

IT opportunities: increasing the level of financial security in digital economy

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ABSTRACT

The article aims at studying the key features of modern information technology in the financial sector, in particular, the main problems and risks of financial security. During the study the experts whose professional activities had been related to financial security and financial law for more than 10 years were asked to fill out a semi-formalized questionnaire. Based on an expert survey, the authors of the article have determined the factors of financial security influencing the digital economy, characterized its components, and presented the opportunities of digital technologies to ensure financial security. The study has concluded that there are certain threats to the circulation of cryptocurrencies in the financial systems of various countries. They consist of ousting real national currencies, distorting interest rate policy, changes in monetary aggregates, and capital flight. There are promising opportunities for introducing digital technology into the functioning of national financial systems, which will help them increase the safety and efficiency of financial transactions.

Keywords: Blockchain, Cryptocurrency, Digital economy, Factors of financial security, Financial security

Introduction

The rapid development of information technology causes an active transformation of the global financial system and financial systems of various countries [1, 2]. The most dynamic changes occur in the financial market and financial infrastructure (banking system, foreign exchange markets, and stock exchanges). They indirectly affect other segments of the financial system: national and local finance, the finance of non-production spheres, business entities, and the population [3, 4].

Over the next few years, the financial sector will experience rapid development of IT, in particular, Internet banking, algorithmic trading, the Big Data industry, credit electronic

platforms, blockchain, and cryptocurrencies, as well as a gradual abandonment of cash payments.

The expected positive consequence of these changes might seriously limit the shadow economy and everyday corruption. However, this process is accompanied by a significant restructuring of the usual way of life common to most people. The negative consequences and threats of transforming the current financial system include the disappearance of a classical banking system, the destruction of the deposit market and the system of accumulative pension provision, radical changes in the labor market, and dramatic social changes caused by the extinction of some jobs due to the spread of new IT, including in the financial market.

Today, one of the most promising areas in the financial security of banking systems and states is the study of the risks of cryptocurrency development for financial security. It is relevant to conduct a study to find opportunities for the emission of cryptocurrencies by central banks and the implementation of the blockchain model in national banking systems and international settlements.

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Literature review

With the development of post-industrial society, scientific works begin to deepen the theoretical background of objects, essential characteristics, and categorical features of the digital economy. There is a new direction of scientific research on the regulation of digitalization processes, [5, 6] prospects, risks, and threats of introducing digital technologies and utilizing the FinTech phenomenon, [7, 8] as well as the digital transformation of financial intermediation [9].

The analysis of scientific views shows that they differ in clarifying the target action aimed at ensuring financial security in varying degrees of detail. Most often, it is associated with the state of a particular subject and emphasizes the influence of internal and external factors, as well as the ability to resist them (**Table 1**).

Table 1. Different viewpoints on the category of "financial security"

Author, source	Definition of the "financial security" category
M. de Goede [10]	The state of financial relations, when acceptable conditions and necessary resources are created for expanded reproduction, economic growth, the well-being of the population, stability, and preservation of the integrity and unity of the financial system to resist internal and external factors of financial destabilization in any country.
N. Boy [11]	The state of financial and credit spheres characterized by balance and resistance to internal and external negative impacts and the ability to ensure the economic growth and effective functioning of the national economic system.
S.M. Amadae [12]	The state of banking institutions characterized by balance and resistance to internal and external threats, its ability to achieve the goals set and generate a sufficient amount of financial resources to ensure sustainable development.

Research hypothesis: Financial security depends on the functioning of cryptocurrencies in the financial market and the potential of digital technologies to ensure financial security. Study objectives are as follows:

- To determine the factors of financial security influenced by the digital economy;
- To reveal the specific factors of financial security in the digital economy through the qualitative characteristics of digital technologies and financial innovations concerning expectations and impacts on financial security.

The article consists of an introduction, literature review, methods, results, discussion, and conclusion.

Materials and Methods

We applied several general and special methods, including comparison and generalization when analyzing various scientific views; the abstract-logical method for conclusions; the expert survey method. The main method was a survey of experts in the field of research. The experts were asked to fill out a semi-formalized questionnaire.

Due to the method of an expert survey, we determined the main factors of financial security influencing the digital economy and certain components of financial security.

