

# HOW BLOCKCHAIN TECHNOLOGY WILL IMPACT THE DIGITAL ECONOMY

Christian Catalini

## THE PLATFORM OF THE FUTURE?

The survival of any organization depends on its ability to outperform competitors and marketplaces in attracting and rewarding talent, ideas and capital. As communication and transaction costs have drastically declined because of the internet, new platforms have emerged, delivering goods and services at a speed and efficiency previously unimaginable. These new digital players took advantage of the changes in the underlying technology to challenge established business models and rethink pre-existing value chains. The ones that succeeded did so because they achieved a level of efficiency that their brick and mortar counterparts had trouble replicating. Through online reputation and feedback systems, digital players were able to create global marketplaces where individuals, products and services could be matched more effectively than ever before. By providing curation and ensuring the safety of transactions, these new types of intermediaries were able to reap the returns of this first wave of digitization.

A similar transformation is about to happen as blockchain technology and cryptocurrencies mature and mainstream applications emerge. Under this new wave of technological change, intermediaries will still be able to add value to transactions, but the *nature of intermediation will fundamentally change*. Whereas some established players will be able to use this opportunity to further scale their operations, others will be challenged by new entrants proposing entirely new approaches to value creation and value capture.

## COMPLEMENTING AI WITH HUMAN INTELLIGENCE

Rising complexity and interdependency between organizations combined with the increased specialization needed to advance the [technological frontier](#), have made human

abilities a key bottleneck in the generation, processing and diffusion of real time information. To counterbalance this trend, we developed better technology, governance, and contracts to simplify decision making, and ultimately allow organizations to scale across different markets.

On the technology side, artificial intelligence holds the promise to dramatically reduce the cost of prediction, leaving human judgment as the last barrier before full automation ([Agrawal et al, 2016](#)). Except, we already have the technology to harness, select and reward decision making at scale because of cryptocurrencies.

Whereas we had the ability to [crowdsource ideas and solutions](#) (e.g. Innocentive, TopCoder), to [source talent](#) (e.g. Upwork), [services](#) (e.g. Uber, Lyft, AirBnb), and [capital](#) (e.g. Kickstarter, AngelList) for some time, all these solutions rely on traditional platforms to aggregate the intentions of the crowd, source expertise and redistribute returns. Moreover, for these market to scale, often incentives and labor-intensive human judgment had to be brought back into the picture to ensure, for example, that

## IN THIS RESEARCH BRIEF

- A transformation challenging established business models and pre-existing value chains is about to happen as blockchain technology and cryptocurrencies mature and mainstream applications emerge. Under this new wave of technological change, intermediaries will still be able to add value to transactions, but the nature of intermediation will fundamentally change.
- Crypto-tokens (like Bitcoin) and blockchain are associated with a reduction in two key costs: the cost of verifying the transaction attributes that can be recorded on a blockchain, and the cost of networking.
- Combined with the right incentives, participants can use a cryptocurrency to reach consensus - on a global scale - about the allocation of scarce resources. This drastically changes the scale and scope of what an online community or platform can achieve.



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professional investors had a reason to [help the crowd sift through](#) thousands of startups asking for funding. All these platforms, by building the reputation, payment and curation systems needed for exchanges to safely take place, were able to place themselves at the center of these new marketplaces. While information was freely flowing thanks to the internet, the flow of value was not.

## A NEW WAY TO SCALE A GLOBAL PLATFORM

To understand the transformation brought by blockchain technology, it is useful to start from its largest implementation to date: Bitcoin. Although often criticized for its inability to match the performance of existing payments networks or the requirements of the financial system and governments, Bitcoin is extremely successful at solving the problem it was designed for: allowing a global network to securely transact and exchange value without the need of a costly intermediary. Through a clever mix of game theory and cryptography, the Bitcoin network is able to reach consensus about the true state of its distributed ledger at regular intervals.

While the energy and computational waste associated with this approach is often criticized, it is exactly the sunk computational cost (proof-of-work) that secures the Bitcoin ledger from an attack. By throwing cheap hardware at the problem, Bitcoin replicates the financial system's ability to transfer value without many of the tasks and costs typically involved in running and securing traditional transactions. Furthermore, it does so while minimizing the degree of trust parties have to place in each other when transacting, mimicking digitally many of the features - [including the privacy ones](#) - of cash.

## FROM BITCOIN TO THE MARKETPLACES ENABLED BY CRYPTO-TOKENS

The marketplaces enabled by crypto-tokens (e.g. Ethereum) represent a new type of organizational form: one that resembles a spot market in its decentralized and incentives-driven nature, but one that can also

replicate the more complex forms of governance used in a traditional corporation.

For example, while still in their infancy, smart contracts can add nuance to the transactions performed on top of a cryptocurrency, allowing for new types of agreements and exchanges to emerge. The organizations adopting them will benefit from substantial economies of scale in the way they match the supply and demand of capital, talent and ideas, as they will be able to tap resources on a global scale without the infrastructure costs of incumbents. When developed as open protocols, these ecosystems will also benefit from innovators expanding their potential in multiple different directions, most of which the original organization would not have imagined.

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Whereas most existing firms are currently tempted to adopt blockchain technology predominantly as a way to lower costs and push for standardization within their industry, the architectural nature of the innovation may make some incumbents ill-equipped for its long-run implications. By trying to preserve the current competitive structure of their industry and the value of their complementary assets, incumbents may fail to realize that crypto-tokens allow for a radically novel approach to value creation and capture. In this new regime intermediaries can still add substantial value to markets, but this will not come anymore from simply controlling the transfer of value, the settling of payments or the underlying digital assets.

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## A NEW DIGITAL ECONOMY?

Crypto-tokens and blockchain are associated with a reduction in [two key costs](#): the cost of verifying the transaction attributes that can be recorded on a blockchain, and the cost of networking ([Catalini and Gans, 2016](#)). For a market to function, key attributes of the individuals, firms, goods and services involved need to be verified and audited before and after transactions take place. Whereas this process is often labor-intensive or requires a third-party to ensure market safety, it can be cheaply implemented on a distributed ledger. But the time-stamping ability and immutable nature of a blockchain are not what make the technology a radical innovation. In fact, these two features fit well into incumbents' value chains as they allow for reductions in costs through cheaper forms of settlement and reconciliation.

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The [architectural change](#) brought by cryptocurrencies is tied instead to their use of a native token to incentivize the growth, operations, and securing of a platform. Like in Bitcoin, the token can bootstrap the development of an entire innovation ecosystem where anyone can build novel applications on top of the underlying protocol without requiring permission from a network operator or intermediary. Combined with the right incentives, participants can use

a cryptocurrency to reach consensus - on a global scale - about the allocation of scarce resources. This drastically changes the scale and scope of what an online community or platform can achieve.

In their seminal work, Jensen and Meckling (1976) defined the firm as a 'nexus of contracts': crypto-tokens are the natural next step in our search for an organizational form that can transcend geographical boundaries and allocate resources more efficiently. This new form will combine the efficiency of a spot market with the more complex forms of governance and incentives used within today's organizations. By automating the aggregation of information and preferences, and overcoming the limits of our cognitive ability, the ecosystems built on top of blockchain technology will be able to source and remunerate talent, ideas and capital at a scale previously unimaginable. As described by Hayek in his seminal work on the price system: *'[I]f we possess all the relevant information, if we can start out from a given system of preferences, and if we command complete knowledge of available means, the problem which remains is purely one of logic'*.

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The full working paper can be found [here](#).

An interview with Christian Catalini on the research can be found [here](#). And a video presentation is available [here](#).