

## An Analysis of Circulation of Decentralized Digital Money in Quantum Electrodynamics Space: the Econphysics Approach

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### Abstract:

The study aimed at showing how to create and release cryptocurrency, based on which one can introduce a new generation of this money that can continue its life in the quantum computers space and study whether cryptocurrency could be controlled or the rules should be rewritten in line with new technology. Regarding this, we showed the evolution of money and its uses in economic relations. According to the theoretical basics, the concepts, principles and rules of quantum theory in the physics economics were distributed and the use of modern money by simplified electrodynamic patterns of Richard Feynman was shown. The result showed that the subject could be tested through the physics if the system is closed, and due to the limited nature of the creation of cryptocurrencies like bitcoin, with such conditions, this currency can supply the borderless economics with a new approach with infinite probabilities in the quantum paradigm. Furthermore, given the structure of cryptocurrencies, one cannot control them completely controlled and it is better to rewrite the rules for the creation, release and uses of cryptocurrencies

### 1. Introduction

Nowadays, human relationships are more complicated than before, and the cyberspace allows the individuals the opportunity to go beyond the political boundaries of the countries and intensify and strengthen the dependence on

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technology-driven interaction, which leads in interconnected social relationships. All these speed up the move towards globalization every day.

The Stone Age did not finish because of the end of the stone, but with the introduction of new technologies, and today with blockchains and cryptocurrencies, we may be so close to the end of the traditional banking system.

The countries behind the others in this regard will depend on the leading ones entering the blockchain sooner.

One of the tools able to weaken the effect of powerful countries in today's polar world is establishing a currency without borders not under the control of any central banks, in which case, any sanctions against a country will badly affect all countries. A useful tool in this area is cryptocurrencies. This kind of currency, like quanta, can bond the economies of developing countries like Iran to the global economy, and any pressure on, say, the Iranian economy or any other country affected by it would be the imposition of embargo on all the inhabitants of the planet.

There have been no comprehensive studies regarding cryptocurrencies, and most of the existing literature is the personal interpretation of the individuals and composition like. Nowadays, when the new generation of decentralized currencies is being created, computer engineers on the competing arena are building quantum processors able to reverse hash functions. Thus, the new generation of cryptocurrencies has to be rewritten and interpreted through quantum theory. Some studies have been conducted on the physics economy through thermodynamic approach, yet due to the closed and unrestricted nature of the money-creating system, it was not possible to compare it with the reality that but with the introduction of cryptocurrencies we have closed the gap in reaching the goals of the physical-economics in monetary terms. This is because many of the cryptocurrencies, the most known of which is bitcoin for people, will eventually create as many as 21 million, which is a step forward regarding the money-creating system being closed. Moreover, cryptocurrencies can end being obsolete or restrained by one country, with the infinite release of their own copies in the parallel quantum worlds, called blockchains. One method for analyzing the economics of physics is metaphorical instrumental method. In this method, when the concepts of the two domains have similar fundamentals, so that the analogy is allowed, the main question is dissolved, and the problem is removed, so that the validity of the initial assumptions is not important and what matters is the credibility of the predictions provided by the theory.

In this paper, cryptocurrencies, like photons, in the exchange among human beings, which is like electrons, have the potential to spread infinitely through a market that resembles a magnetic field, stopping the governments from creating fiat money. Regarding this, the simplified physical relationships of Richard Feynman are a good option for analyzing how this money works. Furthermore,

the simulated electromagnetic space can simplify the structure of trading thus control inflation by raising the welfare of individuals.

The purpose of the study is to show how to create and release cryptocurrencies, based on which one can introduce a new generation of money that does not face the problems and limitations of previous generations.

Moreover, it considers whether decentralized currencies can be controlled, or should the rules be rewritten for new technology. In this paper, the second section tackles the literature and research, in the third section the methodology of physics and quantum mechanics in a decentralized monetary space, and in the fourth section concludes on cryptocurrencies through quantum results.

## **2. Literature**

### **2.1 Theoretical basics**

Money should be easily portable and easily moved to various locations for purchase (Murphy & Seitzinger, 2015). In conventional economic terms, money is a useful commodity with a medium of exchange or part of the calculation and saving of value (Frnham, 2005). Nevertheless, as a facilitator of trade, money voids any meaning. The money is neutral and only has quantitative meaning (Giddens, 2010). A banknote is only a banknote in economics, but when entering the society it is not just a banknote because money is an integral part of life (Walzer, 2010). Unlike the past, the foundation of the world economy is no longer agriculture or industry and is controlled by activities impregnable and intangible (weightless economy), in which all products are based on information (Okupski, 2016).

