Expectation on Blockchain : Blockchain Economics and Finance

ブロックチェーンへの期待：ブロックチェーン経済と金融

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Editor's Note

メラニー・スワン氏は『Blockchain: Blueprint for a New Economy』（O'Reilly, 2015 年）の著書を持つ，ブロックチェーンにおける世界的な有識者の一人である．同氏はニューヨークのニュースクール大学で哲学と経済理論について教鞭を取るとともに，シリコンバレーのシンギュラリティ大学でも教えるなど，理論に裏付けられた経済に対する深い洞察と，最先端のイノベーションの双方に造詣が深い．

今回，このスワン氏に「ブロックチェーンへの期待」と題して寄稿を頂いた．本稿で同氏は，ブロックチェーン技術が経済と金融に「改善」ではなく「根本的な変化」をもたらすと指摘している．特に，スマート・コントラクトや DAC（Decentralized Autonomous Corporation）の仕組みにより，市場の自動化がさらに進むだけでなく，金融のあり方そのものが変わるとする．そこには，希少性から豊富さ，労働から満足，階層から分散へという経済全体に対する考え方に関する変化があり，こうした中でブロックチェーンがアルゴリズムによって信頼を提供することで，ロングテール的な金融が可能になるという．こうして，資本がよりオンデマンドで，アンビエント（環境的）に提供される経済が実現するのではないかと指摘する．それはどのように可能になり，何をもたらすのか．ぜひ本稿をお読み頂きたい．

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Introduction

The aim of this chapter is to explore the potential impact of blockchain technology on economics and finance. Finance and economics are some of the last sectors of the economy to become re-engineered and modernized by the Internet and digitalization. So far, the Internet has enabled the transfer of information, and now blockchain technology is orchestrating a higher level of network activity - the transfer of value. Additional software features are needed to transfer high-value items such as money, property, and assets. The central technical requirement is to avoid the double-spend problem. Whereas it is possible to make an arbitrary number of copies of a digital file sent by email, for example, money should only be spent once. Now in what could be a new phase of the Internet, blockchains have arisen as functionality that allows the secure transfer of value. This could lift finance and economics into the modern era. On one hand, a digital transition could happen quickly given the global network infrastructure that is already in place. On the other hand, since modernizing economics and finance involves the transfer of value-based assets such as money and property, the process could be complicated and take longer than the 20-30 year adoption period we have seen so far with the basic Internet.

Blockchains allow the Internet to have a digital payments layer as part of the standard infrastructure. Therefore it is possible that many forms of value transfer could eventually take place via the Internet. This could include both real-time monetary assets (the cash or spot market), and assets and liabilities over future time frames (the futures and options market, mortgages, debt

and equity securities, treasury issuance, and public debt). The implication is that there could be a digital future of cryptographically-activated assets and actions, where 1) physical and intellectual property might be registered and transacted via blockchains as smart property, and 2) agreements, contractual relationships, societal record-keeping, and governance might be enacted through code-based smart contracts (digital contracts registered to blockchains). The farther future is possibly one of hybrid systems that are optimized to include both physical and virtual, and centralized and decentralized aspects.

Blockchain technology is essentially an advanced version of EDI (electronic data interchange). In national or regional financial systems, the idea is that there could be one shared ledger, a single database of ownership and transaction records accessed by all industry participants, instead of the many proprietary versions that need to be individually reconciled now. The benefit is that the time to clear securities transactions might be reduced from days to hours or minutes, which could confer a significant decrease in risk and cost. The need for independent custody and verification functions and other costly aspects of the securities value chain could be greatly reduced by having a single registry of securities ownership.

Blockchain Adoption

There are two phases in the adoption of any new technology. Initially the innovative idea, such as blockchains, might be grasped in its capacity as a "better horse;" as an improved version of something familiar. Most simply, blockchains are merely a modernizing information technology. Blockchains might help current economic and finance practices to operate more efficiently. In the second moment, after having implemented a new technology in its "better horse" applications, a new tier of possibilities can come into view more clearly. The new technology can now be conceived as a "car;" as a transformative and novel paradigm that might completely reconfigure the former operation. At present, "better horse" implementations of blockchain technology are being investigated to modernize the existing finance industry with single ledgers and private ledgers (ledgers where identity is known and confirmed) that are still centralized. In the second moment, "car" implementations might be the longer-term future. These could include digitalizing money, payments, and contractual agreements. One implication of blockchain economic networks is that a larger scale of activity could take place since there is lower cost and fewer barriers in digital networks. Another implication is that economic activity could become more heterogeneous, flexible, composable, and automatable in novel applications that have not been possible before. Just as eCommerce and digital stores like eBay and Amazon opened up a wider range of content consumption, so too could there be a Cambrian explosion in the type of economic systems that individuals and groups might like to participate in since one size no longer has to fit all. Long-tail blockchain economics enables variety and multiplicity in the type and structure of economic systems. Blockchains not only modernize economic operations, but also invite a foundational rethinking of the concepts of finance and economics themselves.

Blockchains are a New Kind of Network Computing Technology

Crypto-synecdoche

One notable property of blockchains is synecdoche. A synecdoche is a structure in which a part represents a whole. Blockchains simultaneously connect many layers or levels of detail in that in the connected database tree, any one items calls or refers to all other levels, so it is possible to drill up and down levels of detail with ease. For example, with a hard-currency note or dollar bill, there may be twenty levels of aggregation upstream from the actual unit of the bill, all of which could be rolled up with a mouse click. Another case of the crypto-synecdoche property in action is in the idea of hospital

inventories (including controlled-substance pharmaceuticals) instantiated as blockchain-based smart property, where a hospital, county, state, or nation's inventory could be viewed at an instant. The crypto-synecdoche property could be used to roll up the whole of an economy for an on-demand real-time assessment (essentially automating national-level economic statistics). In any industry, blockchains are a next-generation technology that enables the secure, trackable, automated coordination of large numbers of items, and implies the possibility of undertaking larger-scale projects than have been possible before.

