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Blockchains and Human Beings

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Thanks to the "miraculous tool" of interpersonal tenderness, "our experience can travel through time, reaching those who have not yet been born, but who will one day turn to what we have written, the stories we told about ourselves and our world," Olga Tokarczuk said in her Nobel address at the Swedish Academy. How different is this view of reality is from the one that we economists typically practice! We attempt to prove certain hypotheses and refute others by relying on facts, figures, and verifiable observations. Such a humanistic approach to economics is rather foreign to members of our profession.

In line with this, blockchain technology is typically approached the technological or economic (financial) perspective, often omitting human aspects. If we do take the latter into account, we do so in the context of blockchains as instruments or objects of a researcher's observations. Is the growth in cryptocurrency prices

Blockchain technology may soon profoundly transform the economic, financial, and legal reality of entire societies and even systems of government. But is this new financial instrument (a new form of "tender," in the sense of money offered for payment) sensitive only to the rules of free-market economics, or also to human rights and sensibilities? Whose needs will determine the direction of change: those of ordinary people, or the financial elite?

actually a rational phenomenon? Are such investment decisions being made by investors who are sensible, or by ones who are ignorant of threats and must be protected even against their own decisions? What economic incentives should be put in place? What can be done to motivate teams and to ensure the security of IT systems? Even in these ostensibly human-centered questions, very little thought is actually given to the impact on humans, as social beings capable of building interpersonal relationships or to humanism. Let us, however, risk the assumption that this issue is ultimately also important to economists. Let us try to look, here, at blockchain technology and its applications through the prism of such attitudes as interpersonal tenderness, sensitivity, solidarity, and a sense of community – what all of them have in common is respect for humans and care for their well-being.

Bitcoin and the origins of cryptocurrencies

The ideological groundwork for the emergence of cryptocurrencies was laid by the societal objection to the dominance of banks in Western nations, including their role in the onset and escalation of the

international financial crisis in 2008–2009. It had many negative social consequences, including the loss of major assets or their devaluation (for example in the real estate sector) as well as the loss of many people's personal savings and jobs.

The list of the social consequences that followed the crash – the world's worst financial crisis in 70 years – stretches a lot longer. Notice the message that Satoshi Nakamoto included in the Bitcoin source code, in the very first block of transactions (referred to as "the genesis block" or "the zero block"): "*The Times* 03/Jan/2009 Chancellor on brink of second bailout for banks." Technically, the purpose of this was to prove that this piece of Bitcoin code was written on 3 January 2009 or later. But more important than the date of the newspaper's issue is the choice of that cover story and the decision to include a quote from that particular article in the source code. It is interpreted as the (anonymous) Bitcoin creator's manifesto on the problems faced by the public in connection with the ongoing bank crisis and its consequences.

Alistair Darling, the British Labour Party politician who served as Chancellor of the Exchequer, decided shortly after his appointment (in September 2007) that the bank Northern Rock should be bailed out (with the help of £20 billion from the Bank of England). The quote from *The Times* referred to the second bailout package and the impending decision to spend billions of pounds (after nearly £40 billion had already been spent in 2008, through the partial nationalization of the economy) to buy up what were referred to as "toxic assets" and offer banks cheap guarantees, among other measures.

Hardcoding that particular quote into the Bitcoin blockchain, therefore, was underpinned by ideological considerations: the purpose was to stress that the technology would offer people an alternative to the traditional banking system, which had suffered an economic crisis that proved so very costly to taxpayers. The quote was a protest against the billions that were being pumped into collapsing banks, whose greed was seen as the root cause of the crisis. Since then, bitcoin has been seen as not only an alternative but also a potential rival to banks (hence the frequent objections to cryptocurrencies voiced by banks, especially central banks).

The blockchain code

The eleven years bitcoin has functioned have demonstrated that it is the world's most secure IT system. It was designed following the principle "no one trusts anyone" so that it would be resistant to bad actors. Bitcoin uses several well-proven concepts and some new ones to boot, thus resolving a serious security problem that IT experts had been grappling with since the arrival of the Internet. As a result of the creation of bitcoin, we have a system for making payments (and more) that has been probed intensively by hackers (who have spent many years searching for vulnerabilities). If a bad actor attempts to deceive other users of the system, the records in the Bitcoin blockchain are safe (this may not be true for weaker blockchains).

The security and freedom offered by independence from intermediaries (banks) mean that bitcoin works 24 hours a day, seven days a week without interruption (with a few minor exceptions in the early stages of the project). While banks may suffer hacker attacks and IT failures that prevent their clients from accessing their savings, bitcoin gives its users greater control over their funds.

