited range of services available on its predecessor, the 1990s Web1.[6] Within Web2, a handful of companies gained centrality by offering server-based services that gradually replaced static webpages. In detail, the revolution brought by Web2 marked the shift from static webpages and hyperlinks towards dynamic platforms where users soon started to interact and publish content. However, static webpages continue to exist even today, even though the range of services they provide is limited compared to Web2 platforms. The Big Techs, owning the platforms, established as trusted intermediaries to run services and enable P2P interactions. User interactions on digital platforms, in turn, gave rise to the P2P economy: an ecosystem of on-platform exchanges of information, goods and services.

Digital platforms have brought efficient functioning of the internet by serving as intermediaries. However, centralisation has enhanced growing network control, enabling platforms' full access to users' data.[7] Following a trajectory known as Web2's S-curve, platforms shifted from *attracting* users to *extracting* value from the data they collected and owned about them (*users monetisation*), to compete against rivals.[8] Furthermore, platforms' gatekeeping powers generate conflicts between Big Techs and users, with accusations of exclusion and censorship on their content moderation activities. For instance, digital platforms rely on algorithmic recommendation systems to promote and filter content based on highly granular information collected on each user.[9] Empirical evidence has shown that some recommendation systems run by e-Commerce platforms have been promoting certain brands, products or services over others, to the detriment of competition.[10] On social media, content moderation governed by the platforms influences interactions among users. As a further technical

[6] Remarkably, the main features underlying Web1 included decentralisation and lack of central control. See the seminal document from its seminal document, by Sir T. Berners-Lee: https://www.w3.org/History/1989/proposal.html .
[7] Aggarwal, Charu C., and S. Yu Philip. "On the network effect in Web 2.0 applications." Electronic Commerce Research and Applications 11.2 (2012): 142-151.
[8] These are usually former partners. See on Apple vs Epic: https://www.nytimes.com/2017/07/01/technology/yelp-google-european-union-antitrust.html on Google vs Yelp, or https://www.theverge.com/2021/9/12/22667694/epic-v-apple-trial-fortnite-judge-yvonne-gonzalez-rogers-final-ruling-injunction-breakdown .
[9] Algorithmic recommendation systems usually rely on advanced artificial intelligence methods and big data analysis. For an overview, see Borgogno & Marchetti, Discriminazione algoritmica e concorrenza, n. prot. 1823961/2021.
[10] E.g. https://www.nytimes.com/2018/06/23/business/amazon-the-brand-buster.html .

drawback, by relying on web servers to feed and update frontend applications, Web2 is vulnerable to single point of failures (SPoF)[11] as well as denial of service (DoS)[12] attacks.

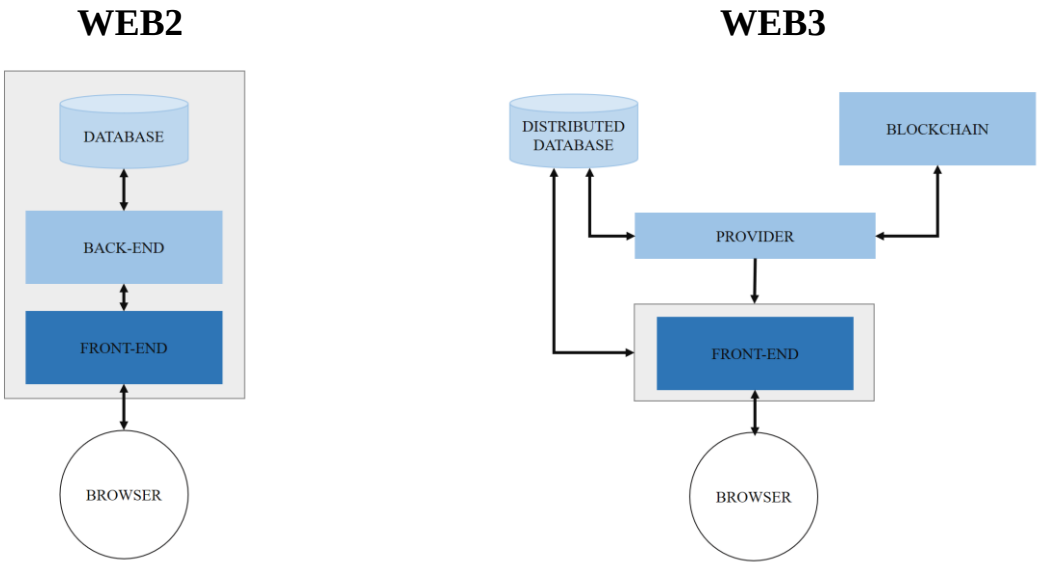

Figure 1: Simplified representation of the architecture of Web2 applications (left) and of Web3 decentralised applications (right). The grey area identifies the steps managed via web servers.

