Wealth Distribution in the Bitcoin Ecosystem

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ABSTRACT

The paper deals with the problems of measuring uneven wealth distribution in the bitcoin ecosystem. All existing bitcoin distribution models depend on the analysis of bitcoin wallets and bitcoin addresses. They are based on the Bitcoin Rich List. This approach is insufficient due to the inscrutable relationships between people owning bitcoin, bitcoin wallets, and bitcoin addresses. In this paper, we used the methods of comparative analysis resulted in graphics as represented by Lorentz and Lamé curves and distribution of the Gini coefficients and the Kolkata index. We identified empirical cumulative functions of wealth distribution and the number of addresses with positive balance during the bubble and after its explosion. Approximations of the distribution of 'poor' and 'rich' addresses have been obtained and compared with the other results from the cited literature. The general public views the equality of network members as synonymous with the equal distribution of wealth among them. Emerging financial bubbles, especially in the US financial markets, lead to an increase in income inequality. However, after a bubble explodes, the inequality falls to the initial level.

Keywords: bitcoin; inequality; distribution of wealth; Lorenz curve; Lamé curves; Gini coefficient; Kolkata index

Распределение богатства в экосистеме биткоин

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АННОТАЦИЯ

В статье рассматриваются проблемы измерения неравномерности распределения богатства в экосистеме биткоин. Все существующие модели распределения биткоин зависят от анализа биткоин-кошельков и биткоин-адресов. Они основаны на богатом списке биткоинов. Такого подхода недостаточно из-за непостижимых отношений между людьми, владеющими биткоинами, биткоин-кошельками и биткоин-адресами. В работе нами использовались методы сравнительного анализа с графическим изображением результатов в виде кривых Лоренца, Ламе и распределения коэффициентов Джини и индекса Кольката. Авторы определили эмпирические кумулятивные функции распределения богатства и количества адресов с положительным балансом во время пузыря и после его взрыва. Получены аппроксимации распределения «бедных» и «богатых» адресов и сделано их сравнение с другими результатами, представленными в цитируемой литературе. Широкая общественность рассматривает равенство членов сети как синоним относительно равного распределения богатства между ними. Появление финансовых пузырей, в особенности на финансовых рынках США, приводит к увеличению неравенства доходов, но после краха пузыря неравенство падает до начального уровня.

Ключевые слова: биткоин; неравенство; распределение богатства; кривая Лоренца; кривые Ламе; коэффициент Джини; индекс Калькутты

INTRODUCTION

The issues of inequality of wealth distribution in the Bitcoin ecosystem attracted the attention of some researchers [1–4]. 'Cryptocurrencies' are nothing else, but offering **nothing** for **something** that has any value. They are not money at all. It is some kind of a 'valued' financial claim, and nothing else. In the world of 'cryptocurrencies' are two main questions. The first question concerns the payment system and the underlying technology. The second one concerns the money as such. The bitcoin ecosystem, as declared by Satoshi Nakamoto in his "white paper", ought to be a peer-to-peer **payment system** with the *central* accounting book (ledger) maintained by the so-called miners as a chief accountant, and no intermediaries. However, it is only digital technology with no means of payments. There exist payment systems (VISA, MasterCard, American Express, PayPal and others) using fiat money as a means of payments.

On the contrary, Nakamoto proposed to introduce proprietary means of payments — bitcoin. It is assumed that the terms 'bitcoin' or 'cryptocurrency' create a mental image of a real currency. Moreover, the name *bitcoin* was also intended to create a mental image of money in circulation — coins. The intention was to use bitcoins as a tool for purchasing goods and services, i.e. as a *medium of exchange*.

Our main theses as concerns the Bitcoin ecosystem are as follows:

It is a big redistributive pump.

It is a big speculative controlled chaos using price manipulations.

It is a means of wealth accumulation and increasing inequality.

It is not a payment system, and the so-called 'cryptocurrency' is not money.

It is the most appropriate place for money laundering, buying drugs, and other illicit activities.

In the Bitcoin ecosystem, the only winner is a miner and several very clever tech-savvy.

The Bitcoin ecosystem cannot operate without parallel fiat money system.

The Bitcoin ecosystem, declared by Satoshi Nakamoto as a new inflation-free money system, is nothing but a child's play for adults.