Structurally, the digital money identity is the bits existing in electronic devices memory, with value equal to the value of cash (Jalili, 2000), encompassing two groups:

- 1) the electronic money whose identity is identifiable (Planning and economic Assistance, 2005).
- 2) Cryptocurrencies have the identity of their owner and can be spent without any traces, and it is not possible to trace it in any bank (Zamani, 2007). This method differs from the conventional electronic payment systems (Fung and Halaburda, 2014).

In a traditional financial system, the new money is produced by a central bank, yet most the networks of most of the cryptocurrencies do not have a central bank and use distributed computers. This means that all the processors of the computers are converted to a single processor through blockchain accepting heavy computing load.

Cryptocurrencies were first released in early February 2009 entitled bitcoin following a paper called Nakamoto, and introduced to the world. This programmer created an open source electronic payment system called Bitcoin

system that runs on a decentralized control system without a central server or relying on credit institutions. Thus, this system needs an alternative mechanism to inject money in circulation. In doing so, thousands of miners computers work together across the Internet, with the process of processing digital money transactions called mining in a computational competition with winning money-makers (Badev and Chen, 2014).

On the other hand, macroeconomic and macroeconomic fluctuations are generally considered by the physics economics and financial physics as they have irregular and unpredictable behavior. Thus, the analysis and study of stock market fluctuations with time series information is included in such patterns. Creating cryptocurrency usually starts with the Initial Coin Offering (ICO) to obtain the necessary resources for the development of the currency to continue to become a token, and converted into money in case of being accepted in Cryptocurrency Market. In many financial markets, cryptocurrencies are traded on stock exchanges online, which cannot be anything separated from the financial and monetary markets that operate beyond the limits of the macro-limits of countries (Ookupsky, 2016).

## **2.2. Experimental studies**

In their studies, Hoseini & Renani (2011) compared money with energy showing that in a closed quantum economic system, money remains constant<sup>1</sup> and follows the law of survival, it has energy characteristics, thus unit rules prevail these two rules. Therefore, like energy, money has storage capability and is convertible to other forms. Through theoretical and hermeneutical methods, Mohammad Hadi (2011) showed that the quantum paradigm, uncertainty, ambiguity and complexity are among the features of the modern management vision because, unlike Newtonian sciences that are atomistic, in this paradigm, everything is looked holistically from the quantum angle. Through the news and distribution network among the economic systems, Feld, Schonfeld and Werner (2014) concluded that bitcoin is widely accepted in popular supermarkets and coffee shops, and its popularity is increasing. Barber, Boyen, Shi and Uzun (2014) show the breadth of the Bitcoin encryption, and its strong point is its simplicity, flexibility, and decentralization. Fang and Halaburda (2014) showed that bitcoin has lower transaction costs for online merchants compared to payment tools such as credit cards, as there are no third-party agents. Roth (2015) concluded that by strengthening bitcoin security system, one could use it as a non-inflationary alternative to money. Kubat (2015) stated that a curtailed currency and a reduction in the likelihood of government influence in the supply of money are among the benefit of using bitcoins or similar currencies, which helps paying to happen very quickly around the world. Orrell (2016) concluded that storing value and the means of exchange of money are two distinct issues and

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<sup>1</sup> The total bitcoins of the netbook never exceeds 21 million bitcoins

this central dichotomy is at the heart of quantum nature of money. This is because money, as a fundamental quantum quantity, has a constant value that has a constant value like an electron. Gaspareniene, Remeikiene and Schneider (2016) concluded that the rapid development of electronic services sets the shift in the concept of shadow economy to consumers. In their introduction to the regulation of cryptocurrencies in parliamentary studies, Nouri and Navabpour (2018) stated that the speed of legislation in Iran is much less compared to blockchain transformation, and the governments should be more flexible in digital economy.

