The Gene of the Digital Economy

-- Analysis of the Impacts of Blockchain based on Efficiency Economics

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Abstract. At present, blockchain technology has great application value and broad application prospect in various economic fields. This paper analyzes the impact of blockchain technology on economic efficiency by reviewing the basic concepts, working principles and main features of blockchain technology and applying the theory of new institutional economics, and finds that the application of blockchain technology can effectively reduce transaction costs, promote self-execution of transaction contracts and solve the problem of information asymmetry, which can greatly improve the efficiency of the economy. Finally, policy suggestions are proposed to deepen the exploration and research of blockchain technology, strengthen the integration and development of blockchain and emerging technologies, and accelerate the application of blockchain technology on the ground in various fields.

Keywords: Digital Economy; Blockchain; Bitcoin.

1. Introduction

Blockchain, at the heart of the bitcoin cryptocurrency, is a chain of blocks that verify, store and share transaction information for users. Blockchain, with its transparency, decentralization, immutability, anonymity, and traceability, is like the gene of the digital economy. From an economic efficiency perspective, this paper summarizes the economic effect of blockchain in the next decade.

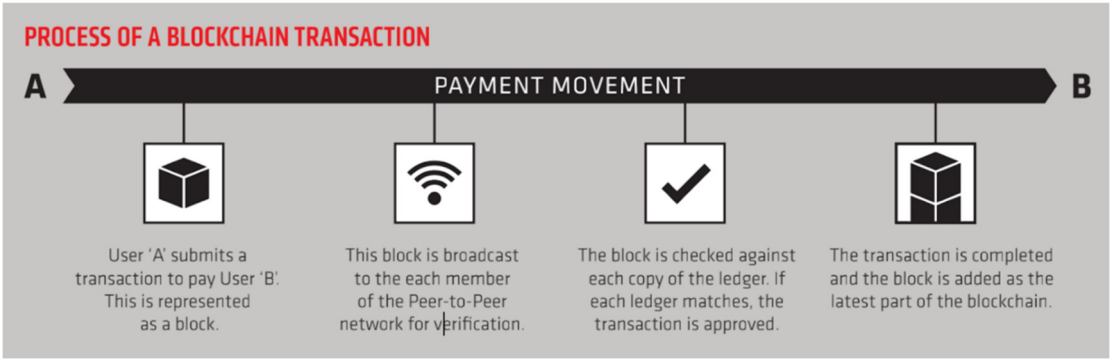

Figure 1. Process of a Blockchain Transaction

2. Productive Efficiency

Productive efficiency can be achieved by producing at a minimum cost.

2.1 Finance

Blockchain technology saves costs for financial intermediaries by reducing bad debt costs, premium costs, and rating costs. Based on the customers' identities and historical repositories, blockchain assesses their creditworthiness, as well as minimizes manipulation of information. (Patel et al.,2022) Similar schemes can be designed for the insurance industry to avoid adverse selection. IBM Blockchain with the American Association of Insurance Services is automating regulatory reporting, reducing insurance fraud. Blockchain also facilitates data sharing by agencies and eliminates redundant work in credit rating. In the United States, third-party data for mortgage

origination costs as much as $80 per mortgage. With blockchain, decentralized open data can be used to reduce costs.

2.2 Supply Chain

Apart from energizing the financial sector, blockchain could also help supply chain management in the manufacturing sector. When structuring cooperation between firms, blockchain allows sharing of financial status and builds trusts, rendering verifications by intermediaries.

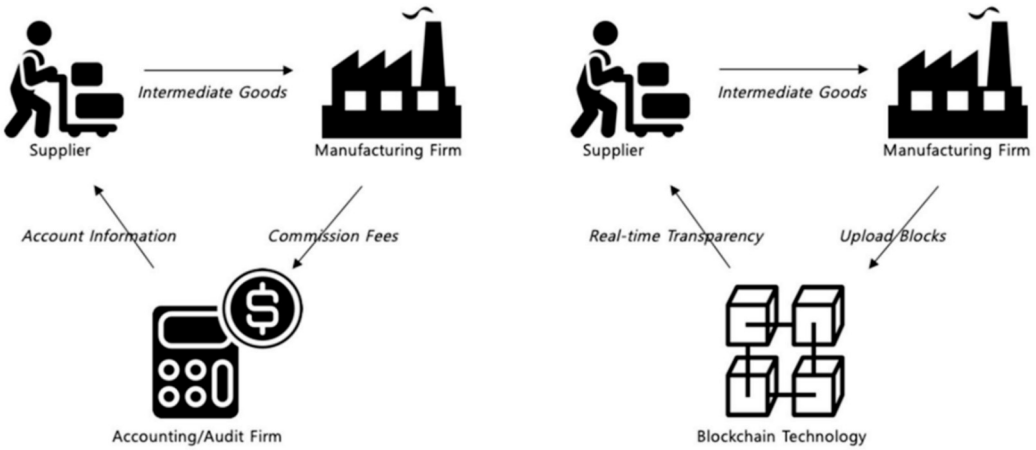

Figure 2. Elimination of Verification Costs (Ko et al.,2018)