Any so-called 'cryptocurrency' is the main threat to the social and financial inclusion of the less developed nations and communities.

Despite the difference and diversity of processes in socio-economic systems, the distribution of wealth and income among agents consistently demonstrates a surprising similarity for a strikingly broad class of systems [1–8].

We can observe that for 'poor' agents, the wealth distribution has an exponential Boltzmann-Gibbs form, and for 'rich' agents, 'thick' tails with Pareto power. It is well-known that the increase in inequality of wealth distribution in socio-economic systems leads to an increase in its social, economic and political instability.

Emerging digital forms of assets, rapid development of the so-called 'cryptocurrencies', the growth of global telecommunications networks (including the internet) and the rise of innovative financial technologies (FinTech) make inequality in the digital economy extremely relevant.

In 2009, an anonymous author [9], known under a pseudonym of Satoshi Nakamoto, published a document that marked the beginning of the development of the bitcoin peer-to-peer network using the replicated distributed database technology — the blockchain technology. The advanced technology based on the asymmetric encryption eliminates the need to attract a financial intermediary for the payments between equal network participants.

The possibility of algorithmic support of trust between the participants of the bitcoin network without intermediaries and regulators has formed high expectations for the libertarian Internet community, especially in the United States.

The early triumphs of the bitcoin community in the fight against the state monetary monopoly and national financial regulators, the obvious simplicity of cross-border operations and the announced complete equality of all network participants also attracted the attention of the media to the new technology. The optimistic publications contributed to the inclusion of new network members and the efficiency growth of the peer-to-peer network, according to *Metcalfe's Law*. Regarding the bitcoin network, the media develops the following expectations for the general public:

absolute equality of participants;

full disclosure of the system;

high probability of bitcoin 'value' growth in the future;

complete absence of state influence as a regulator of self-made 'currencies'.

The general public views the equality of network members as a synonym for the relatively equal wealth distribution in the network. Emerging bubbles in the U.S. financial market lead to an increase in income inequality, but after a bubble explodes, the inequality falls to the initial level. However, the issue of the impact of the network bubble on the inequality of wealth of bitcoin network addresses remains open, and the present work is devoted to the empirical study of this issue.

NAKAMOTO'S SYSTEM OF PAYMENTS

According to Nakamoto, a solution to the double-spending problem can be a peer-to-peer network electronic cash system that is a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions. Nakamoto has built his electronic cash system for commerce on the Internet free of trusted third parties. However, until now this system relies on financial institutions serving as trusted third parties for processing electronic payments. In the current electronic payment systems, completely non-reversible transactions are not possible.

Further, Nakamoto wrote, "What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party" [9, p. 1]. Another issue is the high transaction costs for small random transactions and significant costs when there is a loss of ability to make irreversible payments for irreversible services. Moreover, a certain percentage of fraud should be recognized as inevitable.

In Nakamoto's payment system are two key issues — **honesty** and **incentive**.

Honesty means equality, trust in code, decentralisation, privacy, anonymity, consensus mechanism secured by a majority of nodes and lack of fraudulent activity. Simplified payment verification is reliable as long as honest nodes control the network.

The incentive is devoted to nodes to support the network. It provides a way to initial distribution of new 'coins' into circulation. The cost of the stimulus of the block containing the transaction is added to the transaction fee. This activity of network users is called mining. Mining is the act of creating bitcoins. It brings the miner new 'coins'. The miners are always first possessors of new 'coins'.

Mining is a contest to be first. Other contests, such as sports, are different because there are differences in skills among the participants. Here, it is the sufficient computing power under control that matters. It means, the more mining power a miner has, the higher the probability is to add more than one block. The only way is investing in hardware. However, this business is not for all. There is no *skill* in such search; the search can also be random in space.

On the other hand, 'cryptocurrencies' rely on competitive mining to add new blockchains, thereby finalising transactions and creating new 'coins'. For example, if there is a monopoly in mining bitcoins, then the bitcoin fails to achieve an open process. This does not rely on one trusted entity such as a private firm or a central bank. The monopolist must be trusted, or the Bitcoin ecosystem falls apart. If a miner or a collective group of miners (known as a pool) have 51 per cent of the total hashing power on the network, those miners would be able to exert significant power over the entire blockchain. It could be potentially devastating to the stability and reliability of the mined 'cryptocurrency'.