3. Web3, under the hood

Web3 aims to solve most of Web2's limitations by leveraging on blockchain-based technology and artificial intelligence (AI) enabled algorithms.[13]

Relying on blockchain-based technology, **Web3 would reshape today's pivotal role of centralised servers to connect and manage web applications throughout their operation** (see Figure 1, left panel). Decentralised information processing across blockchain networks of nodes might bring a substantial downsizing of the relevance of web servers, whose functioning would be limited to handling frontend processes (see Figure 1, right panel). Deployment of most services would rely on Decentralised applications (DApps), i.e. user-facing applications based on smart contracts. DApps enable collaboration between parties to deliver a service as an alternative to business models relying on centralisation of power. Collaboration relies on tokens to incentivise participation and to represent property rights.[14] Along such path, Web3 proponents argue that users could themselves become "owners of the web". By supporting the costs for the deployment of DApps, users would retain control over their data, while partaking in the gains from the DApps' services.

Decentralised autonomous organizations (DAOs) would constitute a natural business model for Web3, akin to Big Techs for Web2. DAOs are entities constituted by communities of participants

[11] SPoF are unique or non-redundant elements of an IT infrastructure, whose failure is bound to affect the whole functioning of the system.
[12] Malicious actors launching DoS security attacks pursue unavailability of a platform, like a web page or any information system, for its users.
[13] See Annex: Web3 Glossary.
[14] https://cointelegraph.com/blockchain-for-beginners/what-is-web-3-0-a-beginners-guide-to-the-decentralized-internet-of-the-future .

sharing a common set of goals, whose governance is defined through smart contracts and internal incentive mechanisms.[15] DAOs' scope for activities would range from architecture building of Web3 (i.e. blockchain development on the backend) to deployment of services for users, with DApps, on the frontend (i.e. development of user interfaces; see Figure 1). To date, DAOs represent a business model that is still in its infancy, although rapidly evolving: its estimated market valuation exceeds 10 billion dollars.[16] They are being developed to raise funds, provide online services and as an alternative to traditional financial institutions.[17] Nevertheless, their fair value is still difficult to assess as they present a number of issues, including the vulnerability of their code to exploitations[18] and the potentially cumbersome consequences of disputes on voting mechanisms and procedures.

The main technical features of Web3 are summarised in Box 1.[19]

Box 1: Main features of Web3

Ubiquitousness: Personal Computers, mobile and Internet-of-Things devices can all fully access content on the web, continuously in time and space;

Interoperability: an AI-enabled semantic framework enhances evaluation and improved understanding of the information and related metadata on the internet. This enables connectivity of information and improves query and search leveraging on advanced natural language processing methods;

Awareness: The concept of *statefulness* refers to a service's ability to trace and maintain information throughout its functioning. Statefulness of DApps and AI deliver personalised services, including recommendation systems and value exchanges of tokens. Being stateless, i.e. not stateful, Web2 resorted to digital tools like "cookies" to provide the internet sessions information on users' state, including their browsing history. On the blockchain, information on each user's state is collectively maintained, provided all applications run on it with the statefulness feature.

Incentive compatibility: Blockchain protocols aim to design sets of rules that align incentives of all participants to the network, i.e. those who contribute to improve DApps on Web3, by rewarding them with tokens for their work. On Web3, such rewarding would also provide means to define reliability and relevance of contents, by rewarding the consensus they collect from users;

Censorship- and fraud-resistance: disintermediation guarantees each participant to the network.