This sensitivity to freedom and security has resulted in bitcoin and most cryptocurrencies being built on open-source software. In blockchain technology, the bitcoin code is open-sourced. Anyone can access it free of charge and without any restrictions. If they have the relevant knowledge and skills, they can test the software code. Likewise, anyone is free to copy the code (provided they can), for example to use it to develop new and better software. If it wins the community's approval, such code may be successful (and so may its author). This gives ordinary, sometimes young people all over the world a great chance to try their hand at innovation, because the bitcoin source code is not kept locked away from mere mortals in the silos of IT giants (unlike the Windows or Facebook code).

Are cryptocurrencies "sensitive"?

Each bitcoin can be divided down to eight decimal places. Many people would have difficulty buying a single bitcoin (1 bitcoin as of end of October 2020 costs around 55,000 zlotys, or some $14,000), but there are many less expensive cryptocurrencies. For example, 1 dogecoin costs around 0.01 zloty (and it can be further split into smaller units). Such divisibility makes it possible to exchange resources worth a small fraction of a penny in a swift and inexpensive way, which may have special applications in the Internet of Things (once devices themselves become able to settle payments with each other). In this respect, cryptocurrencies are "sensitive" in the sense that transactions can be made with great precision and it will be impossible to lose even very small amounts. Nothing is ever lost on a blockchain – it is a very durable system for making payments. Once recorded, a transaction is stored in the blockchain forever.

Cryptocurrencies were invented as an alternative to existing mediums of payment, which have cre-

ated great imbalance between multinational corporations and banks on the one hand and ordinary people on the other (in Poland, for example, this includes borrowers who took out mortgage loans in Swiss francs, which have now proven so unfavorable). Cryptocurrencies offer hope that if the traditional financial system collapses, people will have an option to partially keep their savings and safely conduct transactions remotely. The traditional ways of dividing up and transferring profits are changing. Previously, the saying "money makes money" was king – in capitalism, the people who already had money were most likely to further augment their fortunes. The software industry changed this trend, and new billionaires linked to the IT market soon started to appear in the world. With cryptocurrencies, this period has become even shorter, and the chances to earn one's "first million" are even greater. Not for everyone, of course (this primarily holds true for IT experts and people with sufficient business savvy to accurately spot a chance in a new sector of the economy), but these methods are nonetheless available to many people.

Equal opportunities, however, has also meant chances for people who are dishonest. Many projects in the cryptocurrency market have ended in triumph for hackers or frauds. What is more, investigations against such individuals are often not launched or are discontinued, for reasons that include limited access to adequate IT tools on the part of law enforcement agencies. What is needed are adequate legal regulations and effective ways to enforce the law, so that the market can grow in a more stable and safer way and victims can assert their rights.

I estimate that the lack of appropriate regulation has prompted around 90% of Polish blockchain companies to decide to leave Poland. This situation has been caused by the lack of goodwill as well as the ideologization and overinterpretation of the phenomenon on the part of the National Bank of Poland (NBP) and the Polish Financial Supervision Authority (KNF), expressed in the unprecedented joint statement of 7 July 2017, in which the two institutions warned against cryptocurrencies in general – rather than against certain risks related to such currencies or against dishonest users. And yet, the fact that certain thieves use a car or the Internet, for instance, would not entitle us to conclude that we need to delegalize the car industry or shut down the Internet.

However, market instability results not only from the lack of regulation but also from the sensitivity of cryptocurrency exchange rates. Here, sensitivity means very high price volatility in relation to official currencies (i.e. legal tenders). Currency exchanges, operating around the clock, note even the slightest fluctuations in exchange rates, and the change in management paradigm means that the investment community's reaction to decisions made by corporate executives is immediate and unmitigated.

Financial innovations in the field of existing assets

One of the most exciting aspects of groundbreaking innovations is the transformative potential of their applications. Such watershed innovations include computers, the Internet, and – in my opinion – blockchain technology and artificial intelligence (AI). Innovations in the latter field require enormous funding and considerable human resources that are hard to find in Poland (there are very few companies in Poland able to provide competitive AI solutions in international markets). In the case of cryptocurrencies, however, the barriers to entry are a lot lower. Of course, the salaries of blockchain developers are among the highest on the market, but creating a new blockchain does not require having a team of several dozen researchers working for several years. The simplest blockchain may be set up in several hours (or less), and it is not very costly, because the technology is free.

It is likewise possible to create tokens at low cost by using a public blockchain, without the need to set up an entire blockchain infrastructure, and to design smart contracts or decentralized applications (dApps) that are safe, because they run on thousands of computers – they cannot be turned off on one computer, deleted, or hacked. This creates a completely new branch of the software market. Anyone can become a participant in this system and use the most secure software in the world without having to spend enormous amounts of money on IT security. Although this still means high costs (chiefly human labor), the trends in technological development show that these costs will decrease over time. In other words, ordinary people will have access to IT solutions with a degree of security that has not been enjoyed by banks, governments, or even intelligence agencies.