PSYCHOLOGY OR ECONOMY?

Such a phenomenon as 'cryptocurrencies' ought to be analysed from the point of view of economy, sociology, psychology, and psychiatry.

You can accumulate bitcoins and enjoy it. However, it is only miners who can accumulate bitcoins or those people who change something valuable for a miner to their bitcoins. Of course, it is preferable if 'something valuable' will be real (fiat) money. The death of the bitcoin payment system began when bitcoins were exchanged for fiat money. This is because there is no utility or opportunity to earn income in cryptocurrency. 'Investing' in the so-called cryptocurrencies means no more speculation on price volatility. Therefore, manipulating cryptocurrency prices is the most powerful means of increasing the 'return from such 'investments' [10].

When we say "wealth", we think how much fiat money should be received for the bitcoins. This is, of course, fiction as we are talking about hypothetical wealth. The so-called miners are generating "wealth'' they put in circulation at their own discretion. In fact, the whole 'payment' system has become a big scam, which is a big **redistributive pump**. There is no more democracy, equality, consensus, and so on. 'Cryptocurrencies' and other assets have evolved from the play money of enthusiasts into a tool for supporting criminal activity, a tool for speculation/gambling and tax evasion. It is now the world of whales, sharks, and sprats. They can be divided further into hoarders, traders, knackers, goofs, ideologists, criminals, and naive users. There are a few tech-savvy guys on top who are in control. Perhaps, Nouriel Roubini was right when he wrote: "It is time to start recognising their issuers' utopian rhetoric for what it is: self-serving nonsense meant to separate credulous investors from their hard-earned savings" [11]. Indeed, all this activity can ultimately be viewed as supporting zero-sum activities.

WHAT IS MONEY?

To answer the question what money (nature and origins) is, we would need the entire issue of the journal or even write a separate book. Anyway, the conceptual approaches concerning money have dramatically different policy conclusions.

For the orthodox theory, money spontaneously arises as a medium of exchange from the attempts of trading individuals to minimise the transaction costs of barter. The standard approach considers money to be neutral. They view money as a veil, a simple medium of exchange, which lubricates markets and derives its value from its metallic content. It is repeated in many theories and models. For example, in the Bewley model [12], the *turnpike model of money* elaborated by Townsend [13], the new monetarist view of money as a *medium of exchange* of Kiyotaki-Wright [14], Lagos-Wright [15] and many others, which share the same perspective as Paul Samuelson [16]. For him, **money is a bubble, as it is an intrinsically worthless asset**, useful for executing trades between people who do not share a **double-coincidence of wants**.

There are also supporters of an unorthodox approach under various names: 'chartalism', 'neohartalism', 'tax-based money', 'modern money' or 'money as a creature the state'. The most discussed theory now is the Modern monetary theory (MMT) rooted in Chartalism [17–19].

It is clearly opposed to Marx's view that money is analytically inconceivable without understanding commodity exchange. But who remembers Marx today?

Someone may think cryptocurrencies are the latest attempt to improve capitalism through the monetary reform. Indeed, attempts to reinvent money have a long history. Shortly speaking, to understand so-called 'cryptocurrencies' one must understand money as such. Strictly speaking, one must follow some theory of money and, consequently, have a theory of value as a basis. However, this topic goes far beyond our article [20, 21].

KEY REASONS FOR BITCOIN DISTRIBUTION INEQUALITY

Obviously, the main question in mined 'cryptocurrency' environment is how literally to **metabolise electricity into money**. However, no cryptocurrency is money. There is also not an account of externalities. According to Nakamoto, since a predetermined number of coins come into circulation, the incentive can completely switch to transaction fees and be **completely inflation-free**. Pipe dreams, and nothing else.

In essence, 'cryptocurrencies' can act as a medium of exchange and as a unit of account **only** within a particular virtual community. However, for the time being, the so-called cryptocurrencies **cannot exist without fiat money systems**. How can money be worth a lot of money? It means that bitcoins are not money if they are worth a lot of money. On the other hand, the large supply of goods and services can absorb a significant volume of 'cryptocurrency'. It is not a case though. It

seems that the hidden purpose of the 'cryptocurrency' movement is to decentralize state power regarding the existence of currencies. It means that cryptocurrencies are intended to be the antidote — not the replication — of modern currencies. This meets the dream of Friedrich von Hayek, who advocated that people have 'freedom of choice' when it comes to what they use as money, that central banks should be abolished, and believed that governments should completely stop issuing money. People would be free to use whatever they chose as money, and free competition would show which money were the best.