The experts in the field of financial security and financial law (23 respondents) participated in the survey. The experts comprised people whose professional activities had been related to financial security and financial law for more than 10 years.

All the respondents were informed about the survey objective and our plans to publish the results in a generalized form.

Results and Discussion

The experts argued that the effectiveness of the financial security system depends on the identification of its factors (**Table 2**).

Table 2. The factors of financial safety influenced by the digital economy

Factors	Certain features of financial security and its components
Economic	<i>Financial and credit:</i> financial stability, inflation, sources of financing, investment climate, foreign capital, the tax burden of business entities and their financial stability, living standards and public confidence, the amount of savings, competition, the cost of credit resources, the credit activity of borrowers, loan debt, etc.
	<i>Budgetary:</i> world financial market, capital market, economy, the amount and balance of budget money, fiscal buffers, foreign borrowings, investment climate, export/import structure, corruption, property rights to public resources, strategically important enterprises, etc.
	<i>Tax:</i> the shadow and offshore economy, corruption, the financial state of business entities and citizens, etc.
	<i>Currency:</i> crises in the world foreign exchange market, the amount and structure of exchange reserves, inflation, an exchange rate regime, a national currency exchange rate, capital outflow, dollarized and shadow economy, legal destabilization, etc.
Institutional	<i>Financial and credit:</i> the national financial and banking system, financial and money market, regulatory framework, monetary policy, the independence and transparency of central banks, etc.
	<i>Budgetary:</i> the national budget system, the payment and settlement system, regulatory framework, budgetary policy, etc.
	<i>Tax:</i> the national tax system, tax legislation, taxation mechanisms, methods of assessing objects of taxation, etc.
	<i>Currency:</i> a national currency system, the currency market infrastructure, currency legislation and regulation, exchange rate policy, etc.
Organizational	<i>Financial and credit:</i> a money emission model, mechanisms, methods, and tools of regulation, supervision, and control, refinancing and capitalization systems, capital protection, a credit model, methods for assessing the creditworthiness of borrowers, risk management, etc.
	<i>Budgetary:</i> budget procedures, budget planning, and control, budget (payment) discipline, etc.
	<i>Tax:</i> financial discipline, methods of tax control, the structure of fiscal control, protection of property rights, etc.
	<i>Currency:</i> a currency strategy, the nature and model of exchange rate policy, foreign exchange control and stabilization mechanisms, foreign exchange risk management, etc.

Note: the table is compiled based on the expert survey.

According to certain factors, we tried to reveal their specific manifestation in the digital economy through the qualitative characteristics of digital technology and financial innovations concerning expectations and impacts on financial security.

Financial and credit security: The most significant financial and credit innovation based on digital blockchain technology is cryptocurrency. Regulators aim at introducing restrictions and minimizing risks that can affect financial and credit security: 1) the introduction of foreign financial institutions and, consequently, increased competition and loss of market share by national financial institutions; 2) leveling the state monopoly on the money supply; 3) reducing the seigniorage of central banks; 4) a decrease in demand for a national currency and its further depreciation; 5) the impossibility of implementing an effective monetary policy since a significant part of the money will be uncontrolled; 6) a decrease in the influence or disappearance of financial intermediaries, etc. [13]

Despite everything, banks believe that potential opportunities outweigh possible risks. In early 2020, the European banks were able to provide services concerning cryptocurrencies in conformity with the FATF requirements. Almost 40 German banks plan to use this permission since cryptocurrencies were recognized as a financial instrument with the status of "private money" for clearing operations in 2013. In 2018, they began to be considered means of payment [14].

Considering these facts and modern technological trends, central banks of many countries (the EU, the USA, Japan, China, Canada, Sweden, Norway, Turkey, the UAE, etc. – almost 70% of central banks in total) have initiated projects to create central bank digital currencies (CBDC).

According to the experts, it is significant to consider other motives for making such a decision. In particular, such objectives differ in various countries. For example, it might be the desire to overcome hyperinflation, restore confidence in a national currency, switch to non-cash payments and thus reduce manufacturing cost and cash control, eliminate the shadow sector of the economy, protect the tax system from the impact of illegal offshores, or fight against the laundering of dirty funds and the financing of terrorism. It is assumed that CBDCs will be built over blockchain technology. Therefore, they can be regarded as a new type of cryptocurrency, whose issuer is the Central Bank of any state. This will allow supplementing (expanding) the form of fiat currency, maintaining confidence in paper money, increasing efficiency, control, transparency, security, and stability, strengthening its position, and minimizing the above-mentioned risks in the conditions of the digital economy.