The introduction of the physical modeling of monetary and financial markets, heralded by Samuelson, has a central role in the balance of thought between Newton and Descartes. Thus, the metaphorical use of thermodynamic concepts such as energy, temperature, heat, and work of the economic variables were simulated in accordance with some common characteristics. Then the results and implications of these categories in thermodynamics, such as the first law, the energy conservation law and the second law, the entropy law, were generalized to the economy. Here, the atom and the sub-atom are of the quantum physics tool, which with their metaphoric use as money and man, one can generalize the results of their examination. People such as Friedman supported these instrumental concepts. This method actually clears the fundamental question and clears the form of the problem, so that the validity of the initial assumptions does not matter and what matters is the credibility of the predictions provided by the theory (Hosseini and Renani, 2011).

The metaphor is used when the concepts of the two domains have similar fundamental features, so that the analogy is allowed. Here, human interaction and the release of cryptocurrencies are very similar to the behavior of fermions and bosons, and this the unpredictability of the entry of quantum topics. The most fundamental assumption for economic physicists is that the total amount of money in a closed economic system remains constant. In this case, the balance and the law of distribution of money are used only for short and temporary periods. As in a closed economic system, money remains constant, with the assumption that the government and the private sector do not create money and the bank, the money follows the survival law. Currently, some cryptocurrencies can have mining limit and be closed. They also seek to formulate past statistical data in the physics economy. Given the newness of decentralized money, this study tries to identify and introduce a new model of how cryptocurrencies is created. In doing so, we must first have a way to deal with rival technology that is by knowing quantum processor systems because with the introduction of these processors through reverse engineering, one can retrieve encrypted functions. The clearest difference of the study with all the studies in the world is showing the pattern of money creation based on quantum electrodynamics models, which can be the nature of generation of decentralized money that can provide long-term life

span with all existing threats. In addition, most countries have faced problems to legislate this money because they are unaware of the way and how they are created. None of the studies has provided a clear picture of the functioning and philosophy of creating and maintaining a cryptocurrency in blockchain, so it is almost impossible to legislate what we are not aware of, so the study seeks a more precise analysis of how the currencies evolve and last by several quantum physics theories to give a different perspective to decision makers and readers.

### **3. Uncertainty, a new methodology in the physics economy**

We can consider economic systems as a process of interaction of the information structure, motivation, incentives, investment, and innovation, which is a Brownian move from a collision between particles and irregular and random (Hosseini and Renani, 2011).

In this process, one can state that a game is formed between particles at a small social level. The outcome of this game will determine which way the innovations of the system will be directed towards that shows the overall performance of the economic performance system. Banking system has changed as information broker between depositors and borrowers through the influence of technologies based on the Internet and social networks. People have created new rivals for banks by new businesses and internet-based technologies, which is so similar to sub-atoms in quantum physics (Orlell, 2016).

The word quantum is used to refer to things that are both particle and wave-like. When an electron is wave-shaped, if it encounters an obstacle that has two slits, it can simultaneously pass from both slots and convert from the waveform to the particle (Schmied, 2016). The wave and the particle that are capable of converting to each other are called quanta, which is as the raw material that the whole universe originates from. In fact, quantum physics states that the atom has no definite limits unless it is seen. The exact observation and attention decrease the spatial expansion of atoms. Contrary to the Newtonian physics view and that, the realities of the universe are independent of us in our universe, in quantum physics the realities depend on us and reality is built up with our mental activity.

Einstein's theory of relativity states that energy is discontinuous and is transferred by unit called quanta or energy packet. With the invention of the quantum concept, when light is transmitted from one place to another, it cannot be continuously transmitted to any extent and must be transmitted bit by bit as quanta (Merzbacher, 2002). By changing the term in Werner Heisenberg (1970) quantum world of particles (money), a particle in a single instant can pass through two, three, four, and thousands of slots.

Quantum mechanics also states that a quantum particle (money), like an electron, does not actually have a specific location. It can be near you at a moment and away from you at the same time. Indeed, the nature of quantum particles is their probability. We can only say how much a single particle is

probable to be at a single point. We can calculate this probability with high precision, but it is not currently clear where this particle is, and this process happens to cryptocurrencies at any moment.

The theory of electromagnetic field, one of the fundamental forces of nature, was explained by quantum theory. This means that in the field of magnetic field, money, as a market, is quantified in a quantified manner with a probability of infinity (Merzbacher, 2002). Cryptocurrencies have the possibility of scaling up smaller units and high scalability, can become a piece of money, and each moment in another market can be joined together and make larger currency units.