This, in turn, should lower operating costs for businesses, not only in the financial sector. It will be easy and inexpensive to "tokenize" securities (by analogy with their dematerialization, or the transfer of paper-form records to electronic databases). This offers unprecedented opportunities such as the free exchange of fractional shares between people all over the world in a matter of seconds at the cost of just pennies in transaction fees.

Tokenization of new assets

Tokenization as a trend in the blockchain industry makes it possible not only to digitize existing assets. In fact, anyone can issue his or her digital

GLOSSARY

Bitcoin – the world's most popular cryptocurrency and the first use of blockchain technology. Bitcoins are not printed but produced with the help of people who create the network and the software that solves cryptographic puzzles.

Bitcoin source code – the free, open-source software that underlies the bitcoin cryptocurrency.

Blockchain – the distributed ledger technology in which database records (i.e. transactions) are grouped together as blocks of transactions that are connected together (like links in a chain) using cryptography.

Coin – a popular term for digital currency.

Cryptocurrency – an innovative, distributed system of record-keeping that stores information about the state of ownership of certain units of coins (usually divisible down to eight decimal places). The owner of a cryptocurrency that wishes to make a transaction does so electronically and directly with the other party, and the transaction is not controlled by any regulator or trusted third-party.

Cryptocurrency exchange – an Internet platform that serves as an intermediary in trading in cryptocurrencies.

Decentralized applications (dApps) – computer applications that do not run on a single computer or a central server, but rather constitute a whole set of interconnected smart contracts.

Digital currency – a different term for a cryptocurrency or virtual currency.

Digital token – a smart contract that fulfils the functions of a coin but without the need for its own blockchain.

Internet of Things – an IT concept that involves connecting objects to the Internet and to one another with no involvement of humans.

Miner – a person or a company that authorizes blockchain transactions and is rewarded for their work.

Mining – the process by which miners create new cryptocurrency units and automatically receive them as rewards for authorizing transactions in the network. Such work is done by hardware with relevant computational power that is engaged in the protection of the blockchain network against attacks, thus ensuring its correct operation.

Smart contract – an extensive programmable transaction in the blockchain network, i.e. a computer algorithm that lays down the conditions of adding a record to a blockchain 2.0 network.

Tokenization – the process of creating the digital representation of traditional assets (such as securities, bonds, other rights) in the form of digital tokens.

token, advertise it with his or her name, and market it all over the world. This means that coins could be created not only by celebrities (who would tie them to their advertising value), IT experts (in exchange for their work, training courses, and so on), influencers (to sell advertisements) or politicians (such a market would mean the possibility of constant, day-to-day monitoring of the popularity and reliability of politicians and the "valuation" of their work), but also by ordinary people if only they found a market for their tokens and gave them value (which is not easy). Consequently, we are shifting away from the paradigm of national fiat currencies, whose value depends on trust in governments, towards the hypothetical possibility of having millions of mediums of payment in circulation all with different underlying values. This means the possibility of transforming the world's financial system, as well as the very model of democracy.

It would be possible to tokenize not only personal brands but also completely new assets. For example, the tokenization of an Arabian horse from the famous stud farm in Poland's Janów Podlaski would mean that the horse's win in a race or the profits from the transfer of genetic material to horses owned by other breeders would go into the hands of not only Arab sheikhs and American millionaires but also ordinary people. Anyone could purchase a one-hundred-millionth share of the horse, trade it in secondary markets (digital token exchanges), and benefit from the horse's wins in races.

For now, this is just an example I invented in 2017, but the possibility of tokenizing real properties (instead of buying them in whole – there could be thousands of buyers) is a more realistic business. There are a dozen or so startups all over the world (and a few in Poland) that have such plans. Thanks to them, everyone could buy a share in a real property rented out to someone, say in Palm Beach, for an amount equal to a kid's pocket money. Although the profits would be probably not very high, such investing would offer a way to diversify the investment risk. Consequently, tokenization would democratize investments and reduce barriers in this respect. Anyone could become "a global capitalist" without having to have millions of dollars at their disposal.

"It's the community, stupid!"

Blockchain technology is transforming not only IT and financial markets but also the very paradigm of management. Trends towards crowdfunding are already visible in Poland (for example, 9,000 fans of the soccer club Wisła Kraków bought up 40,000 shares, or nearly 5.1%, for nearly 4 million zlotys, in a crowdsourcing campaign that managed to the save the club from bankruptcy). Blockchain dovetails with these trends, complementing existing solutions with greater security for the owners of "shares" and allowing their exchange (for example on cryptocurrency exchanges).