In the absence of centralized legal regulation, regulators incline to create regulatory sandboxes, as well as to interact with and support self-regulatory organizations [15].

Currency security: According to the experts, risks of the traditional international monetary system under the influence of cryptocurrency are as follows: a radical change in the concept of money and leveling the circulation of traditional money, the transformation of international monetary and financial relations, and "de-dollarization" of world currency markets, increased disintermediation in currency markets and pressure on most traditional financial intermediaries, international lending and investment attraction.

As an argument, we need to cite the opinion of M. Carney, the Governor of the Bank of England. His idea was to create a network of national digital currencies to form and support a "synthetic hegemonic currency" (SHC). To justify the relevance of national and global cryptocurrencies, Carney referred to "dangerous imbalances caused by the dependence of the current system on the US dollar as a world reserve currency" and the need to stabilize the international financial system exhausted by trade and currency wars [16]. The Bank of England was the first to take advantage of blockchain technology and develop a centralized digital cryptocurrency RSCoin.

In response to these and other imbalances, not only central banks but also FinTech companies understand the need to adopt cryptocurrency at the system level. Naturally, the US government perceives it as a threat to their national security and the loss of the dollar's status as an international reserve currency. Therefore, Facebook's announcement of Libra cryptocurrency was met with active pressure and opposition from the US Government. Telegram received the same reaction, namely, the ban on the issuance of Gram cryptocurrency and the end of ICO, when \$1.7 billion had already been raised [17]. Thus, countries of the world realized that cryptocurrencies could become an alternative to national currencies. The traditional international monetary system is likely to experience the transformation of global reserve currencies due to the issuance of private money and sovereign cryptocurrencies of central banks, which does not exclude the need for any global reserve currency.

One can also expect changes at the level of international settlements since the traditional financial ecosystem is based on their infrastructure and SWIFT plays a significant role in their functioning. For instance, Bank Frick (Liechtenstein) replaced the SWIFT system with USDC based on digital stablecoins, i.e. a type of cryptocurrency that has minimum volatility (the cryptocurrency is pegged against the US dollar and maintains a 1-to-1 ratio with the US dollar in terms of value). Bank Frick has become one of the leading European blockchain banks that provides cryptocurrency and custody services to institutional clients and miners and speeds up payment processing [18].

Another risk for currency markets associated with cryptocurrency relates to international lending and investment attraction, whose mechanisms will be transformed due to the spread of crowdfunding and ICO technologies, which helps to generate considerable financial resources. We need to mention Malta's approaches to creating infrastructure, defining the regulatory regime and rules for controlling digital financial assets, conducting ICOs, and attracting investments [19].

Budgetary security: The level of budgetary security and the stability of the budgetary system determine a country's financial sovereignty, which is extremely important due to growing internal imbalances and external threats.

The imperfection of budgetary policy and the budgetary mechanism is reflected in budgetary relations comprising financial resources of some state, their mobilization, and distribution. In addition to other factors, this causes certain risks and threats to budgetary security. A modern challenge for

budgetary security is the use of cryptocurrencies and digital technologies for the shadow economy and the financing of terrorism. Using new technologies, they developed models of forming and moving illegal financial flows, converting fiat money into digital assets, withdrawing illegal capital, and leveling all counter-measures of state bodies and international organizations [20].

Since cryptocurrency has not a clear legal status and is used as a means of payment outside traditional financial channels, it does not come under the control of cash flows and taxation. Therefore, the taxable base decreases and the budget does not receive the full amount of tax revenues, which is crucial due to the capitalization of cryptocurrency markets. Regardless of any risks, there are many investments in cryptocurrency aimed at obtaining super-profits due to the high rate of the latter. This approach leads to a decrease in traditional savings and reduces the resource base of financial intermediaries, which limits the possibilities of the traditional mechanism to transform savings into investments. The increased turnover of cryptocurrencies in business processes will reduce the existing demand for national currencies. As it is possible to obtain financial resources on crowdfunding platforms, financial intermediaries will lose much of their income earned on deposit, settlement, and credit services. The budget will not receive money from such internal sources as central bank revenues generated by seigniorage and operating income. This change will limit the government's lending opportunities and negatively affect the country's financial security.