In this case, there are pairs of physical properties whose exact values cannot be obtained accurately simultaneously. The most famous pair is the size of the movement and the place that become meaningful in this research of money and humanity. The size of the movement or momentum is the result of the multiplication of speed in mass. However, in the case of momentum, there are no definite physical definitions, but it can be considered as the craze for motion by a particle (Gasiorowicz, 2005). The principle of uncertainty in quantum physics states that if you measure one of these two properties, location (human) or the size of the movement (money) carefully, you will be uncertain about the other. This means that if you carefully measure the location of a particle, there will be great carelessness in the size of the movement. Therefore, one cannot have the exact value of both features simultaneously (Chen Wang et al., 2016).

According to Heisenberg's uncertainty principle, certain pairs of physical properties, such as man and money, cannot be specified with the desired precision. In other words, the increase in the precision in the quantity of one of these means the reduction in the accuracy in the quantity of other property. One important results of the uncertainty principle is the creation of matter from nothing. According to this principle, one cannot calculate the energy of a point of space exactly as zero, so virtually in a space void of nothing (exactly nothing, even no energy), the particles of matter and antimatter are created and then converted to energy.

Cryptocurrencies have the feature of being created from nothing. Indeed, what are bitcoin or ethereum, and so on? In addition, in the quantum world, any interference with the operation of a large macroscopic universe causes us to collapse the particle waveform and turn it into a particle because the detection of quantum particles leads to the collapse of wave properties. This means that we change the surrounding world to some extent with each interaction, or in other words, the observer affects the one being observed (Schmidt, 2016). This is exactly the point where decentralization of currencies is their strength as the observation of cryptocurrency leads to the collapse of the fluid structure and their being particles.

The economy physicists tend to start their work with empirical evidence and then extract patterns from information (Chatterjee, Yarlalagadda, and Chakrabarti, 2005). According to Yarlalagadda and Das (2003), in the first step, like energy, money determines the power to do the job. In the second step, as energy, money can be stored; and, thirdly, money such as energy can exist in forms that are convertible into each other and assuming the government, the private sector, and the bank do not create money, the money follows the survival law (Ksenzhek, 2007). As the essential feature of the Energy Conservation Law, it states that energy does not come into existence or disappear (Cockshott, 2009). There are several criticisms to the aforementioned. As was seen, the most fundamental assumption for economic physicists is that the total amount of money in a closed economy system remains constant. Although economic agents do not have the right to print money and only have the right to trade, in reality the government and even private institutions, such as banks, are making money on a large scale. However, to determine the amount of release of digital money, we face the inherent limitation of numerical knowledge and according to Pareto, it is ridiculous to say that we try to prove all the data (Hosseini and Renani, 2011).

In the economic systems, people have a long-term orientation in their decision-making. Thus, in physicists' thought about analyzing the behavior of atoms and elements, studying human behavior and its prediction is much more complicated and needs quantum patterns because not all the properties of a system can be understood accurately. Unlike the classical physics, other relationships lose their decisive and deterministic meanings and thus become more consistent with the voluntary nature of the world economy (Carsten, 1991).

In this case, the statistical equilibrium has meaning and the rules of the balance of economics are questioned (Cockshott, 2009).

#### **4. The findings of the decentralized money in quantum space**

The paper considered the space of human presence and money as the quantum atom and sub-atom. Metaphor is a method for gaining an understanding of complex and vague phenomena with the help of already known concepts by establishing similarities between the research and those concepts. Here, the atom and sub-atom are a quantum physics tool that can be applied metaphorically to them in the form of money and man.

The results can be obtained through instrumental concepts that have been solved substantially and regardless of the validity of the initial assumptions, the predictions provided by the theory Generalized to the economy.

Metaphor can be used when the concepts of the two domains have similar fundamentals, so that the analogy is allowed. The metaphor is used when the concepts of the two domains have similar fundamental features, so that the analogy is allowed. Here, human interaction and the release of cryptocurrencies are very similar to the behavior of fermions and bosons, and this the

unpredictability of the entry of quantum topics. The most fundamental assumption for economic physicists is that the total amount of money in a closed economic system remains constant. In this case, the balance and the law of distribution of money are used only for short and temporary periods. On the other hand, the law is the law of money distribution. As in a closed economic system, money remains constant, with the assumption that the government and the private sector do not create money and the bank, the money follows the survival law. The only money that can be closed now is bitcoin, bitcoin cash, ripple, lightcoin and many cryptocurrencies have a limit of mining. However, some currencies, such as ethereum, do not currently have this property, but they can be considered limited regarding smart contract. Smart contracts make transactions and processes absolutely guaranteed and without third parties.