[15] DAOs are built on transparency, openness and participation principles. For an introduction: https://bitcoinmagazine.com/technical/bootstrapping-a-decentralized-autonomous-corporation-part-i-1379644274 .
[16] Source: https://deepdao.io/organizations, last visited 2022/04/29.
[17] Examples of established DAOs include protocol MakerDAO for P2P lending, investment The LAO supporting DeFi investment, BanklessDAO to "free" people from banks, or Kleros to arbitrate economic disputes based on consensus protocols.
[18] For an example of the exploitation of a vulnerability in the code of The DAO to steal its Ether funds, see https://cointelegraph.com/news/expert-the-dao-was-exploited-not-hacked-ethereum-should-do-nothing .
[19] Additional features of Web3 include openness of code, transparency, anonymity, permissionlessness, SPoF resilience and immutability. For details see Voshmgir, S. (2020). Token Economy: How the Web3 reinvents the Internet (Vol. 2). Token Kitchen.

The technical foundations of Web3, however, are not devoid of issues and inconsistencies.

First, decentralisation makes **coordination more difficult**. In centralised Web2, enforcement of technical requirements[20], as well as of changes of terms and conditions can be adopted swiftly and unilaterally, at least in principle. Decentralized Web3, in contrast, could be more prone to operability freezes in case of disagreements on protocol changes that alter technical features of the platform or that regulate users' behaviour on the platform – e.g. changes in the terms of service. Among others, such disputes may lead to hard forks of the blockchain protocols.

Second, a fully decentralised version of the internet relying on the available technology is likely to incur in the so-called "**blockchain trilemma**": a situation whereby a blockchain-based system cannot achieve simultaneously **high decentralisation, security** and **scalability**; see Figure 2.

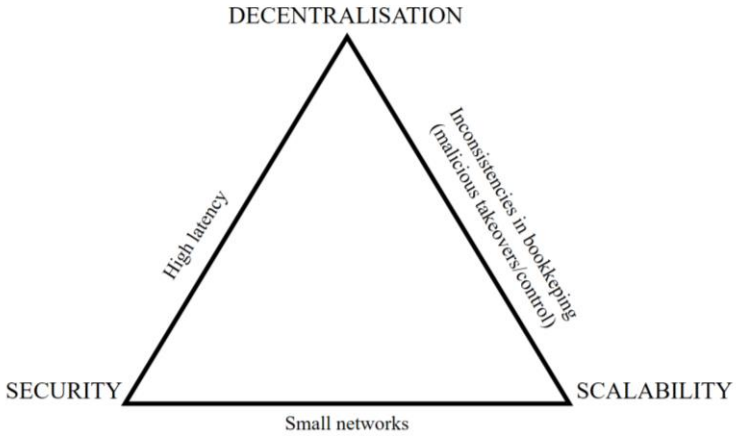

Figure 2: The blockchain trilemma.

Full decentralisation entails plain community-based control via consensus protocols; high security mainly refers to resilience or defensibility of the network against attacks from external sources and interference; high scalability guarantees low costs (mainly in terms of latency, i.e. the amount of time required to align all nodes of the network on its state) to process transactions on the network. According to the trilemma, the trade-offs between the three main properties of any blockchain based initiative limit achievement of their full potential. In detail, a network achieving full decentralisation might either guarantee high security levels by allowing high latency (*Scalability trade-off*) or enhance high scalability by exposing itself to inconsistencies in its bookkeeping, possibly due to malicious attacks (*Security trade-off*). Moreover, a highly secure and scalable network will likely comprise a small number of nodes or rely on consensus mechanisms controlled by few entities (*Decentralisation trade-off*).[21] Given today's state-of-art technology, a secure and decentralized Web3 would likely come at the cost of **limited scalability**, that is, slower transactions and throughput compared to centralised systems. Developments in the consensus protocols may enhance improvement of scalability, leading to a shift of the trade-off terms toward a more efficient building of Web3 applications.

[20] E.g. Software upgrades.
[21] For details, see https://modex.tech/a-brief-overview-of-the-scalability-trilemma/ .