It seems many supporters, and perhaps the creators, of cryptocurrencies were, and still, are, inspired by von Hayek's views on money and monetary reform.

Manipulation with volatility and bubbles

The future of bitcoins seemed to be overwhelming. Many people worry that bitcoins were a Ponzi scheme, with Nakamoto its Bernie Madoff — mining bitcoins when they were worthless and then waited for their value to increase. However, the most dedicated bitcoin loyalists maintained their faith, not just in Nakamoto, but in the system he had built. There are also various third-party institutions, almost exclusively non-banks, which have been active in developing and operating the currency and distributed ledger mechanisms.

The Nobel laureate Robert Schiller called the behaviour of the bitcoin network participants 'epidemic of enthusiasm' and 'social movement'. He explained the rapid development of a bubble in the bitcoin network in December 2017, and the record 'value' of $ 19,499 achieved by the excitement and emotions of the participants with the complete absence of significant financial grounds.

It is hard not to think of *bubbles* in the context of cryptocurrencies, and especially bitcoin. Extensive literature on financial bubbles should be helpful in this regard. Cryptocurrency price fluctuations are common and lead to risk and uncertainty. It may be tempting to think that bitcoin prices can rise forever, since agents assume that prices will be even higher in the future. Using the methods of the theory of complex systems, which originated in physics, Chea and Fry [22] found that the prices of bitcoins contain a substantial speculative bubble component (see also [23]). According to Robert Shiller, speculative bubbles are characterised by a peculiar "kind of fad or social epidemic following the principles of social psychology, imperfect news media and information channels" [24]. It means that the episodes of mass hysteria may still accompany even

rational speculation. Given that most of the existing bitcoins are held in dormant accounts, bitcoin seems to behave more like a *speculative asset* than a currency. However, the fundamental value of bitcoin is zero.

Possible explanations for emerging bubbles include self-fulfilling expectations (rational bubble), mispricing of fundamentals (intrinsic rational bubble) and endowment of irrelevant exogenous variables with asset pricing value (extrinsic rational bubble). The willingness of people involved in the transaction is the basis for treating 'cryptocurrency' as a valuable 'asset'. However, cryptocurrencies take on the quality of a *Ponzi scheme* if the value of the proposition depends on attracting more and more users. Therefore, irrational bubbles can be developed when investors are driven by psychological factors not related to the asset's fundamental value. Moreover, demand is related to mistrust of conventional stores of value. If people fear that excessive taxation, regulation, or social or financial instability places their assets at risk, they will increasingly turn to cryptocurrencies.

It is typical of a financial bubble that investors are buying 'cryptocurrencies' not to use in trading transactions, but because they expect them to increase in value. Therefore, some agents start *hoarding* bitcoins in anticipation of price increase. There are two types of hoards — voluntary and compulsory. It is called "hodles".

Roubini has already said that bitcoin and other cryptocurrencies represent "the mother of all bubbles". Thus, when it comes to financial (economic) bubbles, there is no a greater authority than Robert Shiller. Shiller said that the "best example right now" of *irrational exuberance* is bitcoin and "I'm interested in bitcoin as a sort of bubble. It doesn't mean that it will disappear, that it'll burst forever. It may be with us for a while".

Moreover, we do not trust the market. Crypto mania represents more of a psychological experiment than a serious investment. Shiller called it "glamorous" and "another example of faddish human behaviour" [25].

Scams forever and for everybody
There are four groups of fans of 'cryptocurrency': developers; miners; high-skilled users; 'brokers', and goofs. In essence, 'cryptocurrencies' can act as a medium of exchange and as a unit of account **only** within a particular virtual community. However, until now, 'cryptocurrencies' **cannot exist without a fiat money system**. It means that they can "become a plaything for the naïve and gullible, or a weapon of financial mass destruction for political belligerents around the world" [26].

Roubini said even sharper: "Scammers, swindlers, charlatans, and carnival barkers (all conflicted insid-

ers) have tapped into clueless retail investors' FOMO ("fear of missing out"), and taken them for a ride" [27]. Bitcoin's only real use has been to facilitate illegal activities such as drug transactions, tax evasion, avoidance of capital controls, or money laundering [28].