Activities and records of intelligent contracts can be tracked and irreversible. Smart contracts include all information about the terms of the contract and the implementation of all targeted actions automatically.

Thus, Buterin, the creator of ethereum, probably considers that the mining stop after the full expansion of ethereum at 120 million eaters.

The life of the centralized money today depends on the establishment of the Internet. Nevertheless, the Internet has two major problems. First, any exchange of money on the Internet is a copy without copyrighted of the personal information stored somewhere and the second problem is the Internet space being rented. Even by owning a site, we are not considered the owner. Thus, blockchain has been able to solve the two major Internet problems by creating a parallel world. Thus, during the transaction, the main form of information and the ownership are given to the one with the private key. When people own a cryptocurrency, there is a great deal of copy of what other people can see, but only the owner can use it. However, in the centralized system of the bank, it can cancel the transactions whenever it wishes, but in the blockchain, if the transaction is correct, there is no possibility of return or blocking. When a transaction is recorded in blockchain, the virtually every copy in the world is created peer to peers, visible to individuals, and such cryptocurrencies in quantum worlds go to quantum immortality, and one can prove durability through this perspective.

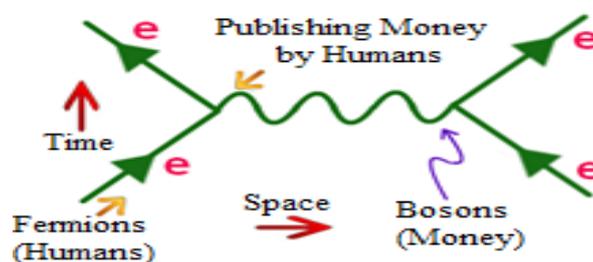
One of the most important principles of quantum phenomena is that if these phenomena are controlled, their characteristics will be lost and destroyed. Thus, cryptocurrencies that come under control and legislation will be destroyed. Electronics and computer engineers created cryptocurrencies based on algorithms and physics and found economical meaningful by pass of time. Hence, they should be analyzed with something of their own kind. The distribution of money between the agents, the flow of money, setting borders and the decoding digital money are all subject to physical rules as they are transmitted in the physical

processes. In the model, the classical and neoclassical paradigm of the market is where competition exists and the money flows at the expense of interest rates and falls into the hands of individuals. However, in the quantum approach, the release of fiat money can accumulate in a variety of ways away from storage to receive interest rates, contrary to the functional flow of money due to different motivations and the ultimate use of money.

In quantum physics, the particles are generally divided into two groups: fermions (humans) and bosons (money). All particles of the matter are in fermions category. These particles have messaging systems among them that make them change. Money (bosons), or particles in other words, send messengers of messages between humans (fermions) and sometimes between themselves. It is as if any particle in the universe is either a boson or a fermion. For example, the cryptocurrencies, exchanged between the buyer and the seller, are as boson, and the two sides of the deal are fermions as well. The blockchains (quantum fields) are formed of cryptocurrencies (messenger particles) or bosons, as the task of transferring power lies with this particle group. Now, if the force we consider stems from monetary policy (electromagnetism) of commercial cycles, then cryptocurrencies will transfer this force. The method is that human (the particle) emits money (boson) that reaches a human (the particle of another substance).

This is very similar to what miners or ordinary people do during the transfer of cryptocurrencies. It describes all the interactions between the money owners (charged particles) in terms of the exchange of photons.

If we use mathematics to describe these interactions, it becomes very complicated, as all the backgrounds occurring in this interaction should be expressed that needs the entire blockchain be read, which no supercomputer is capable of reading it at present. A better way of expressing this is the graphic representation of these interactions. In doing so, we need a simple graph that simply shows the boson exchange between two fermions. These charts, known as Richard Feynman's diagrams, have become important tools in quantum theories and quantum fields. You can see in Figure 1.