Third, the aforementioned **technological limitations prevent effective decentralisation** of the Web3. Web3 would likely fail to ensure deployment of a plain decentralised *pipeline*, i.e. the sequence of processes delivering internet-based services.[22] For instance, since mobile devices' hardware resources are not suited to host the blockchain, currently available DApps running on smartphones provide user interfaces while leveraging on remote servers to store and handle information. While such a setting might nonetheless represent a paradigm shift and a source of innovation, it would ultimately respond to centralised bottlenecks. On the management side, this would prevent overcoming Web2's limitations in content moderation and network accessibility.[23] More generally, services subject to centralised bottlenecks of the pipeline would expose the Web3 system to Web2-type issues.[24]

4. Web3, among us

While the potential for Web3 – and for its technological foundations – remains largely unexplored, public discussion on the topic is laden with its proponents' hype, which describe it as "the better internet"[25]. This has been polarizing the discussion[26], while making it difficult for external observers to infer the fair value underlying the Web3 proposal. This section provides a stylized overview of the "vision" for Web3 and of the criticisms it has sparked.

In advocating a decentralization of backend processes that underlie the internet, Web3 enthusiasts see a potential for major disruptions on a number of levels, including possible political implications. Nevertheless, the absence of evidence prevents an informed assessment on such broader subjects in most cases.

On property rights on data and privacy protection, Web3 enthusiasts argue that the data storing and handling as envisioned in its blockchain-based infrastructure might remove the need for the exposure of sensitive data for authentication purposes at the individual level, e.g. with verifiable credentials for "self-sovereign identity".[27] The effective relevance of such feature strongly depends on the scope encompassed by the web applications involved, and hence on the expected degree of pervasiveness achieved by Web3 applications. To date, we argue the shift from centralised to decentralised building of web pages is bound to take off within specific domains, like online gaming applications and DeFi, whereas it is unlikely to establish within others, like public administration web sites and home banking applications. Moreover, the strong dependence of authentication systems on effective decentralisation of the technical processes and the current early stage of advancement underlying the Web3 prevent an in-depth analysis of this claim.

In this regard, some Web3 supporters see the European Union as the natural candidate to seize the opportunity provided by the Web3, in light of its role as leading tech regulator.[28] It is argued that deployment of plain decentralised Web3 could succeed in enabling privacy, copyright protection and agnostic content moderation by design, while exploiting the European crypto-savviness.[29] However,

[22] https://thenewstack.io/web3-isnt-fully-decentralized-a-look-at-alchemy-bitclout .
[23] https://moxie.org/2022/01/07/web3-first-impressions.html .
[24] E.g. collusive mechanisms and influence on projects viability.
[25] https://a16z.com/wp-content/uploads/2022/01/WEB3-Policy-Handbook-PxP.pdf.pdf .
[26] E.g. https://fortune.com/2021/12/23/web3-elon-musk-marc-andreessen-jack-dorsey-twitter-fight/ .
[27] E.g. https://cryptonomist.ch/2022/03/31/polygon-id-un-identita-zk-per-il-web3/ .
[28] See ftn 35.
[29] https://www.coindesk.com/policy/2020/12/01/why-europe-bests-the-us-at-attracting-crypto-startups/ .

in this respect, the EU still faces two main limitations. First, despite its large cryptocurrency economy in terms of volume of transactions[30], it does not qualify as the forerunner when it comes to funding and building decentralised solutions - with 9.2 billion dollars outstanding amount as of February 2022, well below United States' 24.2 billion dollars.[31] Second, the efforts made so far by the EU to reduce the platforms' control of users' data and copyright infringements, and to enforce content moderation, have not proved entirely effective.[32]

At the aggregate level, supporters claim **Web3 might promote "digital sovereignty" (also "digital autonomy")[33] for countries[34,35], providing a unique opportunity to weaken the present political leverage of the Big Techs**.[36] Enthusiasts foresee a "return to the global village"[37], where users and suppliers could directly and safely meet within a disintermediated environment. Nonetheless, criticism around the so-called *decentralised illusion*[38], had detractors arguing the interest shown by VC[39] would suggest a different scenario, with new companies aiming to replace Big Techs in exercising control over the internet.[40] Overall, we deem a complete replacement of the incumbents by Web3 players is unlikely in the short and medium horizons, regardless of potential incentives for the latter. This is primarily due to technological limitations that foreshadow Big Techs' maintenance of exclusive competence toward a number of services, like social networks, online shopping and search engines, that require stability of the services and interoperability between platforms.