ILLUSION OF MARKET CAPITALIZATION
In financial markets, capitalization refers to the number of outstanding shares multiplied by the share price. As of March 15, 2019, we have 2110 'cryptocurrencies', which are traded in 16,282 markets, and the total 'market capitalization' of all 'cryptocurrencies' is $ 136,103,501,136. The table below shows the market capitalisation of three main 'cryptocurrencies'.

Name	Symbol	Market capitalisation	% of total market capitalisation
Bitcoin	BTC	$ 69137863084	50.8
Ethereum	ETH	$ 14209402572	10.4
XRP*	XRP	$ 13009406968	9.6
Total		$ 96356672624	70.8

* Not mineable

As defined above, 'market capitalization' is nothing more than **fictitious** capital. The main difference between issued shares (all shares of a corporation or financial asset) and 'cryptocurrencies' is that shares acquired and owned by them represent the ownership of the corporation by the person owning the shares. Consequently, they give them the right to receive dividends and to vote at the general meeting of shareholders. However, if you cannot sell your 'cryptocurrency' for fiat money, you have the only opportunity to 'earn' more 'crypto' with the help of arbitrage, which is bought and sold at the same time for the purpose of making a profit from the price difference. It requires sufficient price volatility and is extremely time-consuming.

The so-called market capitalisation of 'cryptocurrencies' has to be corrected for lost, 'dust', and 'hodlers'. As of November 2017, Chainalysis estimates that 3.79 million bitcoins (based on a high estimate) and 2.78 million (based on a low) have already been lost. It means that 17–23 per cent of the current bitcoins have been lost. These losses may result from an improperly directed transaction or the loss of a private key as a result of death or negligence. Some new studies confirm the findings of Chainalysis [29, 30].

Bitcoin uses an accounting structure called UTXO — Unspent Transaction Output. UTXOs are the internal

mechanism used in many cryptocurrencies to represent sets of spendable 'coins'. UTXO analysis does not give us the age / time when this bitcoin was first extracted, but when it was **last used** in a transaction. It means that all bitcoins have age and can be divided (clustered) according to their age. According to the Unchained Capital Blog, there is a common pattern after every rally in bitcoin's price named a "HODL wave" [31]. Further, they examined the history and the future of *dust*: UTXOs of bitcoin that cost more to spend in fees than they hold [32, 33].

MODELLING DISTRIBUTION

Suppose that at a given time in the network are N addresses with a positive balance, which contain W bitcoins. We consider the statistical characteristics of the distribution of wealth W and the number of addresses with a positive balance N on the bitcoin x-axis. Assume that the distribution of wealth W and the number of addresses N are defined by cumulative distribution functions $G(x)$ and $F(x)$. Then the value of wealth dW and the number of dN addresses in the dx interval are determined by the equations

$$dW = WdG(x) = Wg(x)dx \qquad (1)$$

$$dN = NdF(x) = Nf(x)dx, \qquad (2)$$

where *g(x)* and *f(x) are probability density functions of the distribution of W and N.*

The relationship between the wealth volume dW and the number of addresses dN in the dx interval is determined by the value of bitcoin x and sets the ratio between the probability density function $g(x)$ and $f(x)$ in the form

$$Wf(x)dx = xNg(x)dx \qquad (3)$$

$$f(x) = \frac{N}{W}xg(x). \qquad (4)$$

Taking the integral of equation (4) from 0 to ∞ we obtain

$$\int_0^\infty \xi g(\xi)d\xi = \frac{W}{N}. \qquad (5)$$

We use the Lorenz curve to estimate the inequality of wealth distribution by addresses with a positive balance. The cumulative share of addresses with positive balance $z(x)$ and the cumulative share of wealth $L(x)$ are calculated by formulas

$$z(x) = \int_0^x \frac{1}{N}dN(\xi) = \int_0^x g(\xi)d\xi, \qquad (6)$$

$$L(x) = \int_0^x \frac{1}{W}dW(\xi) = \int_0^x f(\xi)d\xi = \frac{\int_0^x \xi g(\xi)d\xi}{\int_0^\infty \xi g(\xi)d\xi}. \quad (7)$$