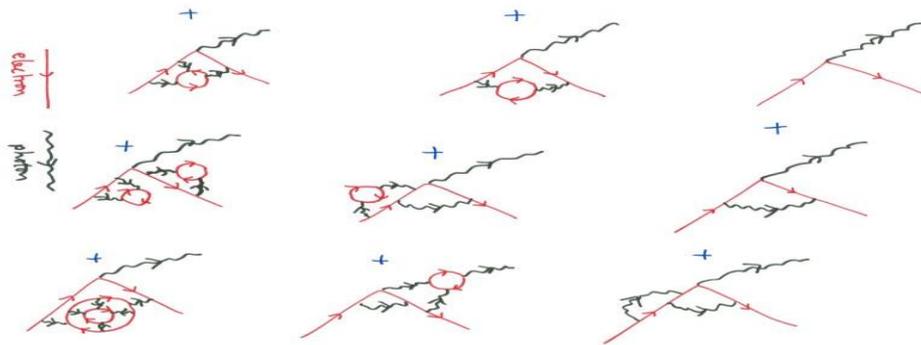


**Figure 1: Richard Feynman's diagram from quantum field and quantum field theory book**

Modified by the author for economic relations

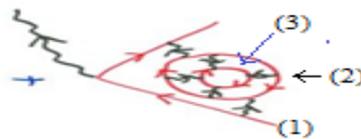
The horizontal direction shows the axis of space in space and the upward direction shows the pass of time. The straight line shows the man (here fermion) and the wavy line shows money (here the boson), and the point of connection of wavy lines and straight lines shows the emanation of money from humans. We start from the bottom. Two humans (fermions) are approaching each other, exchange money (bosons), and the money is absorbed and the humans move apart. This is the simplest background to show the interaction between two humans, but the point is that one can consider infinite number of these cases.

Some other examples of these diagrams are seen in Figure 2 for a given interaction. These diagrams help greatly simplify the theory of quantum electrodynamics. The mathematical description of this interaction is that the probability that the human (the input electron) will end with exchanges with the uncertain final money, with the money (the size of the movement) of the known originals.



**Figure 2: Richard Feynman's diagram based on Quantum World book**

As is seen in Richard Feynman's diagrams, there is an infinite likelihood of movement that, if we want to visualize it in the space of money, in figure 3, the person 1, by paying person 2, is likely to get the same amount of money in a rotating process. Alternatively, person 2 may transfer it to person 3 who can be an accumulator of money and other infinite number of probabilities. In this case, the diagrams help to visualize Quantum electrodynamics (QED) theory.



**Figure 3: Modified for economic relations by the author based on Quantum World book**

When we add up infinite shares bring together the number of these diagrams that lead to an interaction, an infinite result is obtained. This problem suggests that in the monetary system of central banks, human behavior and needs (fermions) are considered measurable, and if there is an infinite number of individuals and cryptocurrencies, this is impossible. In this case, it is very difficult to legislature to control it. Richard Feynman proposed renormalization process to deal with this problem. This process involves lowering the infinite and negative quantities defined in such a way that with the exact mathematical calculation, the sums of the infinitely negative and infinitely positive values that arise in the hypothesis neutralize almost each other, and only the remainder remains small and finite.

Renormalization is mathematically suspicious because according to this process, the numbers obtained for the mass and charge of an electron can be any finite number. This can be seen in the distribution of the ripple or Cardano that, with each transfer, some of the ripples exit the circulation, and after infinite transactions, there should be no ripples left. However, the advantage of this method is that we can select infinite negatives that lead to the correct and finite answer, but the problem is that the number of transactions of the individuals (the mass and charge of the electrons) cannot be predicted from the hypothesis. In fact, the behavioral needs and the number of monetary transactions of individuals (mass and charge of electrons) are optional elements in theories and do not anticipate any theory, and these numbers become optional elements into theories.

However, if the behavioral needs and the number of people's money transactions have been proved only once, one can use QED for very accurate predictions highly consonant with observations, through which one can reach the subject of legislation of cryptocurrencies.

In America, due to the importance of new financial instruments, bitcoin has been considered as the Internet, and a number of legal funds for the taxation system has been established in 2018. With fear of the risk of weakening Yuan status and economic turmoil in 2018, China banned any activity on cryptocurrencies in the country. Europol believes that cryptocurrencies are not electronic money, and they are only a risk-taking investment threatening the long-term financial stability of the world. South Korea is the most advanced country in cryptocurrency legislation. In the winter 2018, the system of using a bank account with the real name for buying and selling caused a sharp decline in the price of cryptocurrency. In Iran, the Central Bank banned cryptocurrencies transactions in all institutions under the supervision of the Central Bank in Iran in April 2011, but given the possibility of the return of the sanctions, there is a better approach towards it. With all stated, cryptocurrencies are a neutral technology. Just like the Internet, many improvements are needed to turn it into an inclusive phenomenon. The Internet was originally developed with some protocols and was only used by developers and technology enthusiasts, but now it is so widespread.