The related debate on government surveillance sees Web3 enthusiasts claiming that the principles underpinning the Web3, like privacy and lack of a centralised control, would make it a political asset to democracies against authoritarian states.[41] In this regard, the cryptocurrency clearance entailed by a blockchain-based internet architecture would make it harder for authoritarian states like China to exercise political influence leveraging on instruments like CDBC for techno-surveillance while banning cryptocurrencies.[42] Nevertheless, Chinese regulators have been quick to embrace Web3, depicting it as instrumental to further curb Big Techs' monopolistic behaviour and to counter biased

[30] According to the annual report of 2021 by Chainalysis, the Northern, Central and Western Europe areas represent the 25 percent of the global activity. The area comprises 30 countries: United Kingdom, France, Germany, Netherlands, Spain, Switzerland, Italy, Belgium, Portugal, Norway, Austria, Ireland, Finland, Sweden, Denmark, Slovenia, Greece, Hungary, Croatia, Estonia, Lithuania, Latvia, Malta, Albania, Luxembourg, Monaco, North Macedonia, Bosnia, Montenegro and Iceland. For details: https://go.chainalysis.com/2021-geography-of-crypto.html .
[31] Source: https://www.crunchbase.com/. Last update: 2022/02/02.
[32] E.g. On terms and conditions: https://www.digitaljournal.com/business/report-finds-only-1-percent-reads-terms-conditions/article/566127 ; on cookies: https://www.vice.com/en/article/m7epda/its-bad-design-on-purpose-why-website-cookie-banners-look-like-that (and links therein).
[33] https://digitalforeurope.eu/merkel-committed-to-the-eus-digital-sovereignty .
[34] https://techcrunch.com/2021/12/14/7-investors-discuss-web3s-present-and-peer-into-its-future/ .
[35] https://law.stanford.edu/2021/11/12/europes-third-way-is-web3-why-the-eu-should-embrace-crypto/ .
[36] https://www.npr.org/2021/11/21/1056988346/web3-internet-jargon-or-future-vision .
[37] www.fintechfestival.sg%2Fwp-content%2Fuploads%2F2021%2F11%2FWeb-3.0-eBook_Singapore-FinTech-Festival.pdf&usg=AOvVaw36AlsfIQBD2lASIkAETBqz .
[38] Aramonte, Sirio, Wenqian Huang, and Andreas Schrimpf. "DeFi risks and the decentralisation illusion" (BIS Quarterly review, Dec. 2021).
[39] https://a16z.com/web3-policy/ .
[40] On December 22nd 2021, Twitter co-founder Jack Dorsey posted a screenshot showing the block by venture capitalist Marc Andreessen, founder of a16z VC firm, on the platform. The block followed Dorsey's criticism on the role of VCs, which in turn responded to several tweets from accounts related to a16z, actively engaged in the funding of Web3 initiatives. For details see: https://www.bloomberg.com/news/articles/2021-12-21/jack-dorsey-stirs-uproar-by-dismissing-web3-as-a-vc-plaything .
[41] https://www.washingtonpost.com/opinions/2022/01/26/web3-is-way-authoritarians-should-be-worried .
[42] https://www.ft.com/content/9ef38be2-9b4d-49a4-a812-97ad6d70ea6f .

recommendation systems.[43] For the digital economy, **Web3 might represent an opportunity to build new models for software design and services delivery, as well as to expand business and networks to create new markets**. The stakes are already high[44] and the prospect for users of directly benefiting from their activities on the internet might help overcome resistance. This would enable a fast transition toward decentralised solutions for social media and streaming platforms. Therein, Web3 would inherently convey key features of the creator economy – content creators earning from their activities on the internet – and of the ownership economy – with property rights attributed directly to users; see Figure 3. On Web3 enhanced platforms, creators could directly monetise their shared contents, and, in principle, supporters and users could earn from their browsing and patronage activities.[45]