Tax security: From the viewpoint of tax security, cryptocurrency is understood as a component of financial security. Being characterized by such features as anonymity, confidentiality, efficiency, cross-border nature, and mobility of transactions, it contributes to the growth of tax evasion, becomes an offshore analog, and undermines the taxable base. Such a challenge requests a new practice, for example, the joint efforts of the tax authorities from the USA, Australia, the UK, Canada, and the Netherlands to investigate tax avoidance schemes using cryptocurrency [21]. Today, we can state that various approaches to the taxation of cryptocurrency have been developed, which is directly related to its unambiguous legal status. Taxation is being implemented for miners, crypto-traders, and consumers of crypto-assets (the USA, Germany, Canada, India, Singapore, South Korea, etc.) [22].

According to the experts, institutional and organizational factors also require special attention to neutralize the possible threats to tax security. In particular, one of the respondents stated, "It is necessary to transform national tax systems and tax laws, develop new approaches to tax control and improve financial discipline in the digital economy".

The potential of digital technologies to ensure financial security: While analyzing the essence and capability of other digital technologies (Big Data, artificial intelligence, machine learning, blockchain) and the related financial innovations, the experts noted that they have positive

opportunities for creating tools overcoming threats to financial security.

Big Data technologies allow monitoring the state of the economy in real-time and measure inflation according to certain indicators (for example, relying on prices in online stores, dynamics of the labor market, real estate, business expectations, etc.). This improves the quality of analysis and forecasting, promptly determines problems, and ensures greater flexibility and resilience of monetary policy. Big Data technologies are useful in managing currency reserves, determining their optimal amount, forecasting foreign exchange risks, and ensuring the stability of national currencies. At the level of a financial intermediary, Big Data technologies are important for determining the client's solvency, identifying the main transaction channels, segmenting and personalizing the offer of products and services, managing financial resources and credit debts, assessing risks and crisis management, fulfilling legal requirements and reporting, etc.

Large amounts of data require modern methods, including AI and machine learning technologies, to turn them into knowledge. Currently, central banks use AI and machine learning technologies in the following ways: 1) the improvement of forecasting and analytical tools; 2) the market research of central bank transparency and behavioral trends; 3) asset management, i.e. determining dynamic changes in exchange rates and prices for securities and precious metals to develop trading models and track the market reaction to the interest rates established by central banks; 4) market analysis, i.e. identifying changes in asset prices to develop strategies for their distribution and ensure a risk-return balance; 5) the management of public securities, i.e. identifying dynamic changes in trading models; 6) risk management, i.e. assessing financial stability; 7) user support through chatbots, etc.

Commercial banks and other market participants should comprehend the statements issued by central banks as signs of their future policy. In 2019, the Nordea Research powerhouse developed Hawk-o-Meter, an AI-based tool for predicting the monetary policy of the Federal Reserve System, the European Central Bank, the Bank of England, and the Bank of Sweden to increase/decrease interest rates. This forecast was posted on Twitter and Bloomberg [23].

An example of digital technologies in taxation is Salesforce's AI Economist project that simulates an ideal tax system [24]. Moreover, these technologies can improve the efficiency of tax revenues, counteract abuse and violations, predict and calculate the taxable base more precisely, strengthen the internal control and audit of taxation, expand electronic services for taxpayers, etc.

Conclusion

In the digital economy, changes in the functioning of financial systems consist in the gradual transfer of payment transactions to an electronic form, the emergence of new means of payment, and the latest payment tools and systems. Many of the expected innovations are debatable from the viewpoint of legal regulation and practical use. In particular, virtual currency or

cryptocurrency (the so-called electronic money) attracts attention from central banks and international financial institutions.

Summarizing the above-mentioned, we can conclude that there are certain threats to the circulation of cryptocurrencies in the financial systems of various countries, which consist in ousting real national currencies, distorting interest rate policy, changes in monetary aggregates, and capital flight. Along with this, there are promising opportunities for introducing digital technology into the functioning of national financial systems, which will help them increase the safety and efficiency of financial transactions.

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