The paradigm shift in management manifests itself in the changes in the role played by boards of directors. Business executives must build rapport with different communities (including observers of the project, cryptocurrency "miners," developers, and investors) and look after them and their interests. What is more, they may increasingly seek to fulfill the wishes of their broader community, with thousands of its members turning into a quasi-supervisory board. If a given management team is unable to run a project efficiently, members of the community can vote "with their feet" and leave the project (cease to mine a specific cryptocurrency, end cooperation in the field of software development, and sell their coins) or even remove the directors (as was the case with the cryptocurrency called dash), and the project will then fail. A several-member management team must be open to the opinions of fans of the project, listen to the

expectations of ordinary people, and potentially strive to meet them. Not through formal means, as has been so far the case (i.e. through surveys, focus groups), but by being constantly in touch with the community (not only shareholders, as is the case with publicly-traded companies) via numerous communication channels (not only such traditional media as Facebook and Twitter but also Telegram or Discord), including around the clock.

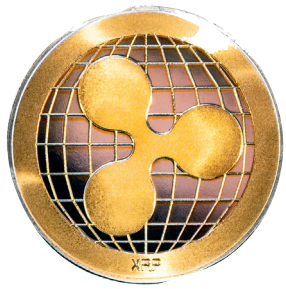
Moreover, in blockchain projects, there is no need to set up a business to manage the project. Examples include such projects as DAO (Decentralized Autonomous Organization), or a type of entity that operates only in the Internet using the blockchain. A DAO may be a "business" that has no legal personality (in the traditional sense), but may make financial decisions. It is not associated with any territory or jurisdiction. Its "directors" may be scattered all over the world and may not even know one another's names– they do not have to trust one another, but they work together thanks to the strict rules written down in code in accordance with the principle "code is law"– what is written into lines of code is a contract that is binding on the parties. Such organizations already exist. They offer many people a chance to participate in important projects and fulfill their dreams and ambitions, regardless of whether they were lucky or unlucky enough to be born in a specific country (people born in the United States or Dubai, for instance, are more likely to become millionaires) or in a rich or poor family.

Democracy

The transformative impact of blockchain technology may be even further-reaching. As Polish authors Szczepan Bentyn and Michał Grzybkowski have written in their book on cryptocurrencies, "The Internet connected the world, blockchain will settle its transactions." Inexpensive and swift payments, available to every citizen (not necessarily representatives of the financial markets), will lead to the development of a new "financial democracy." In particular, this may offer poor countries a chance to gain greater access to global financial markets and participate in the creation of wealth and its distribution (despite certain threats related to knowledge, the economies of scale, and access to modern solutions). This is a great opportunity for people and countries in need. The question is, will they take advantage of it?

Blockchain technology not only helps conduct financial transactions in a secure way. It may also foster democratization by providing a secure system for online voting (see, for example, the Polish project iVoting). The changing role of governments, their self-restricting power – these are broader trends towards the democratization of societies and the empowerment of ordinary people. Blockchain encourages these trends by making their development less expensive, faster, and safer (than they would be only with the use of the Internet and the related hacker attacks, and so on).

Blockchain may also affect the emergence of freedom-minded movements. Since their inception, cryptocurrencies have been popular among different social groups, including those with anarchist leanings, and above all among people weary of the state's growing surveillance of citizens (their finances, exchange of information, and so on). Increasing the share of what is referred to as 'direct democracy' through inexpensive and above all safe voting systems will make it possible to conduct faster public opinion surveys, including referendums. Maybe politicians will start seeking popularity among voters more than just once every four years. They will have to be constantly in touch with them and meet their needs (for example through personal tokens and their exchange rates, which will change under the influence of market forces). If the concept of "liquid democracy" became popular, which would be relatively easy to introduce with the help of the safe delegation of voting power via a blockchain, this might change the way in which politicians make decisions or even are elected and removed from office. They would be required less to follow party discipline and more to be loyal to their voters. This technology will transform the traditional civil society, giving it a tool to effectively monitor the government's actions.



"Cold and logical – but not tender"?

It is our duty as human beings to be sensitive and tender towards the needs of others, especially the underprivileged and those who need our support (minorities, animals, and nature, which cannot defend itself against humans). Similarly, such a groundbreaking innovation as blockchain technology can give ordinary people, citizens of many countries, a chance to look after their interests and needs in their relations with the authorities and their administrations and in rivalry over professional, financial, and social development.

Although the blockchain technology itself is "cold and logical – but not tender" (in the words of Rafał Kiełbus, the "Very Bad Moderator" of the Polish Bitcoin Forum), it may nonetheless transform the economic and legal systems of countries and even affect relations and social attitudes – possibly fostering greater interpersonal tenderness and sensitivity.

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