Comparing equations (6)–(7) and equations (1)–(2) allows using cumulative distribution functions $G(x)$ and $F(x)$ to construct the Lorenz curve

$$z(x) = F(x), \qquad (8)$$

$$L(x) = G(x). \qquad (9)$$

The inequality of wealth distribution is defined by the Gini coefficient as

$$Gini = 1 - 2\int_0^\infty F(\xi)dG(\xi). \qquad (10)$$

Another measure of inequality is the Kolkata index or k-index defined as k share of total addresses which possess $(1 - k)$ share of total wealth. [5]

$$L(k) = 1 - k. \qquad (11)$$

Geometrically, this is an intersection point of the Lorenz curve with the diagonal $y = 1 - x$. For a wide class of socio-economic systems with high inequality, there is a relationship between these inequality indicators shown in [6].

$$Gini = k \text{ for all } Gini > 0.79. \qquad (12)$$

To approximate the Lorentz curve in social systems with high inequality, it was proposed to use the curve Lamé or super-ellipse [7], which has the form

$$L^m + (1-z)^m = 1 \text{ for } m < 1. \qquad (13)$$

This ratio allows determining the index m to approximate the Lorenz curve by super-ellipse if the Kolkata index k is known according to the formula

$$m = -\frac{\ln(2)}{\ln(1-k)}. \qquad (14)$$

To determine the empirical cumulative density probability of wealth distribution and the number of addresses with a positive balance of bitcoins we used the data from website bitcoinprivacy.net for the moment of the developed cryptocurrency bubble (De-

cember 2017) and the post-crisis state (June 2018)*. In December 2017, the price of a bitcoin reached the level of 19,290 USD/BTC, and in June 2018 it returned to the price range of 6,000–7,000 USD/BTC. With a clear assessment bubble, the main goal of cryptocurrencies has become a form of high-risk financial speculation. It ultimately diverts productive resources towards supporting the *zero-sum game*.

In *Fig. 1* the cumulative probability densities of wealth *F* and the number of addresses *G* for the two specified periods are given. For comparison, the figure shows the Pareto distribution for rich addresses and logarithmically normal distributions for addresses with a positive balance.

The transition from the state of the cryptocurrency bubble to the post-crisis state and the overcoming of mass excitement did not affect the distribution of wealth in the system, but led to the emergence of a big number of new 'poor' addresses. For rich addresses with a balance of more than 100 BTC, we observed a stable distribution of wealth, which is well described by the equation

$$F(x) = 0.0828\ln(x) + 0.0431 \ \ with \ R^2 = 0.998. \ (15)$$

In this range, the probability density function of the distribution of the number of addresses and wealth are exponential ones, which indicates the presence of thick tails.

The intersection point of the curve (15) with the horizontal axis gives a parameter that conditionally divides the entire area into a range of 'poor' addresses (*x* < 0.595 BTC) and 'rich' addresses (*x* > 0.595 BTC). In the case of 'poor' addresses, their distribution is determined by the log-normal law.

At the same time, the excitement in the crypto-currency market leads to the shift of the *G* curve to the left, which means a big number of addresses with a small and minimal balance.

The obtained results confirm the existence of both lognormal distributions for the 'poor' and exponential distribution for the 'rich' addresses in the system.

In *Fig. 2* we present the Lorenz curves in the Bitcoin ecosystem during the cryptocurrency bubble and the post-critical period. For comparison, we constructed Lamé's approximation with *m* = 0.226 and the diagonal *y* = 1 – *x*. A big change in the exchange rate of bitcoin has led to the relative change of the Gini coefficient of less than 3 per cent.

Comparison of our inequality results in the Bitcoin ecosystem with the results of Paolo Tasca [8], shown in *Fig. 3*, demonstrates the high stability of the level of inequality in the Bitcoin ecosystem.
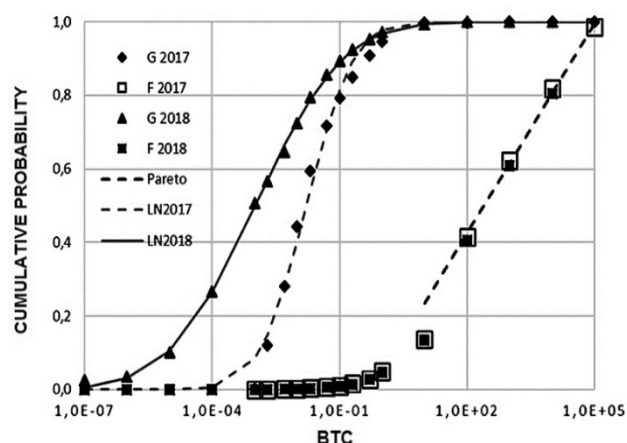
* After many long shutdowns, the administrator of this site decided to temporarily disable it.