## 5. Conclusion

According to the Feynman's model, contrary to the central banks conception of controlling the flow of money, there is no possibility of directing money in this approach, and according to Brownian motion, they continue their release. The very freedom of action regardless of the interest rates can lead to a lack of full control of consumers of this money and a good way to eliminate monetary restrictions and sanctions.

It is very hard for many risk-evaders to accept cryptocurrencies as money. However, away from the confirmation and denial of the political and scientific people, traders and ordinary people as a way to receive and pay have accepted this money, and today many people use it in Iran. Prior to the formation of the economy, something generally accepted used to be called money. Indeed, cryptocurrencies are nothing but a long list of numbers and codes that do not have a real-world interface other than computer and algorithmic power and due to harder mining and the scarcity, some of them face price changes. In addition, the laws of the countries have a strong effect on the price of these currencies now but with the formation of a new generation of money in line with quantum theories and the countries' laws will have fewer effects on their prices due to freedom and high monetary democracy.

In quantum technologies, zero and one logic is not prevailing anymore, and the phenomena change in one spectrum. The basics of linear patterns in the economy are becoming obsolete, and there can be any possible spectral patterns with quantum phenomenon. The most important issue is that, when the quantum phenomenon is controlled, it will lose its value. Thus, the activists in public economy in the world, looking to control cryptocurrencies, will essentially harm its particle nature and will destroy its main functional property.

In trading using cryptocurrencies, the national boundaries are gone, and any idea can provide its own cryptocurrency. Thus, the central banks lose their power in controlling the supply of money to some extent, which will disrupt the supply of money, causing turmoil in the supply of money. This issue with quantum looks and uncertainty seems essential. Hence, the best thing for central banks like Iran is that instead of opposing cryptocurrencies look to create parallel conditions in line with this type of currency, so that the cryptocurrencies exchanges are based on it. Thus, besides increasing public confidence and the up-to-date monetary policy, they can control the direction of exchange transactions and take the public sector's financial need for trade. In addition, given the structure of cryptocurrencies, one cannot completely control them, and it is better to rewrite the rules for their creation, release and function.

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## تحلیلی بر گردش پول دیجیتال غیر متمرکز در فضای الکترو دینامیک کوانتوم؛ رهیافت فیزیک اقتصاد

### چکیده

هدف این مطالعه نشان دادن چگونگی خلق و انتشار ارزهای رمزپایه است که بر اساس آن بتوان نسل جدیدی از این نوع پول را معرفی کرد که بتواند در فضای رایانه‌های کوانتومی به حیات خود ادامه دهد و بررسی این موضوع که آیا می‌توان ارزهای رمزپایه را تحت کنترل درآورد یا اینکه باید قوانین را هم جهت تکنولوژی جدید بازنویسی کرد؟ در این راستا، ابتدا با نشان دادن سیر تکامل پول و به کارگیری آن در روابط اقتصادی پرداخته‌ایم و با اساس مبانی نظری، مفاهیم، اصول و قوانین نظریه کوانتوم در علم اقتصاد فیزیک، توزیع و استفاده از پول نوین از طریق الگوهای ساده سازی شده‌ی الکترو دینامیک ریچارد فاینمن نشان داده شده است و نتیجه بر آن شد که زمانی یک موضوع از طریق فیزیک آزمایش پذیر است که سامانه بسته باشد و با توجه به محدود بودن خلق کریپتوکارنسی‌ها مانند بیت‌کوین که واجد چنین شرایطی است و این پول می‌تواند رویکردی جدید با بی‌نهایت احتمال در پارادایم کوانتوم پیش روی اقتصاد بدون مرز بگذارد. همچنین با توجه به ساختار کریپتوکارنسی‌ها نمی‌توان آنها را بطور کامل تحت کنترل درآورد و بهتر است قوانین را هم جهت خلق، انتشار و کارکرد کریپتوکارنسی‌ها بازنویسی کرد.

**کلید واژه‌ها:** بیت‌کوین، پول غیرمتمرکز، پول کوانتومی، اقتصاد بی‌وزن، کریپتوکارنسی.