Technical Problem Solved: Byzantine General's Problem

Blockchains solve a long-standing computing challenge called the Byzantine General's Problem, which entails how to securely update far-flung nodes in a distributed computing network. The issue is knowing whether Byzantine generals out in the field are defecting and colluding, or remaining loyal and fighting; i.e.; how to determine if network nodes have become befouled. By enforcing integrity and security in distributed computing networks, blockchains extend the scale and scope of what might be possible with network computing as a general computational substrate. In finance, HFT (high-frequency trading) is already one of the most automated computational network activities, and could become even more so if instantiated in blockchain-based smart contract DACs (distributed autonomous corporations (i.e.; packages of smart contracts)). A heightened speed-up in concentration, processing power, and returns in HFT might be available in the short-term (until the opportunity has been saturated).

Automatic Markets

More kinds of human-operated activity might be instantiated in smart contract DACs that look like HFT financial instruments in the sense of having automated execution. Real-time bidding (RTB) networks for advertising are already a form of programmable financial instrument in this sense, and more processes could be implemented in the automatic markets format. Energy, logistics, fulfillment, and transportation are other industries that could be automatically orchestrated by smart contract DACs, unobtrusively in background from the consumer's perspective. Pricing as an external heuristic (currently assessed and imposed by human agents) could become obsolete. In smartnetworks, the most effective pricing could be when the resource prices itself because the underlying network-based resource knows its own price most closely. In this fit-ordered model, the underlying resource could determine its own real-time minute-to-minute value, price itself as a smart resource on a smartnetwork, and enter into contractual arrangements, such as futures and options agreements, to engage its availability.

Blockchain Finance and Economics

Mindset Shifts

As the field of economics has been traditionally conceived with scarcity as its basis (the production and consumption of scarce goods), so too has finance been conceived as the control or prediction of the future value of assets and liabilities. However, the scarcity view of economics no longer holds in an era of digital services, non-rival goods, and complementarity. Likewise, the controlled future value of assets view of finance also no longer holds now where all of the variables concerning assets, capital, and investment might be changing. In economics, three crucial mindset shifts for progress are moving from scarcity to abundance, labor to fulfillment, and hierarchy to decentralization. In finance, three analogous mindset shifts are moving from ownership to access, point values to topological ranges, and insufficiency to assurity.

Capital Reconceived: Ambient Finance

Capital is a core element of any economic system. Blockchains might help in reordering the process of capital-raising and in bringing greater transparency,

accountability, and monitoring to the effective use of capital. Currently, there is just one mode of capital-raising for projects and it is narrowband - the "big chunk of capital" method. One of the most rooted assumptions in economics is that any large-scale project requires financing, which would necessarily be in the form of debt capital. Other means such as pledged capital calls have traditionally failed because monies are unavailable when needed. Blockchain-based smart contracts might change this, and widen the range and type of financing choices that might be available. At minimum, pledges might be confirmed and escrowed. Beyond that, a new mode of finance might be implemented whereby capital is an available on-demand resource disbursed continuously in real-time per the assessed level needed. This more ambient version of capital as a resource could have more tightly-linked correspondence to objectively-determined and objectively-monitored underlying project needs. Capital budgeting could become an on-demand resource assigned in micro-financed packets like just-in-time inventories instead of large and costly fundraisings.

Automatic Capital

In the farther future, as smart resources automatically price themselves on smartnetworks, so too could smart contracts automatically call from escrowed pledges and "drip" capital into projects on-demand. Some of the technical modes of implementing this could be Ricardian contracts and Hash Time-Locked Contracts (such as on the Lightning payment network); essentially ways to escrow-pledge capital and secure bi-directional payment channels without cheating. Kickstarter and the legalization of crowdfunding have already been a shift toward resilient network models of on-demand ambient financing. Blockchains might allow the administration of capital commitment calls in greater correspondence with the underlying project needs. Most essentially, finance concerns credit, and credit concerns trust. With the creation of algorithmic trust in blockchain ledgers, the possibility is that the long-tail of economics and finance can meet. Like eBay for investors and projects, any two long-tail parties (with specific economic interests) can meet and transact in a secure blockchain-based environment, without having to know each other. The effect could be that many more projects and micro-size starter projects might be able to receive requisite funding and large-scale project financing risk could be reduced.

Conclusion

This chapter considers the potential impact of blockchain technology on economics and finance. Blockchains are a new form of cryptographic information technology that allows the secure transfer of money, property, and assets via the Internet. One implication of blockchain technology is that economics and finance could be modernized to keep pace with other sectors of the economy. Blockchains might be instrumental in orchestrating an orderly transition to the automation economy, where technological unemployment (jobs outsourced to technology) is a concern. Blockchains could be used to implement nation-wide GBIs (guaranteed basic income initiatives) to provide a basic income to all members of a society. Blockchain-based GBIs could take advantage of the special attributes of programmable money such as demurrage redistribution and expiry features to prevent hoarding and induce a sense of comfort per the abundance of resources. Successful economies of the future might attend to the production and consumption of intangible social goods like autonomy, choice, and recognition, in addition to materials goods. Beyond the modernization of economics and finance, blockchain technology could be pointed at the broader societal goal of cognitive easing over cognitive efforting for resource attainment in both the present (economics) and the future (finance).