Fig. 1. **Cumulative probability densities of wealth *F* of wealth and the number of addresses *G* for the two specified periods**

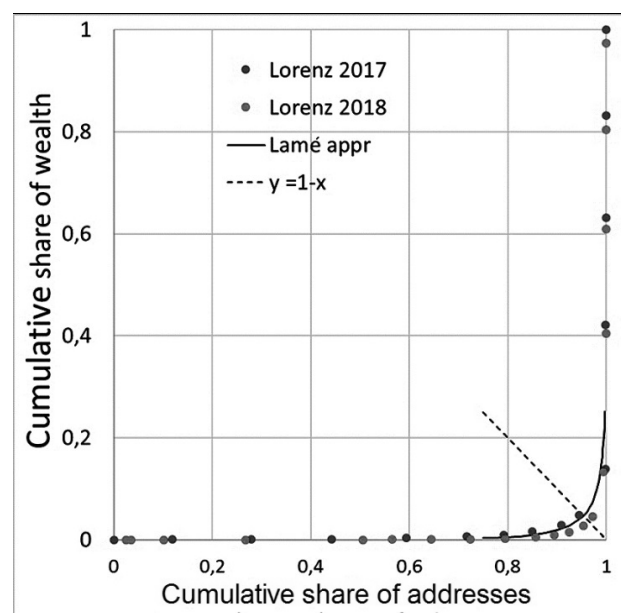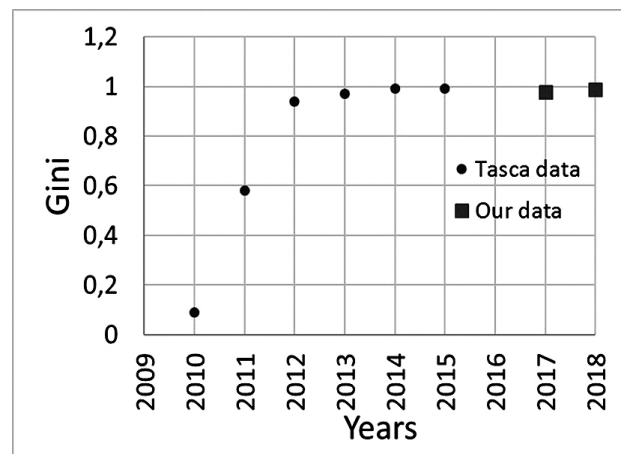*Fig. 2.* **Lorenz curves and Lamé approximation distribution**

Fig. 3. **Comparative picture of inequality**

Distribution of Addresses and Bitcoins

Bitcoin distribution (March 2019)

Balance	Addresses	% Addresses	% Addresses (cumulative)	Coins, BTC	% Coins (Total)	% Coins (cumulative)
0–0.001	11,295,892	48.43	100	2,277	0.01	100
0.001–0.01	5,235,013	22.45	51.57	21,341	0.12	99.99
0.01–0.1	4,206,319	18.04	29.12	138,788	0.79	99.87
0.1–1	1,857,802	7.97	11.08	590,351	3.36	99.08
1–10	576,019	2.47	3.12	1,513,772	8.62	95.72
10–100	134,320	0.58	0.65	4,402,776	25.06	87.1
100–1,000	14,661	0.06	0.07	3,709,066	21.11	62.04
1,000–10,000	1,780	0.01	0.01	4,397,776	25.03	40.92
10,000–100,000	100	0.00	0.00	2,219,202	12.63	15.89
100,000–1,000,000	5	0.00	0.00	571,958	3.26	3.26
Total	**23,321,911**			**17,567,307**		

Bitcoin distribution (September 2018)