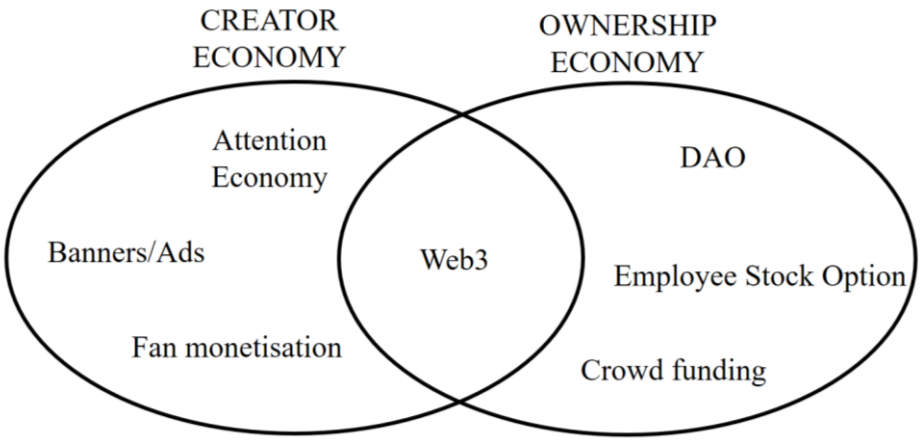

Figure 3: Web3 evangelists claim the Web3 might be the junction point for the creator economy, where users and business benefit from their generated contents on platforms, and the ownership economy, where participants benefit from a business activity by owning a stake in it.

The blockchain backbone of Web3 would encompass seamless exchange of tokens to enable its functioning that would in turn enhance large-scale diffusion of built-in crypto-based payments. According to Web3 advocates, hardwired crypto-payments have the potential to dislodge the financial institutions from their intermediary role in settling online transaction.[46] The proliferation of cryptocurrencies might also underpin a steep growth of the volume of DeFi exchanges, which have grown to exceed 157 billion USD of Total Value Locked (TVL) by the end of April 2022 (see Figure 4, top panel).[47] Remarkably, the Ethereum blockchain, which generates over half of the TVL of DeFi (see Figure 4), is enabling the development and deployment of most Web3 DApps, thanks to its tools

[43] Since late 2020, China has rolled out a series of regulations, with the aim to cast aside domestic Big Techs' dominant position. On Web3: https://mp.weixin.qq.com/s/KMOG0bdM5y8m3JfDDwBr1A. For a commentary see: https://cointelegraph.com/news/web3-will-be-key-to-the-future-of-china-s-internet-says-security-regulator .

[44] Some argue such over-evaluation shall be attributed to the unsubstantiated technology claims, whereas evidence suggests such initiatives, including those involving cryptocurrencies, are bound to beneficiate of such bubble, whose burst is unlikely impending. See https://web.archive.org/web/20190630155104/https://blocksplain.com/2018/04/25/3-problems-the-blockchain-industry-must-fix/ .

[45] https://li.substack.com/p/the-web3-renaissance-a-golden-age .

[46] See ftn. 35.

[47] The TVL metric refers to the total assets deployed in smart contracts, either directly as liquidity or as collateral in lending protocols. Source: https://defillama.com/; last visited: 2022/04/29.

to design smart contracts. While Web3 enthusiasts claim the reduction of intermediation layers could effectively foster financial inclusion[48], large-scale diffusion of cryptocurrencies may generate a number of adverse externalities. Among others, the current instruments for regulating crypto-activities could prove insufficient to face the large-scale circulation of cryptocurrencies enabled by Web3. To date, existing regulations apply rather mild provisions on a limited number of services that qualify as financial instruments, like "know your customer" checks to authenticate customers based on their perceived risk profile against anonymity risks and anti-money laundering. Re-design of regulation, envisioning a substantial tightening of current provisions, ought to comply with local norms and requirements as well, dampening the borderless (and foundational) ambitions of the crypto-community. Furthermore, proliferation of crypto-activities could boost today's accountability issues since most crypto-activities and DeFi exchanges are currently governed by companies that do not qualify as legal entities, making it hard to hold them accountable in the event of infringements.