Blockchain remedies the complexity and paper documentation in logistics networks. Implementation of smart contracts powered by blockchain automatically executes actions according to predetermined rules. (Sadouskaya, 2017) This feature offers an audit trail that automates recordings of delivery between supply chain members and the detection of errors. Paper-based records in each supply chain member may be redundant, inconsistent, or forged. As blockchain provides paperless electronic bills of lading, JD for example is able to save nearly RMB 400 million and reduce paper by more than 5,000 tons.

3. Allocative Efficiency

Allocative efficiency is an optimal distribution of goods and services considering consumer preferences.

3.1 Food Safety

As blockchain combines with IoT, they realize information records of each stage of food production and provide greater transparency and traceability for consumers. (Galvez et al., 2018) In this way, information about food will be integrated into the product pricing mechanism credibly, bringing the food market closer to an efficient market, thereby facilitating transactions and reducing deadweight losses. The BeefChain is an example of a platform tracking “grass-fed” beef to offer trustworthy meat to consumers paying a premium and ensure that ranchers receive the payoff for their cows in open-range conditions.

3.2 Digital Asset Ownership Affirmation

Blockchain can be useful for defining digital property ownership and bringing standardization and network effects to it. (Savelyev2018) For unauthorized resale or distribution, blockchain identifies who is using the work and takes action such as legal proceedings and takedown requests by distributing ownership of the ledger. Metaverse ecosystem will drive more transactions. PeerTracks is a platform where artists can seek royalty payments by attaching a smart contract to every song

uploaded and dividing the revenue according to contract terms. Blockchain-based NFT marketplace, like OpenSea, is now selling virtual assets from professional artwork to user-generated content.

3.3 Smart Pricing System

As mentioned earlier, blockchain can effectively record transaction contracts in the financial industry, reducing default risk and adverse selection. Based on this, blockchain can help financial companies to give intelligent interest rate quotes based on customers' credit ratings. For industries such as hotels and airlines that do not have their own rating systems, they can access a platform that can provide credit ratings and use this to assist in quotation decisions. For example, in the Sesame credit system, with more than 300 million users, high credit users can avoid room checks, queues, and deposits in hotels, rent products and appliances without deposit, and receive higher loan limits.

4. Pareto Efficiency

Under pareto efficiency, it is impossible to make one party better off without making another party worse off.

4.1 Taxation

Blockchain is a reliable tool for tax authorities to detect tax evasion and fraud. The Shenzhen Tax Bureau cooperated with Tencent to create a blockchain storing the history of exchange over 7,600 companies' transactions, easing the detection of fraudulent invoices used as tax deductions or for trade finance. (Leger Insights,2019) Blockchain saves tax revenue, promotes the welfare of all tax thresholds, and offers more funds for transfer payments to vulnerable groups. Specific cases analyzed by the UK government also approve and distribute tax revenue with blockchain to avoid welfare fraud.

4.2 Health Care

Blockchain helps pharmaceutical procurement and healthcare record. By avoiding corruption and validating information, governments could purchase medicines in the right quantity and quality at cost-effective prices. China's State Council made advocacy for transparency in the medicine supply chain, which allows for more medicine reimbursement, hence helping more patients and enhancing public welfare. A U.K. hospital network has become one of the first worldwide to track the handling of COVID-19 vaccines with blockchain. The immutability of blockchain avoids manipulation and reduces the harm of infection to others. Other valuable applications include combating organ trafficking, bone marrow bank matching, blood matching, etc.

5. Conclusion

Foreseeing the next decade, the development of the digital economy will be accelerated and a higher level of economic efficiency will be achieved by the blockchain. But we cannot omit challenges in the adaptation of blockchain. Cryptocurrencies are conflicting with current laws, with huge regulatory challenges. The decentralized nature of blockchain goes against the meaning of government, so contradictions in practical applications may reveal. In the face of intense climate activism, huge energy consumption from blockchain's hash calculations is criticized. Nevertheless, the benefits of blockchain outweigh the harms, and it is a critical component in bringing about another technological revolution in humanity. Undoubtedly, next decade, blockchain will become the gene of the digital economy.

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