Balance	Addresses	% Addresses	% Addresses (cumulative)	Coins, BTC	% Coins	% Coins (cumulative)
0–0.001	10,986,131	49.14	100.00	2,277	0.01	100
0.001–0.01	4,973,608	22.24	50.86	20,243	0.12	99.99
0.01–0.1	3,922,873	17.55	28.62	125,146	0.72	99.87
0.1–1	1,746,074	7.81	11.07	566,352	3.28	99.15
1–10	581,157	2.6	3.26	1,524,614	8.82	95.87
10–100	132,404	0.59	0.67	4,373,696	25.31	87.05
100–1,000	14,750	0.066	0.07	3,700,301	21.41	61.74
1,000–10,000	1,528	0.0068	0.01	3,366,888	19.48	40.32
10,000–100,000	123	0.0000055	0.00	3,157,831	18.27	20.84
100,000–1,000,000	3	0.0000000	0.00	443,396	2.57	2.57
Total	**22,358,651**			**17,280,744**		

Bitcoin distribution (September 2017)

Balance	Addresses	% Addresses	% Addresses (cumulative)	Coins, BTC	% Coins	% Coins (cumulative)
0–0.001	10,620,060	48.93	100.00	2,108	0.01	100
0.001–0.01	4,890,033	22.53	51.07	20,471	0.12	99.99
0.01–0.1	3,822,343	17.61	28.54	122,423	0.73	99.87

End of Table 1

Balance	Addresses	% Addresses	% Addresses (cumulative)	Coins, BTC	% Coins	% Coins (cumulative)
0.1–1	1,673,101	7.71	10.93	539,890	3.20	99.14
1–10	549,847	2.53	3.22	1,451,329	8.60	95.94
10–100	130,962	0.6	0.68	4,334,128	25.69	87.34
100–1,000	15,677	0.07	0.08	3,692,242	21.88	61.65
1,000–10,000	1,529	0.01	0.01	3,326,271	19.72	39.77
10,000–100,000	112	0.00	0,00	2,948,970	17.48	20.05
100,000–1,000,000	3	0.00	0,00	433,865	2.57	2.57
Total	**21,703,667**			**16,871,697**		

Bitcoin distribution (September 2016)

Balance	Addresses	% Addresses	% Addresses (cumulative)	Coins, BTC	% Coins	% Coins (cumulative)
0–0.001	7,164,625	67.86	100	5,458	0.03	100.00
0.001–0.01	1,765,595	16.72	32.08	30,084	0.19	99.96
0.01–0.1	724,696	6.86	15.36	89,929	0.57	99.77
0.1–1	591,370	5.60	8.50	457,334	2.88	99.20
1–10	202,350	1.92	2.90	1,136,689	7.16	96.32
10–100	102,904	0.97	0.98	5,375,940	33.87	89.16
100–1,000	5,756	0.06	0.1	3,950,850	24.89	55.29
1,000–10,000	451	0.004	0.004	2,609,991	16.45	30.40
10,000–100,000	45	0.000	0.00	2,079,374	13.10	13.95
100,000–1,000,000	1	0.000	0.00	134,995	0.85	0.85
Total	**10,557,793**			**15,870,644**		

Aggregate Comparison of Main Tendencies

Addresses for range 0–0.1	Coins for range 0–0.1 as% of total	Coins for range 1,000–1,000,000
2019 = 88.92% 2018 = 88.93% 2017 = 89.07% 2016 = 91.44%	2019 = 0.94 2018 = 0.85 2017 = 0.86 2016 = 0.78	2019 = 40.92 2018 = 40.32 2017 = 39.77 2016 = 30.40

CONCLUSIONS

All cryptocurrency schemes are nothing more than computer games designed for those who have a lot of time or a lot of real money. Since, to be richer you have to be rich. This is due to the fact that people tend to get rich quick. According to Roubini's apt definition, "bitcoin is a slow energy-inefficient dinosaur". All so-called cryptocurrencies are not payment systems. They are also not money. Given the scale of the movement, it does not deserve the attention it initially received. However, we should consider what Robert Shiller called "go viral". Even a new invention, the so-called *stable coins*, which are considered as a less risky entry into the world of 'cryptocurrency', is not protected from risky activities. They are also subject to actions such as "pump and dump" price manipulation schemes. In this world, there are not enough guarantees of equality and fairness. Here we can observe the growth mechanism of inequality in its pure form. And such research should be continued in the future.

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