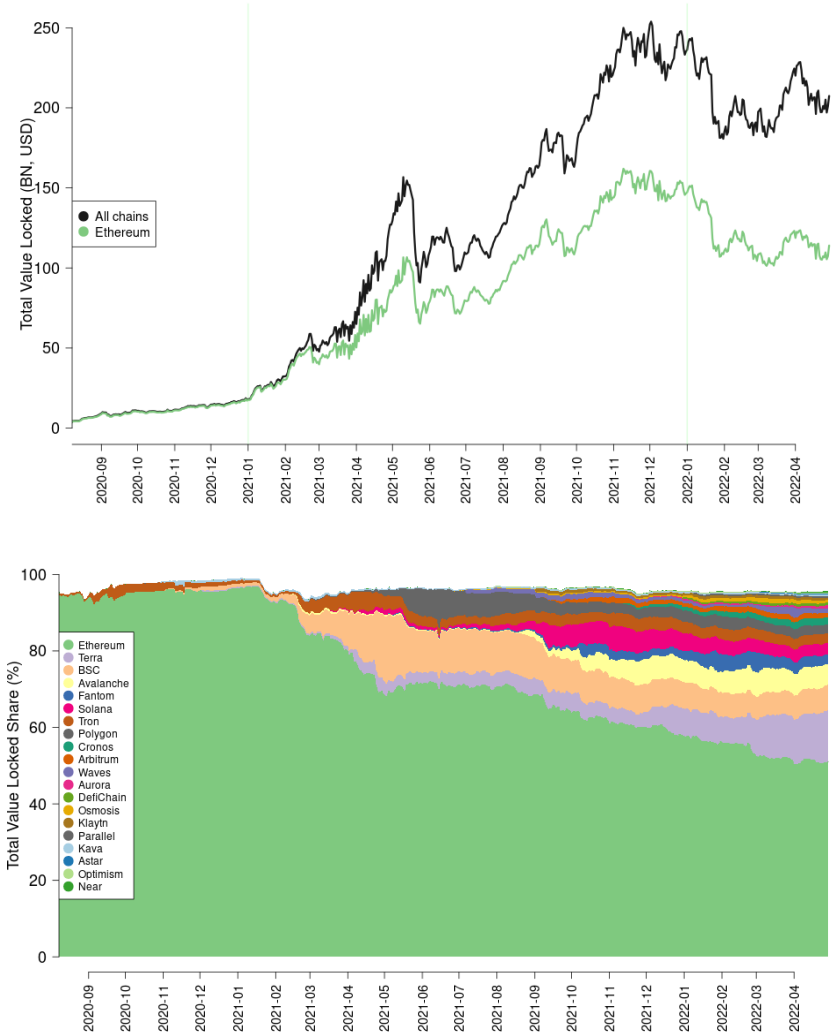

Figure 4: Top: TVL in all DeFi exchanges on all chains (black) and on the Ethereum chain (green) since September 2020. Bottom: TVL shares (in percentage points) of the main 20 chains. Source: our elaborations from https://defillama.com/ .

[48] With direct impact on financial intermediaries.

Web3 evangelists argue that the large-scale diffusion of blockchain-based activities and large-scale diffusion of crypto-assets could affect geopolitical equilibria. For instance, some claim it could reduce the power the US enjoys today in a USD-dominated international payments system that includes the stablecoins market and that of remittances. According to Web3 supporters, this could eventually weaken foreign policy measures, including sanctions.[49]

In concrete terms, the paradigm shift required for the adoption of blockchain-based services by mainstream companies and users would bring a technological friction in the near future. The skills required for the building and operation of Web3 applications may act as a disincentive due to generational reasons[50] and builders' aptitude[51], among others.[52] This might have Web3 falling short regardless of its promises of redistribution of power and influence. Conversely, the sizeable economic incentives could promote Web3 as an opportunity to build new models for software design and services delivery as well as business and networks to create new markets. Venture capitalists, the tech-savviness of users and the extent to which countries will foster investments in decentralised technologies will contribute to determine the speed and direction of the Web3.

5. Final Remarks

The debate around Web3 will likely continue to unfold in the future, touching upon technological aspects as well as mere wishful thinking by its evangelists. Whilst the discussion will continue to polarise opinions, we expect the actual advent of the Web3 to follow a slow path, with hybrid solutions deployed as testing ground. Analogously to what happened with the shift from Web1 to Web2, the eventual advent of Web3 would take off from below, with Web3 services gradually replacing the current ones within specific categories of services.

The interest of VCs toward Web3 projects has nevertheless already catalysed attention and attracted sizeable resources. Crypto VC funds - estimated to have reached 32 billion dollars in 2021, with a fourfold growth compared to 2020 - are increasingly specialising toward Web3 projects[53], spurring concerns over their strategic influence on the latter.[54] To date, investments, building and design of Web3 applications are mainly located in the US, which is set to lead the incoming transition from fully centralised services to increasingly decentralised frameworks, while Europe lags behind.

Up to this point, the technology underlying the Web3 has been suffering from a number of limitations and from a general degree of technological unpreparedness, at least for large-scale applications. The envisioned heterogeneous spread of Web3 across internet services suggests Big Techs will have time to adjust to the transition, leveraging on the established system of protocols and hardware resources enhancing today's high performance, to ensure their influence over a number of domains. Overall, we argue that time is not yet ripe to place a bid on whether the project will prove a breakthrough innovation or crash against its own technological boundaries, nor whether Big Techs will take seatbacks from its large-scale diffusion. Nevertheless, EU regulators ought to remain vigilant on the subject, in light of the many potential economic and financial implications of Web3. In this regard, a

[49] See ftn 35. See also: Eurointelligence briefing "*Worry about etherium, not the renminbi*" (2022/04/13) on the use of the Ethereum blockchain by Russians to evade sanctions, available at: https://www.eurointelligence.com/briefing?newsdate=2022-04-13&cHash=3d90d4002a121c3400fd8c81fbd14de7 .
[50] See ftn 3.
[51] See ftn 23.
[52] https://moxie.org/2022/01/07/web3-first-impressions.html .
[53] https://members.delphidigital.io/reports/funding-frenzy-btc-breakout-aave-bal-collab/ .
[54] https://tokenist.com/why-does-jack-dorsey-hate-web-3-0/ .

dialogue with the companies already developing decentralised solutions could prove critical to gather insights for an assessment of the economic implications of Web3.

A Web3 Glossary

Artificial Intelligence (AI): The ensemble of processes and systems that collectively enable reproduction of human-like skills in their functioning, automatizing reasoning and learning processes.

Backend/Frontend (website): The backend of a website corresponds to a layer of processes that run scripts and/or access data dynamically to generate webpage content. This is shown to users by the frontend layer, a combination of graphical rendering and user interface that directly interacts with internet users.

Blockchain: Blockchain refers to a paradigm to manage record keeping and maintenance of a distributed database as a back-listed sequence of blocks. Each node in the blockchain owns a copy of the database, that is collectively maintained and updated based on distributed ledger technology.

Cryptocurrency: Encrypted digital asset representing a virtual unit of currency on the blockchain.

Decentralised Autonomous Organisation (DAO): Organization constituted by collectives of participants collaborating over a set of shared goals, whose governance is defined through smart contracts and internal incentive mechanisms. Each participant holds a stake in the DAO, represented by foundational governance tokens. These enable decision-making (via voting) and goal setting. DAOs' foundational principles are transparency, openness and participation.

DApp: Applications whose backend code runs on decentralised blockchain networks based on smart contracts. DApps perform any action given the adequate resources, (*Turing-completeness*), irrespectively of the environment they are executed in (*determinism*), while preventing the risk of hampering the latter (*isolation*). Deployment of DApps entails decentralised trustless computation without the need to authenticate by its executor, while guaranteeing complete data integrity, i.e. *immutability* and *indisputability*, thanks to the blockchain.

Decentralisation (blockchain): Dispersion of authority, governance or responsibility from a central entity toward an interconnected community, e.g. the nodes of a network.

Decentralised Finance (DeFi): A set of financial applications built and run on a blockchain. DeFi enables virtual transactions between parties based on the execution of smart contracts, without relying on central authorities or intermediaries to act as gatekeepers (for authentication) or third parties (for settling).

Smart contracts: Sets of rules defined algorithmically and stored on a blockchain, whose conditions trigger their self-execution.

Token: Digital asset issued on a blockchain, representing value. Tokens may either be fungible when they are non-unique and shall be exchanged on the blockchain for other tokens of equal value (e.g. cryptocurrency), or non-fungible when they are unique and their trading requires determination of their value (e.g. digital art piece).

Web server: A hardware and software utility enabling storage of component files for websites (e.g. JavaScript files) and content display to users on webpages. When a user submits an internet request by pointing to a website, this is sent from the browser to a Domain Name Server, which converts the received link (e.g. URL) into a unique identifier, the corresponding Internet Protocol (IP) address. Given an IP address, the web server displays content to the user.